

# Polygon Editing Tool

Instruction Manual



KONICA MINOLTA

## ■ Safety Symbols

The following symbols are used in this manual to prevent accidents which may occur as result of incorrect use of the instrument.

	Denotes a sentence regarding safety warning or note. Read the sentence carefully to ensure safe and correct use.
	Denotes a prohibited operation. The operation must never be performed.
	Denotes an instruction. The instruction must be strictly adhered to.
	Denotes a sentence regarding safety precaution for laser. Read the sentence carefully to ensure safe and correct use.

## ■ Notes on this Manual

- The VI-9i, VI-910, VI-900, VI-700, VI-300 are model names for Europe and VIVID 9i, VIVID 910, VIVID 900, VIVID 700, VIVID 300 are model names for other countries. The VIVID (VI) series digitizer includes VIVID 9i (VI-9i), VIVID 910 (VI-910), VIVID 900 (VI-900), VIVID 700 (VI-700) and VIVID 300 (VI-300).
- In this manual, VIVID(VI) Series digitizer is also renamed to as “VIVID digitizer” or simply “VIVID”.
- Copying or reproduction of all or any part of the contents of this manual without KONICA MINOLTA SENSING’s permission is strictly prohibited.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact a KONICA MINOLTA SENSING authorized service facility.
- KONICA MINOLTA SENSING will not accept any responsibility for consequences arising from the use of the instrument.

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- Other product names and company names used herein are trademarks or registered trademarks of their respective owners.

## ■ Official names for application mentioned in this manual

Name given in this manual	Official name
Windows	Microsoft® Windows®
Windows XP	Microsoft® Windows® XP Professional Operating System
Windows Vista	Microsoft® Windows® Vista Business Operating System
Windows 7	Microsoft® Windows® 7 Professional Operating System

## ■ About This Manual and Related Documents

This manual explains how to install and operate the Polygon Editing Tool software as well as explaining all the functions it provides.

The Polygon Editing Tool software is designed to control “VIVID Series” non-contact 3D digitizers, convert scan data into polygons, edit data and convert VIVID data to universal data formats.

The following is a list of manuals related to this one.

Document	Content
Polygon Editing Tool Basic Operation Guide	Explains the basic operations of the Polygon Editing Tool software.

Instruction manual for each model in the VIVID series of non-contact 3D digitizers	VIVID digitizers offers rapid, high-precision 3D scanning ideal for imaging of industrial products in a wide range of shapes and configurations. This manual describes the digitizer's features and operating procedures, and calls attention to relevant precautions.
Photogrammetry System PSC-1 Instruction Manual	Explains the PSC-1 system, a high-precision alignment system based on photographic measurement technology. This system is for use in the VIVID 9i only.
Bench Top Frame Set Instruction Manual	This manual explains how to set up the Bench Top Frame Set, which offers more stable measurements both horizontally and vertically, and how to attach the VIVID 910(VI-910) or VIVID 900(VI-900) to the set. This frame set is for use with VIVID 910(VI-910) or VIVID 900(VI-900) only.

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## Safety Precautions

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When using this software, the following points must be strictly observed to ensure correct and safe use. After you have read this manual, keep it in a safe place so that it can be referred to easily whenever it is needed.

	<b>WARNING</b>	Failure to adhere to the following points may result in death or serious injury
	To ensure correct and safe use of this software, please read the instruction manuals of the VIVID (VI) series digitizer and personal computer in addition to this manual before operating. Incorrect operation of the software may result in fire or electric shock.	

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## Software Restrictions

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- Copying or reproduction of all or any part of the contents of this software and manual without KONICA MINOLTA SENSING's permission is strictly prohibited.
- The specifications of the software are subject to change without prior notice.
- KONICA MINOLTA SENSING will not take any responsibility for damage caused as result of use of this software.

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## Notes On Use

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- When inserting a CD-ROM into the CD-ROM drive, make sure that it is placed straight in the right direction, and inserted gently.
- Keep the CD-ROM clean. If it becomes dirty, a reading or writing error may result.
- Pay attention to rapid temperature changes and dew condensation.
- Keep the CD-ROM away from direct sunlight or heaters.
- Do not let the CD-ROM drop or be exposed to strong shocks.
- Keep the CD-ROM away from water, alcohol, thinner etc.

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## Notes On Storage

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- Do not store the CD-ROM in a hot area, for instance, in direct sunlight or near heaters.

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**Chapter 3**

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# Conventions for Command Reference (Chapter 2)

Chapter 2 “Command Reference” (from page 21) gives an explanation of the function and operating procedure of each command in the menu order.

The shortcut key and the icon (displayed on the tool bar) are also shown in the command title.

We recommend that you make extensive use of shortcut keys when running this software. Note that while software keys indicated in the command reference are effective by default, you are free to add new shortcuts and to customize the existing ones.

*[Ref.] For information about using and customizing shortcut keys, see page 242.*

**Command icon**

**Mouse functions**

Command name	Description of the command	Shortcut key
	<p><b>View – Zoom</b> Enlarging/Reducing the Displayed Item</p>	<p><b>[Z] (Effective while held down)</b></p>

This command is used to enlarge (zoom-in) or reduce (zoom-out) the displayed item, or to move the camera to change the view angle.

*[Ref.] For a description of camera position, refer to the View – Camera Settings command (page 155).*

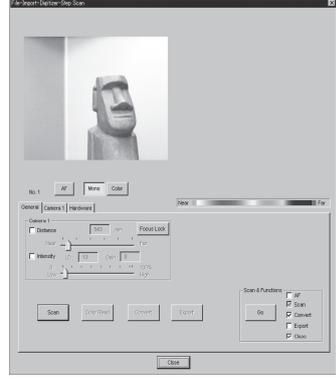
**Notes**  
View – Zoom mode will be active when this command is selected. To cancel the View – Zoom mode, execute the View – Zoom command again. However, if you are executing this command using the shortcut key, the View – Zoom mode can be canceled by releasing the key.

 Left : zoom-in, zoom-out  
 Middle ([Shift] + Left) : –  
 Right : Drags the camera.

**Operating Procedure**

- 1** From the [File] menu, select [Import], [Digitizer] and then [Step Scan].  
The [File-Import-Digitizer-Step Scan] dialog box will appear.
- 2** Place the object on the rotating stage.
- 3** To display the object in the middle of the window, change the position of the object or move the VIVID 900/910 back and forth to change the view angle.

- The monochrome monitor image currently captured by the VIVID 900/910 will appear in the Image area of the dialog box.



*[Memo]*  
If necessary, replace the lens attached to the VIVID 900/910.

**Chapter and Menu entry**

**In Chapter 2, it shows the model name.**

**The left column shows detailed explanations of each step.**

**The right column shows the outline of the procedure.**

\* This sample page is for explanatory purposes. Actual pages will be different.

# Chapter 1

# F o r w a r d

Chapter 1 explains the preparations for using Polygon EditingTool. The method for uninstalling the software from the computer is also explained.

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# Preparations

## 1) Introduction of Operating Conditions

The following hardware environment is required to run this software.

<b>Hardware</b>	PC/AT compatible
<b>CPU</b>	Piuentm 4 or higher recommended (only Intel)
<b>Main memory</b>	1024 MB or more (2048 MB or more recommended)
<b>HDD</b>	15 MB free space is required to install this software.
<b>Applicable OS</b>	Windows XP Professional SP2 (32 bit) Windows XP Professional x64 Edition SP2 (64 bit) Windows Vista Business Edition SP2 (32 bit) Windows Vista Business x64 Edition SP2 (64 bit) Windows 7 Professional (32 bit) Windows 7 Professional (64 bit) * This software runs as the 32 bit application software on the 64 bit OS.
<b>Graphic</b>	A graphic board that supports Open GL and enables 16-bit color display with a resolution of 1024 by 768 pixels or higher is required.
<b>Interface</b>	USB port for the protect key SCSI port for VIVID control * Adaptec SCSI interface board and ASPI layer (Ver. 4.70 or higher) must be installed. * When Windows Vista or Windows 7 is used, the RATOC Systems Inc.'s USB2.0-UltraSCSI converter U2SCX must be used.
<b>Other</b>	A CD-ROM drive is required to install the software.

**Note**

*To install and use this software, a login must be made by a user who has Administrator authority.*

## 2) Connecting the protect key to the computer

When using Polygon Editing Tool, it is necessary to attach the protect key and install the protect key (HASP) driver to the computer before installing Polygon Editing Tool.

Attach the protect key to the computer correctly according to the following procedure.

**Memo**

The installation procedure is also given in the “README\_E.txt” file in the “Polygon Editing Tool” directory of the software’s CD-ROM.

### ■ Installing the protect key driver software (HASP driver) on the computer

In order for the protect key to be recognized by the corresponding driver software, it is necessary to install the driver software on the computer before connecting the protect key to the computer.

#### Operating Procedure

- 1 Start Windows and insert the software CD-ROM into the CD-ROM drive.

- 
- 2 From Explorer, execute the “HASPUser-Setup.exe” file stored in the CD-ROM.

The driver setup program will start.

- 
- 3 Follow the instructions displayed on the screen to complete installation.

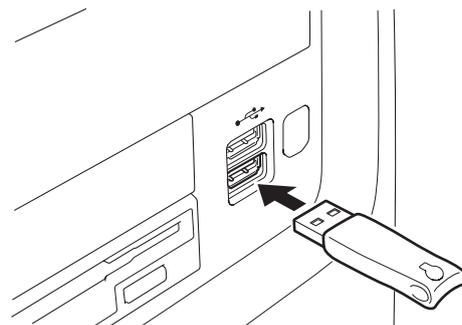
The protect key driver will be installed.

### ■ Connecting the protect key

Connect the protect key to the USB port of the computer.

\* Insert the protect key into the computer’s USB port straightly and carefully.

- 
- 1 Connect the protect key to the computer’s USB port.



## 3) Installing the ASPI driver software to the computer

The software uses SCSI as the interface connecting the VIVID and the computer.

For the computer to recognize VIVID correctly, it is necessary to install the ASPI driver software on the computer.

\* Even if the VIVID will not be connected to the computer, it is still necessary to install the ASPI driver.

### Note

When Windows Vista or Windows 7 is used, it is necessary to install the driver software of the RATO Systems Inc.'s USB2.0-UltraSCSI converter U2SCX on the computer. Be careful not to install the Adaptec ASPI driver software, because it cannot control the VIVID digitizer.

To install the USB2.0-UltraSCSI converter driver software, refer to "About installation of U2SCX" below.

### Operating Procedure

**1 Start up Windows, and set the Polygon Editing Tool CD-ROM into the computer's CD-ROM drive.**

**2 Using Explorer, access the CD-ROM drive and double-click on "aspi\_v\*\*\*.exe".**

#### Memo

The "aspi\_v.exe" file stores the driver and installation software in self-compressed form. Double-clicking on "aspi\_v.exe" causes the file to automatically decompress into multiple files.

**3 Proceed to install the driver as described below.**

#### Memo

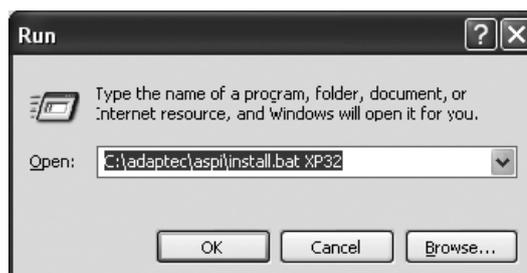
About the details of installation, refer to the decompressed "Readme.txt" file.

**4 Double-click on the decompressed "ASPIINST.EXE" file.**

The driver install program starts up.

#### Memo

If you use Windows XP, select [Run] from the [Start] menu, and then run the decompressed "INSTALL.BAT" file added "XP32" parameter as following dialog. The install program starts to install.



**5 Follow the instructions on the screen to complete the installation.**

The install program installs the ASPI driver.

## About installation of U2SCX

It is necessary to install Polygon Editing Tool on the computer before installing the driver software of the USB2.0-UltraSCSI converter.

### Operating Procedure

**1 Start Windows and insert the software CD-ROM into the CD-ROM drive.**

**2 From Explorer, open the "U2SCX for Vista" (when using Windows Vista) or "U2SCX for Win7" (when using Windows 7) directory in the CD-ROM.**

**3 Proceed to install the driver as described on "Installation of Emulation Driver" in U2SCX\_InstallGuide.**

# 4) Installing Polygon Editing Tool on the computer

When installing the software, make sure to install it correctly according to the following procedure.

### Memo

It is necessary to connect the protect key to the computer correctly before installing the software.

If the protect key has not yet been connected, connect the protect key to the computer according to the procedure on page 9.

## Operating Procedure

- 1 Start Windows and insert the software CD-ROM into the CD-ROM drive.

- 2 From Explorer, execute the "setup.exe" file stored in the CD-ROM.

The setup program will start.

Below are display examples when Windows Vista is used.



- 3 Click the [NEXT] button.

A dialog asking whether you agree with the program agreement will appear.

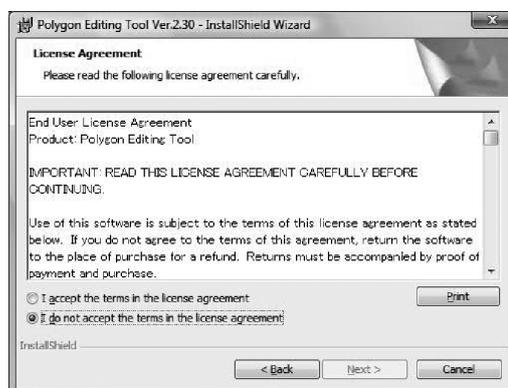
### Note

Read it thoroughly and select whether you agree or not.

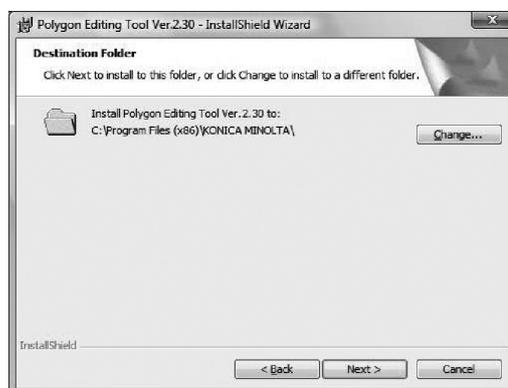
If you agree, proceed to step 4.

If you do not agree, the software cannot be installed.

Click the [Cancel] button to cancel installation.

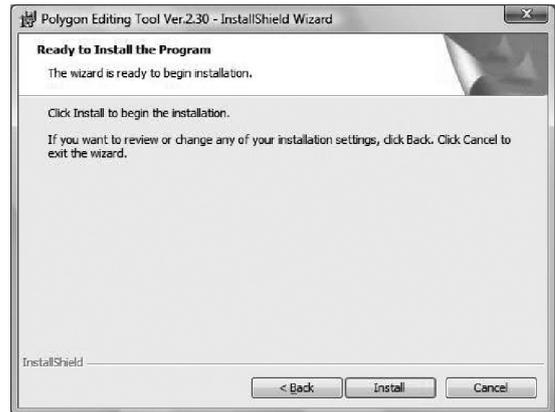


- 4 Select [ I accept the terms in the license agreement. ] and click the [NEXT] button.



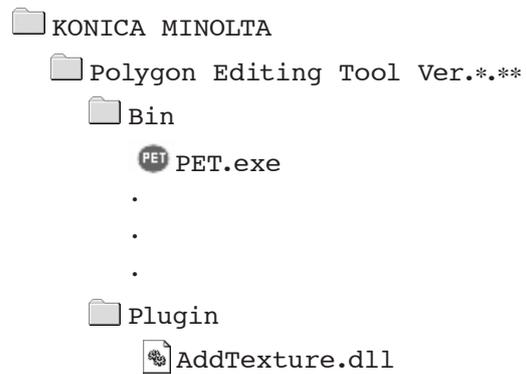
**Memo** If you want to install the software in another directory, click the [Change...] button and select the desired directory. If you do not specify another directory, the software will be installed in "C:\Program Files (x86)\KONICA MINOLTA" in case of a 64-bit OS or "C:\Program Files\KONICA MINOLTA" in case of a 32-bit OS.

**5** Click the [NEXT] button and click the [Install] button.



**6** Follow the instructions displayed on the screen to complete installation.

The Polygon Editing Tool will be installed. When installation is completed successfully, the following files will be created in the directory where the software has been installed.



**Memo**

The files that will be created will change according to the selected installation type.

**Memo**

When the application software runs for the first time, the “.KONICA MINOLTA\Polygon Editing Tool Ver.\*.\*\*\Model” folder will be created in My Documents.

## 5) Connecting the VIVID digitizer to the computer

When the VIVID digitizer will be controlled from Polygon Editing Tool, connect the VIVID digitizer to the computer first, and then start up Polygon Editing Tool.

The first time the VIVID digitizer is connected to the computer, it is necessary for the computer to recognize the VIVID digitizer as an external device.

Perform operations according to the following procedure.

### ■ Connecting the VIVID digitizer to the computer

In order for the protect key to be recognized by the corresponding driver software, it is necessary to install the driver software on the computer before connecting the protect key to the computer.

#### Operating Procedure

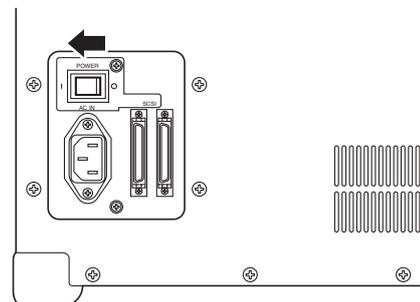
- 1 Turn the **POWER** switch of the computer **OFF**.

- 2 Connect the **VIVID digitizer to the computer**.

**Memo**

For details on how to connect the VIVID digitizer to the computer, refer to the instruction manual of each model of the VIVID digitizer.

- 3 Set the **POWER** switch of the **VIVID digitizer to ON** (set switch to "I" mark).  
Initializing of the digitizer will start.



- 4 After **MENU** appears in the finder of the digitizer, switch on the computer to start the Windows operating system.

**Note**

The **POWER** switch of the digitizer should be set to **ON** first before switching on the computer.

# ■ Recognition of the VIVID digitizer by the computer

The first time the VIVID digitizer is connected to the computer, cause the computer to recognize the VIVID digitizer as an external device by following the procedure below.

**Note**

*It is not necessary to install the device driver of the VIVID digitizer on the computer; however, Polygon Editing Tool cannot control the digitizer until recognition has been completed.*

## Operating Procedure

- 1** After connecting the digitizer to the computer, switch on the computer. The digitizer will be recognized by the computer as a new external device, and then the Hardware Wizard will start.

- 2** A dialog confirming whether or not to connect to Windows Update will appear first. Check the “No, not this time” checkbox and then click “Next”.



- 3** When a dialog for confirming the driver installation method appears, check the “Install from a list or specific location (Advanced)” checkbox and then click “Next”.



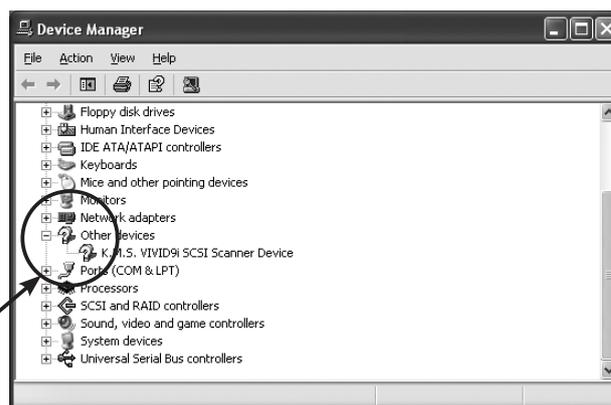
- 4** When a dialog for specifying the desired driver search method appears, check the “Search for the best driver in these locations.” radio button, clear any other checkbox for specifying the location, and then click “Next”.



- 5** If a dialog with the message “Cannot Install this Hardware” appears, check the “Don’t prompt me again to install this software.” checkbox and then click “Finish”.



- 6** Start the device manager to confirm whether or not the VIVID digitizer has been properly recognized by the computer.
- Right-click the “My Computer” icon and select “Properties” in the popup menu. When the “System” dialog appears, click “Device Manager” in the “Hardware” tab.
- Alternately, open the “Control Panel” from the “Start” menu, double-click the “System” icon to display the “System Properties” dialog, and then click “Device Manager” in the “Hardware” tab.
- If the name showing the VIVID digitizer such as “VIVID XXX Scanner Device” appears in the “Other devices” section, recognition of the digitizer has been completed.



**Memo**

! marks may be displayed on the device icon. This is not a problem.

# Regarding the software

## 1) Starting and Quitting the Software

### ■ Starting the Software

#### Operating Procedure

- 1 From the [Start] menu, select [Program] –[KONICA MINOLTA], and then click [Polygon Editing Tool Ver.\*.\*].

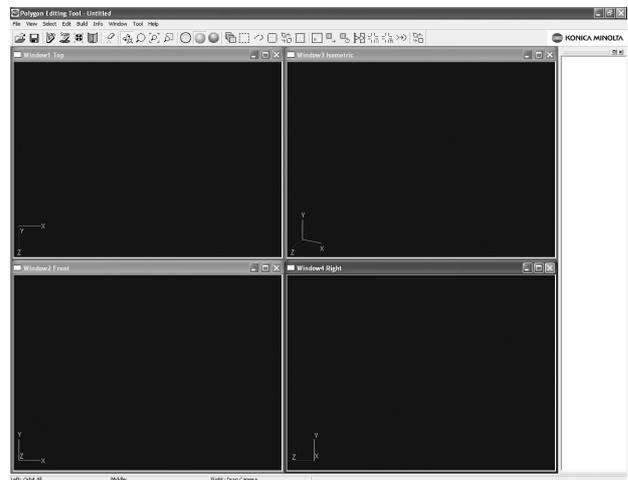
The Polygon Editing Tool will start.

- If a scene file with the name “startup.scn” currently exists in the directory named “Polygon Editing Tool Ver.\*.\*” Model”, the program will automatically load this file as it starts up.

#### Note

When Windows Vista is used and the user account control is available, the [User Account Control] dialog box will appear. Click the [Continue] button.

When Windows 7 is used and UAC (User Account Control) is set to other than “Never notify”, the [User Account Control] dialog box will appear. Click the [Yes] button.

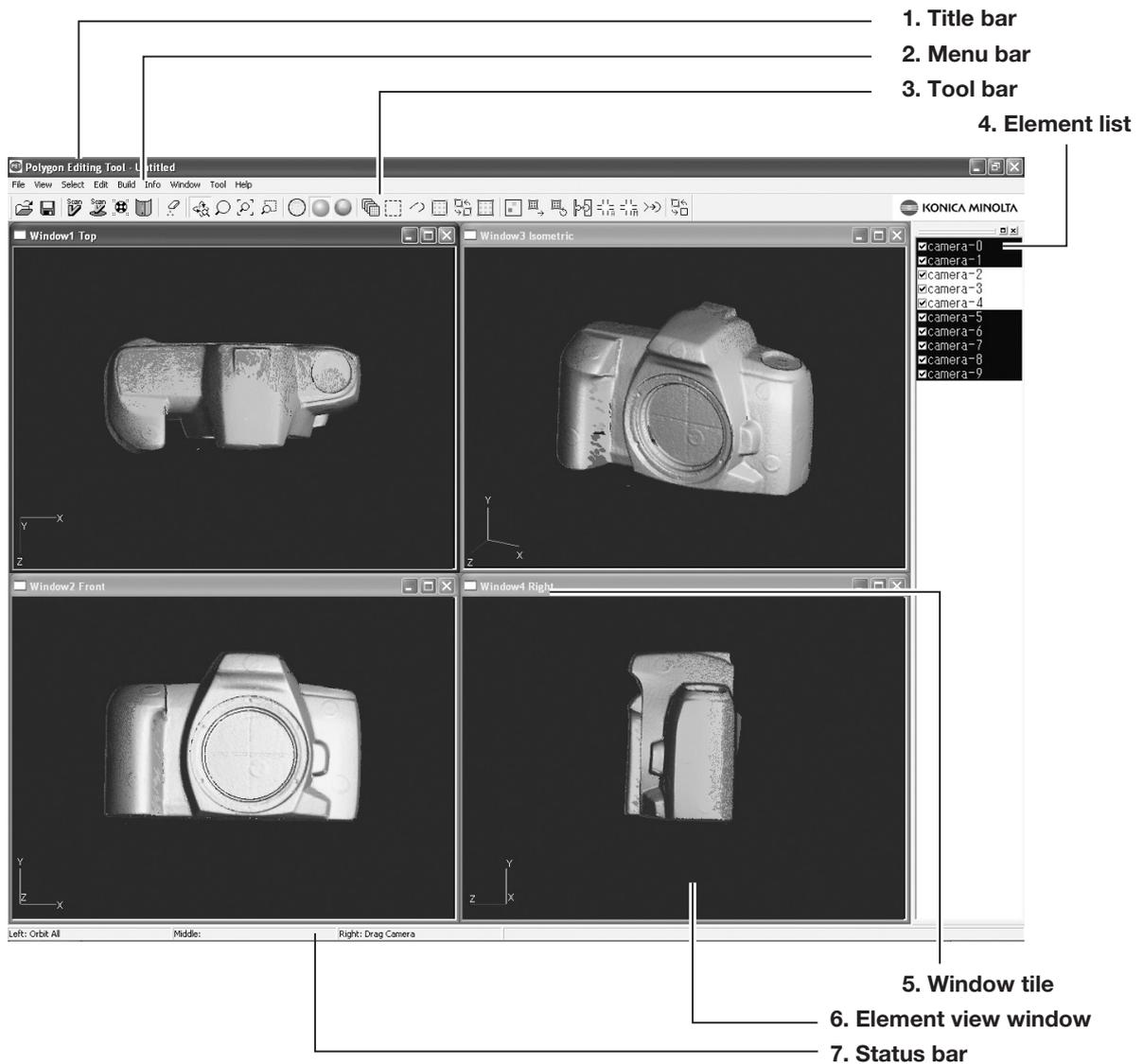


### ■ Quitting the Software

#### Operating Procedure

- 1 Click [Exit] on the [File] menu.  
The software will be exited.

## 2) Main Window



1. Title bar..... Displays the file name of the currently displayed image data.
2. Menu bar..... Used to select various functions of this software.
3. Tool bar ..... Displays the icons of the frequently used commands. Clicking an icon will execute the corresponding command.
4. Element list ..... Displays the names of all the elements currently opened by this software. Highlighted elements mean that they have been selected by an operation (e.g. by a menu). To select/unselect an element, just click its name.  
If you place a checkmark next to an element name, the element will appear in the Element view window. To toggle the display of all selected elements on or off, press the space bar or the [Ctrl] key.
5. Window title ..... Indicates the orientation of the image shown in the window. It is possible to open two or more windows having the same orientation. In the Isometric or Perspective window, the image can be rotated in different directions using the [Orbit], [Camera Settings] commands of the [View] menu.
6. Element view window ..... Displays the elements whose corresponding checkboxes are checked (i.e. a check mark is displayed).
7. Status bar..... Displays the function of each button of the mouse according to the currently selected command. (The functions vary with the currently selected command.)

## ■ Toolbar Icons

Icon	Command	Description	Reference Page
	File – Open	Open an element file or scene file.	24
	File – Save – Elements	Saves element data.	26
	File – Import – Digitizer – One Scan	Reads in the data from a 1-shot scan by the digitizer.	33, 50, 74, 103, 118
	File – Import – Digitizer – Step Scan	Reads in the data from a step-shot scan by the digitizer.	41, 58, 79, 106, 121
	File – Import – Digitizer – PSC-1	Performing Precision Registration of Scan Data * for VIVID 9i only; Additional license is required.	136
	File – Import – Digitizer – Easy Align	Aligns multiple scans taken by the digitizer.	126
	Edit – Delete – Points	Deletes a point(s) selected for the currently displayed element.	170
	View – Orbit	Rotating / moving the camera position	148
	View – Zoom	Enlarges/reduces the window.	149
	View – Full Frame All	Fully frames the element in the window.	150
	View – Area Zoom	Enlarges/reduces the selected area.	152
	Wireframe (Window – Property)	Displays the wireframe.	230
	Shading (Window – Property)	Displays the image in shading mode.	230
	Texture (Window – Property)	Texture-maps the image.	230
	Select – Select Front	Selects a group of polygon points that are at the front and visible.	166
	Select – Rectangle	Selecting points within the specified rectangle area.	159
	Select – Bezier	Selecting points within the specified Bezier curve.	160
	Select – Unselect by Element	Unselects all the points inside the element.	166
	Select – Toggle Points	Reverses the selection state of the points.	165
	Select – Boundary – Elements	Select the points on the boundary of the element.	162
	Build – Registration – Initial – Manual	Performs initial registration of the specified corresponding points of elements.	182
	Build – Move – Elements	Moves the currently selected elements.	189
	Build – Rotate – Elements	Rotates the elements.	198
	Build – Merge	Merges elements to form one element.	200
	Build – Fill Holes – Auto	Fills holes in the element automatically.	202
	Build – Fill Holes – Manual	Creates polygon data for the specified points to fill holes in the element.	201
	Build – Smooth – Points	Smoothens the boundary of the specified points.	205
	Show Vertex/Hide Vertex	Showing or Hiding Vertices	244

# Uninstalling

## 1) Uninstalling the Polygon Editing Tool

To uninstall the software, use the standard uninstall program of Windows.

*Remarks*

*The software will be deleted one folder at a time. If you have a file(s) you want to keep, copy it to another folder before starting uninstallation.*

### Operating Procedure

- 1** From the [Start] menu, select [Setting] and then click [Control Panel].

The [Control Panel] window will appear.

- 
- 2** Double-click the “Add/Remove” icon, select “Polygon Editing Tool” from the list that appears, and then click the [Add/Remove] button.

The uninstall program will start.

- 
- 3** Follow the instructions displayed on the screen to complete uninstallation.

## 2) Uninstalling the Protect Key Driver

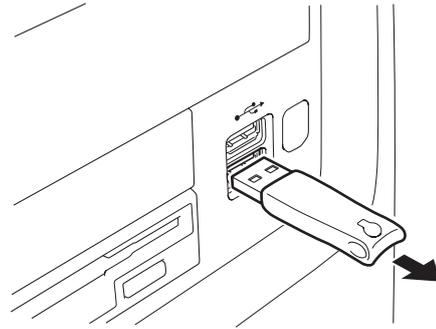
To uninstall the protect key driver, use the standard uninstall program of Windows.

**Memo**

Before uninstalling the protect key driver, make sure that the protect key is removed from the computer.

### Operating Procedure

- 1 Remove the protect key from the computer's USB port.**



- 2 From the [Start] menu, select [Setting] and then click [Control Panel].**

The [Control Panel] window will appear.

- 3 Double-click the "Add/Remove" icon, select "HASP Device Driver" from the list that appears, and then click the [Change/Remove] button.**

The uninstall program will start.



- 4 Follow the instructions displayed on the screen to complete uninstallation.**

The protect key driver will be uninstalled.

**Memo**

After the protect key driver has been uninstalled, restart the computer.

# Chapter 2

## Command Reference

Chapter 2 explains the functions of Polygon Editing Tool, using as keywords the commands that can be selected from the menus of the main window and/or icons of the toolbar.

In addition, the scanning procedure for storing 3-dimensional data by controlling the digitizer from Polygon Editing Tool is also explained.



# File Menu

New .....	24
Open .....	24
Save – Elements .....	26
Save – Scene .....	27
Save as – Elements .....	28
Save as – Scene .....	29
Import – Elements .....	30
Import – Digitizer – One Scan	
• When VIVID 9i is Selected .....	33
• When VIVID 910 is Selected.....	50
• When VIVID 900/910 is Selected .....	74
• When VIVID 700 is Selected.....	103
• When VIVID 300 is Selected.....	118
Import – Digitizer – Step Scan	
• When VIVID 9i is Selected .....	41
• When VIVID 910 is Selected.....	58
• When VIVID 900/910 is Selected .....	79
• When VIVID 700 is Selected.....	106
• When VIVID 300 is Selected.....	121
Import – Digitizer – PC Card	
• When VIVID 910 is Selected.....	67
• When VIVID 900/910 is Selected .....	96
• When VIVID 700 is Selected.....	111
Import – Digitizer – Easy Align .....	126
Import – Digitizer – Photogrammetry System PSC-1 .....	136
Export – Elements .....	137
Export – Images .....	140
Remove Elements .....	141
Preferences .....	142
Select Digitizer .....	144
Exit .....	145

**File – New****[Ctrl] + [N]**

Creating New Scene Data

This command is used to delete the current scene and open a new scene.

**Operating Procedure****1 Click [New] on the [File] menu.**

The current scene will be deleted and a new blank scene will be generated.

- If modifications have been made to an element after it has been imported or saved, the “Some elements are modified. Do you want to save them?” message dialog box will appear.



- To save the element data, click the [Yes] button.
- Clicking the [No] button will display the new scene without saving the element data.

**[Ref.]** For details of how to save elements, refer to the **File – Save – Elements** command (page 26).

**File – Open****[Ctrl] + [O]**

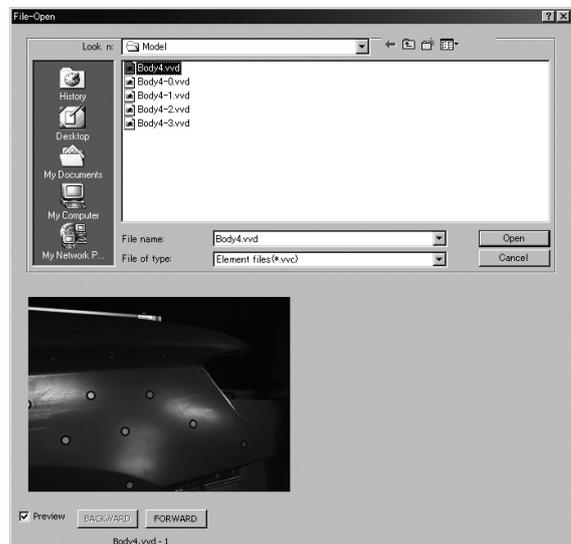
Opening Saved Data

This command is used to load an element file or scene file that has been saved using the **File – Save – Elements** command etc.

**Operating Procedure****1 Click [Open] on the [File] menu.**

The [File-Open] dialog box will appear.

- The dialog box shows a list of files. If all the files cannot be displayed on one page, a scroll bar will be displayed.



## 2 Select the file you want to load.

If you select an element file with an attached image and you have also checked the Preview box, the display area will show a preview image.

### Note

- *It is not possible to select files of different formats.*
- *In the case of scene files, only one file can be opened.*
- *It is not possible to open scene files which have been saved using the Utility Software VI-S1.*

- To display files of a certain format only, select the desired format from the [File of type] pull-down menu.

### Memo

In the case of element files, it is possible to select two or more files by clicking them while holding down the [Shift] or [Ctrl] key. If two or more files are selected, the preview image can be switched from one file to another using the [BACKWARD] and [FORWARD] buttons.

## 3 Click the [Open] button.

The data of the selected file(s) will be loaded and displayed in the element view window.

### When an element file is loaded:

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden.
- The names of the loaded elements will also appear in the element list, indicating that the elements have been selected (highlighted).

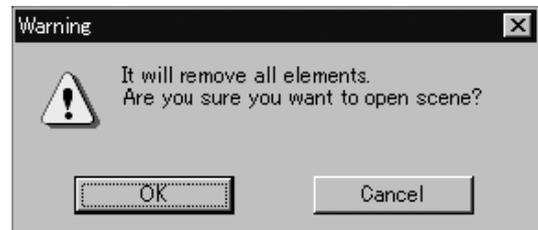
### When a scene file is loaded:

- The element list will show the names of the elements contained in the scene, and the view information of each element will be loaded. The state in effect when a scene file was saved can be restored. However, it cannot always be restored completely, for example, if elements in the file have been set not to be displayed.

- If an element has already been loaded, the Warning dialog box shown on the right will appear.

① Click the [OK] button.

All the elements that have already been loaded will be deleted, and the data of the scene file will be displayed.



### Memo

A clock icon will be displayed during loading.

Parameters for [File-Open] Dialog Box	
Look in	Select the folder containing the file to open.
File name	File name selected on the list is displayed.
File of type	Data format of the selected file is displayed.
Preview	If you check the Preview box, the [File - Open] dialog box will display preview images of those element files that have attached images.



This command is used to save the data selected in the element list. The data will be saved under the current element file name.

**Operating Procedure****1 From the element list, select the element(s) to be saved.***/Memo/*

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

**2 From the [File] menu, select [Save] and then click [Elements].**

The selected element data will be saved under the current file name.

- If the selected elements are newly created elements or those that are loaded in another file format, the same dialog box as the one that appears when the **File – Save as – Elements** command is selected will appear, displaying the element names in the order they are selected.
  - ① If you want to change the file name, change it and click the [Save] button.
- The first element will be saved, and a dialog box for the next element will appear.
- If you click the [Cancel] button, the next element and subsequent elements will not be saved.

***[Ref]** For details of the **File – Save as – Elements** command, refer to page 28.*

## File – Save – Scene

### Saving Scene Data

This command is used to save the current scene data under the current scene file name.

#### Operating Procedure

#### 1 From the [File] menu, select [Save] and then click [Scene].

The elements comprising the scene and its view information will be saved under the current scene file name.

- If the scene is one that has been newly created, the same dialog box as the one that appears when the **File – Save as – Scene** command is selected will appear.

① Enter the desired file name, and click the [Save] button.

The scene will be saved.

**[Ref.]** For details of the **File – Save as – Scene** command, refer to page 29.

**[Memo]**

If no elements are present, only the view information will be saved.

## File – Save as – Elements

### Saving Element Data under a Different Name

This command is used to save the data selected in the element list under a different file name.

#### Operating Procedure

**1 From the element list, select the element to be saved.**

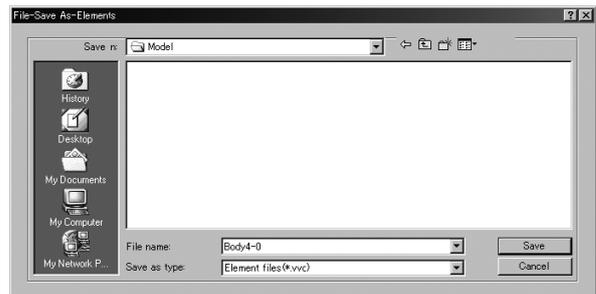
**Memo**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

**2 From the [File] menu, select [Save as] and then click [Elements].**

The [File-Save as-Elements] dialog box will appear.

- If two or more elements have been selected, their names will be displayed in the order they are displayed in the element list.



**3 If you want to change the file name, enter a new file name.**

**Note**

*The file name must consist of alphanumeric characters only.*

*Changing the file name will not cause the element names to change.*

**4 Click the [Save] button.**

The first element will be saved, and a dialog box for the next element will appear.

- When all the elements are saved, the dialog box will close.
- If you click the [Cancel] button, the next element and subsequent elements will not be saved.

**Memo**

By selecting “Element files Ver.1.x” from the [Save as type] pull-down menu, the elements can be saved under the format of the Utility Software VI-S1.

**Note**

*If the elements are saved under the format of the Utility Software VI-S1, data attached to the images may be lost.*

Parameters for [File-Save As-Elements] Dialog Box

Parameters for [File-Save As-Elements] Dialog Box	
Save in	Select the folder for saving file.
File name	Input the name of file to save.
Save as type	Select format for saving file.

## File – Save as – Scene

### Saving Scene Data under a Different Name

This command is used to save the current scene data under a different file name.

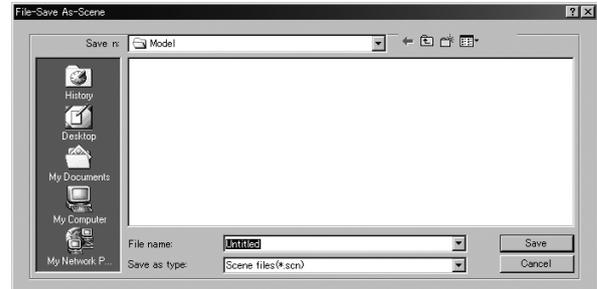
#### Operating Procedure

**1 From the [File] menu, select [Save as] and then click [Scene].**

The [File-Save as-Scene] dialog box will appear.

**2 Enter the desired file name, and click the [Save] button.**

The scene comprising the elements and its view information will be saved.



#### **Memo**

- If no elements are present, only the view information will be saved.
- If you want the scene file to start up automatically the next time you run the program, save it into the “Polygon Editing Tool Ver.\*.\*\*/Model” directory and give it the name “startup.scn”. When the program starts it will check for this file, and if the file exists it will automatically load it.

#### **Note**

- *The scene data can not be loaded using the Utility Software VI-S1.*
- *The file name must consist of alphanumeric characters only.*

Parameters for [File-Save As-Scene] Dialog Box

Save in	Select the folder for saving file.
File name	Input the name of file to save.
Save as type	Select format for saving file.

## File – Import – Elements

### Importing Scanned Data

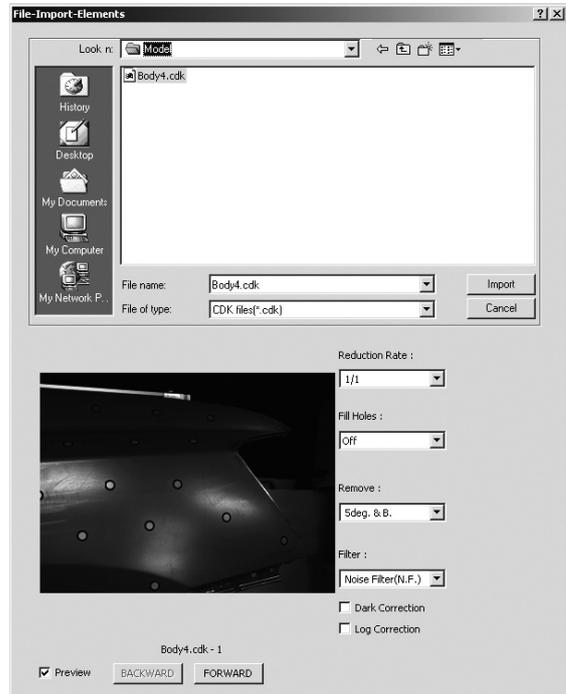
This command is used to import the raw scan data that was saved when the object was scanned by the VIVID (VI) series digitizer.

#### Operating Procedure

### 1 From the [File] menu, select [Import] and then click [Elements].

The [File-Import-Elements] dialog box will appear.

- The dialog box shows a list of files. If all the files cannot be displayed on one page, a scroll bar will be displayed.



### 2 From the [File of type] pull-down menu, select the format of importing data.

Item	Explanation
CAM (*.cam)	Scan data for VIVID 300 or 700
CDM (*.cdm)	Scan data for VIVID 900 or 910
CDK (*.cdk)	Scan data for VIVID 9i
STL (*.stl)	ASCII or Binary-type STL.

### 3 Select the file you want to import.

If you select an element file with the attached image and you have also checked the Preview box, the display area will show a preview image.

#### Note

- *It is not possible to select files of different formats.*
- *Although it is possible to import STL format data, no guarantee will be given if it contains illegal polygons.*

#### Memo

- If you select data files having two or more data, the [BACKWARD] and [FORWARD] buttons will be active, allowing you to display a preview image of each data.
- It is possible to select two or more files by clicking them while holding down the [Shift] or [Ctrl] key. If two or more files are selected, the preview image can be switched from one file to another using the [BACKWARD] and [FORWARD] buttons.

### 4 Set various parameters including reduce rate.

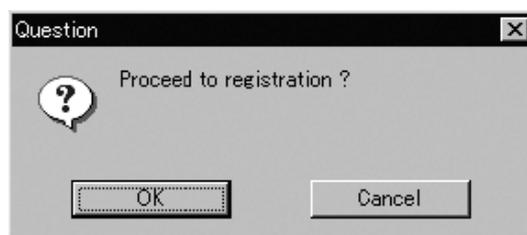
- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu. “Adaptive” is able to be selected when the CDK format is setting.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.

- When importing data, if you want to perform dark correction for color data, check the [Dark Correction] checkbox.
- When importing data, if you want to perform log correction for color data, check the [Log Correction] checkbox.

## 5 Click the [Import] button.

The data will be imported and displayed in the element view window. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden.
- In the case of data acquired using the **File – Import – Digitizer – Step Scan** command, each data will be subjected to registration when the file is opened, and then the resulting data will be displayed. A dialog box will also appear asking whether you want to perform fine-registration.
  - ① Click the [OK] button.  
Fine-registration will be performed.



### **Memo**

A progress bar will be displayed during loading.

Parameters for [File-Import-Elements] Dialog Box	
Look in	Select the folder containing the element file to import.
File name	File name selected on the list is displayed.
File of type	Data format of the selected file is displayed.
Reduction Rate	<p>Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”, “Adaptive”.</p> <p><b>Note</b>  <i>Selecting “Adaptive” reduces data adaptively. This option is displayed only if the CDK format is selected.</i></p>
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is On, the program will automatically generate points to fill in holes left by missing data.
Remove	<p>Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. &amp; B.”, “10deg. &amp; B.”, “15deg. &amp; B.”, or “20deg. &amp; B.”</p> <p>None: Removal is not carried out when importing the data.            Boundary (B.): The program removes boundary points.            5deg. &amp; B., 10deg. &amp; B., 15deg. &amp; B., 20deg. &amp; B.:            The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.</p>
Filter	<p>None: The program does not perform filtering when importing the data.            Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.            High Quality (H.Q.): The program filters out unreliable data. (Effective only when importing data that was scanned using the VIVID 9i or the VIVID 910.)            H.Q &amp; N.F.: Applies both noise filter and high quality filter. (Effective only when importing data that was scanned using the VIVID 9i or the VIVID 910.)</p>
Dark Correction	If this box is checked, the program applies dark correction when importing color data.
Log Correction	If this box is checked, the program applies log correction when importing color data.
Preview	If this box is checked, the program displays color data.



## File – Import – Digitizer – One Scan (When VIVID 9i is Selected)

Performing One Scan with the VIVID 9i

This command is used to cause the VIVID 9i (VI-9i) to scan the object one scan at a time using the remote control function of this software. Registration of multiple scan data can be performed by manually designating their corresponding points.

Once registration is complete, the data can be saved together with the coordinate conversion parameters provided for registration as a single data file (CDK). The data is then registered and three-dimensionalized based upon the saved coordinate conversion parameters using the **File-Import** commands.

### Warning

- Never stare into the laser emitting window.
- Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Memo

Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

Ref. For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### 1 When using VIVID 9i for the first time or when the lens has been exchanged, field calibration must be performed using a Field Calibration System.

Place a Field Calibration System that is suitable for the lens to be used, and click the [Calibration] button in the [File-Import-Digitizer-One Scan] dialog box to start field calibration.

#### Note

User calibration must also be performed when using VIVID 9i after long periods of non-use or when excessive changes in the environment (temperature, humidity) have occurred.

Ref. For details on user calibration, refer to VIVID 9i Instruction Manual.

#### 2 From the [File] menu, select [Import], [Digitizer] and then [One Scan].

The [File-Import-Digitizer-One Scan] dialog box will appear.

- The monochrome monitor image captured by the VIVID 9i will appear in the Work window area of the dialog box.



**3 Set an object in place.**

If you are going to use the rotating stage, place the object on it.

**4 To display the object in the middle of the Work window area, change the position of the object or move the instrument back and forth to change the view angle.**

**[Memo]**

If necessary, replace the lens attached to the instrument. If the lenses are changed, carry out field calibration using the Field Calibration System.

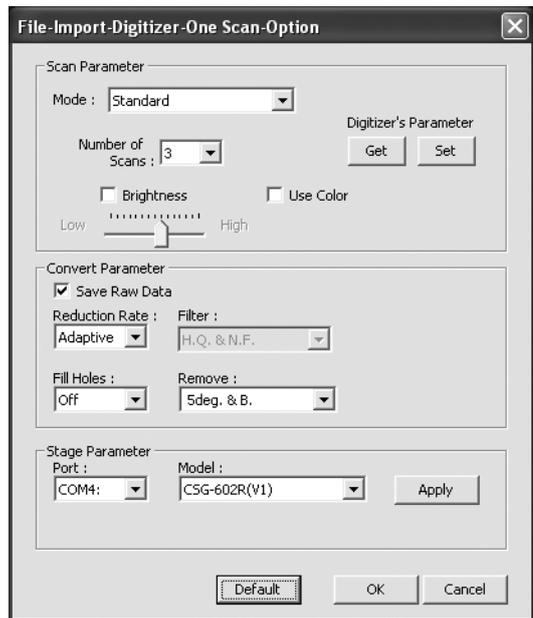
**5 Click the [Option] button.**

The [File-Import-Digitizer-One Scan-Option] dialog box will appear.

**6 Set optional parameters.**

Item	Explanation
Scan Parameter	Sets the settings for scanning.
Convert Parameter	Sets the settings for three-dimensionalization.
Stage Parameter	Select the rotary stage to be used.
[Default] button	Clicking this restores the default settings.

**[Ref.]** For details, refer to parameters (P.39) for [File-Import-Digitizer-One Scan-Option] dialog box.



- Select the desired stage in [Stage Parameter] field, and click on the [Apply] button. If the stage has been recognized properly, a stage slide bar will be displayed at the bottom of the work window when the [File-Import-Digitizer-One Scan-Option] dialog box is closed.



- If initialization is not successful, turn off the power to the rotary stage power, turn it on again, and then click on the [Apply] button.

**7 After necessary settings are made, click the [OK] button.**

The settings will be set and the [File-Import-Digitizer-One Scan-Option] dialog box will close.

**8 Click the [Scan] button to acquire the first scan data.**

A scan will start, and a color image will be displayed in the Work window area.

**Memo**

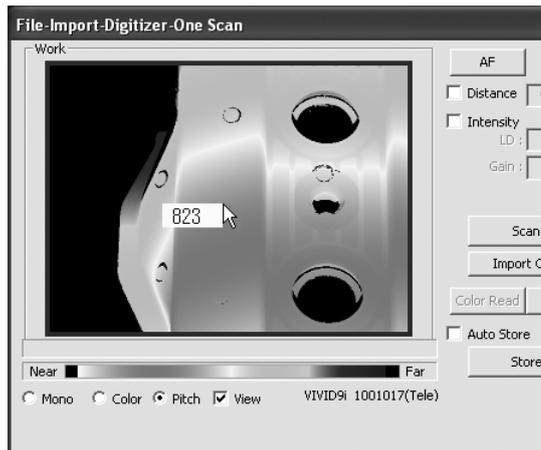
If [Use Color] is not checked (i.e. no check mark is shown), The scan data has no color image data, and a gray-scale image will be displayed instead of a color image.



- Clicking the [Color Read] button will re-scan for the color data only. The distance data will not be updated.
- Clicking the [Edit] button enables you to delete the area that is not necessary for three-dimensionalization by specifying it using the mouse. Messages will appear at the bottom of the Work window area as shown right, so follow them to operate the mouse. Click the [Edit] button again to exit the edit mode.
- Switch to pitch display screen, and right-click on desired position in the screen while holding down [CTRL] key. The Z-axis coordinates at that position (distance from VIVID 9i) will appear. To specify distance manually and perform measurement, this value must be used.

- Clicking on the following radio buttons will make a change to the image displayed in the Work window area. The data acquired during the scan will remain unchanged.

Item	Explanation
[Mono] radio button	The current image is displayed in monochrome.
[Color] radio button	The color image acquired from the scan is displayed.
[Pitch] radio button	The distance data is displayed in the color that is shown in the Near-Far color slide bar according to the distance from the object to the digitizer.

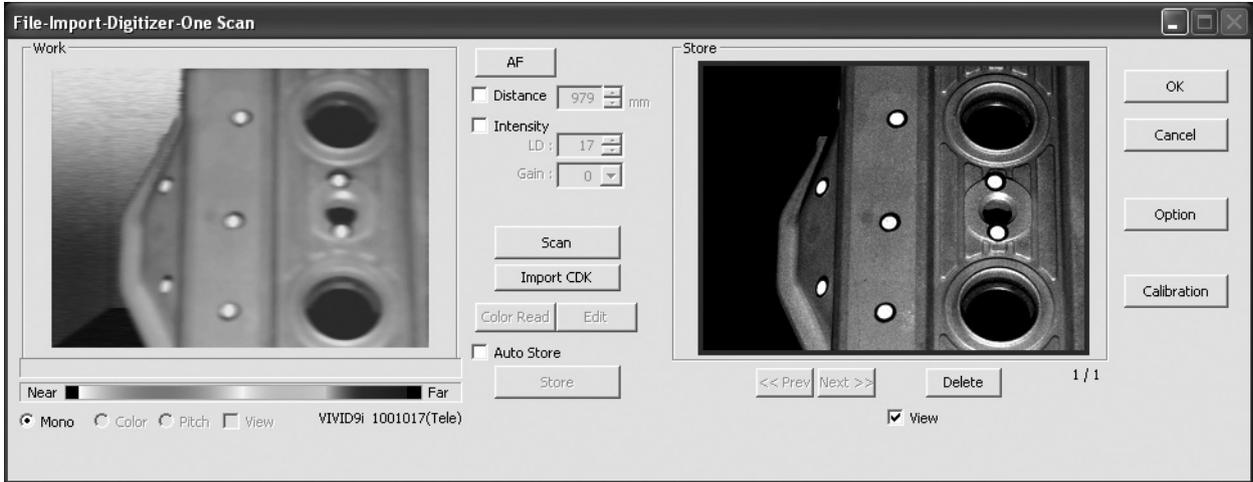


**9 Click the [Store] button.**

The color data displayed in the Work window area will appear in the Store Window area.

**Note**

*The [Store] button will be disabled (displayed in gray) when clicked once. This will prevent the same Work window area's data from being stored repeatedly.*



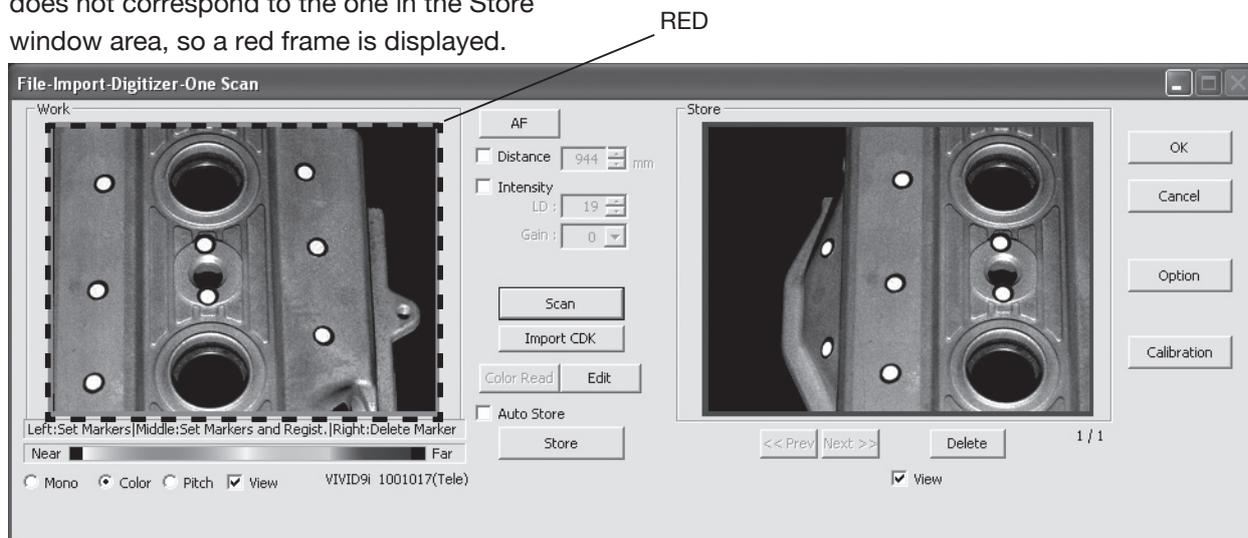
**10 Acquire the second scan data. Move the object so that 3 pairs of corresponding points or 1 or more pairs of corresponding points can be set between the first scan data and the second and subsequent scan data.**

First Scan Data



## 11 Click the [Scan] button.

At this time, the data in the Work window area does not correspond to the one in the Store window area, so a red frame is displayed.



## 12 Designate three or more corresponding points. Set the corresponding points in the Work window area and then store window alternately. When the corresponding points have been designated properly, the red frame will turn to blue.

If desired points are set by left-clicking them, registration will be performed each time 3 or more pairs of corresponding points are set. By using middle button or left button + [Shift] button, registration can be performed when 1 or more pairs of corresponding points are set.

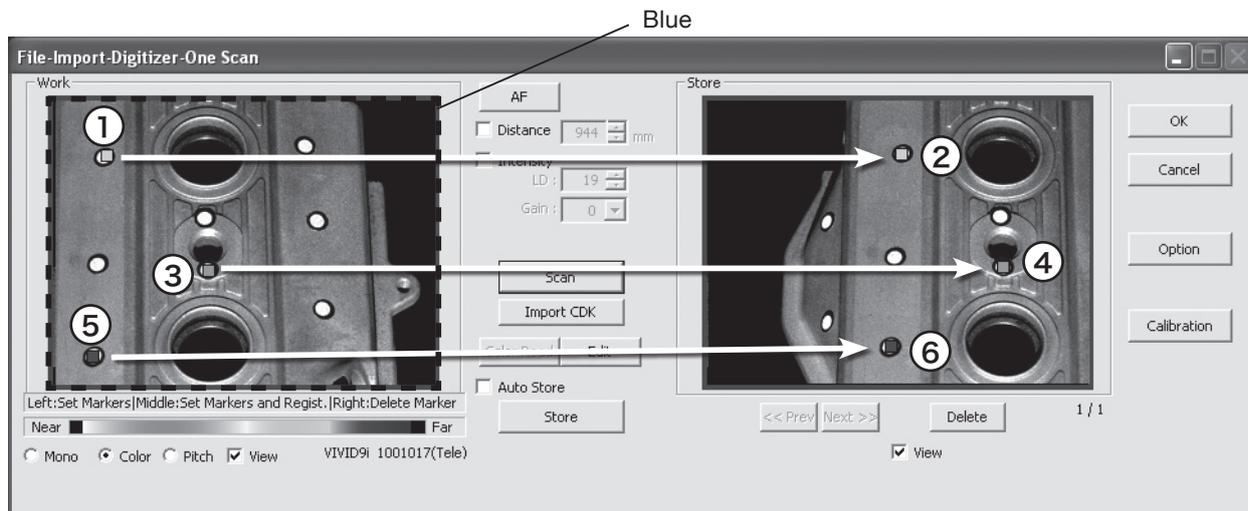
### Memo

Registration with 1 pair of corresponding points must be used for objects with characteristic shape.

Since registration may not be performed successfully for objects with non-characteristic shape (e.g. flat planes, cylindrical surfaces), using 3 pairs of corresponding points is recommended

- Each time corresponding points are designated, registration among data is performed.
- If the [Auto Store] checkbox has been checked, proceed to Step 13 after the corresponding points are designated properly.

- Left : Sets a point.  
(Registration is performed using 3 or more pairs of corresponding points)
-  Middle : Sets a point.  
([Shift] + Left) (Registration is performed using 1 or more pairs of corresponding points)
- Right : Points in a Work window area or Store window area can be deleted by clicking them in the reverse order in which they were set.



### 13 Click the [Store] button.

The data displayed in the Work window area will appear in the Store window area. If the corresponding points have been properly designated, all the stored data will be displayed in 3-D in the element view window after it is registered and three-dimensionalized.

- This step is not necessary if the [Auto Store] checkbox has been checked.

### 14 Repeat Steps 10 to 13 until the desired corresponding points are designated.

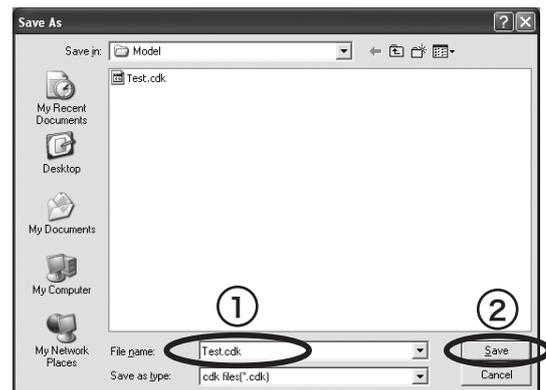
### 15 Click the [OK] button.

The data displayed in the element view window by the Store function will remain as is.

- If [Save Raw Data] checkbox in [File-Import -Digitizer-One Scan-Option] dialog box has been checked, [Save As] dialog box will be displayed. The data comprised of multiple shots will be saved together with the registration conversion parameters as a single piece of data (CDK).
  - ① Enter the desired file name.
  - ② Click the [Save] button.

#### Note

*The file name must consist of alphanumeric characters only.*



- Clicking the [Cancel] button will delete the elements that were displayed in the store window when the [Store] button is clicked at the end of execution of this command.

Parameters for [File-Import-Digitizer-One Scan] Dialog Box	
AF	Executes auto-focus. <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Distance	Checking this checkbox enables distance setting. <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Intensity	Checking this checkbox enables LD and Gain setting. <ul style="list-style-type: none"> <li>• LD: Sets the laser power.</li> <li>• Gain: Sets the gain. The gain cannot be set if the “Standard” scan mode has been selected.</li> </ul> <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Scan	Performs a scan. <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Import CDK	Imports the stored data (CDK) that was scanned by the VIVID 9i. If data containing coordinate conversion parameters is imported, it will be stored automatically even though it contains multiple scan data. In the case of data that has been stored, only the first scan data will be imported.
Color Read	Takes a color shot. Clicking this button at the end of scan will take a color shot again and display the updated color image. <b>Note</b> <i>This button is effective if the [Use Color] checkbox is checked.</i>
Edit	Clicking this button enables you to delete the area that is not necessary for three-dimensionalization by specifying it in the Work window using the mouse.
Auto Store	If this checkbox is checked, data save will be performed automatically when corresponding points are designated in the Work and Store window areas.
Store	Registers the data present in the Work window area as store data, puts it into three-dimensional form and displays it in the element view window.
Mono/Color/Pitch	Switches display mode for the data currently displayed in the Work window area. <ul style="list-style-type: none"> <li>• Mono: The current image is displayed in monochrome. This parameter is effective only when VIVID 9i is connected.</li> <li>• Color: The color data acquired from the scan is displayed.</li> <li>• Pitch: The color display is done in accordance with the distance data from Near to Far.</li> </ul>
Angle	Rotates the rotary stage to the desired angle using the slide bar. This item is displayed when the rotary stage has been initialized successfully.
Prev/Next	Switches from one stored data to another. [Prev] button: Displays the previous data. [Next] button: Displays the next data.
Delete	Deletes the stored data currently displayed in the Work or Store window area. The corresponding elements in the element view window are also deleted at the same time.
View	Displays/hides the data currently displayed in the Store window area into the element view window.
OK	Keeps the element data created during command execution and exits the <b>File-Import-Digitizer-One Scan</b> command. <b>Note</b> <i>If the [Save Raw Data] checkbox is checked, the data save dialog box is displayed.</i>
Cancel	Exits the <b>File-Import-Digitizer-One Scan</b> command. The element data created during command execution will be deleted.
Option	Displays the [File-Import-Digitizer-One Scan-Option] dialogbox.
Calibration	Executes the Calibration command and calibrates the VIVID 9i. <b>Note</b> <i>Have the Field Calibration System ready.</i> <b>[Ref.]</b> For details on user calibration, refer to VIVID 9i Instruction Manual.

Parameters for [File-Import-Digitizer-One Scan-Option] Dialog Box	
<b>Scan Parameter</b>	
Mode	<ul style="list-style-type: none"> <li>• <b>Standard:</b>The Filter settings are fixed to H.Q. &amp; N.F. The settable distance range is from 600 to 1,000 mm. The Gain value is fixed at 0.</li> <li>• <b>Extend:</b> The Filter settings are fixed to Noise Filter (N.F.). The settable distance range is from 500 to 2,500 mm.</li> <li>• <b>User:</b> The Filter settings can be user-defined. The settable distance range is from 500 to 2,500 mm.</li> </ul>
Digitizer's Parameter	<ul style="list-style-type: none"> <li>• <b>GET:</b> Loads the setting parameters from VIVID 9i and uses them as parameters for this command.</li> <li>• <b>SET:</b> Saves the parameters set by this command to VIVID 9i as the setting parameters.</li> </ul>
Number of Scans	Sets the number of shots to expand the dynamic range. Increasing the number of shots reduces data loss.
Brightness	Checking this checkbox enables you to set the brightness of the image.
Use Color	Checking this checkbox takes a color shot when a scan is made.
Log	Performs log correction for the color data if this checkbox is checked. This correction is used to make neutral colors brighter.
Dark	Performs dark correction for the color data if this checkbox is checked. This correction is used when lines are noticeable in the color image.
<b>Convert Parameter</b>	
Save Raw Data	Checking this checkbox displays the data save dialog at the end of the <b>File-Import-Digitizer-One Scan</b> command, allowing you to save the data.
Reduction Rate	Used to select the number of data points to be read from “1/1”, “1/4”, “1/9”, “1/16” and “Adaptive”.
Filter	<ul style="list-style-type: none"> <li>• <b>None:</b> Performs no correction for points when reading data. This can be set for User mode only.</li> <li>• <b>Noise Filter(N.F.):</b> Reduces noise in points when reading data.</li> <li>• <b>High Quality(H.Q.):</b> Deletes low-reliable data when reading data.</li> <li>• <b>H.Q. &amp; N.F.:</b> Reduces noise in points and deletes low-reliable data when reading data.</li> </ul> <p><b>Note</b> <i>In the case of low-reliable data, areas with excessively high laser power are displayed in light gray, and those with excessively low laser power are displayed in dark gray.</i></p>
Fill Holes	If “ON” is selected, points are generated in the holes that were produced as a loss of data so that the holes are filled.
Remove	Select the data to be deleted when reading data. <ul style="list-style-type: none"> <li>• <b>None:</b> Outputs the data without performing specific processing.</li> <li>• <b>Boundary (B.):</b> Outputs the data after deleting boundary points.</li> <li>• <b>5deg &amp; B./10dwg &amp; B./15deg. &amp; B./20deg &amp; B.:</b> Outputs the data after deleting the points present inside and at the boundary of the polygons that are angled within approximately 5, 10, 15 and 20 degrees to the vector of the line of view.</li> </ul>
Stage Parameter	Select the Port and Model to be used and click on the [Apply] button. The rotary stage will be initialized. If initialization is successful, the rotary stage can be controlled by using the Angle slide bar in the [File-Import-Digitizer-One Scan] dialog box.
Default	Restores the default parameter settings.
OK	Closes the [File-Import-Digitizer-One Scan-Option] dialog box. The settings will be set.
Cancel	Closes the [File-Import-Digitizer-One Scan-Option] dialog box. The settings will be cancelled.



## File – Import – Digitizer – Step Scan (When VIVID 9i is Selected)

### Performing Step Scan with the VIVID 9i

This command is used to cause the VIVID 9i to make multiple shots of the object by controlling the rotary stage remotely from this software. Registration of multiple scan data can be performed using the Calibration Chart for extract center of rotation.

Once registration is complete, the data can be saved together with the coordinate conversion parameters provided for registration as a single data file (CDK). The data is then registered and three-dimensionalized based upon the saved coordinate conversion parameters using the **File-Import** commands.

#### Warning

- Never stare into the laser emitting window.
- Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Memo

- The calibration chart is an accessory of the rotating stage set.
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

Ref. For details of the **File-Select Digitizer** command, refer to page 144.

## ■ When Using Only the Rotating Stage

### Operating Procedure

#### 1 When using VIVID 9i for the first time or when the lens has been exchanged, field calibration must be performed using a Field Calibration System.

Place a Field Calibration System that is suitable for the lens to be used, and click the [Calibration] button in the [File-Import-Digitizer-Step Scan] dialog box to start field calibration.

#### Note

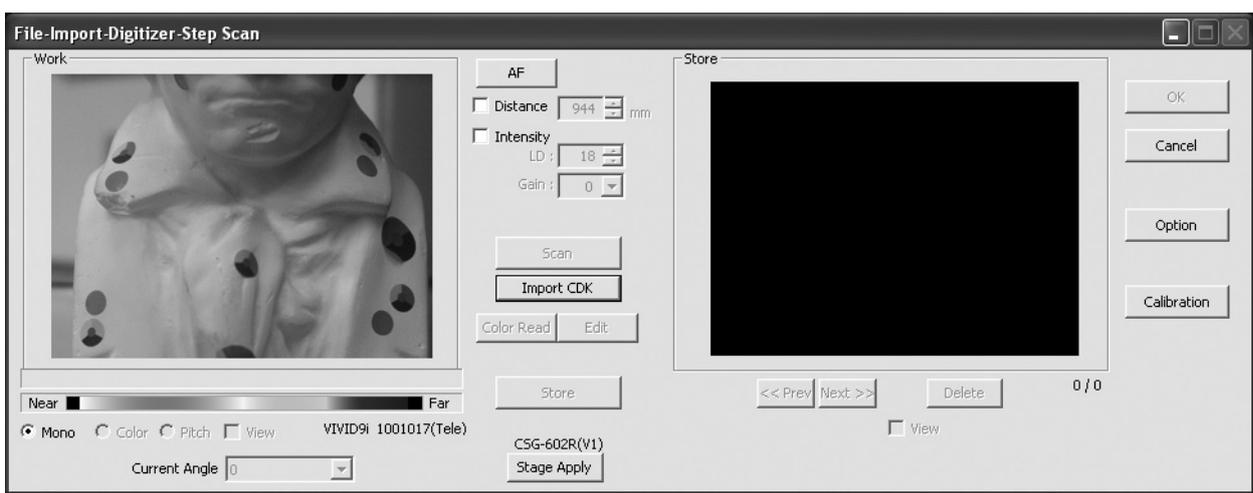
User calibration must also be performed when using VIVID 9i after long periods of non-use or when excessive changes in the environment (temperature, humidity) have occurred.

Ref. For details on user calibration, refer to VIVID 9i Instruction Manual.

#### 2 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

- The monochrome monitor image captured by the VIVID 9i will appear in the Work window area of the dialog box.
- If the Model folder contains the Chart data that is considered to be appropriate, it will be imported automatically.



**3 Place the object on the rotating stage.**

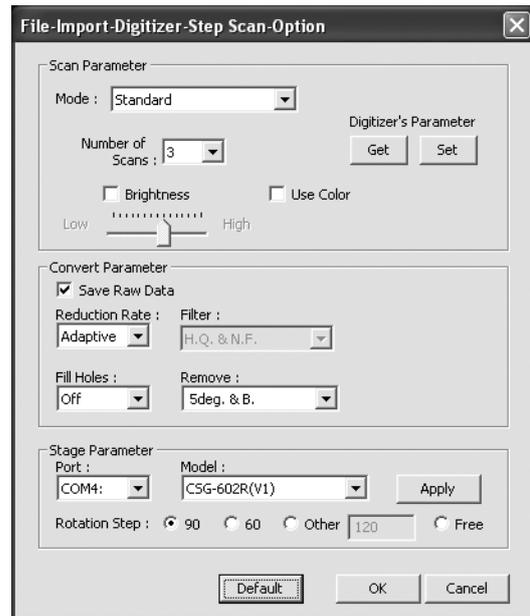
**4 To display the object in the middle of the Work window area, change the position of the object or move the VIVID 9i back and forth to change the view angle.**

*/Memo/*

If necessary, replace the lens attached to the VIVID 9i. If the lenses are changed, carry out field calibration using the Field Calibration System.

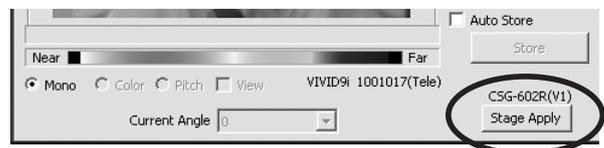
**5 Click the [Option] button.**

The [File-Import-Digitizer-Step Scan-Option] dialog box will appear.



*/Memo/*

- If rotary stage has already been used and if changing settings is not required, initialization of the rotary stage can be performed by clicking on the [Stage Apply] button in the [File-Import-Digitizer-Step Scan] dialog box. In this case, proceed to Step 9.



## 6 Set optional parameters.

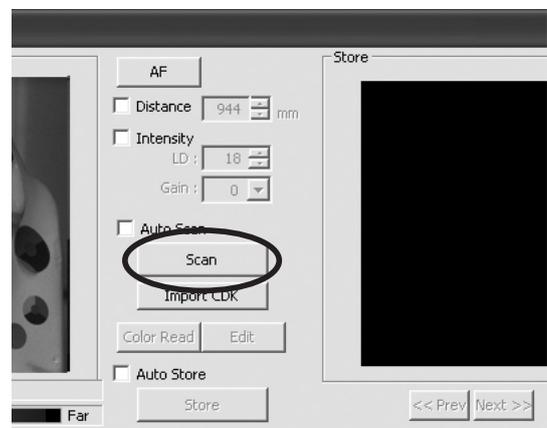
Item	Explanation
Scan Parameter	Sets the settings for scanning.
Convert Parameter	Sets the settings for three-dimensionalization.
Stage Parameter	Select the rotary stage to be used.
[Default] button	Clicking this restores the default settings.

**[Ref.]** For details, refer to the parameters (P.49) for [File-Import-Digitizer-Step Scan-Option] dialog box.

## 7 Click the [Apply] button to check whether the rotary stage has been initialized successfully.

If the rotary stage has been initialized successfully, the [Scan] button will be effective.

- If initialization is not successful, turn off the power to the rotary stage power, turn it on again, and then click the [Apply] button.
- Select “Free” for [Rotation Step] in [Stage Parameter] field, and click [Apply]. If the stage has been recognized properly, a stage slide bar and [Chart Scan] button will be displayed at the bottom of the work window when the [File-Import-Digitizer-Step Scan-Option] dialog box is closed.



- If the rotary stage has already been used and if there is no need to change the settings, initialization of the rotary stage can be performed by clicking on the [Stage Apply] button in the [File-Import-Digitizer-Step Scan] dialog box instead of the [File-Import-Digitizer-Step Scan-Option] dialog box.



## 8 After necessary settings are made, click the [OK] button.

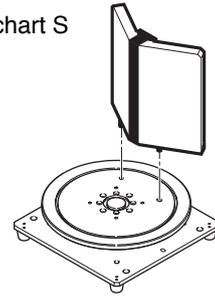
The settings will be set and the [File-Import-Digitizer-Step Scan-Option] dialog box will close.

## 9 Place the Calibration Chart on the rotating stage and scan the Calibration Chart.

Position the chart with the black line facing the VIVID, and place it on the rotating stage so that both entire side surfaces are observed in the viewfinder.

- This step is not necessary if the Calibration Chart data has already been imported when this dialog box is opened.
- To acquire data from the object first then acquire the calibration chart data, perform steps 9 and 10 after completing step 15. In this case, select current chart angle from [Current Angle] and click [Scan] button, or click [Chart Scan] button to acquire chart data.
- The [Chart Scan] button appears when “Free” is selected for [Rotation Step] in [File-Import-Digitizer-One Scan-Option] dialog box.

Calibration chart S



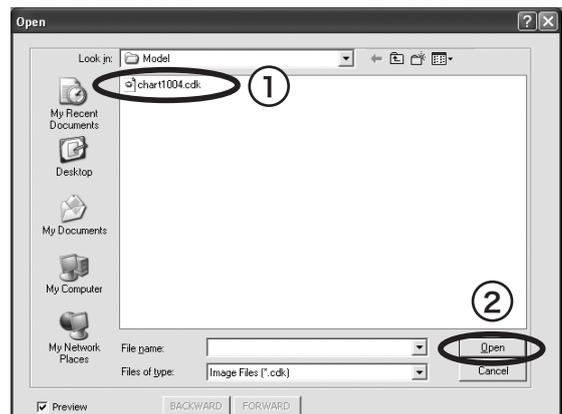
### Memo

If it is not possible to perform calibration using calibration chart S, use calibration chart M.

- Steps 9 and 10 are not necessary when importing existing the Calibration Chart data (i.e. data that has coordinate parameters). Clicking the [Import CDK] button will open the file read dialog box.

The Calibration Chart data (chart\*\*\*\*.cdk) that has been saved can be imported.

- ① Select the file to be imported.
- ② Click on the [Open] button.



## 10 Click the [Scan] button.

The Calibration Chart will be scanned. When the data is recognized as Calibration Chart data successfully:

- ① The Calibration Chart data will be stored under the file name of chart\*\*\*\*.cdk (“\*\*\*\*” are the last four digits of the main unit’s serial number) in the Model folder.
- ② The data acquired from the subsequent scans will be coordinate-converted around the rotational axis.
- ③ The [AutoScan] checkbox will be displayed.

### Note

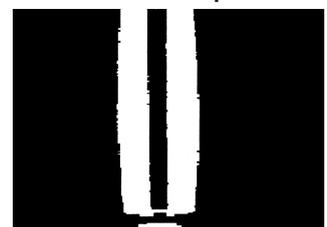
Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.

- An error message will be displayed if the data is not recognized as the Calibration Chart data successfully.
- When “Free” has been selected using the [Rotation Step] of the [Stage Parameter], please use the [Chart Scan] button instead of the [Scan] button.

Good example



Bad example

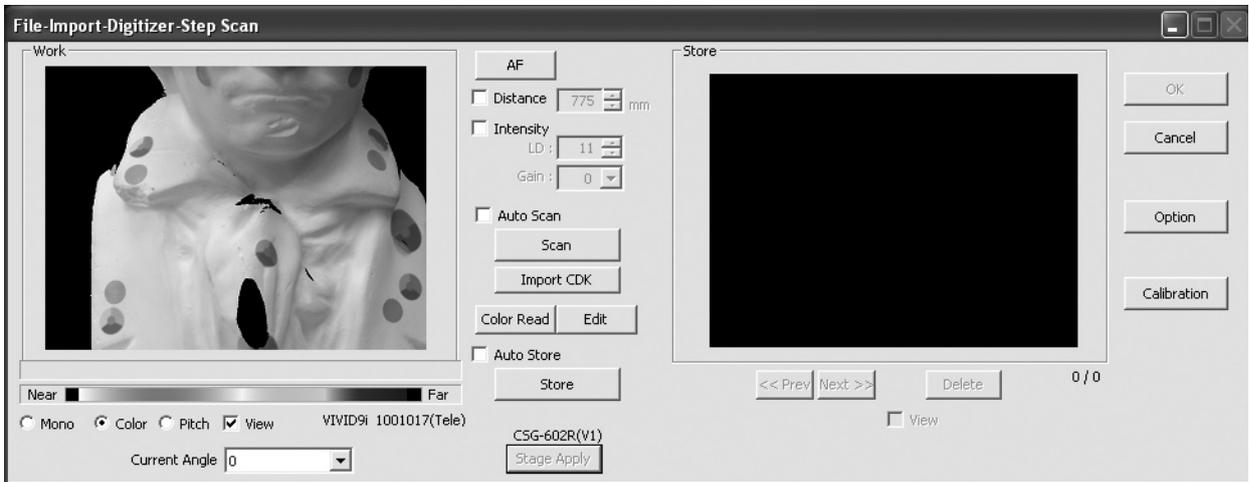


**11 Click the [Scan] button to acquire the first scan data.**

A scan will start, and a color image will be displayed in the Work window area.

**/Memo/**

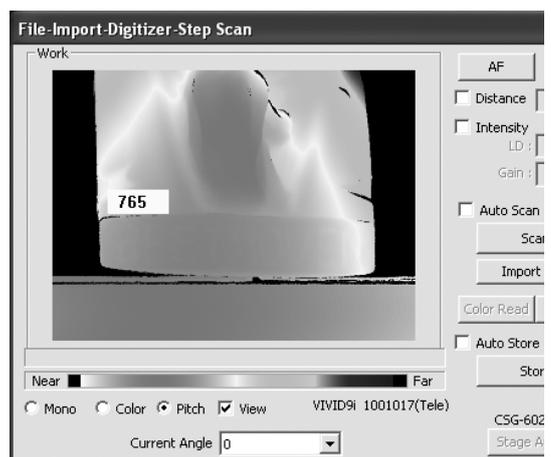
If [Use Color] is not checked (i.e. no check mark is shown), The scan data has no color image data, and a gray-scale image will be displayed instead of a color image.



- If the [Auto Scan] checkbox is checked, the second and subsequent scans will be carried out automatically.
- If the [Auto Store] checkbox is checked, a store will be carried out automatically at the end of scan.
- Clicking the [Color Read] button will re-scan for the color data only. The distance data will not be updated.
- Clicking the [Edit] button enables you to delete the area that is not necessary for three-dimensionalization by specifying it using the mouse. Messages will appear at the bottom of the Work window area as shown right, so follow them to operate the mouse. Click the [Edit] button again to exit the edit mode.
- Switch to pitch display screen, and right-click on desired position in the screen while holding down [CTRL] key. The Z-axis coordinates at that position (distance from VIVID 9i) will appear. To specify distance manually and perform measurement, this value must be used.

- Clicking on the following radio buttons will make a change to the image displayed in the Work window area. The data acquired during the scan will remain unchanged.

Item	Explanation
[Mono] radio button	The current image is displayed in monochrome.
[Color] radio button	The color image acquired from the scan is displayed.
[Pitch] radio button	The distance data is displayed in the color that is shown in the Near-Far color slide bar according to the distance from the object to the digitizer.

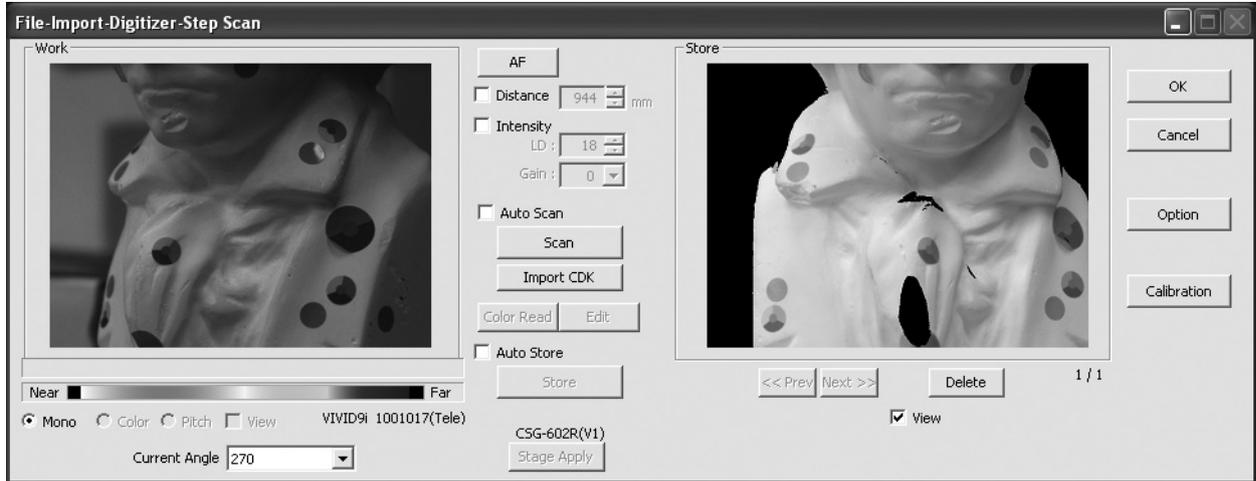


**12 Click on the [Store] button.**

The color data displayed in the Work window area will appear in the Store window area.

**Note**

*The [Store] button will be disabled (displayed in gray) when clicked once. This will prevent the same work window area's data from being stored repeatedly.*



- By clicking the [Store] button, each shot data other than the Calibration Chart data will be coordinate-converted around the rotational axis and displayed three-dimensionally in the element view window. If a setting other than “Free” is selected for [Rotation Step], the rotary stage will rotate at specified angles automatically. The angle shown in [Current Angle] will automatically be updated at the same time.
- This step is not necessary if the [Auto Store] checkbox has been checked.

**13 Click the [Scan] button to acquire the second data.****Note**

*If “Free” is selected for [Rotation Step] in the [File-Import-Digitizer-Step Scan-Option] dialog box, the rotary stage must be rotated to the desired angle using the slide bar in advance.*

**14 Click the [Store] button.**

The data displayed in the Work window area will appear in the Store window area. If the corresponding points have been properly designated, all the stored data will be displayed in 3-D in the element view window after it is registered and three-dimensionalized.

- This step is not necessary if the [Auto Store] checkbox has been checked.

**15 Repeat Steps 13 to 14 until the desired corresponding points are designated.**

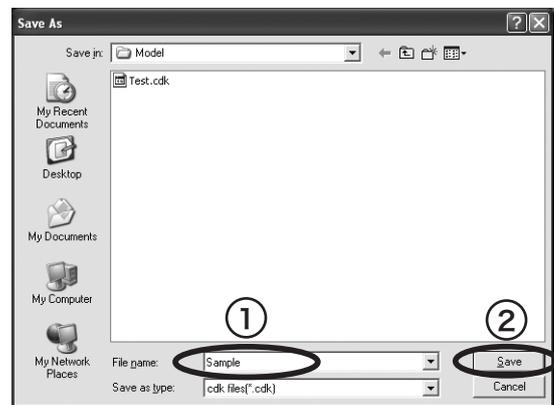
**16 Click the [OK] button.**

The data displayed in the element view window by the Store function will remain as is.

- If [Save Raw Data] checkbox in [File-Import -Digitizer-Step Scan-Option] dialog box has been checked, [Save As] dialog box will be displayed. The data comprised of multiple shots will be saved together with the registration conversion parameters as a single piece of data (CDK).
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

*The file name must consist of alphanumeric characters only.*



- Clicking on the [Cancel] button will delete the elements that were displayed in the Store window area when the [Store] button is clicked at the end of execution of this command.

Parameters for [File-Import-Digitizer-Step Scan] Dialog Box	
AF	Executes auto-focus. <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Distance	Checking this checkbox enables distance setting.
Intensity	Checking this checkbox enables LD and Gain setting. <ul style="list-style-type: none"> <li>• LD: Sets the laser power.</li> <li>• Gain: Sets the gain. The gain cannot be set if the “Standard” scan mode has been selected.</li> </ul>
Auto Scan	Checking this checkbox causes scan, store and stage control operations to be automatically performed sequentially.
Scan	Performs a scan. <b>Note</b> <i>This parameter is effective only when VIVID 9i is connected.</i>
Import CDK	Imports the stored data (CDK) that was scanned by the VIVID 9i.
Color Read	Takes a color shot. Clicking this button at the end of scan will take a color shot again and display the updated color image. <b>Note</b> <i>This button is effective if the [Use Color] checkbox is checked.</i>
Edit	Clicking this checkbox enables you to delete the area that is not necessary for three-dimensionalization by specifying it in the work window using the mouse.
Auto Store	Checking this checkbox performs store operation automatically at the end of scan operation.
Store	Registers the data present in the Work window area as store data, puts it into three-dimensional form and displays it in the element view window.
Mono/Color/Pitch	Switches display mode for the data currently displayed in the Work window area. <ul style="list-style-type: none"> <li>• Mono: The current image is displayed in monochrome. This parameter is effective only when VIVID 9i is connected.</li> <li>• Color: The color data acquired from the scan is displayed.</li> <li>• Pitch: The color display is done in accordance with the distance data from Near to Far.</li> </ul>
Current Angle	The current step angle is displayed. Normally, the angle is updated when a store operation is carried out, so additional operations are not necessary. When the step angle has been changed to the desired angle manually, data scan can be performed at the new step angles. <b>Memo</b> This item is not displayed if “Free” is selected for [Rotation Step].
Angle	Rotates the rotary stage to the desired angle using the slide bar. This item is displayed when the rotary stage has been initialized successfully.
Chart Scan	Used to scan the Calibration Chart data. <b>Memo</b> This item is displayed if “Free” is selected for [Rotation Step].
Stage Apply	Initializes the rotary stage.
Prev/Next	Switches from one stored data to another. [Prev] button: Displays the previous data. [Next] button: Displays the next data.
Delete	Deletes the stored data currently displayed in the Work or Store window area. The corresponding elements in the element view window are also deleted at the same time.
View	Displays/hides the data currently displayed in the Store window area into the element view window.
OK	Keeps the element data created during command execution and exits the <b>File-Import-Digitizer-One Scan</b> command. <b>Note</b> <i>If the [Save Raw Data] checkbox is checked, the data save dialog box is displayed.</i>
Cancel	Exits the <b>File-Import-Digitizer-One Scan</b> command. The element data created during command execution will be deleted.
Option	Displays the [File-Import-Digitizer-Step Scan-Option] dialogbox.
Calibration	Executes the Calibration command and calibrates the VIVID 9i. <b>Note</b> <i>Have the Field Calibration System ready.</i> <b>Ref.</b> For details on user calibration, refer to VIVID 9i Instruction Manual.

Parameters for [File-Import-Digitizer-Step Scan-Option] Dialog Box	
Scan Parameter	
Mode	<ul style="list-style-type: none"> <li>• <b>Standard:</b> The Filter settings are fixed to H.Q. &amp; N.F. The settable distance range is from 600 to 1,000 mm. The Gain value is fixed at 0.</li> <li>• <b>Extend:</b> The Filter settings are fixed to Noise Filter (N.F.). The settable distance range is from 500 to 2,500 mm.</li> <li>• <b>User:</b> The Filter settings can be user-defined. The settable distance range is from 500 to 2,500 mm.</li> </ul>
Digitizer's Parameter	<ul style="list-style-type: none"> <li>• <b>GET:</b> Loads the setting parameters from VIVID 9i and uses them as parameters for this command.</li> <li>• <b>SET:</b> Saves the parameters set by this command to VIVID 9i as the setting parameters.</li> </ul>
Number of Scans	Sets the number of shots to expand the dynamic range. Increasing the number of shots reduces data loss.
Brightness	Checking this checkbox enables you to set the brightness of the image.
Use Color	Checking this checkbox takes a color shot when a scan is made.
Log	Performs log correction for the color data if this checkbox is checked. This correction is used to make neutral colors brighter.
Dark	Performs dark correction for the color data if this checkbox is checked. This correction is used when lines are noticeable in the color image.
Convert Parameter	
Save Raw Data	Checking this checkbox displays the data save dialog at the end of the <b>File-Import-Digitizer-Step Scan</b> command, allowing you to save the data.
Reduction Rate	Used to select the number of data points to be read from “1/1”, “1/4”, “1/9”, “1/16” and “Adaptive”.
Filter	<ul style="list-style-type: none"> <li>• <b>None:</b> Performs no correction for points when reading data. This can be set for User mode only.</li> <li>• <b>Noise Filter (N.F.):</b> Reduces noise in points when reading data.</li> <li>• <b>High Quality (H.Q.):</b> Deletes low-reliable data when reading data.</li> <li>• <b>H.Q. &amp; N.F.:</b> Reduces noise in points and deletes low-reliable data when reading data.</li> </ul> <p><b>Note</b>  <i>In the case of low-reliable data, areas with excessively high laser power are displayed in light gray, and those with excessively low laser power are displayed in dark gray.</i></p>
Fill Holes	If “ON” is selected, points are generated in the holes that were produced as a loss of data so that the holes are filled.
Remove	<p>Select the data to be deleted when reading data.</p> <ul style="list-style-type: none"> <li>• <b>None:</b> Outputs the data without performing specific processing.</li> <li>• <b>Boundary (B):</b> Outputs the data after deleting boundary points.</li> <li>• <b>5deg &amp; B./10deg &amp; B./15deg. &amp; B./20deg &amp; B.:</b> Outputs the data after deleting the points present inside and at the boundary of the polygons that are angled within approximately 5, 10, 15 and 20 degrees to the vector of the line of view.</li> </ul>
Stage Parameter	Select the Port and Model to be used and click on the [Apply] button. The rotary stage will be initialized. If initialization is successful, the rotary stage can be controlled in the [File-Import-Digitizer-Step Scan] dialog box.
Rotation Step	Select rotating angle for each step of rotary stage.
Default	Restores the default parameter settings.
OK	Closes the [File-Import-Digitizer-Step Scan-Option] dialog box. The settings will be set.
Cancel	Closes the [File-Import-Digitizer-Step Scan-Option] dialog box. The settings will be cancelled.



## File – Import – Digitizer – One Scan (When VIVID 910 is Selected)

### Performing One Scan with the VIVID 910

This command is used to cause the VIVID 910 (VI-910) to scan the object one scan at a time using the remote control function of this software. Registration of multiple scan data can be performed by manually designating their corresponding points.

#### Warning

- Never stare into the laser emitting window.
- Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Memo

Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

Ref. For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [One Scan].

The [File-Import-Digitizer-One Scan] dialog box will appear.

- The monochrome monitor image captured by the VIVID 910 will appear in the Work window area of the dialog box.



910

#### 2 Set an object in place.

If you are going to use the rotating stage, place the object on it.

#### 3 To display the object in the middle of the Work window area, change the position of the object or move the instrument back and forth to change the view angle.

#### Memo

If necessary, replace the lens attached to the VIVID.

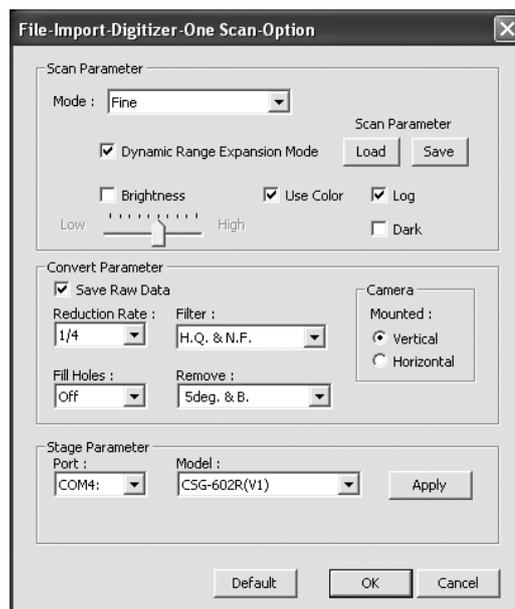
#### 4 Click the [Option] button.

The [File-Import-Digitizer-One Scan-Option] dialog box will appear.

#### 5 Set optional parameters.

Item	Explanation
Scan Parameter	Sets the settings for scanning.
Convert Parameter	Sets the settings for three-dimensionalization.
Stage Parameter	Select the rotary stage to be used.
[Default] button	Clicking this restores the default settings.

**[Ref.]** For details, refer to parameters (P.57) for [File-Import-Digitizer-One Scan-Option] dialog box.



- Select the desired stage in [Stage Parameter] field, and click on the [Apply] button. If the stage has been recognized properly, a stage slide bar will be displayed at the bottom of the work window when the [File-Import-Digitizer-One Scan-Option] dialog box is closed.



- If initialization is not successful, turn off the power to the rotary stage power, turn it on again, and then click on the [Apply] button.

#### 6 After necessary settings are made, click on the [OK] button.

The settings will be set and the [File-Import-Digitizer-One Scan-Option] dialog box will close.

## 7 Click on the [Scan] button to acquire the first scan data.

A scan will start, and a color image will be displayed in the Work window area.

**Memo**

If [Use Color] is not checked (i.e. no check mark is shown), the scan data has no color image data, and a gray-scale image will be displayed instead of a color image.



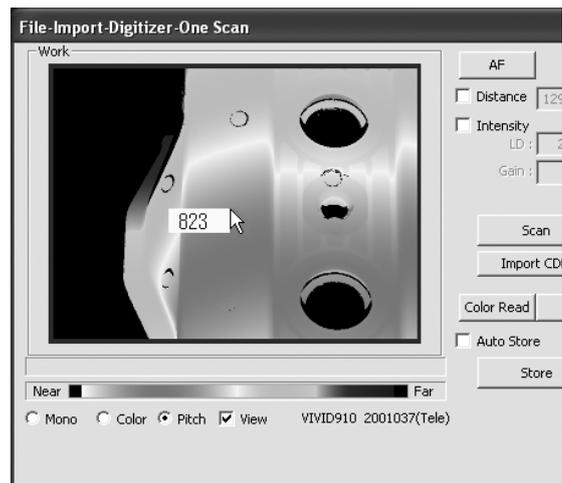
- Clicking the [Color Read] button will re-scan for the color data only. The distance data will not be updated.
- Clicking the [Edit] button enables you to delete the area that is not necessary for three-dimensionalization by specifying it using the mouse. Messages will appear at the bottom of the Work window area as shown right, so follow them to operate the mouse. Check the [Edit] button again to exit the edit mode.

- Clicking on the following radio buttons will make a change to the image displayed in the work window. The data acquired during the scan will remain unchanged.

Item	Explanation
[Mono] radio button	The current image is displayed in monochrome.
[Color] radio button	The color image acquired from the scan is displayed.
[Pitch] radio button	The distance data is displayed in the color that is shown in the Near-Far color slide bar according to the distance from the object to the digitizer.



- Switch to pitch display screen, and right-click on desired position in the screen while holding down [CTRL] key. The Z-axis coordinates at that position (distance from VIVID 9i) will appear. To specify distance manually and perform measurement, this value must be used.



**8 Click on the [Store] button.**

The color data displayed in the Work window area will appear in the Store window area.

**Note**

*The [Store] button will be disabled (displayed in gray) when clicked once. This will prevent the same Work window area's data from being stored repeatedly.*



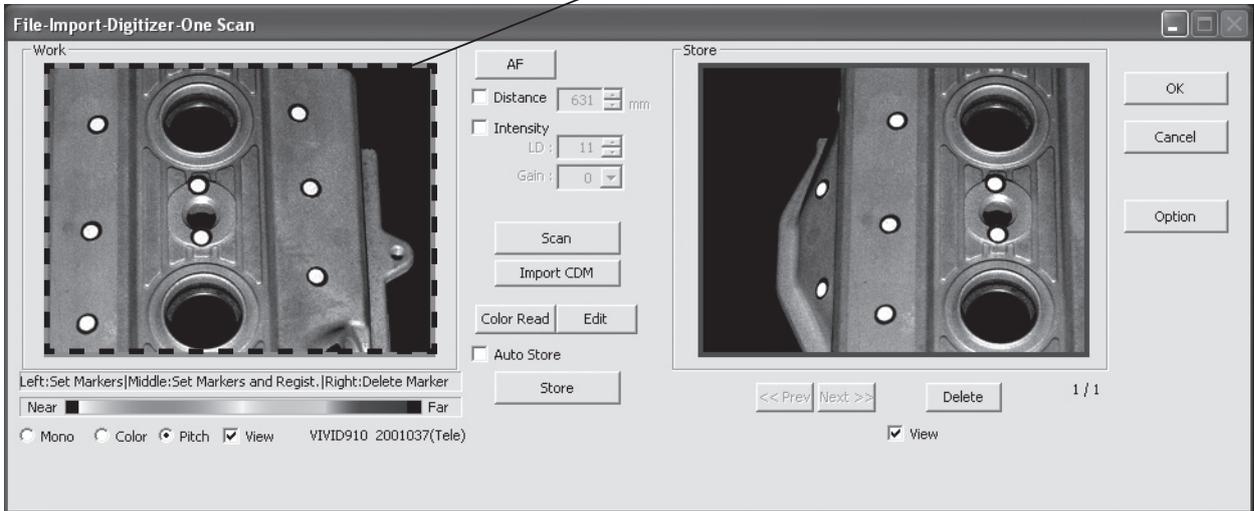
**9 Acquire the second scan data. Move the object so that 3 pairs of corresponding points or 1 or more pairs of corresponding points can be set between the first scan data and the second and subsequent scan data.**



**10 Click on the [Scan] button.**

At this time, the data in the Work window area does not correspond to the one in the Store window area, so a red frame is displayed.

RED



**11 Designate three or more corresponding points. Set the corresponding points in the work window and then store window alternately. When the corresponding points have been designated properly, the red frame will turn to blue.**

If desired points are set by left-clicking them, registration will be performed each time 3 or more pairs of corresponding points are set. By using middle button or left button + [Shift] button, registration can be performed when 1 or more pairs of corresponding points are set.

Left : Sets a point.  
(Registration is performed using 3 or more pairs of corresponding points)



Middle : Sets a point.  
([Shift] + Left) (Registration is performed using 1 or more pairs of corresponding points)

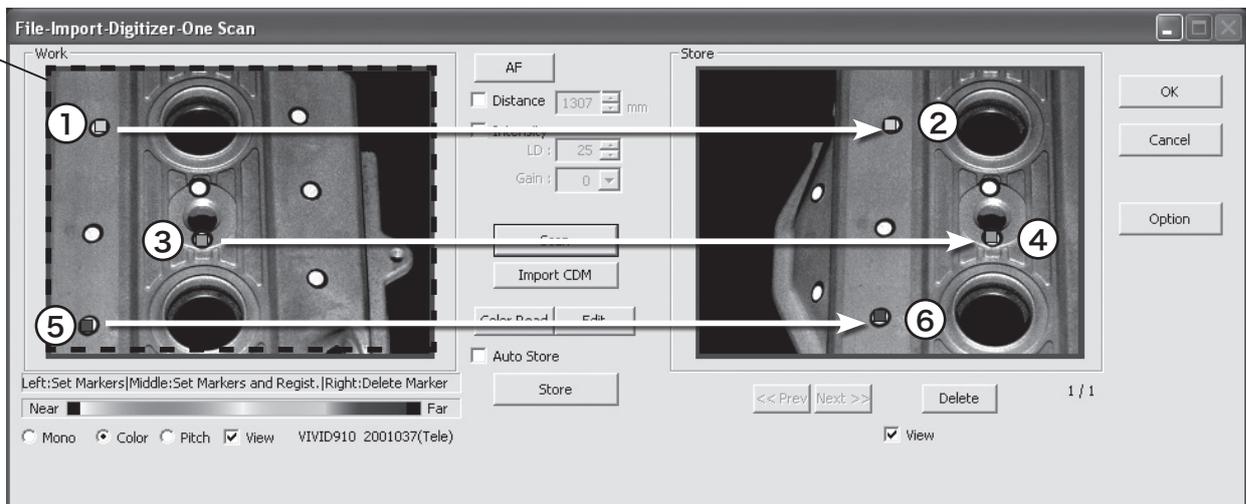
Right : Points in a Work window area or Store window area can be deleted by clicking them in the reverse order in which they were set.

**Memo**

Registration with 1 pair of corresponding points must be used for objects with characteristic shape. Since registration may not be performed successfully for objects with non-characteristic shape (e.g. flat planes, cylindrical surfaces), using 3 pairs of corresponding points is recommended

- Each time corresponding points are designated, registration among data is performed.
- If the [Auto Store] checkbox has been checked, proceed to Step 12 after the corresponding points are designated properly.

Blue



**12 Click on the [Store] button.**

The data displayed in the Work window area will appear in the Store window area. If the corresponding points have been properly designated, all the stored data will be displayed in 3-D in the element view window after it is registered and three-dimensionalized.

- This step is not necessary if the [Auto Store] checkbox has been checked.

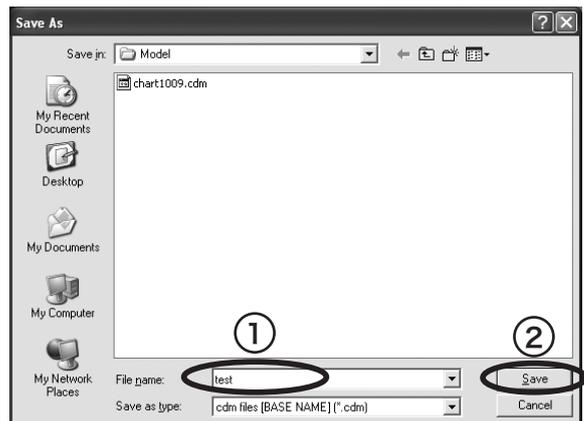
**13 Repeat Steps 9 to 12 until the desired corresponding points are designated.****14 Click the [OK] button.**

The data displayed in the element view window by the Store function will remain as is.

- If [Save Raw Data] checkbox in [File-Import -Digitizer-One Scan-Option] dialog box has been checked, [Save As] dialog box will be displayed. The data will be saved as a CDM file.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

*The file name must consist of alphanumeric characters only.*



- Clicking on the [Cancel] button will delete the elements that were displayed in the store window when the [Store] button is clicked at the end of execution of this command.

Parameters for [File-Import-Digitizer-One Scan] Dialog Box	
AF	Executes auto-focus. <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Distance	Checking this checkbox enables distance setting. <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Intensity	Checking this checkbox enables LD and Gain setting. <ul style="list-style-type: none"> <li>• LD : Sets the laser power.</li> <li>• Gain : Sets the gain.</li> </ul> <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Scan	Performs a scan. <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Import CDM	Import the saved CDM data.
Color Read	Takes a color shot. Clicking this button at the end of scan will take a color shot again and display the updated color image. <b>Note</b> <i>This button is effective if the [Use Color] checkbox is checked.</i>
Edit	Clicking this checkbox enables you to delete the area that is not necessary for three-dimensionalization by specifying it in the Work window area using the mouse.
Auto Store	If this checkbox is checked, data save will be performed automatically when corresponding points are designated in the Work and Store window areas.
Store	Registers the data present in the Work window area as store data, puts it into three-dimensional form and displays it in the element view window.
Mono/Color/Pitch	Switches display mode for the data currently displayed in the Work window area. <ul style="list-style-type: none"> <li>• Mono : The current image is displayed in monochrome. This parameter is effective only when VIVID 9i is connected.</li> <li>• Color : The color data acquired from the scan is displayed.</li> <li>• Pitch : The color display is done in accordance with the distance data from Near to Far.</li> </ul>
Angle	Rotates the rotary stage to the desired angle using the slide bar. This item is displayed when the rotary stage has been initialized successfully.
Prev/Next	Switches from one stored data to another. [Prev] button : Displays the previous data. [Next] button : Displays the next data.
Delete	Deletes the stored data currently displayed in the Work or Store window area. The corresponding elements in the element view window are also deleted at the same time.
View	Displays/hides the data currently displayed in the Store window area into the element view window.
OK	Keeps the element data created during command execution and exits the <b>File-Import-Digitizer-One Scan</b> command. <b>Note</b> <i>If the [Save Raw Data] checkbox is checked, the data save dialog box is displayed.</i>
Cancel	Exits the <b>File-Import-Digitizer-One Scan</b> command. The element data created during command execution will be deleted.
Option	Displays the [File-Import-Digitizer-One Scan-Option] dialogbox.

Parameters for [File-Import-Digitizer-One Scan-Option] Dialog Box	
<b>Scan Parameter</b>	
Mode	<ul style="list-style-type: none"> <li>• Select the scanning mode : FINE or FAST</li> </ul>
Scan Parameter	<ul style="list-style-type: none"> <li>• Load : Loads the setting parameters and uses them as parameters for this command.</li> <li>• Save : Saves the parameters set by this command as the setting parameters.</li> </ul>
Brightness	Checking this checkbox enables you to set the brightness of the image.
Use Color	Checking this checkbox takes a color shot when a scan is made.
Log	Performs log correction for the color data if this checkbox is checked. This correction is used to make neutral colors brighter.
Dark	Performs dark correction for the color data if this checkbox is checked. This correction is used when lines are noticeable in the color image.
<b>Convert Parameter</b>	
Save Raw Data	Checking this checkbox displays the data save dialog at the end of the <b>File-Import-Digitizer-One Scan</b> command, allowing you to save the data.
Reduction Rate	Used to select the number of data points to be read from “1/1”, “1/4”, “1/9”, “1/16” and “No Polygon”.
Filter	<ul style="list-style-type: none"> <li>• None : Performs no correction for points when reading data.</li> <li>• Noise Filter(N.F.) : Reduces noise in points when reading data.</li> <li>• High Quality(H.Q.) : Deletes low-reliable data when reading data.</li> <li>• H.Q. &amp; N.F. : Reduces noise in points and deletes low-reliable data when reading data.</li> </ul>
Fill Holes	If “ON” is selected, points are generated in the holes that were produced as a loss of data so that the holes are filled.
Remove	Select the data to be deleted when reading data. <ul style="list-style-type: none"> <li>• None : Outputs the data without performing specific processing.</li> <li>• Boundary (B.) : Outputs the data after deleting boundary points.</li> <li>• 5deg &amp; B./10deg &amp; B./15deg. &amp; B./20deg &amp; B. : Outputs the data after deleting the points present inside and at the boundary of the polygons that are angled within approximately 5, 10, 15 and 20 degrees to the vector of the line of view.</li> </ul>
Hardware Parameter	<ul style="list-style-type: none"> <li>• Vertical : Check this checkbox if using the VIVID unit in vertical orientation.</li> <li>• Horizontal : Check this checkbox if using the VIVID unit in horizontal orientation.</li> </ul>
<b>Stage Parameter</b>	Select the Port and Model to be used and click on the [Apply] button. The rotary stage will be initialized. If initialization is successful, the rotary stage can be controlled by using the Angle slide bar in the [File-Import-Digitizer-One Scan] dialog box.
Default	Restores the default parameter settings.
OK	Closes the [File-Import-Digitizer-One Scan-Option] dialog box. The settings will be set.
Cancel	Closes the [File-Import-Digitizer-One Scan-Option] dialog box. The settings will be cancelled.



## File – Import – Digitizer – Step Scan (When VIVID 910 is Selected)

### Performing Step Scan with the VIVID 910

This command is used to cause the VIVID 910 (VI-910) to make multiple shots of the object by controlling the rotary stage remotely from this software. Registration of multiple scan data can be performed using the Calibration Chart for extract center of rotation.

#### Warning

- Never stare into the laser emitting window.
- Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Memo

- The calibration chart is an accessory of the rotating stage set.
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

Ref For details, refer to parameters (P.144) for [File-Import-Digitizer-Step Scan-Option] dialog box.

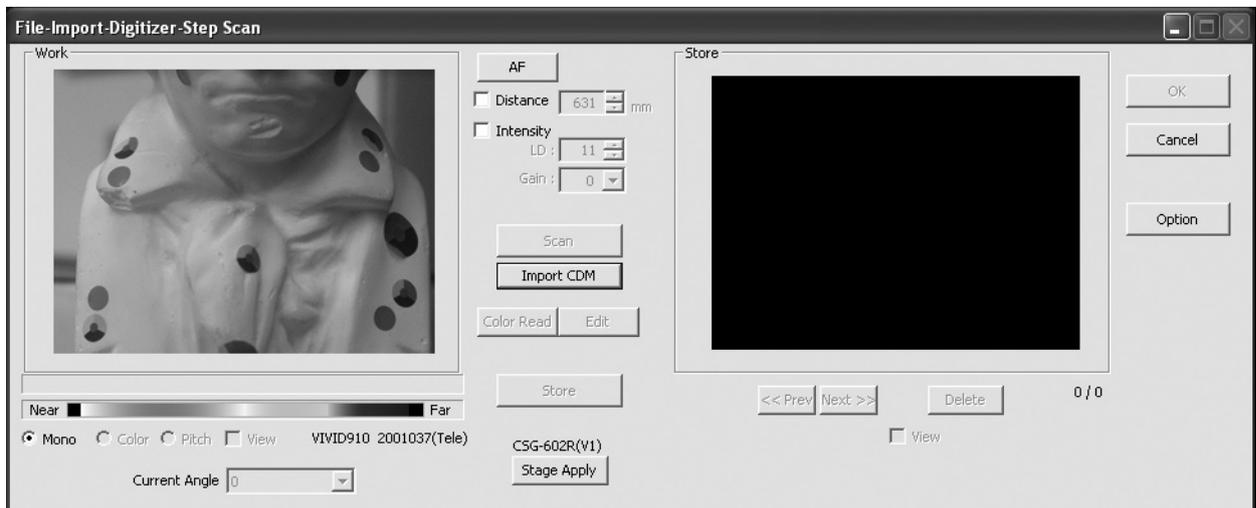
## ■ When Using Only the Rotating Stage

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

- The monochrome monitor image captured by the VIVID 910 will appear in the Work window area of the dialog box.
- If the Model folder contains the Chart data that is considered to be appropriate, it will be imported automatically.



## 2 Place the object on the rotating stage.

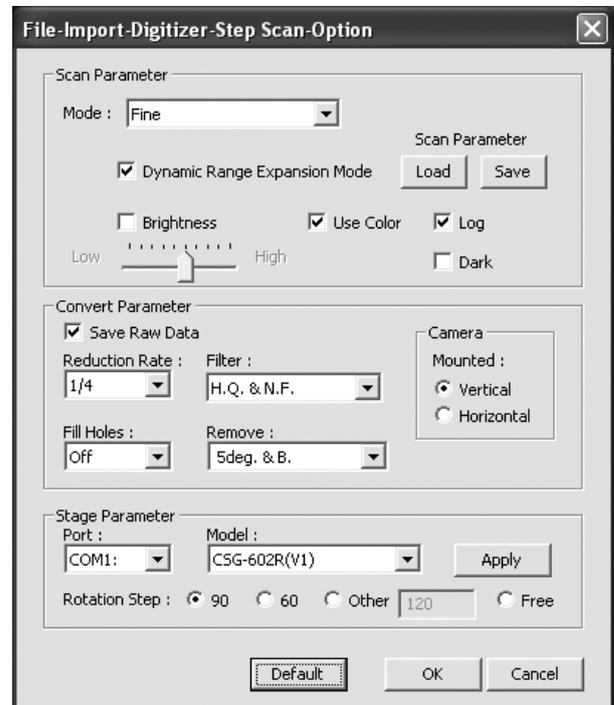
## 3 To display the object in the middle of the Work window area, change the position of the object or move the VIVID 9i back and forth to change the view angle.

**Memo**

If necessary, replace the lens attached to the VIVID 910.

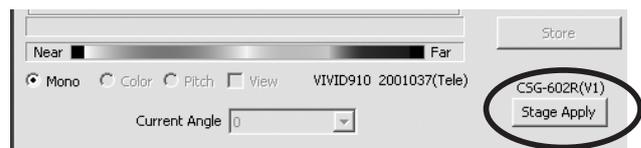
## 4 Click the [Option] button.

The [File-Import-Digitizer-Step Scan-Option] dialog box will appear.



**Memo**

- If rotary stage has already been used and if changing settings is not required, initialization of the rotary stage can be performed by clicking on the [Stage Apply] button in the [File-Import-Digitizer-Step Scan] dialog box. In this case, proceed to Step 8



## 5 Set optional parameters.

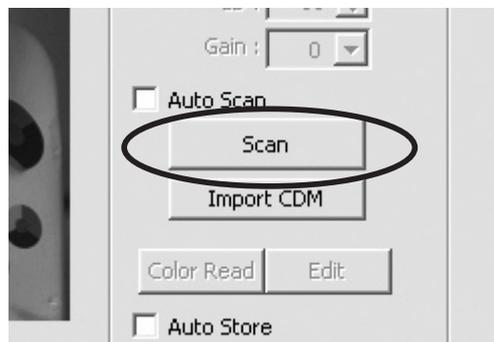
Item	Explanation
Scan Parameter	Sets the settings for scanning.
Convert Parameter	Sets the settings for three-dimensionalization.
Stage Parameter	Select the rotary stage to be used.
[Default] button	Clicking this restores the default settings.

**[Ref.]** For details, refer to the parameters (P.66) for [File-Import-Digitizer-Step Scan-Option] dialog box.

## 6 Click the [Apply] button to check whether the rotary stage has been initialized successfully.

If the rotary stage has been initialized successfully, the [Scan] button will be effective.

- If initialization is not successful, turn off the power to the rotary stage power, turn it on again, and then click on the [Apply] button.
- Select “Free” for [Rotation Step] in [Stage Parameter] field, and click [Apply]. If the stage has been recognized properly, a stage slide bar and [Chart Scan] button will be displayed at the bottom of the work window when the [File-Import-Digitizer-Step Scan-Option] dialog box is closed.



- If the rotary stage has already been used and if there is no need to change the settings, initialization of the rotary stage can be performed by clicking on the [Stage Apply] button in the [File-Import-Digitizer-Step Scan] dialog box instead of the [File-Import-Digitizer-Step Scan-Option] dialog box.



## 7 After necessary settings are made, click the [OK] button.

The settings will be set and the [File-Import-Digitizer-Step Scan-Option] dialog box will close.

## 8 Place the Calibration Chart on the rotating stage and scan the Calibration Chart.

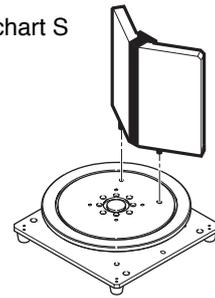
Position the chart with the black line facing the VIVID, and place it on the rotating stage so that both entire side surfaces are observed in the viewfinder.

- This step is not necessary if the Calibration Chart data has already been imported when this dialog box is opened.
- To acquire data from the object first then acquire the calibration chart data, perform steps 8 and 9 after completing step 14. In this case, select current chart angle from [Current Angle] and click [Scan] button, or click [Chart Scan] button to acquire chart data.
  - The [Chart Scan] button appears when “Free” is selected for [Rotation Step] in [File-Import-Digitizer-Step Scan-Option] dialog box.

### Note

After changing the setting orientation at Convert Parameter – Hardware Parameter on the [File-Import-Digitizer-Step Scan-Option] dialog box, the chart data must be acquired again before measuring.

Calibration chart S



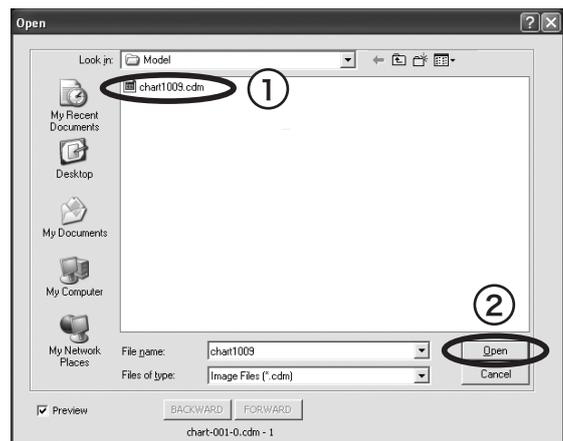
### Memo

If it is not possible to perform calibration using calibration chart S, use calibration chart M.

- Steps 9 and 10 are not necessary when importing existing the Calibration Chart data (i.e. data that has coordinate parameters). Clicking on the [Import CDM] button will open the file read dialog box.

The Calibration Chart data (chart\*\*\*\*.cdm) that has been saved can be imported.

- ① Select the file to be imported.
- ② Click on the [Open] button.



## 9 Click the [Scan] button.

The Calibration Chart will be scanned. When the data is recognized as Calibration Chart data successfully:

- ① The Calibration Chart data will be stored under the file name of chart\*\*\*\*.cdm (“\*\*\*\*” are the last four digits of the main unit’s serial number) in the Model folder.
- ② The data acquired from the subsequent scans will be coordinate-converted around the rotational axis.
- ③ The [AutoScan] checkbox will be displayed.

- An error message will be displayed if the data is not recognized as the Calibration Chart data successfully.
- When “Free” has been selected using the [Rotation Step] of the [Stage Parameter], please use the [Chart Scan] button instead of the [Scan] button.

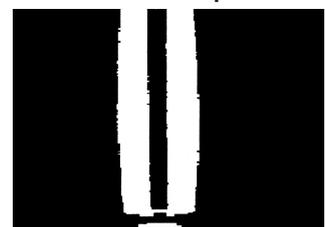
### Note

Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.

Good example



Bad example

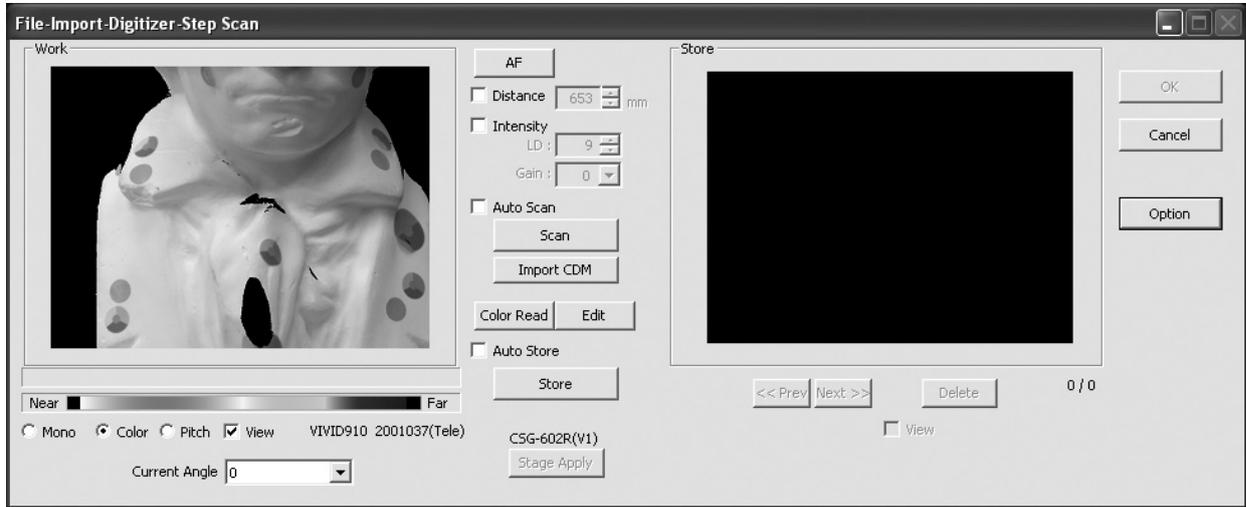


**10 Click the [Scan] button to acquire the first scan data.**

A scan will start, and a color image will be displayed in the Work window area.

**Memo**

If [Use Color] is not checked (i.e. no check mark is shown), the scan data has no color image data, and a gray-scale image will be displayed instead of a color image.



- If the [Auto Scan] checkbox is checked, the second and subsequent scans will be carried out automatically.
- If the [Auto Store] checkbox is checked, a store will be carried out automatically at the end of scan.

- Clicking on the following radio buttons will make a change to the image displayed in the work window. The data acquired during the scan will remain unchanged.

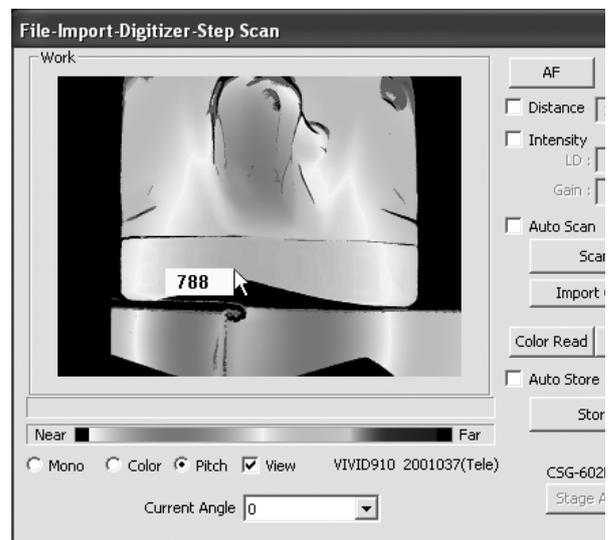
Item	Explanation
[Mono] radio button	The current image is displayed in monochrome.
[Color] radio button	The color image acquired from the scan is displayed.
[Pitch] radio button	The distance data is displayed in the color that is shown in the Near-Far color slide bar according to the distance from the object to the digitizer.

- Clicking the [Color Read] button will re-scan for the color data only. The distance data will not be updated.

- Clicking the [Edit] button enables you to delete the area that is not necessary for three-dimensionalization by specifying it using the mouse. Messages will appear at the bottom of the Work window area as shown right, so follow them to operate the mouse. Click the [Edit] button again to exit the edit mode.



- Switch to pitch display screen, and right-click on desired position in the screen while holding down [CTRL] key. The Z-axis coordinates at that position (distance from VIVID 910) will appear. To specify distance manually and perform measurement, this value must be used.

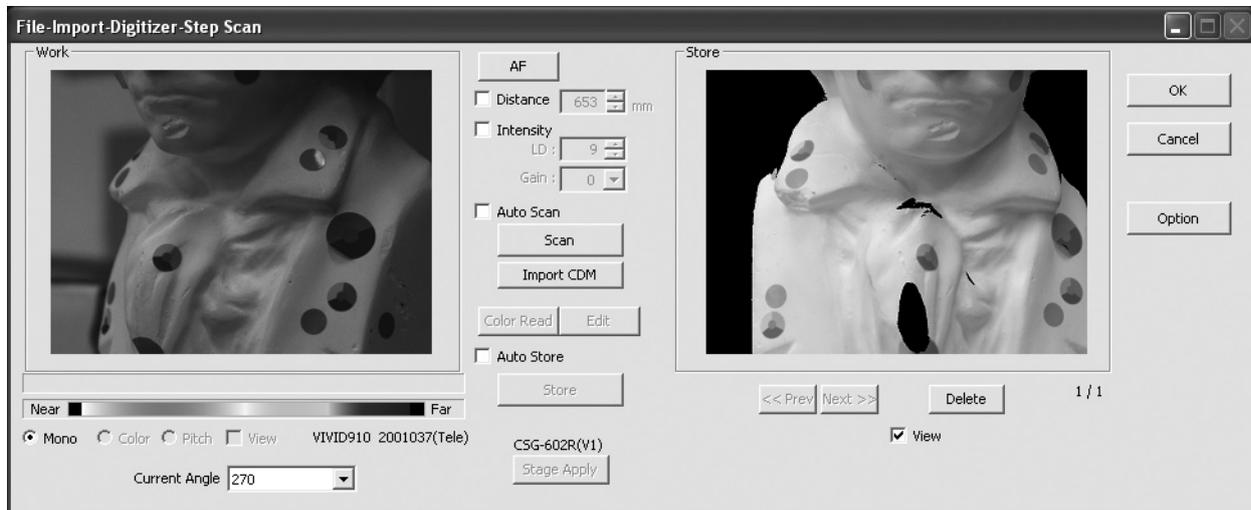


**11 Click on the [Store] button.**

The color data displayed in the Work window area will appear in the Store window area.

**Note**

*The [Store] button will be disabled (displayed in gray) when clicked once. This will prevent the same Work window area's data from being stored repeatedly.*



- By clicking on the [Store] button, each shot data other than the Calibration Chart data will be coordinate-converted around the rotational axis and displayed three-dimensionally in the element view window. If a setting other than “Free” is selected for [Rotation Step], the rotary stage will rotate at specified angles automatically. The angle shown in [Current Angle] will automatically be updated at the same time.
- This step is not necessary if the [Auto Store] checkbox has been checked.

**12 Click on the [Scan] button to acquire the second data.****Note**

*If “Free” is selected for [Rotation Step] in the [File-Import-Digitizer-Step Scan-Option] dialog box, the rotary stage must be rotated to the desired angle using the slide bar in advance.*

**13 Click on the [Store] button.**

The data displayed in the Work window area will appear in the Store window area. If the corresponding points have been properly designated, all the stored data will be displayed in 3-D in the element view window after it is registered and three-dimensionalized.

- This step is not necessary if the [Auto Store] checkbox has been checked.

## 14 Repeat Steps 12 to 13 until the desired corresponding points are designated.

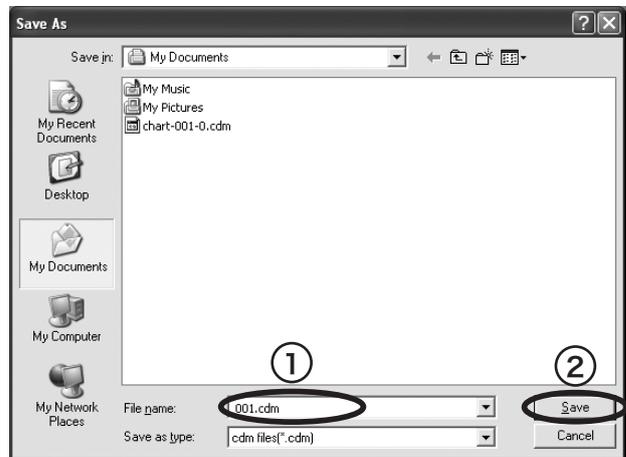
## 15 Click the [OK] button.

The data displayed in the element view window by the Store function will remain as is.

- If [Save Raw Data] checkbox in [File-Import -Digitizer-Step Scan-Option] dialog box has been checked, [Save As] dialog box will be displayed. The data will be saved as a CDM file.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

### Note

*The file name must consist of alphanumeric characters only.*



- Clicking on the [Cancel] button will delete the elements that were displayed in the store window when the [Store] button is clicked at the end of execution of this command.

Parameters for [File-Import-Digitizer-Step Scan] Dialog Box	
AF	Executes auto-focus. <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Distance	Checking this checkbox enables distance setting.
Intensity	Checking this checkbox enables LD and Gain setting. <ul style="list-style-type: none"> <li>• LD: Sets the laser power.</li> <li>• Gain: Sets the gain.</li> </ul>
Auto Scan	Checking this checkbox causes scan, store and stage control operations to be automatically performed sequentially.
Scan	Performs a scan. <b>Note</b> <i>This parameter is effective only when VIVID 910 is connected.</i>
Import CDK	Import the saved CDM data.
Color Read	Takes a color shot. Clicking this button at the end of scan will take a color shot again and display the updated color image. <b>Note</b> <i>This button is effective if the [Use Color] checkbox is checked.</i>
Edit	Clicking this button enables you to delete the area that is not necessary for three-dimensionalization by specifying it in the Work window area using the mouse.
Auto Store	Checking this checkbox performs store operation automatically at the end of scan operation.
Store	Registers the data present in the Work window area as store data, puts it into three-dimensional form and displays it in the element view window.
Mono/Color/Pitch	Switches display mode for the data currently displayed in the Work window area. <ul style="list-style-type: none"> <li>• Mono: The current image is displayed in monochrome. This parameter is effective only when VIVID 910 is connected.</li> <li>• Color: The color data acquired from the scan is displayed.</li> <li>• Pitch: The color display is done in accordance with the distance data from Near to Far.</li> </ul>
Current Angle	The current step angle is displayed. Normally, the angle is updated when a store operation is carried out, so additional operations are not necessary. When the step angle has been changed to the desired angle manually, data scan can be performed at the new step angles. <b>Memo</b> This item is not displayed if “Free” is selected for [Rotation Step].
Angle	Rotates the rotary stage to the desired angle using the slide bar. This item is displayed when the rotary stage has been initialized successfully.
Chart Scan	Used to scan the Calibration Chart data. <b>Memo</b> This item is displayed if “Free” is selected for [Rotation Step].
Stage Apply	Initializes the rotary stage.
Prev/Next	Switches from one stored data to another. [Prev] button: Displays the previous data. [Next] button: Displays the next data.
Delete	Deletes the stored data currently displayed in the Work or Store window area. The corresponding elements in the element view window are also deleted at the same time.
View	Displays/hides the data currently displayed in the Store window area into the element view window.
OK	Keeps the element data created during command execution and exits the <b>File-Import-Digitizer-One Scan</b> command. <b>Note</b> <i>If the [Save Raw Data] checkbox is checked, the data save dialog box is displayed.</i>
Cancel	Exits the <b>File-Import-Digitizer-One Scan</b> command. The element data created during command execution will be deleted.
Option	Displays the [File-Import-Digitizer-Step Scan-Option] dialogbox.

Parameters for [File-Import-Digitizer-Step scan-Option] Dialog Box	
<b>Scan Parameter</b>	
Mode	Select the scanning mode : FINE or FAST
Scan Parameter	<ul style="list-style-type: none"> <li>• Load: Loads the setting parameters from VIVID 910 and uses them as parameters for this command.</li> <li>• Save: Saves the parameters set by this command to VIVID 910 as the setting parameters.</li> </ul>
Dynamic Range Expansion Mode	If this button is checked, the program takes multiple shots so as to expand the dynamic range and reduce data loss. This button is displayed only for the VIVID 910.
Brightness	Checking this checkbox enables you to set the brightness of the image.
Use Color	Checking this checkbox takes a color shot when a scan is made.
Log	Performs log correction for the color data if this checkbox is checked. This correction is used to make neutral colors brighter.
Dark	Performs dark correction for the color data if this checkbox is checked. This correction is used when lines are noticeable in the color image.
<b>Convert Parameter</b>	
Save Raw Data	Checking this checkbox displays the data save dialog at the end of the <b>File-Import-Digitizer-Step Scan</b> command, allowing you to save the data.
Reduction Rate	Used to select the number of data points to be read from “1/1”, “1/4”, “1/9”, “1/16” and “No Polygon”.
Filter	<ul style="list-style-type: none"> <li>• None : Performs no correction for points when reading data. This can be set for User mode only.</li> <li>• Noise Filter (N.F.) : Reduces noise in points when reading data.</li> <li>• High Quality (H.Q.) : Deletes low-reliable data when reading data.</li> <li>• H.Q. &amp; N.F. : Reduces noise in points and deletes low-reliable data when reading data.</li> </ul>
Fill Holes	If “ON” is selected, points are generated in the holes that were produced as a loss of data so that the holes are filled.
Remove	Select the data to be deleted when reading data. <ul style="list-style-type: none"> <li>• None : Outputs the data without performing specific processing.</li> <li>• Boundary (B) : Outputs the data after deleting boundary points.</li> <li>• 5deg &amp; B./10dwtg &amp; B./15deg. &amp; B./20deg &amp; B.: Outputs the data after deleting the points present inside and at the boundary of the polygons that are angled within approximately 5, 10, 15 and 20 degrees to the vector of the line of view.</li> </ul>
Hardware Parameter	<ul style="list-style-type: none"> <li>• Vertical : Check this checkbox if using the VIVID unit in vertical orientation.</li> <li>• Horizontal : Check this checkbox if using the VIVID unit in horizontal orientation.</li> </ul> <p><b>Note</b> After changing the setting orientation, the Calibration Chart data of the rotating stage must be acquired again before measuring.</p>
<b>Stage Parameter</b>	
Select the Port and Model to be used and click the [Apply] button. The rotary stage will be initialized. If initialization is successful, the rotary stage can be controlled in the [File-Import-Digitizer-Step Scan] dialog box.	
Rotation Step	Select rotating angle for each step of rotary stage.
Default	Restores the default parameter settings.
OK	Closes the [File-Import-Digitizer-Step Scan-Option] dialog box. The settings will be set.
Cancel	Closes the [File-Import-Digitizer-Step Scan-Option] dialog box. The settings will be cancelled.

## File – Import – Digitizer – PC Card (When VIVID 910 is Selected)

### Importing Data from the Memory Card of VIVID 910

This command is used to remote-control the data stored in the memory card of the VIVID 910 (VI-910).

#### Note

This command does not operate on step-shot scan data in the memory card.

#### Memo

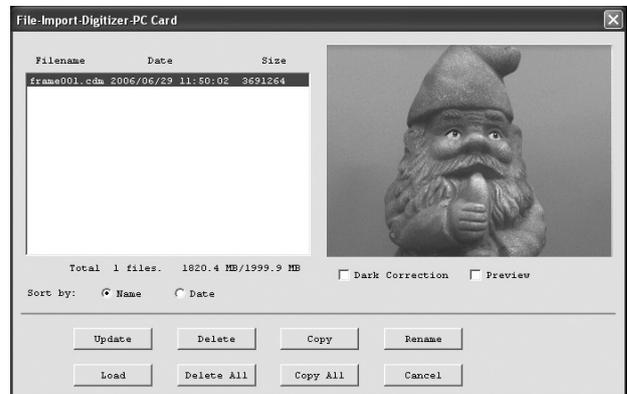
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

## Operating Procedure

### 1 From the [File] menu, select [Import], [Digitizer] and then [PC Card].

The [File-Import-Digitizer-PC Card] dialog box will appear.



#### Memo

- Only the raw image data (.cdm) scanned by the VIVID 910 (VI-910) or VIVID 900 (VI-900) will be displayed.
- Upper-case file names specified using the camera will be converted to lower-case file names when the files are imported to this software.

### 2 Select the file you want to import.

- To perform dark correction for the color data, check the [Dark Correction] checkbox.
- To display the preview image, check the [Preview] checkbox (so that a check mark appears in the check box). A color image of the selected file will be displayed.

#### Memo

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card] Dialog Box	
File name	Displays file names stored in the memory card.
Date	Displays the dates on which the files are stored in the memory card.
Size	Displays the size of each file (in bytes).
Total ** files	Displays the total number of camera data files stored in the memory card.
** MB/ ** MB	Displays the unoccupied capacity and total capacity of the memory card.

## ■ **Sorting the Files (Sort radio button)**

The [Name] and [Date] radio buttons are used to select whether file names are displayed alphabetically or by date.

### **Operating Procedure**

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### **1 Click the [Name] radio button to sort the files alphabetically or [Date] radio button to sort by date.**

Clicking the [Name] radio button will sort the files alphabetically, and clicking the [Date] radio button will sort them by date.

- When sort is complete, selection state of each file in the file list and preview image will be cleared.

## ■ **Updating the File List ([Update] button)**

The [Update] button is used to load the file names from the memory card to this software and update the file list. If the memory card is replaced while the [File-Import-Digitizer-PC Card] dialog box is open, be sure to click this button to update the file list.

### **Operating Procedure**

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### **1 Click the [Update] button.**

All the file names in the memory card will be loaded to the software and a new file list will be displayed.

## ■ Loading the Selected Data ([Load] button)

The [Load] button is used to load the data of the selected file from the memory card to the software.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the name of the file you want to load.

#### 2 Click the [Load] button.

A dialog box will appear, allowing you to enter the desired element name.

The file name in the memory card will be displayed as an element name.

#### 3 Change the element name if necessary, and set the parameters.



- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to program to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- Use the [Remove] pull-down menu to select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.

#### 4 Click the [OK] button.

The data of the selected file will be loaded and displayed in the element view window. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden.

#### **Memo**

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card-Load] Dialog Box

Element name	Enter the desired element name.
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is On, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”  None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: The program does not perform filtering when importing the data.  Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.  High Quality (H.Q.): The program filters out unreliable data.  H.Q & N.F.: Applies both noise filter and high quality filter.

## ■ Deleting the Selected File ([Delete] button)

The [Delete] button is used to delete the selected file from the memory card.

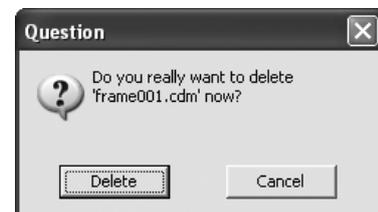
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

- 1 From the file list, select the name of the file you want to delete.

- 2 Click the [Delete] button.

A message dialog box will appear.



- 3 Click the [Delete] button.

The file will be deleted.

## ■ Deleting All the Files ([Delete All] button)

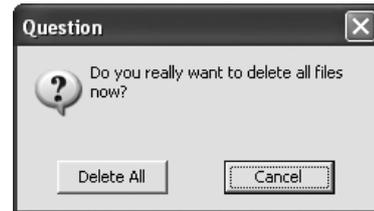
The [Delete All] button is used to delete all the files from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Delete All] button.

A message dialog box will appear.



#### 2 Click the [Delete All] button.

All the files in the memory card will be deleted.

#### Note

*All the files in the memory card will be deleted, irrespective of whether or not they are currently selected in the file list.*

## ■ Saving the Selected File ([Copy] button)

The [Copy] button is used to copy the selected file from the memory card and save it as camera data.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the name of the file you want to save.

#### 2 Click the [Copy] button.

The [PC Card-Copy] dialog box will appear. The copy destination directory and names of the files present in that directory will be displayed.

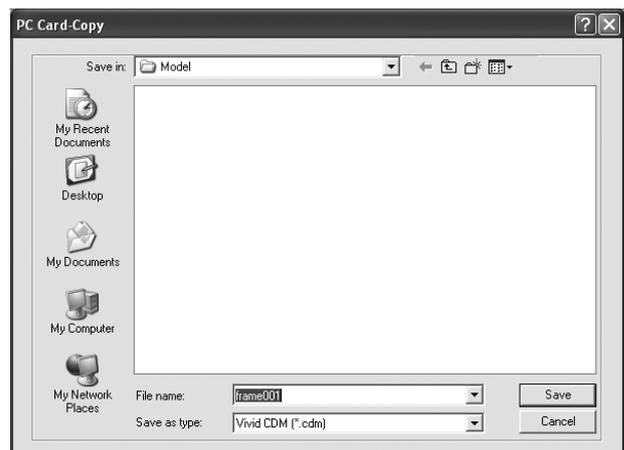
#### 3 Change the directory and file name if necessary.

#### Note

*The file name must consist of alphanumeric characters only.*

#### 4 Click the [Save] button.

All the files will be saved as camera data.



## ■ Saving All the Files ([Copy All] button)

The [Copy All] button is used to copy the data of all the files from the memory card and save them as camera data.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Copy All] button.

The [File-Import-Digitizer-PC Card-Copy All] dialog box will appear.

The copy destination directory will be displayed.

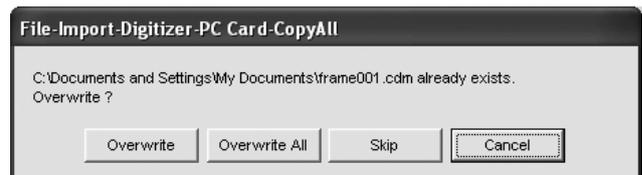


#### 2 Change the directory if necessary.

#### 3 Click the [OK] button.

All the files will be saved as camera data.

- If a file(s) having the same name exists, a message dialog box will appear.



- Clicking the [Overwrite] button will overwrite the file which is currently displayed in the message dialog box.
- Clicking the [Overwrite All] button will overwrite the file which is currently displayed in the message dialog box as well as all the remaining files having the same names at once. The message dialog box will not be displayed for those remaining files.
- Clicking the [Skip] button will ignore the file displayed in the dialog box and proceed to the next file on the file list.
- Clicking the [Cancel] button will close the dialog box without saving the files displayed in the dialog box.

## ■ Changing the Selected File Name ([Rename] button)

The [Rename] button is used to change the name of the file selected from the memory card.

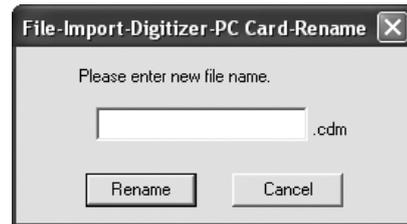
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

**1 From the file list, select the name of the file you want to save.**

**2 Click the [Rename] button.**

The [File-Import-Digitizer-PC Card-Rename] dialog box will appear.



**3 Enter the new name and click the [Rename] button.**

The file name will be changed.

#### Note

*Names of the files stored in the memory card must consist of up to eight characters. Only alphabets, numerical numbers, bars “-” and underbars “\_” can be used. Lower-case characters contained in file names will be converted to upper-case characters.*



## File – Import – Digitizer – One Scan (When VIVID 900/910 is Selected)

Performing One Scan with the VIVID 910 or VIVID 900

This command is used to cause the VIVID 910 (VI-910) or VIVID 900 (VI-900) to scan the object one scan at a time using the remote control function of this software. If a rotating stage has been selected, rotation of the stage can also be controlled.

### Warning

- Never stare into the laser emitting window.
- Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Note

If the rotating stage does not operate correctly from the dialog box, turn OFF the stage, turn it ON again, and then try to operate it.

#### Memo

- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.
- Note that although this version of the software supports simultaneous use of two VIVID 910 or VIVID 900 units, the software can only access the memory card located in the unit with the higher SCSI ID.

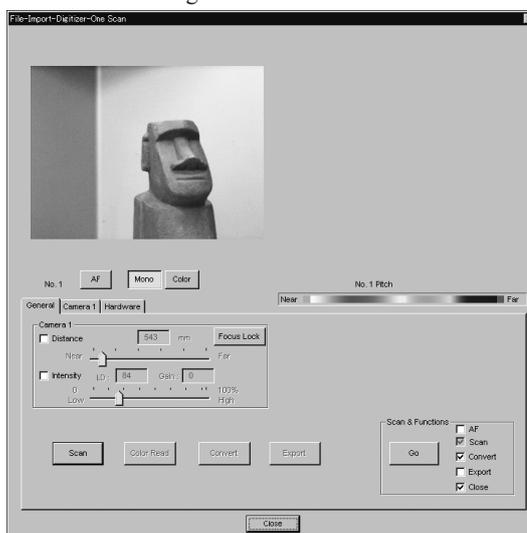
**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [One Scan].

The [File-Import-Digitizer-One Scan] dialog box will appear.

- The monochrome monitor image currently captured by the VIVID 910 or VIVID 900 will appear in the image area of the dialog box.



#### 2 Set an object in place.

If you are going to use the rotating stage, place the object on it.

#### 3 To display the object in the middle of the image area, change the position of the object or move the instrument back and forth to change the view angle.

#### Memo

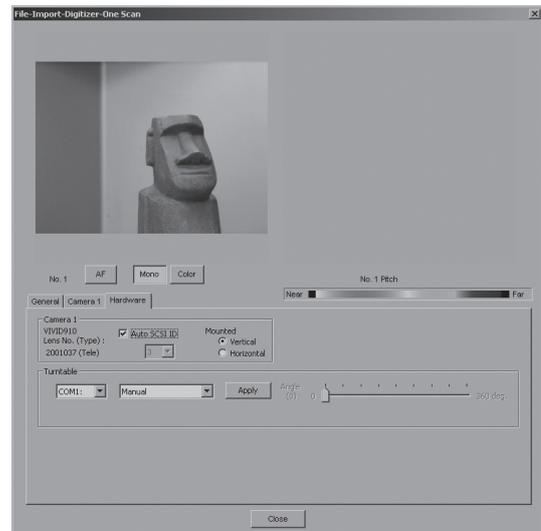
If necessary, replace the lens attached to the VIVID.



#### 4 In the [Camera1] tab, select the desired scan mode (Fine or Fast).

**5** If you are going to use the turntable, set the serial port and rotating stage type to be used under the Hardware tab.

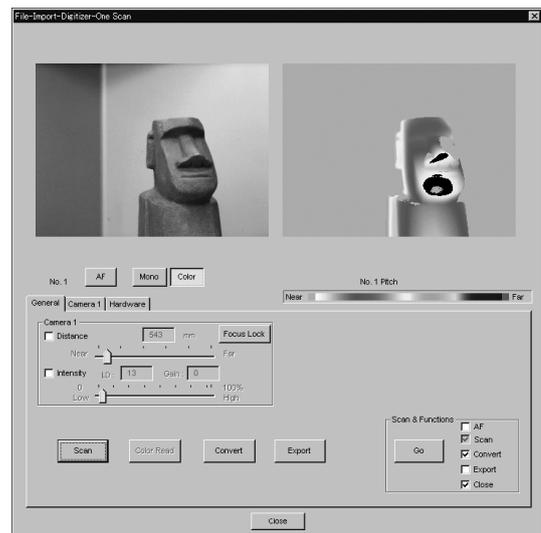
**6** Set optional parameters.



**7** In the [General] tab, click the [Scan] button.

Scan will start, and both color and range images will be displayed.

- If the color and range images are not scanned at the same time, clicking the [Color Read] button or double-clicking on the image will capture a color image and display it.
- Dragging the mouse on the color image will enlarge the image. If necessary, enable color correction such as “Dark”, “Log” and “Smooth” in the [Camera1] tab, and load the color image again.
- To restart scan, repeat steps 2 to 4. If necessary, click the [Mono] button to display a monochrome image.

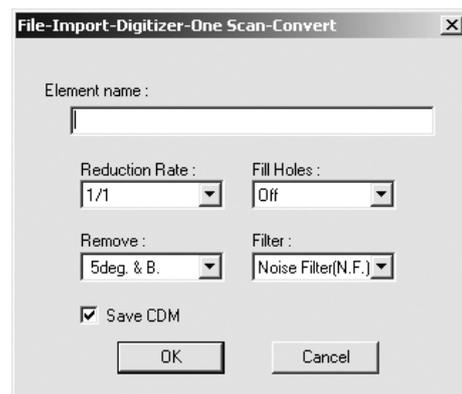


**Memo**

- In the range image, areas comprised of regular data are shown in color.
- In High Quality mode, data for which laser intensity was too high are displayed in bright gray, while data for which intensity was too low are displayed in dark gray.

**8** In the [General] tab, click the [Convert] button.

The [File-Import-Digitizer-One Scan-Convert] dialog box will appear.



## 9 Enter the desired element name, and set parameters.

### Note

The element name must consist of up to 31 characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- To save the raw scan data (.cdm) when importing data, check the [Save CDM] checkbox.

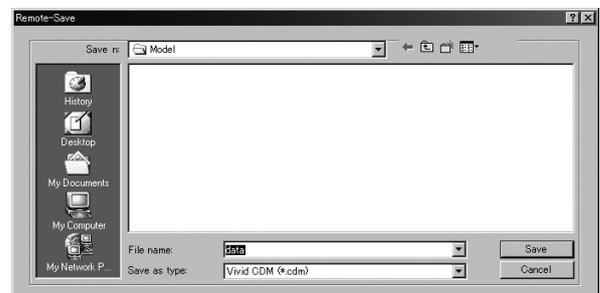
## 10 Click the [OK] button.

The scanned image will be displayed. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If the [Save CDM] checkbox was checked at step 9, the [Remote-Save] dialog box will appear.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

### Note

The file name must consist of alphanumeric characters only.



Parameters for [File-Import-Digitizer-One Scan] Dialog Box	
AF	Executes auto-focus.
Mono	Displays a monochrome monitoring image.
Color	Takes and displays a color picture.
Pitch	Displays previously scanned pitch image. (This button appears only if you are using two inter-connected VIVID units.)
General Tab	
Distance	Checking this checkbox sets [Distance] on.
Intensity	Checking this checkbox sets [LD] and [Gain] on.
LD	Sets the intensity of the laser beam.
Gain	Sets the gain.
Focus Lock	Locks the focus. When you select this item, the program automatically places checks in the [Distance] and [Intensity] checkboxes, and displays the currently set position, the current laser-beam intensity, and the gain value.
Scan	Executes scanning from the VIVID unit.
Color Read	When you press this button after taking a scan, the program takes a color shot and updates the picture on the display. This button is effective only after scanning, and only if [Use Texture] is checked and [Auto Read] is unchecked.
Convert	Use when you want the program to load camera data. Opens the [File-Import-Digitizer-One Scan-Convert] dialogbox.
Export	Export scanned data in various data formats.
Go	Sequentially executes those of the following functions that are checked: [AF], [Scan], [Convert], [Export], and [Close].
Camera 1 Tab	Note that the program runs a SCSI check when the dialog tabs are generated. If the check reveals that two camera units are connected, the dialog will display a [Camera 2] tab as well as the [Camera 1] tab. The control content of both tabs will be identical.
Log	If this checkbox is checked, the program applies log correction for color data. Use when you want to brighten up neutral color.
Smooth	If this checkbox is checked, the program applies smoothing to color data. Use if illumination is low and the image is unclear.
Dark	If this checkbox is checked, the program applies dark correction to color data. Use if you are getting striation-type noise in the images.
Color Level	Checking this checkbox sets the program to use color exposure level.
Threshold	Checking this checkbox sets the program to use a threshold for distance-image creation.
Fine/Fast	Selects the scan mode.
Dynamic Range Expansion Mode	If this checkbox is checked, the program takes multiple shots so as to expand the dynamic range and reduce data loss. This button is displayed only for the VIVID 910.
High Quality Mode	If this checkbox is checked, the program includes display of low-reliability data. On the range image, data for which laser intensity was too high appear in light gray, while data for which intensity was too low are shown in dark gray. This checkbox appears only if you using the VIVID 910.
Use Texture	Checking this checkbox enables use of color images when converting and exporting. <i>/Memo/</i> Note that if you use the [Go] button, the program will automatically load color data after scanning, regardless of whether [Auto Read] is checked.
Auto read	Checking this checkbox enables auto-read operation. If auto-read is enabled, the program will load data after scanning (after the [Scan] button is clicked), with no need to click the [Color Read] button.
Scan loop	Sets the number of scan iterations when taking multiple scans.
Auto Load Parameters	Causes the command to automatically load the parameter settings saved by the [Save Parameters] feature.
Save Parameters	Saves the parameter settings entered in the [Camera 1] tab.
Load Parameters	Loads the parameter settings saved by the [Save Parameters] feature.

## Parameters for [File-Import-Digitizer-One Scan] Dialog Box

Hardware Tab	
Auto SCSI ID	Check this checkbox if you want the program to automatically check SCSI connections for VIVID units. If this checkbox is not checked, the program will recognize VIVID units at specified SCSI IDs only.
Mounted	<ul style="list-style-type: none"> <li>• <b>Vertical</b> : Check this checkbox if using the VIVID unit in vertical orientation.</li> <li>• <b>Horizontal</b> : Check this checkbox if using the VIVID unit in horizontal orientation.</li> </ul>
Apply	When you click the [Apply] button after selecting the serial port and rotating stage, the [Angle] slider becomes effective and stage control is enabled. <b>Note</b> <i>If connecting to a SKIDS-60YAW unit, select “CSG-602R(Ver.1.0)” from the pull-down menu. If connecting to a SKIDS-60YAW (Ver. 2.0) unit, select “CSG-602(Ver.2.0)”.</i>
Angle	This slider becomes enabled when the program determines that the rotating stage is operating normally. You can use the slider to control the stage’s rotation.

## Parameters for [File-Import-Digitizer-One Scan-Convert] Dialog Box

Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is “On”, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.” None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data. High Quality (H.Q.): The program filters out unreliable data. (Effective only when importing data that was scanned using the VIVID 910.) H.Q. & N.F.: Applies both noise filter and high quality filter. (Effective only when importing data that was scanned using the VIVID 910.)
Save CDM	Save the images as camera data.

## File – Import – Digitizer – Step Scan (When VIVID 900/910 is Selected)

### Performing Step Scan with the VIVID 910 or VIVID 900

This command is used to take two or more shots using the rotating stage via the remote control function of this software. If a rotating stage has been selected by the Turntable, rotation of the stage can also be controlled. After the necessary shots are taken, scan the calibration chart required for calibration of rotation. Data acquired from different angles will be subjected to registration, and the resulting data will appear.

#### Warning

-  Never stare into the laser emitting window.
-  Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### **Note**

*If the rotating stage does not operate correctly from the dialog box, turn OFF the stage, turn it ON again, and then try to operate it.*

#### **Memo**

- The calibration chart is an accessory of the rotating stage set.
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.
- If you have connected multiple VIVID 910 or VIVID 900 units, you can select the unit to be used by changing the SCSI ID. Note that the software can only load memory-card data from the VIVID unit with the highest SCSI ID.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

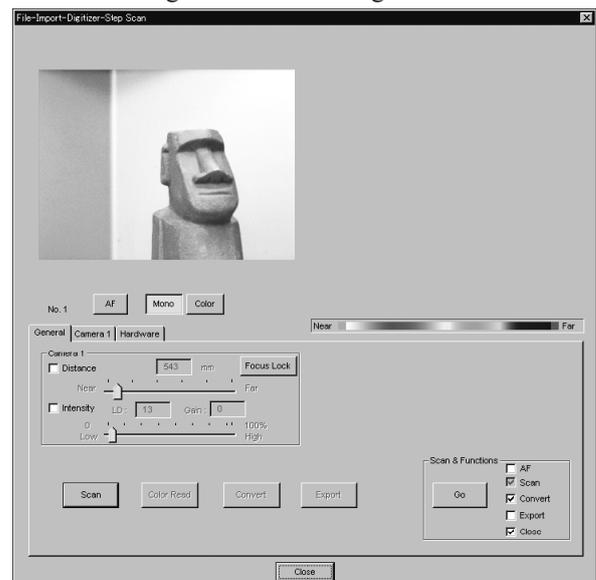
## When Using Only the Rotating Stage

### Operating Procedure

#### **1** From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

- The monochrome monitor image currently captured by the VIVID 910 or VIVID 900 will appear in the image area of the dialog box.



#### **2** Place the object on the rotating stage.

#### **3** To display the object in the middle of the image area, change the position of the object or move the VIVID digitizer back and forth to change the view angle.

#### **Memo**

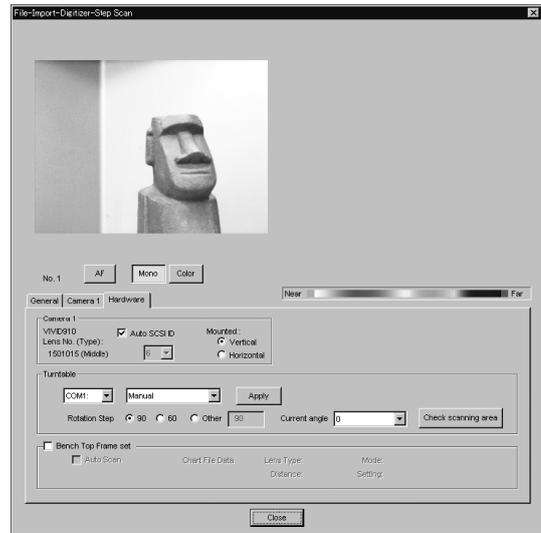
If necessary, replace the lens attached to the VIVID .

**4** In the [Hardware] tab, select the desired rotation step from “90”, “60” and “Other” so that the rotating stage will rotate at the selected step.

If “Other” is selected, enter the desired rotation angle.

**Note**

*The rotating stage may rotate in the opposite direction during measurement depending on its type.*



**Memo**

To check whether the object is scanned properly when it is rotated, click [Check scanning area].

While the rotating stage rotates at the step selected by Rotation Step, the monochrome image acquired from each angle will be displayed in the preview area.

When the rotating stage completes one turn, it will return to the home position and the check is complete.

If any problem is detected, repeat step 3.

**5** In the [Camera1] tab, select the desired scan mode (Fine or Fast).

**6** Set optional parameters.

**Note**

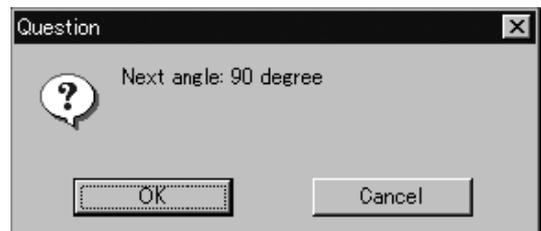
*If high measurement accuracy is required, set the distance parameter.*



**7** In the [General] tab, click the [Scan] button.

Scan will start, and both color and range images will be displayed.

The “Next angle: \*\*degree” message dialog box will also appear.



**Memo**

- In the range image, areas comprised of regular data are shown in color.
- In High Quality mode, data for which laser intensity was too high are displayed in bright gray, while data for which intensity was too low are displayed in dark gray.
- If the color and range images are not scanned at the same time, clicking the [Color Read] button or double-clicking on the image will capture a color image and display it.
- Dragging the mouse on the color image will enlarge the image. If necessary, enable color correction such as “Dark”, “Log” and “Smooth”, in the [Camera1] tab and load the color image again.
- If the type of rotating stage has not been designated, turn the rotating stage manually to the next angle displayed in the “Next angle:\*\* degree” message dialog box.

**8 Click the [OK] button.**

The next specified angle will appear in [Current angle], and the object will be scanned for the next image.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

- To cancel scan, click the [Cancel] button instead of the [OK] button, and repeat steps 6 to 8.

**Note**

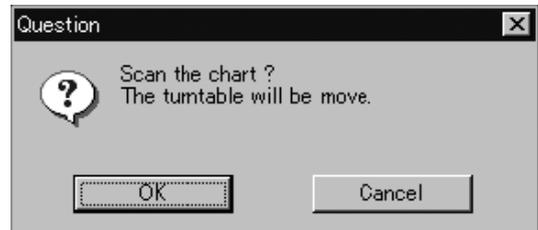
*The rotating stage may rotate in the opposite direction during measurement depending on its type.*

**9 Repeat step 8 until shots from all the desired angles are captured.**

When shots from all the desired angles are captured, the “Scan the chart ? The turntable will be move.” message dialog box will appear.

- Click the [OK] button. The rotating stage will start to rotate toward the angle (home position) where the calibration chart is to be measured. When the rotating stage has reached that angle (home position), the “Scanning the Calibration Chart.” message dialog box will appear.

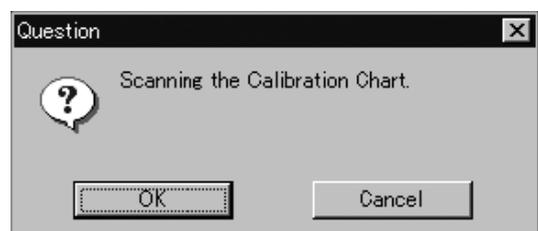
- Click the [OK] button. The rotating stage will start to rotate toward the angle (home position) where the calibration chart is to be measured. When the rotating stage has reached that angle (home position), the “Scanning the Calibration Chart.” message dialog box will appear.



- If you want to acquire a shot again, click the [Cancel] button to close the dialog box, click the angle currently displayed in [Current] with the left mouse button, then select the desired angle among those which have been set from the pulldown menu that appears.

**Memo**

If an angle (rotation step) has been selected at step 4, necessary steps (angles) to complete 360 degrees will be displayed in the pull-down menu. However, it is not necessary to scan at all the angles. You can select necessary steps (angles) only.

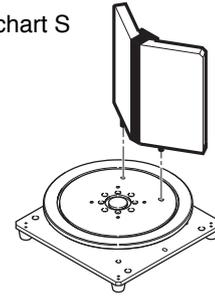


## 10 Place the calibration chart on the rotating stage.

When the “Scanning the Calibration Chart.” message dialog box appears, position the chart with the black line facing the VIVID, and place it on the rotating stage so that both entire side surfaces are observed in the view-finder.

- If “Chart” is not displayed in [Current angle], click the left mouse button and select “Chart” from the pull-down menu that appears.

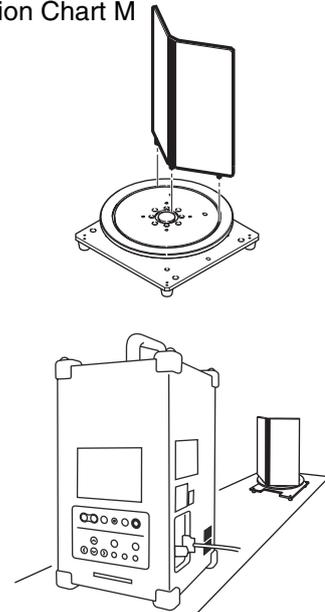
Calibration chart S



**Memo**

If it is not possible to perform calibration using calibration chart S, use calibration chart M.

Calibration Chart M



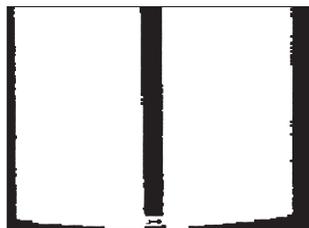
## 11 Click the [OK] button.

The calibration chart will be scanned.

**Note**

*Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.*

Good example

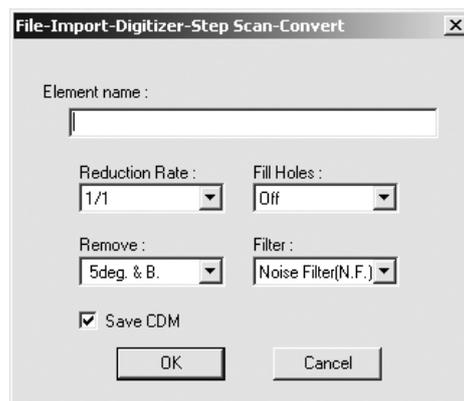


Bad example



## 12 Click the [Convert] button.

The [File-Import-Digitizer-Step Scan-Convert] dialog box will appear.



### 13 Enter the desired element name, and set parameters.

**Note**

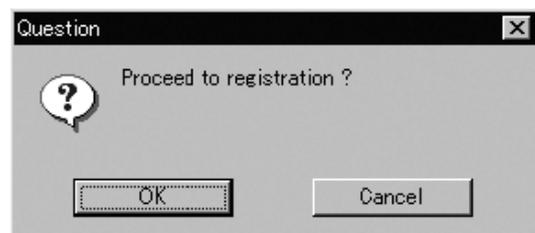
The element name must consist of up to 31 alphanumeric characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- If you want to save the raw scan data (.cdm) when importing, check the [Save CDM] checkbox.

### 14 Click the [OK] button.

Each scanned image will be subjected to registration and displayed, and the “Proceed to registration?” message dialog box will appear. The element list will also show the element name specified at step 13 plus “rotation step”. The element name is highlighted, indicating that it is currently selected.

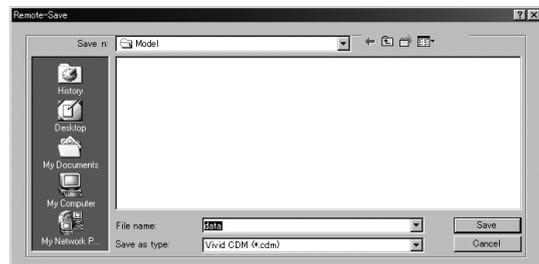
- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed (i.e. the windows that are not set to “Selective”).
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If a rotating stage has been designated, the rotating stage will rotate back to the original position before data reading starts.



- If the [Save CDM] checkbox was checked at step 13, the [Remote-Save] dialog box will appear before the dialog box that asks whether you want to perform fine-registration.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

The file name must consist of alphanumeric characters only.



### 15 Click the [OK] button.

Fine-registration of the element position will be performed and the data will be displayed again.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

- If you are not going to perform fine-registration, click the [Cancel] button instead of the [OK] button.

**Memo**

Fine-registration can be cancelled even if it has started, by clicking the [Cancel] button in the dialog box that appears during fine-registration.

## ■ When Using the Bench Top Frame Set

### **Memo**

The VIVID 910 or VIVID 900 can be mounted on the bench top frame set vertically or horizontally.

For the mounting method, refer to the instruction manual of the frame set.

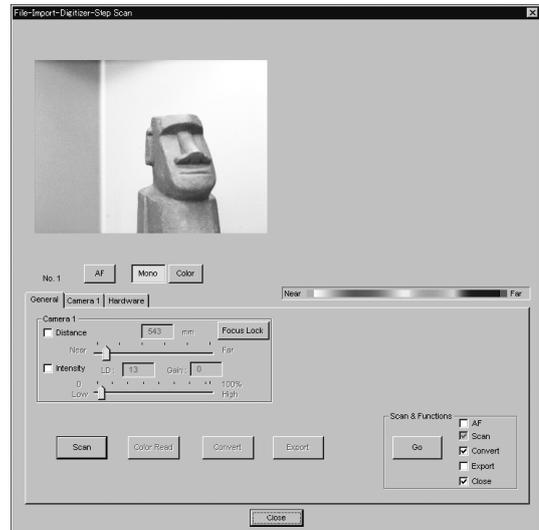
Saving the calibration chart data helps you reduce work time when scanning different objects under the same conditions.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

- The monochrome monitor image currently captured by the VIVID 910 or VIVID 900 will appear in the image area of the dialog box.



### **Memo**

If the VIVID digitizer is mounted horizontally, the preview image will be in portrait form.

After the image is converted to 3D, it will be displayed according to the coordinate system of the VIVID.

#### 2 Select the desired installation direction of the VIVID digitizer.

From the [Hardware] tab, check the [Bench Top Frame set] checkbox, and select the VIVID digitizer installation direction by clicking the corresponding [Mounted] radio button.

Select [Vertical] if the VIVID 910 or VIVID 900 is mounted vertically, or select [Horizontal] if it is mounted horizontally.

#### 3 Place the object on the rotating stage.

### **Note**

If the VIVID digitizer is mounted on the frame set horizontally, the object will be affected by repeated reflection on the rotating stage surface, preventing correct scan operation. To prevent this, place an appropriate item of the following thickness under the object to raise it.

Measurement Distance	Thickness of Item
600 mm	Approx. 30 mm
1000 mm	Approx. 20 mm

#### 4 To display the object in the middle of the image area, change the position of the object or move the instrument back and forth to change the view angle.

### **Memo**

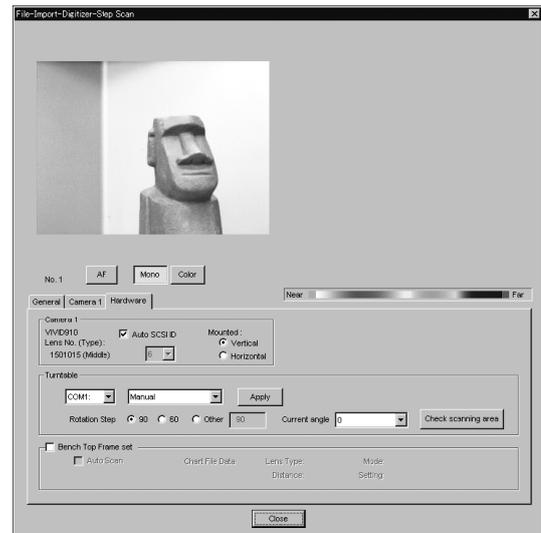
If necessary, replace the lens attached to the VIVID digitizer.

- 5** In the [Hardware] tab, select the desired rotation step from “90”, “60” and “Other” so that the rotating stage will rotate at the selected step.

If “Other” is selected, enter the desired rotation angle.

**Note**

The rotating stage may rotate in the opposite direction during measurement depending on its type.



- 6** In the [Camera1] tab, select the desired scan mode (Fine or Fast).

**Memo**

To check whether the object is scanned properly when it is rotated, click [Check scanning area].

While the rotating stage rotates at the step selected by Rotation Step, the monochrome image acquired from each angle will be displayed in the preview area.

When the rotating stage completes one turn, it will return to the home position and the check is complete.

If any problem is detected, repeat step 4.

- 7** Set optional parameters.

**Note**

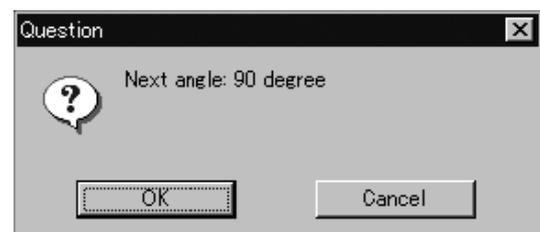
If high measurement accuracy is required, set the distance parameter in the [General] tab.



- 8** In the [General] tab, click the [Scan] button.

Scan will start, and both color and range images will be displayed.

The “Next angle: \*\*degree” message dialog box will also appear.



- If the color and range images are not scanned at the same time, clicking the [Color Read] button or double-clicking on the image will capture a color image in the [General] tab in the [File-Import-Digitizer-Step Scan] dialog box and display it.
- Dragging the mouse on the color image will enlarge the image. If necessary, enable color correction such as “Dark”, “Log” and “Smooth”, and load the color image again.
- If the type of rotating stage has not been designated, turn the rotating stage manually to the next angle displayed in the “Next angle: \*\*degree” message dialog box.

**Memo**

Step 8 and subsequent steps can be processed automatically. (For details, refer to page 90.)

## 9 Click the [OK] button.

The next specified angle will appear in [Current angle], and the object will be scanned for the next image.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

**Note**

The rotating stage may rotate in the opposite direction during measurement depending on its type.

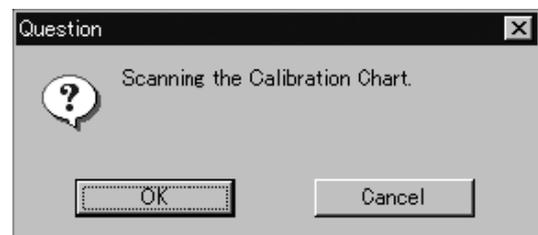
- To cancel scan, click the [Cancel] button instead of the [OK] button, and repeat steps 6 to 8.

## 10 Repeat step 9 until shots from all the desired angles are captured.

When shots from all the desired angles are captured, the “Read the chart data ?” message dialog box will appear.

If calibration chart data already exists, click the [OK] button to import it. After the data has been imported, proceed to step 13.

If you click the [Cancel] button, the “Scan the chart? The turntable will be move.” message dialog box will appear. If you click [OK] button the stage will move to the angle that allows measurement of the calibration, and the “Scanning the Calibration Chart.” message dialog box will appear.

**Note**

If no chart data exists or the existing chart data does not match the measurement conditions, the following error messages will appear.

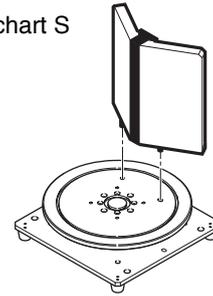


## 11 Place the calibration chart on the rotating stage.

Position the chart with the black line facing the VIVID digitizer, and place it on the rotating stage so that both entire side surfaces are observed in the viewfinder.

- If “Chart” is not displayed in [Current angle], click the left mouse button and select “Chart” from the pull-down menu that appears.

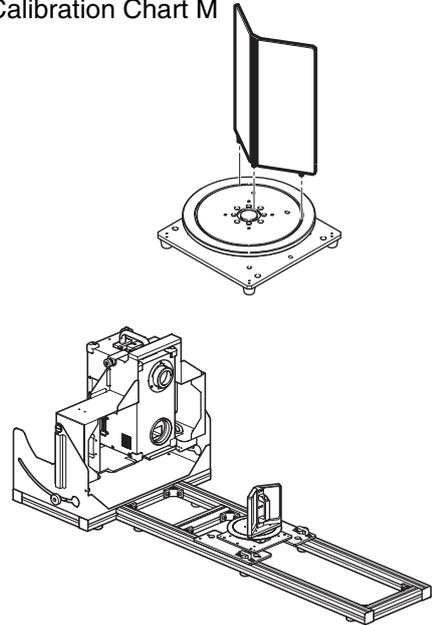
Calibration chart S



### Memo

If it is not possible to perform calibration using calibration chart S, use calibration chart M.

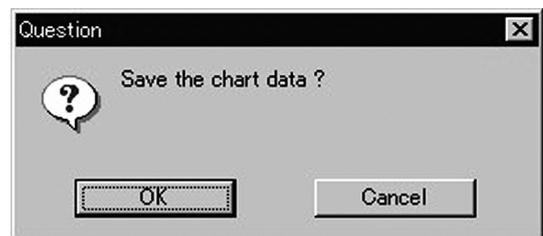
Calibration Chart M



## 12 Click the [OK] button.

The calibration chart will be scanned, and the “Save the chart data ?” message dialog box will appear.

To save the calibration chart data, click the [OK] button.



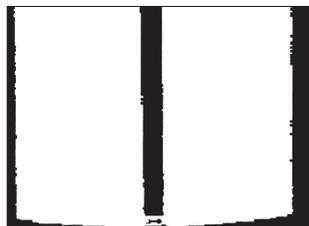
### Memo

Saving the calibration chart data helps you reduce work time when scanning different objects under the same conditions.

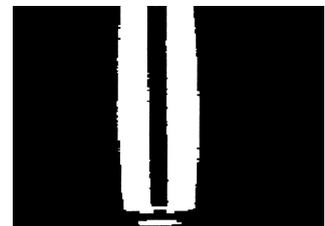
### Note

- *If accurate data is required, it is recommended that calibration be performed each time.*
- *Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.*

Good example

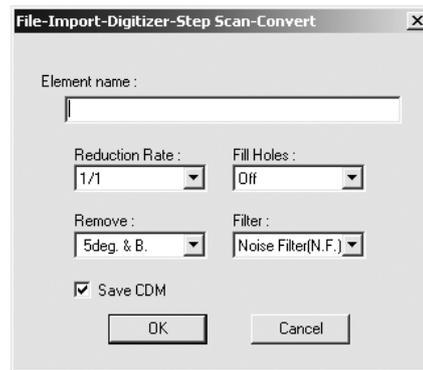


Bad example



**13 Click the [Convert] button.**

The [File-Import-Digitizer-Step Scan-Convert] dialog box will appear.

**14 Enter the desired element name, and set parameters.****Note**

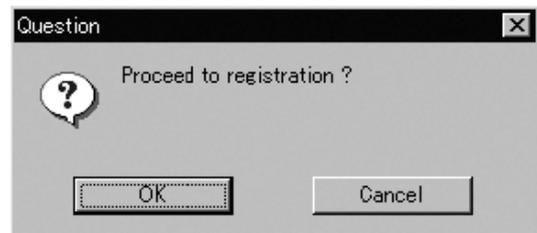
The element name must consist of up to 31 alphanumeric characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16”, and “No polygon”, by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- If you want to save the raw scan data (.cdm) when importing, check the [Save CDM] checkbox.

**15 Click the [OK] button.**

Each scanned image will be subjected to registration and displayed, and the “Proceed to registration?” message dialog box will appear. The element list will also show the element name specified at step 14 plus “rotation step”. The element name is highlighted, indicating that it is currently selected.

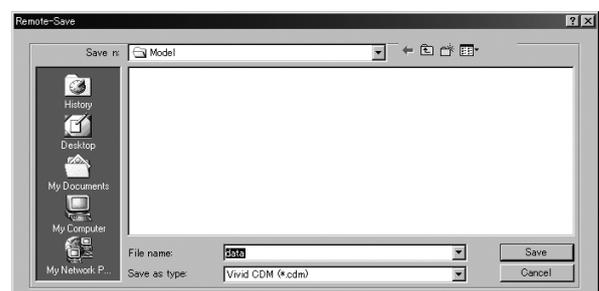
- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed (i.e. the windows that are not set to “Selective”).
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If a rotating stage has been designated, the rotating stage will rotate back to the original position before data reading starts.



- If the [Save CDM] checkbox was checked at step 14, the [Remote-Save] dialog box will appear before the dialog box that asks whether you want to perform fine-registration.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

The file name must consist of alphanumeric characters only.



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## 16 Click the [OK] button.

Fine-registration of the element position will be performed and the data will be displayed again.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

- If you are not going to perform fine-registration, click the [Cancel] button instead of the [OK] button.

### Memo

Fine-registration can be cancelled even if it has started, by clicking the [Cancel] button in the dialog box that appears during fine-registration.

## ■ Performing Scan Operations Automatically

If the bench top frame set is used and calibration chart data exists, a series of scan operations can be processed automatically.

### **Memo**

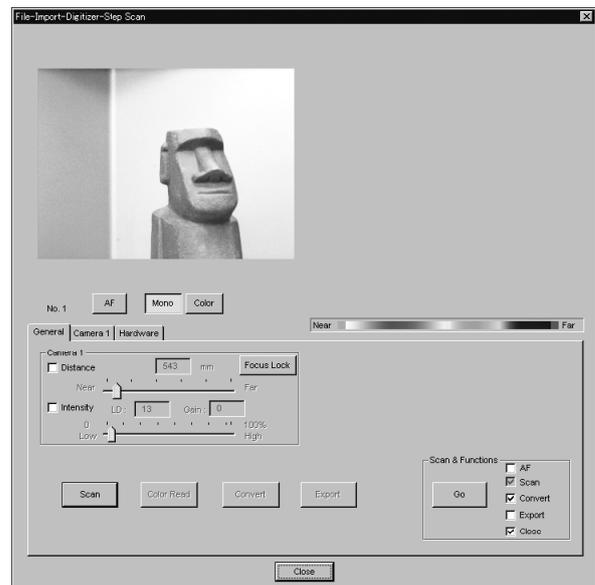
For details of how to save the calibration chart data, refer to page 87,88.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

- The monochrome monitor image currently captured by the VIVID 910 or VIVID 900 will appear in the image area of the dialog box.



### **Memo**

If the VIVID digitizer is mounted horizontally, the preview image will be in portrait form.

After the image is converted to 3D, it will be displayed according to the coordinate system of the VIVID.

#### 2 Select the desired installation direction of the VIVID digitizer.

From the [Hardware] tab, check the [Bench Top Frame set] checkbox, and select the VIVID digitizer installation direction by clicking the corresponding [Mounted] radio button.

Check the [Auto Scan] checkbox under the [Hardware] tab.

Select [Vertical] if the VIVID digitizer is mounted vertically, or select [Horizontal] if it is mounted horizontally.

#### 3 Place the object on the rotating stage.

### **Note**

*If the VIVID digitizer is mounted on the frame set horizontally, the object will be affected by repeated reflection on the rotating stage surface, preventing correct scan operation. To prevent this, place an appropriate item of the following thickness under the object to raise it.*

Measurement Distance	Thickness of Item
600 mm	Approx. 30 mm
1000 mm	Approx. 20 mm

#### 4 To display the object in the middle of the image area, change the position of the object or move the rotating stage back and forth to change the view angle.

### **Memo**

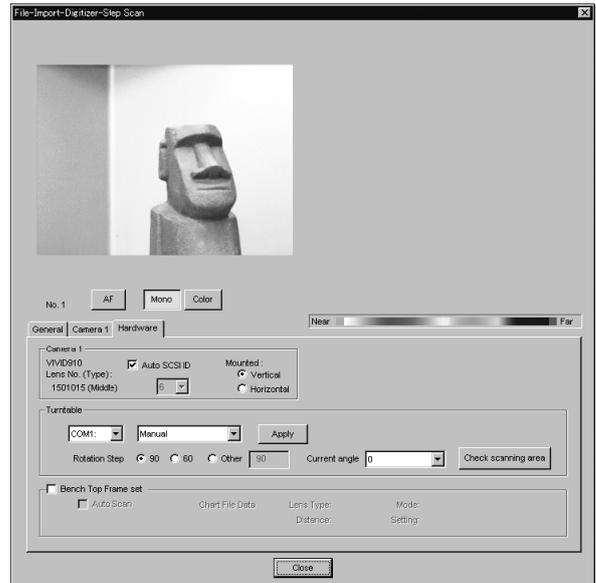
If necessary, replace the lens attached to the VIVID digitizer.

**5** In the [Hardware] tab, select the desired rotation step from “90”, “60” and “Other” so that the rotating stage will rotate at the selected step.

If “Other” is selected, enter the desired rotation angle.

**Note**

*The rotating stage may rotate in the opposite direction during measurement depending on its type.*



**Memo**

To check whether the object is scanned properly when it is rotated, click [Check scanning area].

While the rotating stage rotates at the step selected by Rotation Step, the monochrome image acquired from each angle will be displayed in the preview area.

When the rotating stage completes one turn, it will return to the home position and the check is complete.

If any problem is detected, repeat step 4.

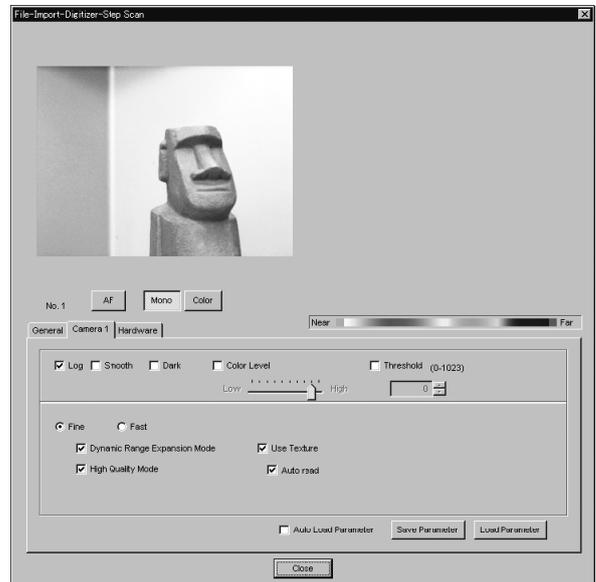
**6** In the [General] tab, select the desired scan mode (Fine or Fast).

**7** Set optional parameters.

- Check the [Convert] checkbox of the [Scan & Functions] in the [General] tab.

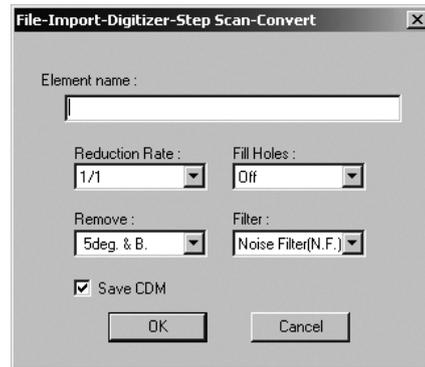
**Note**

*If high measurement accuracy is required, set the distance parameter in the [General] tab.*



## 8 In the [General] tab, click the [Go] button.

The [File-Import-Digitizer-Step Scan-Convert] dialog box will appear.



### **Note**

*If no chart data exists or the existing chart data does not match the measurement conditions, the following error messages will appear.*



## 9 Enter the desired element name, and set parameters.

### **Note**

*The element name must consist of up to 31 alphanumeric characters.*

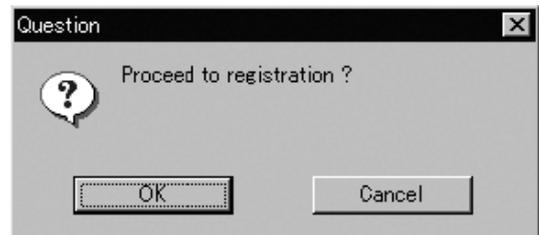
- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- If you want to save the raw scan data (.cdm) when importing, check the [Save CDM] checkbox.

**10 Click the [OK] button.**

the “Proceed to registration?” message dialog box will appear.

The element list will also show the element name specified at step 9 plus “rotation step”. The element name is highlighted, indicating that it is currently selected.

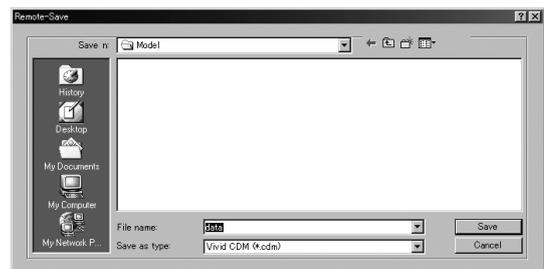
- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed (i.e. the windows that are not set to “Selective”).
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If a rotating stage has been designated, the rotating stage will rotate back to the original position before data reading starts.



- If the [Save CDM] checkbox was checked at step 9, the [Remote-Save] dialog box will appear before the dialog box that asks whether you want to perform fine-registration.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

*The file name must consist of alphanumeric characters only.*

**11 Click the [OK] button.**

The object will be scanned sequentially at the step selected by Rotation Step. Registration of the scanned images will be performed using the saved chart data to convert them to 3D data, and the result will be displayed.

**Note**

*The rotating stage may rotate in the opposite direction during measurement depending on its type.*

- If you are not going to perform fine-registration, click the [Cancel] button instead of the [OK] button.

Parameters for [File-Import-Digitizer-Step Scan]Dialog Box	
AF	Executes auto-focus.
Mono	Displays a monochrome monitoring image.
Color	Takes and displays a color picture.
General Tab	
Distance	Checking this checkbox sets [Distance] on.
Intensity	Checking this checkbox sets [LD] and [Gain] on.
LD	Sets the intensity of the laser beam.
Gain	Sets the gain.
Focus Lock	Locks the focus. When you select this item, the program automatically places checks in the [Distance] and [Intensity] checkboxes, and displays the currently set position, the current laser-beam intensity, and the gain value.
Scan (Auto Scan)	Causes the VIVID unit to execute a scan. If [Auto Scan] (in the [Hardware] tab) is checked, this name for this control becomes [Auto Scan].
Color Read	When you press this button after taking a scan, the program takes a color shot and updates the picture on the display. This button is effective only after scanning, and only if [Use Texture] is checked and [Auto Read] is unchecked.
Convert	Use when you want the program to load camera data. Opens the [File-Import-Digitizer-Step Scan-Convert] dialog box.
Export	Export scanned data in various data formats.
Go	Sequentially executes those of the following functions that are checked: [AF], [Scan], [Convert], [Export], and [Close].
Camera 1 Tab	
Log	If this checkbox is checked, the program applies log correction for color data. Use when you want to brighten up neutral color.
Smooth	If this checkbox is checked, the program applies smoothing to color data. Use if illumination is low and the image is unclear.
Dark	If this checkbox is checked, the program applies dark correction to color data. Use if you are getting striation-type noise in the images.
Color Level	Checking this checkbox sets the program to use color exposure level.
Threshold	Checking this checkbox sets the program to use a threshold for distance-image creation.
Fine/Fast	Selects the scan mode.
Dynamic Range Expansion Mode	If this checkbox is checked, the program takes multiple shots so as to expand the dynamic range and reduce data loss. This checkbox is displayed only for the VIVID 910.
High Quality Mode	If this box is checked, the program includes display of low-reliability data. On the range image, data for which laser intensity was too high appear in light gray, while data for which intensity was too low are shown in dark gray. This checkbox appears only if you using the VIVID 910.
Use Texture	Checking this checkbox enables use of color images when converting and exporting. <b>/Memo/</b> Note that if you use the [Go] button, the program will automatically load color data after scanning, regardless of whether [Auto Read] is checked.
Auto read	Checking this checkbox enables auto-read operation. If auto-read is enabled, the program will load data after scanning (after the [Scan] button is clicked), with no need to click the [Color Read] button.
Auto Load Parameters	Causes the command to automatically load the parameter settings saved by the [Save Parameters] feature.
Save Parameters	Saves the parameter settings entered in the [Camera 1] tab.
Load Parameters	Loads the parameter settings saved by the Save [Parameters] feature.

Parameters for [File-Import-Digitizer-Step Scan] Dialog Box	
Hardware Tab	
Auto SCSI ID	Check this checkbox if you want the program to automatically check SCSI connections for VIVID units. If this checkbox is not checked, the program will recognize VIVID units at specified SCSI IDs only.
Mounted	<ul style="list-style-type: none"> <li>• Vertical : Check this checkbox if using the VIVID unit in vertical orientation.</li> <li>• Horizontal : Check this checkbox if using the VIVID unit in horizontal orientation.</li> </ul>
Apply	To change the rotation stage being controlled: Select the appropriate serial port and rotation stage, and then click [Apply]. <b>Note</b> <i>If connecting to a SKIDS-60YAW unit, select “CSG-602R(Ver.1.0)” from the pull-down menu. If connecting to a SKIDS-60YAW (Ver. 2.0) unit, select “CSG-602(Ver.2.0)”.</i>
Rotation Step	Sets the rotational step, in degrees. You can set this to 90, to 60, or to “Other”. If you select “Other”, you can proceed to enter your own custom setting.
Current angle	Selects the scanning step (the scan angle). When the dialog box opens, the setting is “0”. To change the setting, left-click on the angle to open the pull-down menu, and then enter the scanning step (angle) that you wish to use. If you enter an angle that was already used for a scan and then proceed to click the [Scan] button, the new scan data will overwrite the previous data for that angle.
Check Scanning area	<b><i>Turns the rotating stage through the angle set by the Rotation Step setting, while displaying a monochrome image in the preview window.</i></b>
Bench Top Frame Set	Checking this item enables the [Auto Scan] function.
Auto Scan	The program automatically scans over the angle set by the [Rotation Step] setting, and automatically reads in the resulting camera data.
Chart File Data	Displays the information ([Lens Type], [Mode], [Distance], [Setting]) of the saved calibration data.

Parameters for [File-Import-Digitizer-Step Scan-Convert] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is “On”, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.” None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data. High Quality (H.Q.): The program filters out unreliable data. (Effective only when importing data that was scanned using the VIVID 910.) H.Q & N.F.: Applies both noise filter and high quality filter. (Effective only when importing data that was scanned using the VIVID 910.)
Save CDM	Save the images as camera data.

## File – Import – Digitizer – PC Card (When VIVID 900/910 is Selected)

### Importing Data from the Memory Card of VIVID 910 or VIVID 900

This command is used to remote-control the data stored in the memory card of the VIVID 910 (VI-910) or VIVID 900 (VI-900).

#### Note

This command does not operate on step-shot scan data in the memory card.

#### Memo

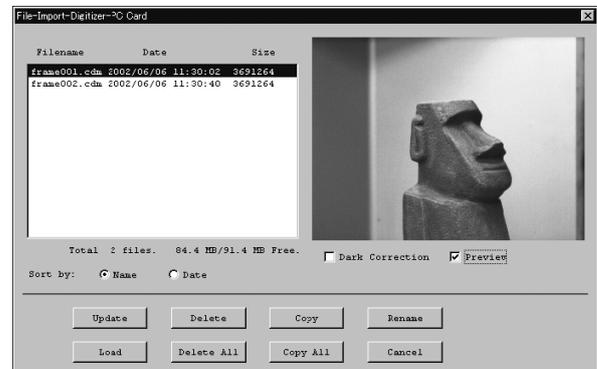
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.
- Note that if multiple VIVID units are connected, the software can only access the memory card in the VIVID unit with the highest SCSI ID setting.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

## Operating Procedure

### 1 From the [File] menu, select [Import], [Digitizer] and then [PC Card].

The [File-Import-Digitizer-PC Card] dialog box will appear.



#### Memo

- Only the raw image data (.cdm) scanned by the VIVID 910(VI-910) or VIVID 900(VI-900) will be displayed.
- Upper-case file names specified using the camera will be converted to lower-case file names when the files are imported to this software.

### 2 Select the file you want to import.

- To perform dark correction for the color data, check the [Dark Correction] checkbox.
- To display the preview image, check the [Preview] checkbox (so that a check mark appears in the check box). A color image of the selected file will be displayed.

#### Memo

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card] Dialog Box

Parameters for [File-Import-Digitizer-PC Card] Dialog Box	
File name	Displays file names stored in the memory card.
Date	Displays the dates on which the files are stored in the memory card.
Size	Displays the size of each file (in bytes).
Total **files	Displays the total number of camera data files stored in the memory card.
** MB/ ** MB	Displays the unoccupied capacity and total capacity of the memory card.

## ■ **Sorting the Files (Sort radio button)**

The [Name] and [Date] radio buttons are used to select whether file names are displayed alphabetically or by date.

### **Operating Procedure**

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### **1 Click the [Name] radio button to sort the files alphabetically or [Date] radio button to sort by date.**

Clicking the [Name] radio button will sort the files alphabetically, and clicking the [Date] radio button will sort them by date.

- When sort is complete, selection state of each file in the file list and preview image will be cleared.

## ■ **Updating the File List ([Update] button)**

The [Update] button is used to load the file names from the memory card to this software and update the file list. If the memory card is replaced while the [File-Import-Digitizer-PC Card] dialog box is open, be sure to click this button to update the file list.

### **Operating Procedure**

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### **1 Click the [Update] button.**

All the file names in the memory card will be loaded to the software and a new file list will be displayed.

## ■ Loading the Selected Data ([Load] button)

The [Load] button is used to load the data of the selected file from the memory card to the software.

### Operating Procedure

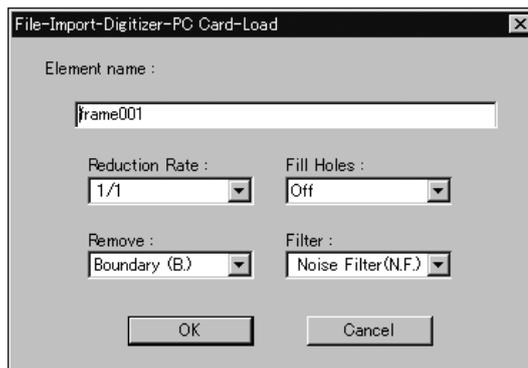
Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the name of the file you want to load.

#### 2 Click the [Load] button.

A dialog box will appear, allowing you to enter the desired element name.

The file name in the memory card will be displayed as an element name.



#### 3 Change the element name if necessary, and set the parameters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to program to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- Use the [Remove] pull-down menu to select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.

#### 4 Click the [OK] button.

The data of the selected file will be loaded and displayed in the element view window. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden.

#### **Memo**

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card-Load] Dialog Box	
Element name	Enter the desired element name.
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is On, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”  None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: The program does not perform filtering when importing the data.  Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.  High Quality (H.Q.): The program filters out unreliable data. (Effective only when importing data that was scanned using the VIVID 910.)  H.Q & N.F.: Applies both noise filter and high quality filter. (Effective only when importing data that was scanned using the VIVID 910.)

## ■ Deleting the Selected File ([Delete] button)

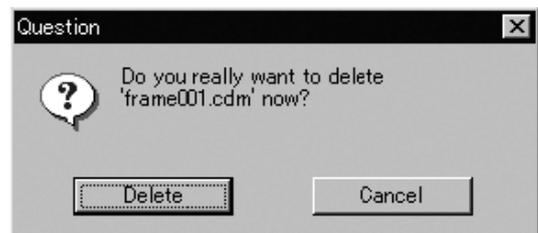
The [Delete] button is used to delete the selected file from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

**1** From the file list, select the name of the file you want to delete.

**2** Click the [Delete] button.  
A message dialog box will appear.



**3** Click the [Delete] button.  
The file will be deleted.

## ■ Deleting All the Files ([Delete All] button)

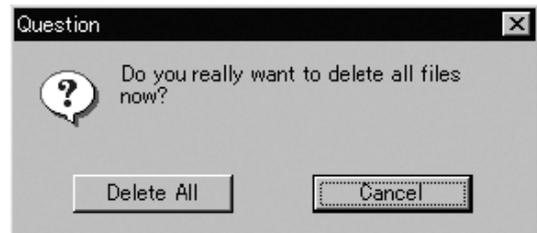
The [Delete All] button is used to delete all the files from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Delete All] button.

A message dialog box will appear.



#### 2 Click the [Delete All] button.

All the files in the memory card will be deleted.

#### Note

*All the files in the memory card will be deleted, irrespective of whether or not they are currently selected in the file list.*

## ■ Saving the Selected File ([Copy] button)

The [Copy] button is used to copy the selected file from the memory card and save it as camera data.

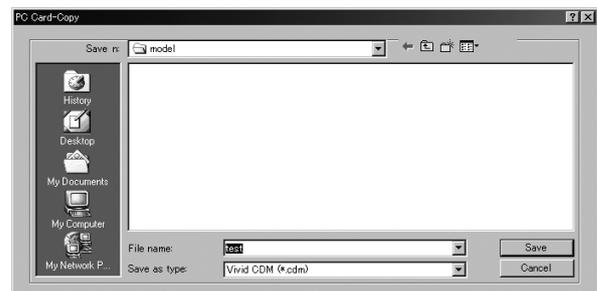
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the name of the file you want to save.

#### 2 Click the [Copy] button.

The [PC Card-Copy] dialog box will appear. The copy destination directory and names of the files present in that directory will be displayed.



#### 3 Change the directory and file name if necessary.

#### Note

*The file name must consist of alphanumeric characters only.*

#### 4 Click the [Save] button.

All the files will be saved as camera data.

## ■ Saving All the Files ([Copy All] button)

The [Copy All] button is used to copy the data of all the files from the memory card and save them as camera data.

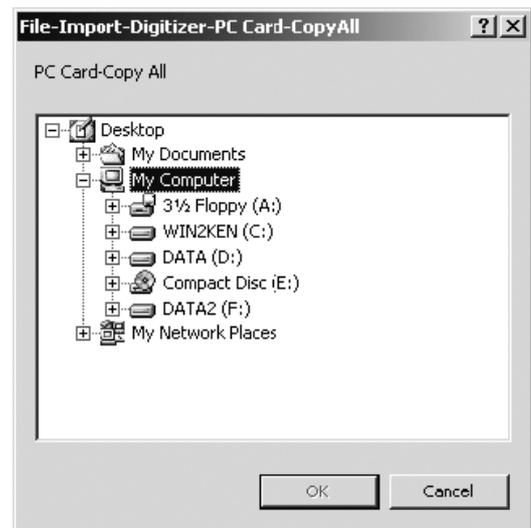
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Copy All] button.

The [File-Import-Digitizer-PC Card-Copy All] dialog box will appear.

The copy destination directory will be displayed.

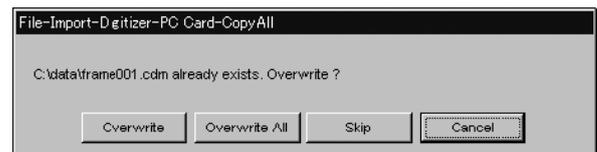


#### 2 Change the directory if necessary.

#### 3 Click the [Copy All] button.

All the files will be saved as camera data.

- If a file(s) having the same name exists, a message dialog box will appear.



- Clicking the [Overwrite] button will overwrite the file which is currently displayed in the message dialog box.
- Clicking the [Overwrite All] button will overwrite the file which is currently displayed in the message dialog box as well as all the remaining files having the same names at once. The message dialog box will not be displayed for those remaining files.
- Clicking the [Skip] button will ignore the file displayed in the dialog box and proceed to the next file on the file list.
- Clicking the [Cancel] button will close the dialog box without saving the files displayed in the dialog box.

## ■ Changing the Selected File Name ([Rename] button)

The [Rename] button is used to change the name of the file selected from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

- 1 From the file list, select the name of the file you want to save.

- 2 Click the [Rename] button.

The [File-Import-Digitizer-PC Card-Rename] dialog box will appear.



- 3 Enter the new name and click the [Rename] button.

The file name will be changed.

#### Note

*Names of the files stored in the memory card must consist of up to eight characters. Only alphabets, numerical numbers, bars “-” and underbars “\_” can be used. Lower-case characters contained in file names will be converted to upper-case characters.*

## File – Import – Digitizer – One Scan (When VIVID 700 is Selected)

### Performing One Scan with the VIVID 700

This command is used to cause the VIVID 700 (VI-700) to scan the object one scan at a time using the remote control function of this software.

#### **Warning**

-  Never stare into the laser emitting window.
-  Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### Memo

Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

Ref. For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [One Scan].

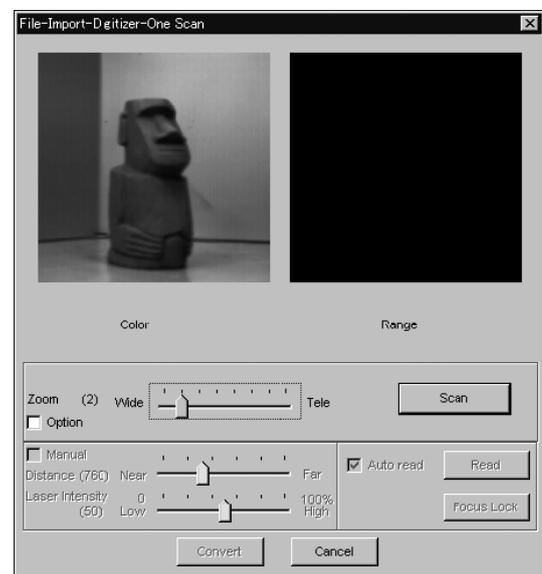
The [File-Import-Digitizer-One Scan] dialog box will appear.

- The color monitor image currently captured by the VIVID 700 will appear in the “Color” area of the dialog box. (No color image will appear if the [Auto read] checkbox is unchecked even if the [Option] checkbox is checked.)

#### 2 Set an object in place.

#### 3 Move the Zoom bar to set the desired view angle.

A new color image captured from the specified view angle will appear. (No color image will appear if the [Auto read] checkbox is unchecked.)



#### 4 Set optional parameters.

Check the [Option] checkbox, and make necessary parameters.

- To set the scan reference position ([Distance]) and laser intensity ([Laser Intensity]), perform the following procedure.
  - Check the [Option] checkbox.
  - Check the [Manual] checkbox.
  - Move the Distance bar or Laser Intensity bar to the desired position.
- If you are not going to scan both color and range images at the same time, uncheck the [Auto read] checkbox.

**5 Click the [Scan] button.**

Scan will start, and both color and range images will be displayed.

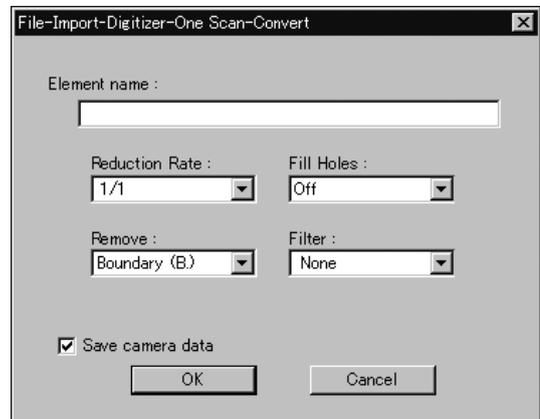
**6 Click the [Convert] button.**

The [File-Import-Digitizer-One Scan-Convert] dialog box will appear.

**7 Enter the desired element name, and set parameters.****Note**

*The element name must consist of up to 31 alphanumeric characters.*

- If the color and range images are not scanned at the same time, clicking the [Read] button will capture a color image and display it.
- To restart scan, repeat steps 2 to 4.



- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- To save the raw scan data (.cam) when importing data, check the [Save camera data] checkbox.

**8 Click the [OK] button.**

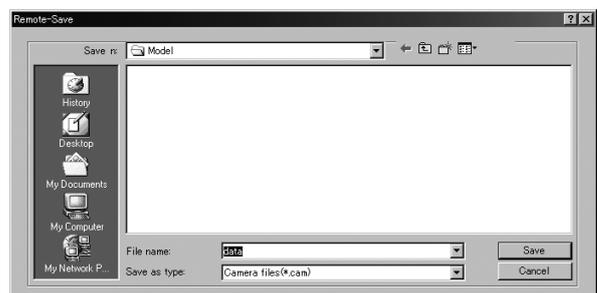
The scanned image will be displayed. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.

- If the [Save camera data] checkbox was checked at step 7, the [Remote-Save] dialog box will appear
  - ① Enter the desired file name.
  - ② Click the [Save] button.

**Note**

*The file name must consist of alphanumeric characters only.*



Parameters for [File-Import-Digitizer-One Scan] Dialog Box	
Zoom	Used to set zoom level of the VIVID 700 (VI-700) series digitizer.
Scan	Causes the VIVID 700 (VI-700) to acquire a shot.
Option	If this checkbox is checked, the lower section of the [Digitizer-One Scan] dialog box will be active, allowing you to set various parameters including [Distance], [Laser Intensity] and [Auto read].
Manual	If this checkbox is checked, the [Distance] and [Laser Intensity] parameters can be set.
Distance	Used to set the instrument's scan reference position.
Laser Intensity	Used to set the laser beam intensity of the VIVID.
Auto read	If this checkbox is checked, a color image will be read automatically when the dialog box is opened. Even if the [Read] button is not clicked after the [Scan] button is clicked, the data will be read automatically after images are acquired, and the color image and range image will be displayed in the dialog box. If there is no check mark in the [Option] checkbox, for instance when the software is just started up, the [Auto read] checkbox will be checked automatically.
Read	Clicking this checkbox while there is no check mark in the [Auto read] checkbox will read data from the instrument and display the range image and the latest color image that were acquired when the [Scan] button was clicked last time in the dialog box. This button is effective only if the [Auto read] checkbox is unchecked.
Focus Lock	Sets the focus lock. The [Manual] checkbox will be checked automatically, and the current position and Laser Intensity will be displayed.
Convert	Causes the [File-Import-Digitizer-One Scan-Convert] dialog box to appear, allowing import of the camera data to this software.

Parameters for [File-Import-Digitizer-One Scan-Convert] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: "1/1", "1/4", "1/9", "1/16", or "No polygon".
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is "On", the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: "None", "Boundary (B.)", "5deg. & B.", "10deg. & B.", "15deg. & B.", or "20deg. & B."  None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: Removal is not carried out when exporting the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.
Save camera data	Save the images as camera data.

## File – Import – Digitizer – Step Scan (When VIVID 700 is Selected)

### Performing Step Scan with the VIVID 700

This command is used to take two or more shots using the optional rotating stage via the remote control function of this software. If a rotating stage has been selected by the rotating table, rotation of the stage can also be controlled.

After the necessary shots are taken, scan the calibration chart. Data acquired from different angles will be subjected to registration, and the resulting data will appear.

#### Warning

-  Never stare into the laser emitting window.
-  Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### **Note**

*If the rotating stage does not operate correctly from the dialog box, turn OFF the stage, turn it ON again, and then try to operate it.*

#### **Memo**

- The calibration chart is an accessory of the rotating stage set.
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### 1 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].

The [File-Import-Digitizer-Step Scan] dialog box will appear.

#### 2 Place the object on the rotating stage.

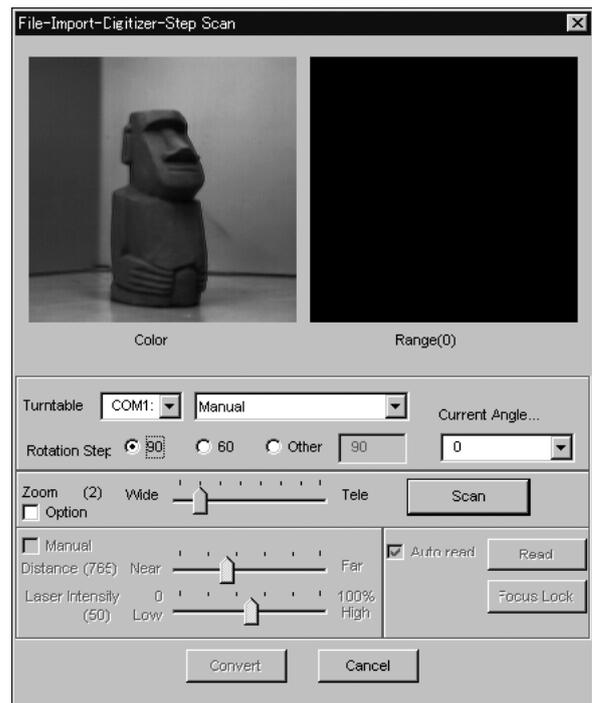
#### 3 Select the desired rotation step from “90”, “60” and “Other”. The rotating stage will rotate at the selected step.

If “Other” is selected, enter the desired rotation angle.

#### 4 Move the Zoom bar to set the desired view angle.

A new color image captured from the specified view angle will appear. (No color image will appear if the [Auto read] checkbox is unchecked.)

- The color monitor image currently captured by the VIVID 700 will appear in the “Color” area of the dialog box. (No color image will appear if the [Auto read] checkbox is unchecked even if the [Option] checkbox is checked.)



**5 Set optional parameters.**

Check the [Option] checkbox, and make necessary parameters.

- To set the scan reference position (Distance) and laser intensity (Laser Intensity), perform the following procedure.
  - ① Check the [Option] checkbox.
  - ② Check the [Manual] checkbox.
  - ③ Move the Distance bar or Laser Intensity bar to the desired position.
- If you are not going to scan both color and range images at the same time, uncheck the [Auto read] checkbox.

**6 Click the [Scan] button.**

Scan will start, and both color and range images will be displayed.

The “Next shot? (angle:\*\*)” message dialog box will also appear.

- If the color and range images are not scanned at the same time, clicking the [Read] button will capture a color image and display it.
- If the type of rotating stage has not been designated, turn the rotating stage manually to the next angle displayed in the “Next shot? (angle:\*\*)” message dialog box.

**7 Click the [OK] button.**

The next specified angle will appear in [Current Angle], and the object will be scanned for the next image.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

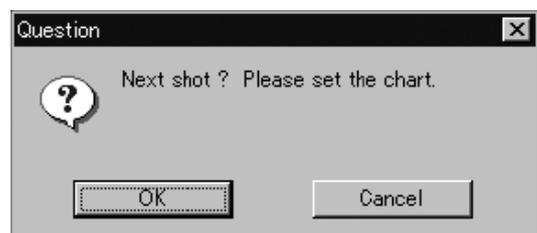
- To cancel scan, click the [Cancel] button instead of the [OK] button, and repeat steps 4 to 6.

**8 Repeat step 7 until shots from all the desired**

angles are captured.

When shots from all the desired angles are captured,

the “Next shot? Please set the chart.” message dialog box will appear.



- If you want to acquire a shot from a certain angle again, click the angle currently displayed in [Current Angle] with the left mouse button, then select the desired angle from the pull-down menu that appears.

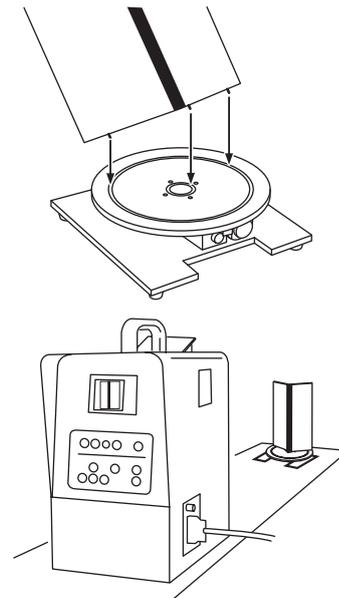
**/Memo/**

If an angle (rotation step) has been selected at step 3, necessary steps (angles) to complete 360 degrees will be displayed in the pull-down menu. However, it is not necessary to scan at all the angles. You can select necessary steps (angles) only.

## 9 Place the calibration chart on the rotating stage.

Position the chart with the black line facing the instrument and place it on the rotating stage so that both entire side surfaces are observed in the view-finder.

- If “Chart” is not displayed in [Current Angle], click the left mouse button and select “Chart” from the pull-down menu that appears.



**Memo**

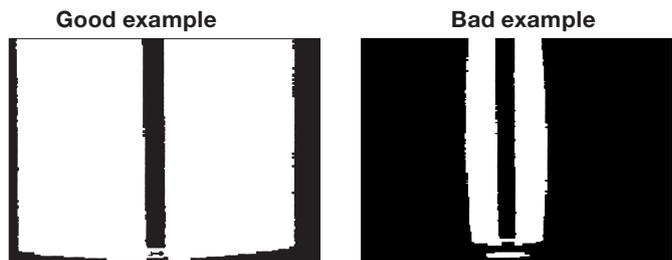
The calibration chart can be scanned at any angle of the rotating stage.

## 10 Click the [OK] button.

The calibration chart will be scanned.

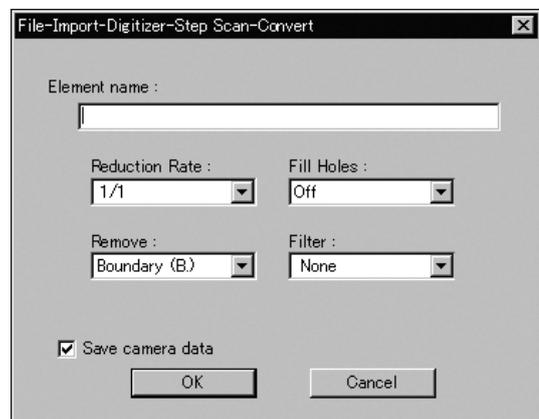
**Note**

Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.



## 11 Click the [Convert] button.

The [File-Import-Digitizer-Step Scan-Convert] dialog box will appear.



## 12 Enter the desired element name, and set parameters.

### Note

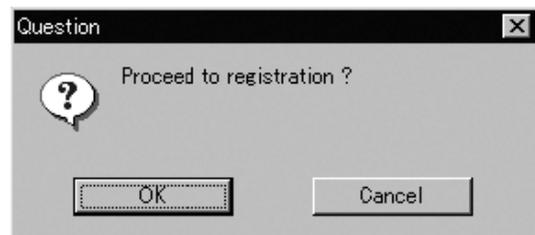
The element name must consist of up to 31 characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- To save the raw scan data (.cam) when importing data, check the [Save camera data] checkbox.

## 13 Click the [OK] button.

Each scanned image will be subjected to registration and displayed, and the “Proceed to registration?” message dialog box will appear. The element list will also show the element name specified at step 12 plus “rotation step”. The element name is highlighted, indicating that it is currently selected.

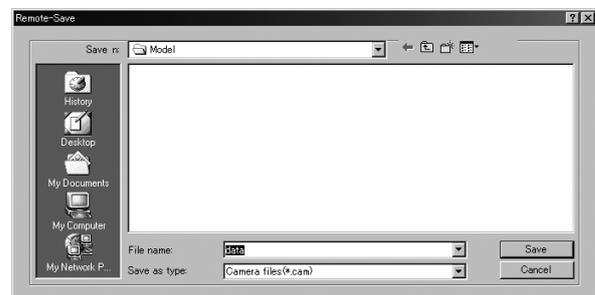
- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If a rotating stage has been designated, the rotating stage will rotate back to the original position before data reading starts.



- If the [Save camera data] checkbox was checked at step 12, the [Remote-Save] dialog box will appear before the one that asks whether you want to perform fine-registration.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

### Note

The file name must consist of alphanumeric characters only.



## 14 Click the [OK] button.

Fine-registration will be performed and the data will be displayed again.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then scan will be performed.

- If you are not going to perform fine-registration, click the [Cancel] button instead of the [OK] button.

### Memo

Fine-registration can be cancelled even if it has started, by clicking the [Cancel] button in the dialog box that appears during fine-registration.

Parameters for [File-Import-Digitizer-Step Scan] Dialog Box	
Turntable	Used to set the serial port and rotating stage type to be used for remote operation. <b>Note</b> <i>If connecting to a SKIDS-60YAW unit, select “CSG-602R(Ver.1.0)” from the pull-down menu. If connecting to a SKIDS-60YAW (Ver. 2.0) unit, select “CSG-602(Ver.2.0)”.</i>
Rotation step	Used to select the desired angle (degree) of the rotating stage from “90”, “60” and “Other”. If “Other” is selected, enter the desired rotation step.
Current Angle	Used to select the desired scan step (i.e. the angle at which scan is to be performed). “0” will be selected first when the dialog box is opened. It is possible to select the desired angle by clicking the angle currently displayed in [Current Angle] and selecting the desired angle from the pull-down menu that appears. If an angle at which scan has already been performed is selected again and the [Scan] button is clicked, the previously acquired image data will be overwritten.
Zoom	Used to set zoom level of the VIVID 700 (VI-700).
Scan	Causes the VIVID 700 (VI-700) to acquire a shot.
Option	If this checkbox is checked, the lower section of the [Remote-Step Scan] dialog box will be active, allowing you to set various parameters including [Distance], [Laser Intensity] and [Auto read].
Manual	If this checkbox is checked, the [Distance] and [Laser Intensity] parameters can be set.
Distance	Used to set the instrument’s scan reference position.
Laser Intensity	Used to set the laser beam intensity of the VIVID.
Auto read	If this checkbox is checked, a color image will be read automatically when the dialog box is opened. Even if the [Read] button is not clicked after the [Scan] button is clicked, the data will be read automatically after images are acquired, and the color image and range image will be displayed in the dialog box. If there is no check mark in the [Option] checkbox, for instance when the software is just started up, the [Auto read] checkbox will be checked automatically.
Read	Clicking this button while there is no check mark in the [Auto read] checkbox will read data from the instrument and display the range image and the latest color image that were acquired when the [Scan] button was clicked last time in the dialog box. This button is effective only if the [Auto read] checkbox is unchecked.
Focus Lock	Sets the focus lock. The [Manual] checkbox will be checked automatically, and the current position and Laser Intensity will be displayed.
Convert	Causes the [File-Import-Digitizer-Step Scan-Convert] dialog box to appear, allowing import of the camera data to this software.

Parameters for [File-Import-Digitizer-Step Scan-Convert] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is “On”, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”  None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.
Save camera data	Save the images as camera data.

## File – Import – Digitizer – PC Card (When VIVID 700 is Selected)

### Importing Data from the Memory Card of VIVID 700

This command is used to remote-control the data stored in the memory card of the VIVID 700 (VI-700).

#### Note

This command does not operate on step-scan scan data in the memory card.

#### Memo

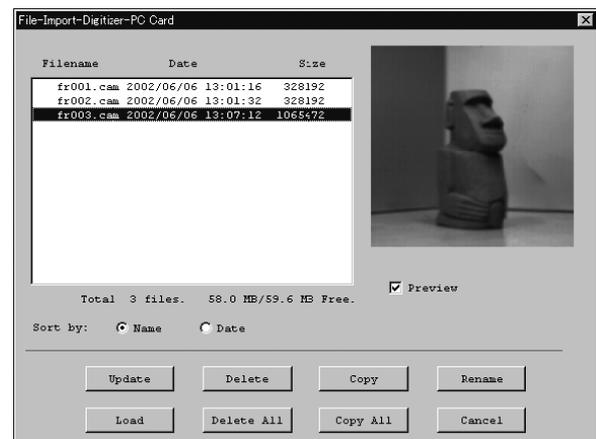
Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

## Operating Procedure

### 1 From the [File] menu, select [Import], [Digitizer] and then [PC Card].

The [File-Import-Digitizer-PC Card] dialog box will appear.



#### Memo

Upper-case file names specified using the camera will be converted to lower-case file names when the files are imported to this software.

### 2 Select the file you want to import.

- To display the preview image, check the [Preview Image] checkbox (so that a check mark appears in the check box). A color image of the selected file will be displayed.

#### Memo

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card] Dialog Box	
File name	Displays file names stored in the memory card.
Date	Displays the dates on which the files are stored in the memory card.
Size	Displays the size of each file (in bytes).
Total ** files	Displays the total number of camera data files stored in the memory card.
** MB/ ** MB	Displays the unoccupied capacity and total capacity of the memory card.

## ■ Sorting the Files (Sort radio button)

The [Name] and [Date] radio buttons are used to select whether file names are displayed alphabetically or by date.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Name] radio button to sort the files alphabetically or [Date] radio button to sort by date.

The files will be sorted alphabetically if the [Name] radio button is selected or by date if the [Date] radio button is selected.

- When sort is complete, selection state of each file in the file list and preview image will be cleared.

## ■ Updating the File List ([Update] button)

The [Update] button is used to load the file names from the memory card to this software and update the file list. If the memory card is replaced while the [File-Import-Digitizer-PC Card] dialog box is open, be sure to click this button to update the file list.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Update] button.

All the file names in the memory card will be loaded to the software and a new file list will be displayed.

## ■ Loading the Selected Data ([Load] button)

The [Load] button is used to load the data of the selected file from the memory card to the software.

### Operating Procedure

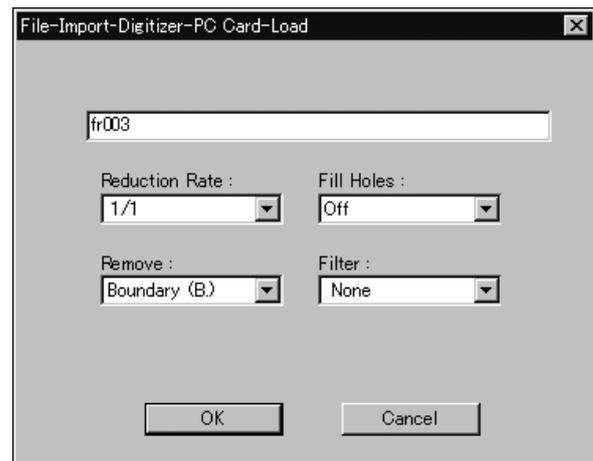
Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the file you want to load.

#### 2 Click the [Load] button.

A dialog box will appear, allowing you to enter the desired element name.

The file name in the memory card will be displayed as an element name.



#### 3 Change the element name if necessary, and set the parameters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.

#### 4 Click the [OK] button.

The data of the selected file will be loaded and displayed in the element view window. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden.

#### **Memo**

A clock icon will be displayed during loading.

Parameters for [File-Import-Digitizer-PC Card-Load] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is “On”, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from an of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15° or 20°) to the view vector.
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.

## ■ Deleting the Selected File ([Delete] button)

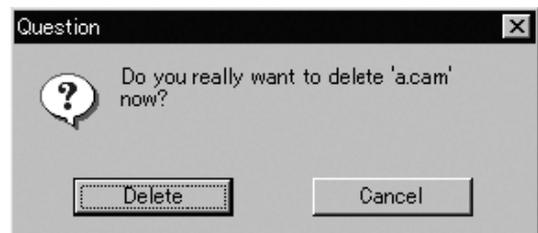
The [Delete] button is used to delete the selected file from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

**1 From the file list, select the file you want to delete.**

**2 Click the [Delete] button.**  
A message dialog box will appear.



**3 Click the [Delete] button.**  
The file will be deleted.

## ■ Deleting All the Files ([Delete All] button)

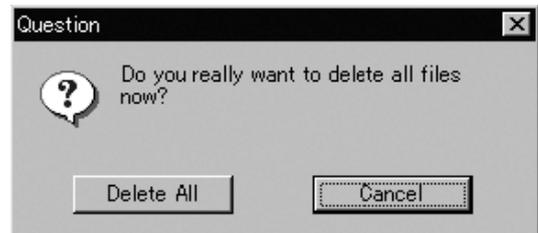
The [Delete All] button is used to delete all the files from the memory card..

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 Click the [Delete All] button.

A message dialog box will appear.



#### 2 Click the [Delete All] button.

All the files in the memory card will be deleted.

#### Note

*All the files in the memory card will be deleted, irrespective of whether or not they are currently selected in the file list.*

## ■ Saving the Selected File ([Copy] button)

The [Delete All] button is used to delete all the files from the memory card..

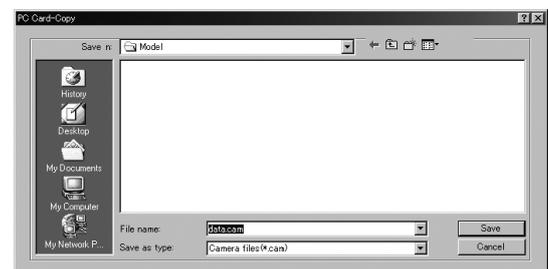
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed.

#### 1 From the file list, select the file you want to copy.

#### 2 Click the [Copy] button.

The [PC Card-Copy] dialog box will appear. The copy destination directory and names of the files present in that directory will be displayed.



#### 3 Change the directory and file name if necessary.

#### Note

*The file name must consist of alphanumeric characters only.*

#### 4 Click the [Save] button.

The file will be saved as camera data.

## ■ Saving All the Files ([Copy All] button)

The [Copy All] button is used to copy the data of all the files from the memory card and save them as camera data.

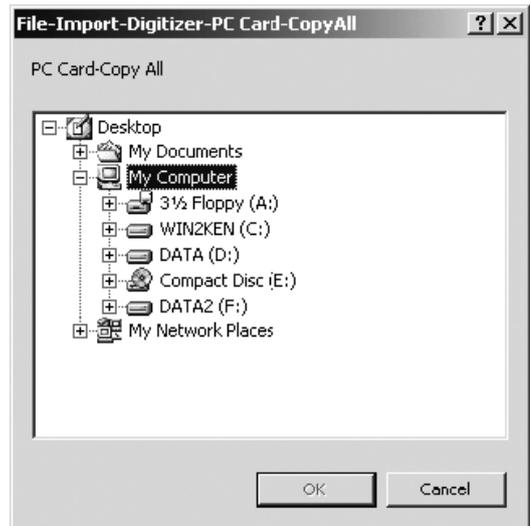
### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed..

#### 1 Click the [Copy All] button.

The [File-Import-Digitizer-PC Card-Copy] dialog box will appear.

The copy destination directory will be displayed.

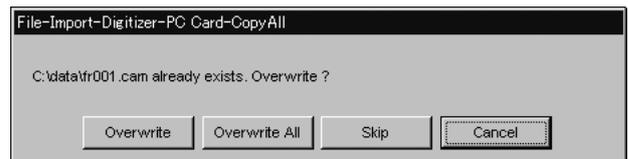


#### 2 Change the directory if necessary.

#### 3 Click the [Copy All] button.

All the files will be saved as camera data.

- If a file(s) having the same name exists, a message dialog box will appear.



- Clicking the [Overwrite] button will overwrite the file which is currently displayed in the message dialog box.
- Clicking the [Overwrite All] button will overwrite the file which is currently displayed in the message dialog box as well as all the remaining files having the same names at once. The message dialog box will not be displayed for those remaining files.
- Clicking the [Skip] button will ignore the file displayed in the dialog box and proceed to the next file on the file list.
- Clicking the [Cancel] button will close the dialog box without saving all the remaining files (including the one displayed in the dialog box).

## ■ Changing the Selected File Name ([Rename] button)

The [Rename] button is used to change the name of the file selected from the memory card.

### Operating Procedure

Before starting the following procedure, make sure that the [File-Import-Digitizer-PC Card] dialog box is displayed..

- 1 From the file list, select the name of the file you want to change.



- 2 Click the [Rename] button.

The [File-Import-Digitizer-PC Card-Rename] dialog box will appear.

- 3 Enter the new name and click the [Rename] button.

The file name will be changed.

#### Note

*Names of the files stored in the memory card must consist of up to eight characters. Only alphabets, numerical numbers, bars “-” and underbars “\_” can be used. Lower-case characters contained in file names will be converted to upper-case characters.*

## File – Import – Digitizer – One Scan (When VIVID 300 is Selected)

### Performing One Scan with the VIVID 300

This command is used to cause the VIVID 300 (VI-300) to scan the object one scan at a time using the remote control function of this software.

#### **Warning**

-  Never stare into the laser emitting window.
-  Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### **Memo**

Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

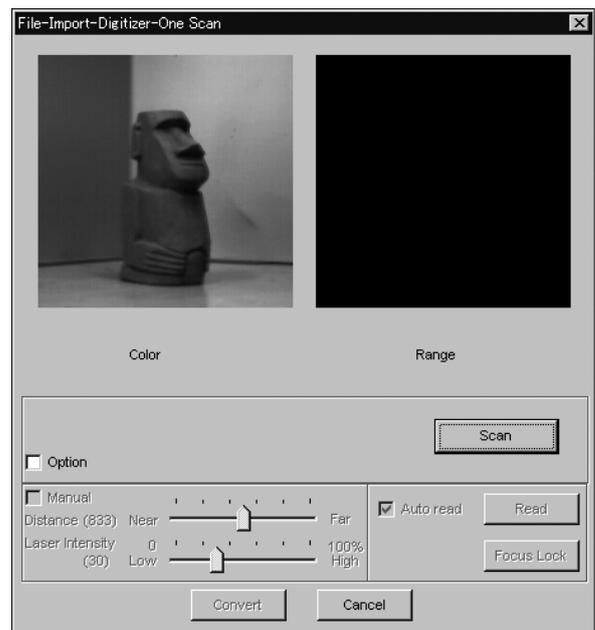
**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### **1** From the [File] menu, select [Import], [Digitizer] and then [One Scan].

The [File-Import-Digitizer-One Scan] dialog box will appear.

- The color monitor image currently captured by the VIVID 300 will appear in the “Color” area of the dialog box. (No color image will appear if the [Auto read] checkbox is unchecked even if the [Option] checkbox is checked.)



#### **2** Set an object in place.

#### **3** Set optional parameters.

Check the [Option] checkbox, and make necessary parameters.

- To set the scan reference position (Distance) and laser intensity (Laser Intensity), perform the following procedure.
  - Check the [Option] checkbox.
  - Check the [Manual] checkbox.
  - Move the Distance bar or Laser Intensity bar to the desired position.
- If you are not going to scan both color and range images at the same time, uncheck the [Auto read] checkbox.

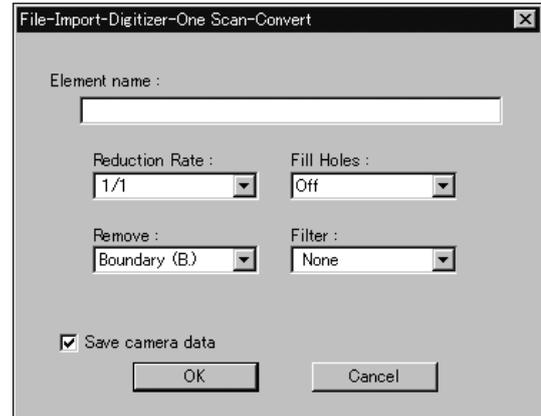
#### 4 Click the [Scan] button.

Scan will start, and both color and range images will be displayed.

- If the color and range images are not scanned at the same time, clicking the [Read] button will capture a color image and display it.
- To restart scan, repeat steps 2 to 3.

#### 5 Click the [Convert] button.

The [File-Import-Digitizer-One Scan-Convert] dialog box will appear.



#### 6 Enter the desired element name, and set parameters.

##### Note

The element name must consist of up to 31 alphanumeric characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- To save the raw scan data (.cam) when importing data, check the [Save camera data] checkbox.

#### 7 Click the [OK] button.

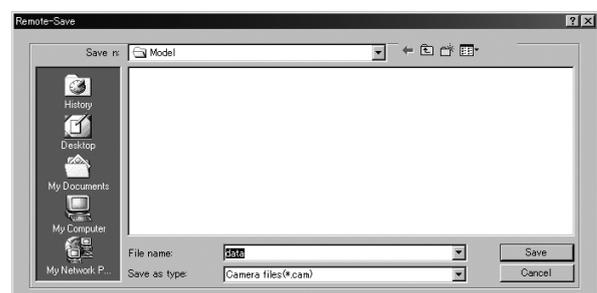
The scanned image will be displayed. The names of the imported elements will also appear in the element list, indicating that the elements have been selected (highlighted).

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.

- If the [Save camera data] checkbox was checked at step 7, the [Remote-Save] dialog box will appear.
  - ① Enter the desired file name.
  - ② Click the [Save] button.

##### Note

The file name must consist of alphanumeric characters only.



Parameters for [File-Import-Digitizer-One Scan] Dialog Box	
Scan	Causes the VIVID 300 (VI-300) to acquire a shot.
Option	If this checkbox is checked, the lower section of the [Digitizer-One Scan] dialog box will be active, allowing you to set various parameters including [Distance], [Laser Intensity] and [Auto read].
Manual	If this checkbox is checked, the [Distance] and [Laser Intensity] parameters can be set.
Distance	Used to set VIVID's scan reference position.
Laser Intensity	Used to set the laser beam intensity of the VIVID.
Auto read	If this checkbox is checked, a color image will be read automatically when the dialog box is opened. Even if the [Read] button is not clicked after the [Scan] button is clicked, the data will be read automatically after images are acquired, and the color image and range image will be displayed in the dialog box. If there is no check mark in the [Option] checkbox, for instance when the software is just started up, the [Auto read] checkbox will be checked automatically.
Read	Clicking this button while there is no check mark in the [Auto read] checkbox will read data from the instrument and display the range image and the latest color image that were acquired when the [Scan] button was clicked last time in the dialog box. This button is effective only if the [Auto read] checkbox is unchecked.
Focus Lock	Sets the focus lock. The [Manual] checkbox will be checked automatically, and the current position and Laser Intensity will be displayed.
Convert	Causes the [File-Import-Digitizer-One Scan-Convert] dialog box to appear, allowing import of the camera data to this software.

Parameters for [File-Import-Digitizer-One Scan-Convert] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: "1/1", "1/4", "1/9", "1/16", or "No polygon".
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is "On", the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from any of the following: "None", "Boundary (B.)", "5deg. & B.", "10deg. & B.", "15deg. & B.", or "20deg. & B." None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.
Save camera data	Save the images as camera data.

## File – Import – Digitizer – Step Scan (When VIVID 300 is Selected)

### Performing Step Scan with the VIVID 300

This command is used to take two or more shots using the optional rotating stage via the remote control function of this software. If a rotating stage has been selected by the Turntable, rotation of the stage can also be controlled.

After the necessary shots are taken, scan the calibration chart. Data acquired from different angles will be subjected to registration, and the resulting data will appear.

#### Warning

-  Never stare into the laser emitting window.
-  Do not place a lens, mirror or optical element in the passage of the laser beam. Doing so may converge the laser beam, resulting in damage to your eyes, burns or fire. To prevent the above accidents, make sure that a wall or similar which can block the laser beam is located behind the object.

#### **Note**

*If the rotating stage does not operate correctly from the dialog box, turn OFF the stage, turn it ON again, and then try to operate it.*

#### **Memo**

- The calibration chart is an accessory of the rotating stage set.
- Before performing the procedure below, make sure that the digitizer you are going to use is selected by the **File – Select Digitizer** command.

**Ref.** For details of the **File – Select Digitizer** command, refer to page 144.

### Operating Procedure

#### **1 From the [File] menu, select [Import], [Digitizer] and then [Step Scan].**

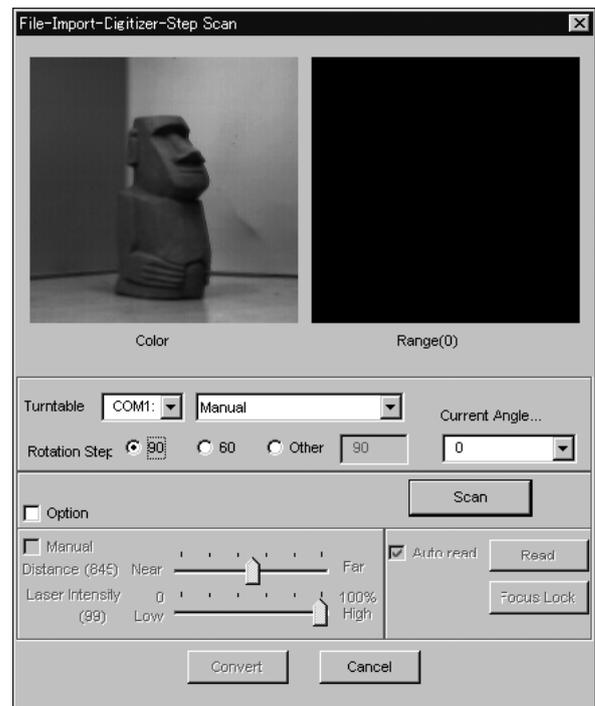
The [File-Import-Digitizer-Step Scan] dialog box will appear.

#### **2 Place the object on the rotating stage.**

#### **3 Select the desired rotation step from “90”, “60” and “Other”. The rotating stage will rotate at the selected step.**

If “Other” is selected, enter the desired rotation angle.

- The color monitor image currently captured by the VIVID 300 will appear in the “Color” area of the dialog box. (No color image will appear if the [Auto read] checkbox is unchecked even if the [Option] checkbox is checked.)



#### 4 Set optional parameters.

Check the [Option] checkbox, and make necessary parameters.

- To set the scan reference position (Distance) and laser intensity (Laser Intensity), perform the following procedure.
  - ① Check the [Option] checkbox.
  - ② Check the [Manual] checkbox.
  - ③ Move the [Distance] bar or [Laser Intensity] bar to the desired position.
- If you are not going to scan both color and range images at the same time, uncheck the [Auto read] checkbox.

#### 5 Click the [Scan] button.

Scan will start, and both color and range images will be displayed.

The “Next shot? (angle:\*\*)” message dialog box will also appear.

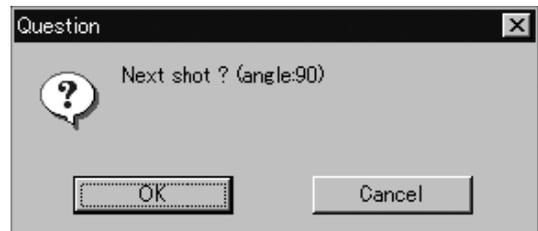
- If the color and range images are not scanned at the same time, clicking the [Read] button will capture a color image and display it.
- If the type of rotating stage has not been designated, turn the rotating stage manually to the next angle displayed in the “Next shot? (angle:\*\*)” message dialog box.

#### 6 Click the [OK] button.

The next specified angle will appear in [Current Angle], and the object will be scanned for the next image.

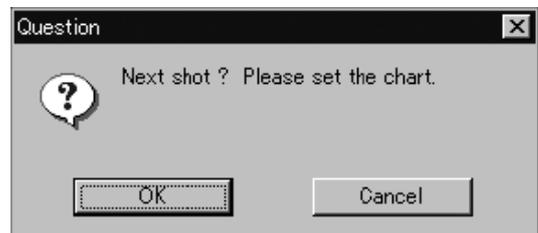
- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then the object will be scanned.

- To cancel scan, click the [Cancel] button instead of the [OK] button, and repeat steps 4 to 5.



#### 7 Repeat step 6 until shots from all the desired angles are captured.

When shots from all the desired angles are captured, the “Next shot? Please set the chart.” message dialog box will appear.



- If you want to acquire a shot from a certain angle again, click the angle currently displayed in [Current Angle] with the left mouse button, then select the desired angle from the pull-down menu that appears.

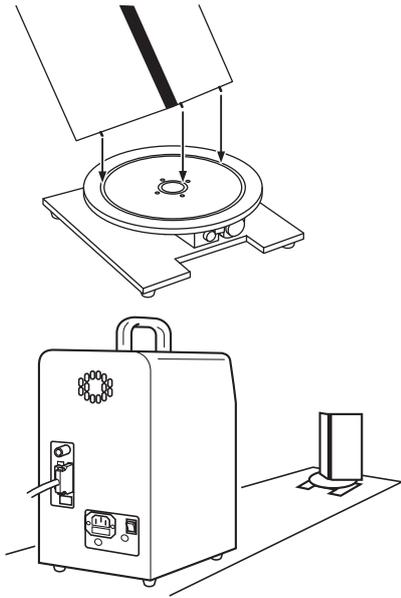
#### **Memo**

If an angle (rotation step) has been selected at step 3, necessary steps (angles) to complete 360 degrees will be displayed in the pull-down menu. However, it is not necessary to scan at all the angles. You can select necessary steps (angles) only.

## 8 Place the calibration chart on the rotating stage.

Position the chart with the black line facing the instrument and place it on the rotating stage so that both entire side surfaces are observed in the viewfinder.

- If “Chart” is not displayed in [Current Angle], click the left mouse button and select “Chart” from the pull-down menu that appears.



**Memo**

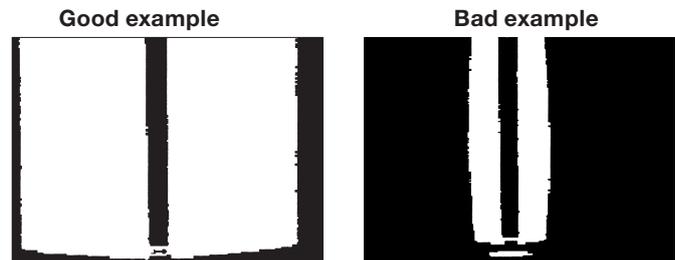
The calibration chart can be scanned at any angle of the rotating stage.

## 9 Click the [OK] button.

The calibration chart will be scanned.

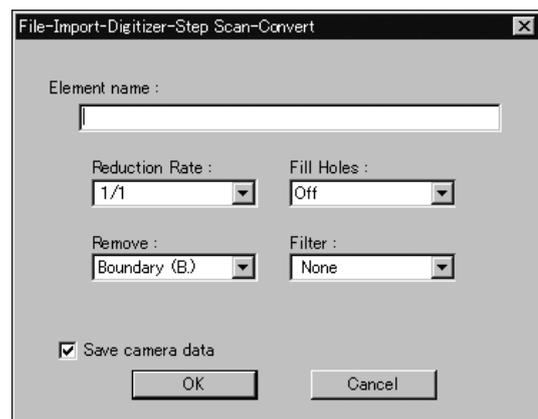
**Note**

*Make sure that the acquired range image looks like the good example given below. If it resembles the bad example, click the [Scan] button again to re-scan the calibration chart.*



## 10 Click the [Convert] button.

The [File-Import-Digitizer-Step Scan-Convert] dialog box will appear.



## 11 Enter the desired element name, and set parameters.

### Note

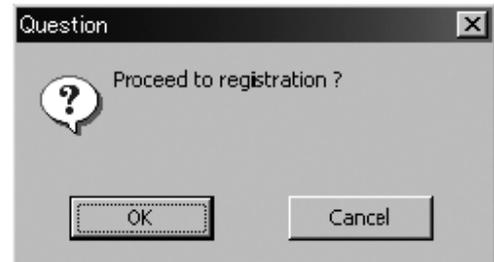
The element name must consist of up to 31 characters.

- Select the desired rate from “1/1”, “1/4”, “1/9”, “1/16” and “No polygon” by selecting from the [Reduction Rate] pull-down menu.
- If you want to generate points to fill in holes caused by missing data, set the [File Holes] setting to “On”.
- The [Remove] pull-down menu lets you select which points to remove from the imported data. You can set this to any of the following: “None”, “Boundary(B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.”
- If you want to filter the imported data, select the appropriate parameter from the [Filter] pull-down menu.
- To save the raw scan data (.cam) when importing data, check the [Save camera data] checkbox.

## 12 Click the [OK] button.

Each scanned image will be subjected to registration and displayed, and the “Proceed to registration?” message dialog box will appear. The element list will also show the element name specified at step 11 plus “rotation step”. The element name is highlighted, indicating that it is currently selected.

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- When the data is loaded for the first time after the software is started, it will be fully framed in all the windows including those that are hidden automatically.
- If a rotating stage has been designated, the rotating stage will rotate back to the original position before data reading starts.
- If the [Save camera data] checkbox was checked

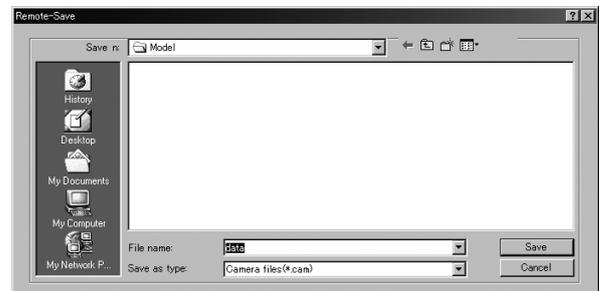


at step 11, the [Remote-Save] dialog box will appear before the one that asks whether you want to perform fine-registration.

- ① Enter the desired file name.
- ② Click the [Save] button.

### Note

The file name must consist of alphanumeric characters only.



## 13 Click the [OK] button.

Fine-registration of the element position will be performed and the data will be displayed again.

- If a rotating stage has been selected by the Turntable, the stage will turn to the next angle and then scan will be performed.

- If you are not going to perform fine-registration, click the [Cancel] button instead of the [OK] button.

### Memo

Fine-registration can be cancelled even if it has started, by clicking the [Cancel] button in the dialog box that appears during fine-registration.

Parameters for [File-Import-Digitizer-Step Scan] Dialog Box	
Turntable	Used to set the serial port and rotating stage type to be used for remote operation. <b>Note</b> <i>If connecting to a SKIDS-60YAW unit, select “CSG-602R(Ver.1.0)” from the pull-down menu. If connecting to a SKIDS-60YAW (Ver. 2.0) unit, select “CSG-602R(Ver.2.0)”.</i>
Rotation step	Used to select the desired angle (degree) of the rotating stage from “90”, “60” and “Other”. If “Other” is selected, enter the desired rotation step..
Current Angle	Used to select the desired scan step (i.e. the angle at which scan is to be performed). “0” will be selected first when the dialog box is opened. It is possible to select the desired angle by clicking the angle currently displayed in [Current Angle] and selecting the desired angle from the pull-down menu that appears. If an angle at which scan has already been performed is selected again and the [Scan] button is clicked, the previously acquired image data will be overwritten.
Scan	Causes the VIVID 300 (VI-300) to acquire a shot.
Option	If this checkbox is checked, the lower section of the [Remote-Step Scan] dialog box will be active, allowing you to set various parameters including [Distance], [Laser Intensity] and [Auto read].
Manual	If this checkbox is checked, the [Distance] and [Laser Intensity] parameters can be set.
Distance	Used to set the VIVID’s scan reference position.
Laser Intensity	Used to set the laser beam intensity of the VIVID.
Auto read	If this checkbox is checked, a color image will be read automatically when the dialog box is opened. Even if the [Read] button is not clicked after the [Scan] button is clicked, the data will be read automatically after images are acquired, and the color image and range image will be displayed in the dialog box. If there is no check mark in the [Option] checkbox, for instance when the software is just started up, the [Auto read] checkbox will be checked automatically.
Read	Clicking this button while there is no check mark in the [Auto read] checkbox will read data from the instrument and display the range image and the latest color image that were acquired when the [Scan] button was clicked last time in the dialog box. This button is effective only if the [Auto read] checkbox is unchecked.
Focus Lock	Sets the focus lock. The [Manual] checkbox will be checked automatically, and the current position and Laser Intensity will be displayed.
Convert	Causes the [File-Import-Digitizer-Step Scan-Convert] dialog box to appear, allowing import of the camera data to this software.

Parameters for [File-Import-Digitizer-Step Scan-Convert] Dialog Box	
Reduction Rate	Selects the reduction rate to be applied when importing the data. You can select any of the following: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
Fill Holes	Selects whether the programs fill in holes when importing the data. If the setting is “On”, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which the data the program excludes when carrying out the import. Select from any of the following: “None”, “Boundary (B.)”, “5deg. & B.”, “10deg. & B.”, “15deg. & B.”, or “20deg. & B.” None: Removal is not carried out when importing the data. Boundary(B.): The program removes boundary points. 5deg. & B., 10deg. & B., 15deg. & B., 20deg. & B.: The program removes boundary points, and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: Removal is not carried out when exporting the data. Noise Filter (N.F.): When importing the data, the points that appear to be noise will be corrected according to other data.
Save camera data	Save the images as camera data.



## File – Import – Digitizer – Easy Align

### Aligning Multiple Scans (for VIVID 910 only)

This program allows you to take and align multiple shots (multiple scans) of a single object using a VIVID 910. You use the program to remotely control the scans, and you attach markers onto the object so that the program can correlate the data taken from multiple shots (at multiple angles). The program aligns the data based on the markers, and displays the result.

Left : Set marker correspondence  
Right : Edit/Add marker  
[Ctrl] + Right : Delete marker

#### **Memo**

- This command works only with the VIVID 910.
- To use all function of this command, connecting to VIVID 910 and the license will be required.
- Prior preparation (calibration) is required for the marker to be automatically recognized.

**Ref.** For details about the *Automatic Marker Recognition*, refer to page 131.

## Operating Procedure

### 1 From the [File] menu, select [Import] – [Digitizer] and click [Easy Align].

The program opens the [File-Import-Digitizer-Easy Align] dialog and a temporary window.

- If the VIVID 910 is connected, the monochrome monitor image currently captured by the VIVID 910 will appear in the work window area on the left of the dialog box.



- The very first time you use this command (with the VIVID 910 connected), the command begins by displaying the [License Failure] dialog box.

#### **Memo**

If the VIVID 910 is not connected when you first execute this command, the [License Failure] dialog box will not appear and the program will not check for a license. You can continue directly from step 2 below.

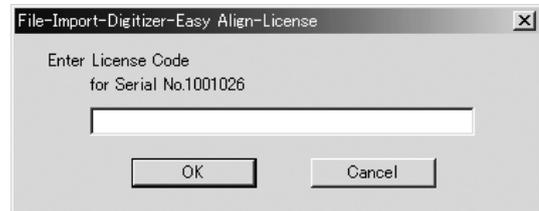
- ① Click the [OK] button.

The [File-Import-Digitizer-Easy Align-Li-  
cense] dialog box opens.

- ② At the dialog, enter the license code that corresponds to the displayed VIVID 910 serial number, and then click [OK].

**Note**

If you do not enter the correct licence code, the [Convert] button will not be enabled. This means that you will not be able to make use of the aligned data.



## 2 Adhere markers onto the object.

**Memo**

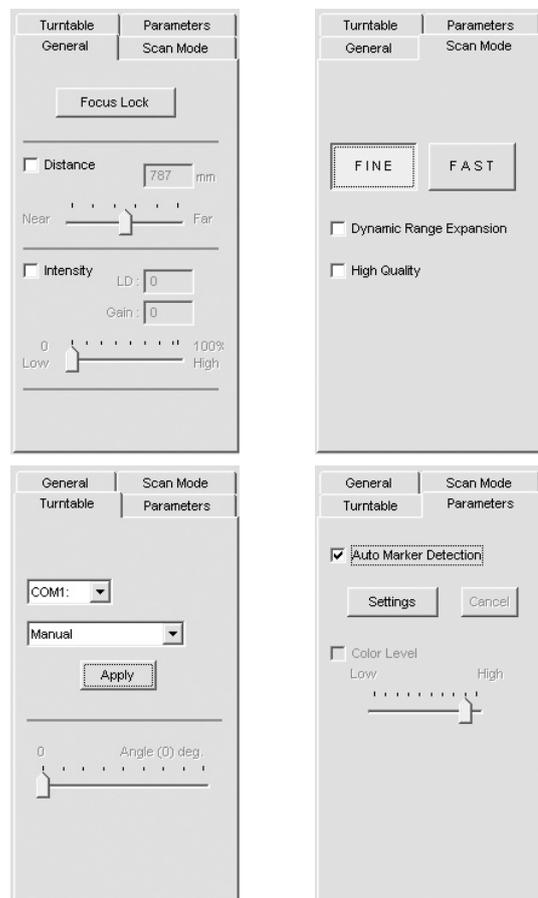
Note that some objects have delicate surfaces that may be damaged when markers are peeled off after use. In particular, the markers we provide have fairly strong adhesive and will become difficult to peel off if left attached for more than 24 hours.

## 3 Adjust the position of the object and move the VIVID 910 forward or back so that the object appears at the middle of the image area at the appropriate view angle.

## 4 Click the [Scan Mode] tab, and set the scan mode to either Fine or Fast.

## 5 If you are using a turntable, click the [Turntable] tab and set the serial port, the rotating stage type, and the rotation angle.

## 6 Set other parameters as necessary.



## 7 Click the [Scan] button.

The program takes the scan and displays the resulting color image in the work window area on the left of the dialog. It also automatically detects the markers, and displays a single character (0 to 9 or A to Y) for each “marker ID” (0 to 34) in each location at which a marker was detected.

If the program determines that the scanned data is good enough for alignment processing, the condition bar (under the work window) becomes blue and displays the “Good condition” message. If the program determines that the scan results are not good enough for alignment, the condition bar turns red and displays “No good”.



### **Memo**

On the color image, areas that have no distance data are displayed as black.

- When [Auto Marker Detection] checkbox is unchecked, the automatic marker detection will not be carried out.
- As an alternative to taking the scan at this time, you can import a saved scan (CDM file) that was previously taken with the VIVID 910. Just click the [Import] button and load the appropriate file.

## 8 If necessary, adjust the marker correspondences.

### **Note**

*If the condition bar (under the work window) is red, this means that the data is not yet suitable for alignment. Adjust the marker correspondences and take other steps as necessary until the bar becomes blue.*

- If any of the detected marker IDs does not match the corresponding marker on the actual object, correct as follows: right-click the marker ID on the image, and then enter the correct marker ID at the dialog that opens.
- If any of the marker IDs displayed on the previously stored image (the image stored at step 9 below) does not match the corresponding marker ID displayed on the image scanned at step 7 above, correct as follows: Left-click the mismatched ID in either of these two images, and then left-click on the correct corresponding marker ID in the other image. The program will change the IDs so that they are identical.
- To set up a “new” marker ID on images from Step 7 on Step 9 in a location where there was no physical marker on the object (or where the program failed to detect a marker), left-click the corresponding points in the two images. The program will display a marker ID of “\*” at these points.

## 9 Click the [Store] button.

The data displayed in the work window moves over into the store window on the right side of the dialog.

Marker detection results are indicated in the condition bar. The temporary window shows a preliminary converted image (“pre-converted” image) of all of the stored data.

## 10 Repeat steps 7 to 9 as necessary to scan at all desired angles.

- You can use the [ <<Prev ] button or [ Next >> ] button to move through the stored-data displays.
- You can use the [ Delete ] button to delete unnecessary stored data.
- You can use the [ View ] button to move through the data display or hiding in the temporary window.

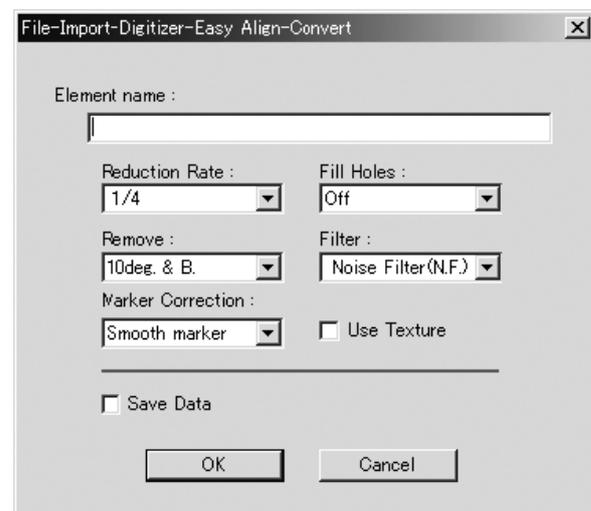
## 11 If you have adjusted the marker correspondences, click the [Pre-Convert] button.

The image displayed in the store window area (on the right of the dialog box) is realigned based on the change in the marker correspondence, and the result appears in the temporary window.

## 12 Click the [Convert] button.

The program opens the [File-Import-Digitizer-Easy Align-Convert] dialog.

- If you did not enter a valid license code at Step 1 above, the [Convert] button will not appear.



## 13 Enter an element name and set the element parameters.

### Note

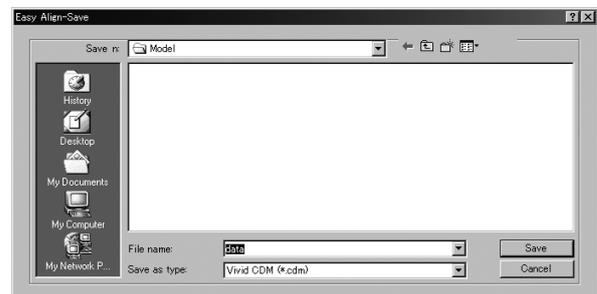
Enter an element name of up to 31 alphanumeric characters.

- Select the data resolution from the [Reduction Rate] pull-down menu. Choices are: “1/1”, “1/4”, “1/9”, “1/16”, or “No polygon”.
- If you want the program to fill-in lost data areas when loading the data, set [Fill Holes] to “On”.
- At the [Remove] pull-down menu, select the data to be excluded at time of loading. Choices are: “None”, “Boundary (B.)”, “5deg.& B.”, “10deg.& B.”, “15deg.& B.”, and “20deg.& B.”
- If you want to filter the data when loading it, make the appropriate selection at the [Filter] pull-down menu.
- If you want to apply 3D processing to the marker sections, make the appropriate selection at the [Marker Correction] pull-down menu.
- If you want to use texturing, check the [Use Texture] checkbox.
- If you want to save the data at the time of conversion, check the [Save Data] checkbox.

## 14 Click the [OK] button.

The temporary window (the window that was showing the pre-converted image) closes. The program converts the data that was displayed in the store window, and displays the resulting aligned data.

- The loaded data will be ready for display in all windows. It will be shown in the active window and in those windows for which all elements are set to be displayed (i.e., in those windows that are not set to “Selective”).
- The first time the program loads data after starting up, it will be fully framed in all windows (including those that are hidden automatically).
- If you are using the rotating stage, the stage now rotates back to its origin.
- For elements that existed prior to execution of this command, the selection status and display states remain unchanged.



- If you checked [Save Data] (at Step 13 above), the program opens the [Easy Align-Save] dialog box (shown above).
  - ① Enter a filename for the saved file.
  - ② Click the [Save] button.

### Note

The filename must be alphanumeric characters only.

## ■ Calibration to Facilitate Automatic Marker Recognition

In the Easy Align, position alignment is carried out based on the marker information gotten from the markers affixed to the object to be measured. The program identifies markers by color patterns. Under some scan lighting conditions, however, the program is unable to distinguish the markers correctly. Accordingly, adjustment is necessary to carry out by implementing calibration of the White Balance adjustment and Color Chart under the same lighting conditions as those used for the actual scan in order to get stable and correct marker information, as you will use for scanning the marked object.

The calibration procedure described below generates the reference file. Once the file has been created, the program will use it as reference when detecting markers from the scanned images.

### **Memo**

In performing calibration, always be sure to attach the same lens that will be used during the actual scan of the object to be measured.

## ■ VIVID 910 White Balance Adjustment

Because the Easy Align command must automatically detect the markers adhered to the scanned object, lighting conditions are of critical important. This means that it is necessary to adjust the white balance at the VIVID 910 unit before using the command, and it is important to keep the illumination conditions constant during measurements.

### **Note**

*The Easy Align command cannot be used if you are working near a window exposed to the midday sun, or if you are using a tungsten-color fluorescent light source.*

### **Memo**

The recommended light source is a daylight-colored fluorescent lamp with a brightness that is appropriate for a typical office environment (about 500 lux).

**Ref.** *For information about how to carry out white-balance adjustment, refer to page 43, in the VIVID 910 unit's Instruction Manual.*

## ■ Color Chart Calibration

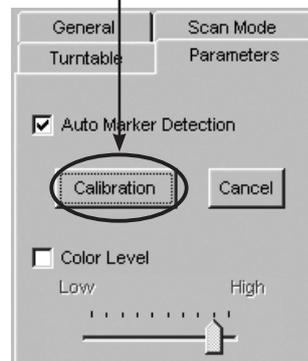
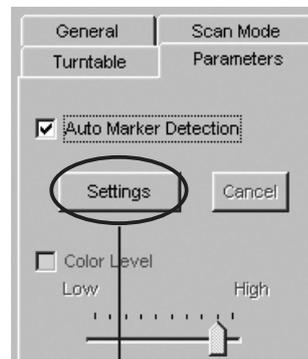
### Operating Procedure

To carry out the following procedure, you must first open the [File-Import-Digitizer-Easy Align] dialog.

#### 1 Click the [Parameters] tab.

##### Note

The [Settings] button will not appear if [Auto Maker Detection] is unchecked.



#### 2 Click the [Settings] button.

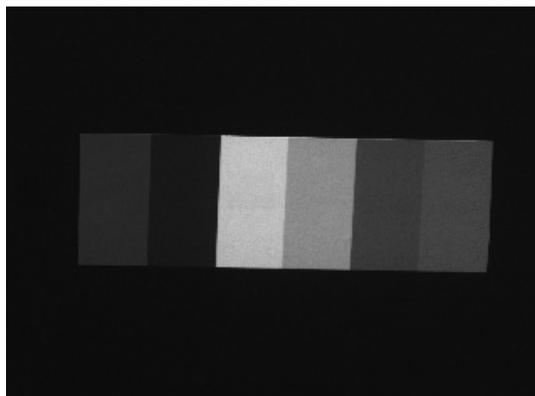
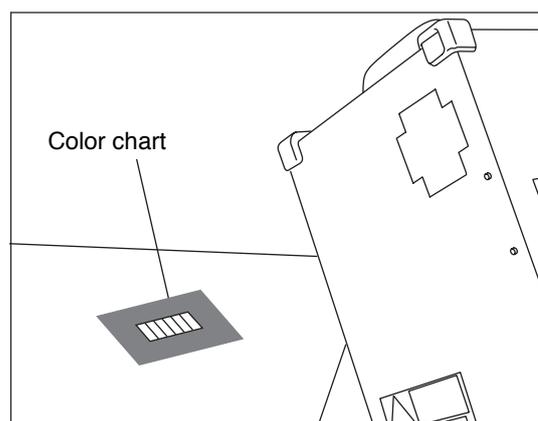
The name of the button changes to [Calibration]. It is now possible to change the [Color Level].

#### 3 Place the supplied color chart same position as the object to be scanned.

Set the lighting to the same conditions you will use when carrying out the actual scan. Set the color chart so that it is directly facing the VIVID 910 lens.

##### Note

To be sure that you scan only the chart and not anything else, check the image shown in dialog to confirm that you have placed the chart in the right place.



#### 4 Click the [Calibration] button.

The program executes calibration. If calibration is successful, the “Calibration success.” message dialog box will appear.



- If calibration is not successful, the “Calibration failure.” message dialog box appears. If this happens, click the dialog’s [OK] button, and effect the measures listed below in accordance with the content given in the dialog.

In the case of that the “Lighting is too bright.” message dialog box will appear, the light source is too strong, so decrease its intensity.

In the case of that the “Lighting is too dark.” message dialog box will appear, the light source is too dark, so increase its intensity.

In the case of that the “Chart setting is improper. or Light source is improper.” message dialog box will appear, either the Color Chart has been improperly set or the light source is unstable. Make sure that the Color Chart directly faces the VIVID 910 and that it fills the screen completely. Also check to make sure that the fluorescent light is not flickering.

#### 5 Click the [OK] button.

The dialog closes. This completes the calibration.

Parameters in the [File-Import-Digitizer-Easy Align] Dialog	
Import	Lets you import data that was previously scanned by a VIVID 910 and saved as a CDM file. Once you have imported the data, you can proceed just as you would when working with an actual scan. Note that if you are using saved CDM data from a step-scan, the program will only import the data currently shown in the preview. The data that is not in the color image or VIVID 900 data cannot be imported
AF	Executes auto-focus. To manually adjust the distance, exposure, or other settings, open the General tab and set as desired. This button is active only if the VIVID 910 is connected.
Scan	Executes scanning. When [Auto Marker Detection] checkbox is checked, the automatic marker detection will be carried out. When the [Color Level] checkbox is unchecked at the time of automatic marker detection, the automatic switching of color levels will be carried out, and there are cases when color images are taken multiple times. This button is active only if the VIVID 910 is connected.
Color Read	Retakes a color shot and display the newest picture by clicking this button after scanning. This button will be enabled after scanning.
Auto	If this checkbox is checked, the program will automatically execute store processing on imported or scanned data that is determined to be in “good condition” (i.e., for which the condition bar appears blue). When the command starts, this checkbox is empty.
Store	Registers the scanned data as stored data.
View marker ID	Turns display of marker IDs in the work and store windows ON or OFF.
Mono/Color/Pitch	Changes the type of the display in the work window. Mono : The window displays monochrome monitor data. (It is available only if the VIVID 910 is connected.) Color : The window displays color data. Pitch : The window displays distance data for scanned or imported data.
Prev/Next	Change display to the previous or next stored data by clicking the [Prev] or [Next] button.
Delete	Deletes the stored data currently shown in the store window. If the program is showing the result as an element in the temporary window, this element is also deleted.
Pre-Convert	Pre-converts and aligns the stored data, and displays the result in the temporary window.
View	Turns the pre-converted element display in the temporary window ON or OFF.
Convert	Converts all stored data in accordance with the specified parameter settings, and displays the aligned result.
<b>General Tab</b>	
Distance	Checking this checkbox sets [Distance] on.
Intensity	Checking this checkbox sets [LD] and [Gain] on.
LD	Sets the intensity of the laser beam.
Gain	Sets the gain.
Focus Lock	Executes focus lock. When you select this item, the program automatically places checks in the [Distance] and [Intensity] checkboxes, and displays the current set position, the laserbeam intensity, and the gain value.
<b>Scan Mode Tab</b>	
Fine/Fast	Sets the scan mode.
Dynamic Range Expansion	If this checkbox is checked, the program takes multiple shot so as to expand the dynamic range and reduce data loss.
High Quality	If this checkbox is checked, the program includes display of low-reliability data. On the range image, data for which laser intensity was too high appear in light gray, while data for which intensity was too low are shown in dark gray.

Parameters in the [File-Import-Digitizer-Easy Align] Dialog	
Parameters Tab	
Auto Maker Detection	Check this checkbox if using markers.
Settings	When you click this button, the button's name changes to [Calibration]. You can then change the color level and carry out calibration. This button appears only if the [Auto Maker Detection] checkbox is checked
Color Level	Checking this checkbox sets the program to use color exposure level.
Calibration	If this checkbox is checked, the program gets a color image and generates a reference file from it. This check box appears only if the [Auto Maker Detection] checkbox is checked.
Log	If this checkbox is checked, the program applies logarithmic correction to color data. Use if you want to brighten up neutral colors. This check box appears only if the [Auto Maker Detection] checkbox is unchecked.
Smooth	If this checkbox is checked, the program applies smoothing to color data. Use if illumination is low and the image is unclear. This check box appears only if the [Auto Maker Detection] checkbox is unchecked.
Dark	If this checkbox is checked, the program applies dark correction to color data. Use if you are getting striation-type noise in the images. This check box appears only if the [Auto Maker Detection] checkbox is unchecked.
Turntable Tab	
Apply	When you click the [Apply] button after selecting the serial port and rotating stage, the [Angle] slider becomes effective and stage control is enabled. <b>Note</b> <i>If connecting to a SKIDS-60YAW unit, select "CSG-602R (Ver.1.0)" from the menu. If connecting to a SKIDS-60YAW (Ver.2.0) unit, select "CSG-602R (Ver.2.0)".</i>
Angle	The Angle slider becomes enabled when the program determines that the rotating stage is operating normally. You can use the slider to control the stage's rotation.

Parameters in the [File-Import-Digitizer-Easy Align-Convert] Dialog	
Reduction Rate	Selects the reduction rate to be applied when importing data. You can select any of the following: "1/1", "1/4", "1/9", "1/16", or "No polygon".
Fill Holes	Selects whether the program fills in holes when importing the data. If the setting is On, the program will automatically generate points to fill in holes left by missing data.
Remove	Selects which data the program excludes when carrying out the import. Select from any of the following: "None", "Boundary (B.)", "5deg. & B.", "10deg & B.", "15deg & B.", or "20deg. & B." None: No removal when importing the data. Boundary (B.): The program removes boundary points. 5deg & B., 10deg & B., 15deg. & B., 20deg. & B.: The program removes boundary points and also removes polygons within the specified angular range (5°, 10°, 15°, or 20°) to the view vector.
Filter	None: The program does not perform filtering when importing the data. Noise Filter (N.F.): When importing data, the program corrects the points that appear to be noise. High Quality (H.Q.): The program filters out unreliable data. (Effective only when importing data that was scanned using the VIVID 910.) H.Q & N.F.: Applies both noise filter and high quality filter. (Effective only when importing data that was scanned using the VIVID 910.)
Marker Correction	None: The program does not perform filtering the marker sections. Cut marker: The data in the marker section will be deleted and treated as a hole. Smooth marker: Smoothing will be carried out for the marker section data.
Use Texture	Check this checkbox when using texture.
Save Data	If you check this checkbox, the program will automatically save the data into a camera data file when carrying out conversion. <b>Note</b> <i>If you select CDM as the file type for the save (at the Save dialog that appears), the program will not include the above-described data corrections and data-coordinate conversion information into the saved file. If you select a file type other than CDM, however, the program does incorporate this information into the save.</i>



## File – Import – Digitizer – PSC-1

### Performing Precision Registration of Scan Data

This command uses photogrammetry to enable precision registration of data scanned by VIVID 9i, by utilizing 3D data that is obtained from the 2D data taken by a digital camera.

To obtain 3D data from 2D data, the image data taken by a digital camera from different angles is processed using software called “PhotoModeler KM”.

Since this requires some experiences in operation and another software in addition to this Polygon Editing Tool software, a separate operation manual has been prepared. For details, refer to the Photogrammetry System PSC-1 Instruction Manual.

#### **Memo**

- This command can only be used on the VIVID 9i.
- To use this command, a license of the Photogrammetry System PSC-1 is required.

## File – Export – Elements

### Exporting Element Data as Various Formats

This command is used to export the data of the selected elements in various data formats.

#### Operating Procedure

### 1 From the element list, select the elements to be exported.

#### **Memo**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

### 2 From the [File] menu, select [Export] and then click [Elements].

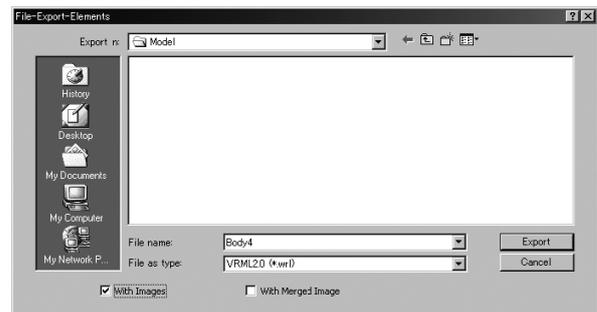
The [File-Export-Elements] dialog box will appear.

- If two or more elements have been selected, their names will be displayed in the order they are displayed in the element list.

### 3 If you want to change the file name, enter a new file name.

#### **Note**

The file name must consist of alphanumeric characters only.



### 4 From the [File as type] pull-down menu, select the desired format.

The following file types are available.

- VRML1.0 (\*.vrl)
- VRML2.0 (\*.vrl)
- Softimage (\*.hrc)
- Wavefront (\*.obj)
- DXF (\*.dxf)
- ASCII (\*.asc)
- STL(ascii, binary) (\*.stl)
- MGF (\*.mgf)

- If a format (i.e. VRML1.0, VRML2.0, Softimage) that allows attachment of images is selected, the [With Images] checkbox will be effective. If you want to attach images to the data, check the checkbox.

### 5 Click the [Export] button.

The first element will be exported, and a dialog box for the next element will appear.

- When all the elements are exported, the dialog box will close.
- If you click the [Cancel] button, the next element and subsequent elements will not be exported.

#### **Note**

If the element data contains two or more images, an error message will appear when the [Export] button is clicked with "Softimage" selected in [File as type], [With Images] checked and [With Merged Image] unchecked.

#### **Memo**

If "Softimage" has been selected in [Export as type] and the [Export] button is clicked, four kinds of files will be exported (\*.hrc, \*.mtr, \*.pic, \*.txt). (Only "\*.hrc" files will be exported if the [With Images] checkbox is not checked.)

To use exported data with "Softimage", store the data files in the following directories of the "Softimage" database.

- "\*.hrc" file - [Models] directory
- "\*.mtr" file - [MATERIALS] directory
- "\*.pic" file - [Pictures] directory
- "\*.txt" file - [TEXTURES2D] directory

Parameters for [File-Export-Elements] Dialog Box

Parameters for [File-Export-Elements] Dialog Box	
Export in	Select the folder for exporting data.
File name	Input the name of data file to export.
File as type	Select format for exporting data.
With Images	Textures will also be output when the data is exported.
With Merged Image	Textures will be merged and output when the data is exported.

## ■ Texture Merging

To merge textures and output the result when the element is exported, follow the procedure given below.

### Operating Procedure

Before starting the following procedure, make sure that the desired file and output format have been selected in the [File-Export-Elements] dialog box.

#### 1 Check the [With Images] and then [With Merged Image] checkbox in this order.

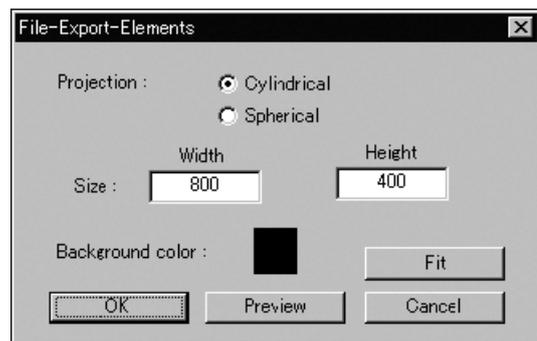
##### Note

*If two or more elements have been selected, it is not possible to check the [With Merged Image] checkbox (the checkbox will be ineffective).*

#### 2 Click the [Export] button.

The [File-Export-Elements] dialog box will close, and the dialog box shown on the right will appear instead.

- The loaded data will be ready to be displayed in all windows. It will be displayed in the active window and the windows for which all the elements are set to be displayed.
- The unselected elements which have been displayed when this command is executed will be hidden in all windows. The elements that have been hidden will be displayed when the menu is exited.
- A projection plane will be displayed in each window in such a way that it encloses the element (default projection plane: Cylindrical). The axis of the projection plane is indicated in red, the green end of the axis indicates the top side of the projection plane and the blue end indicates the bottom side. In addition, disconnections of textures are indicated by purple lines.



#### 3 Select the desired projection and move or rotate it.

Dragging with the left mouse button will rotate the projection's axis, and dragging with the left mouse button while holding down the [Shift] button will rotate the projection around the axis.

- Changing the "projection" type will cause the projection displayed inside the window to change to the selected type. The projection will be displayed so that it encloses the element.

##### Note

*It is possible to change view mode for the element view window, but not to close the element view window.*

- To fit the projection to the shape of the element, click the [Fit] button.

## 4 Set the size and background color.

- Clicking [Background color] with the left mouse button will open a color palette, allowing you to set the desired background color.
- Width and Height must be set within the range of “0” and “10000”. An error message will appear if they are outside the range.

## 5 Click the [Preview] button.

All the element view windows will be hidden, and the image and preview windows will appear.

- The image window shows the color image projected on the projection plane.
- The preview window shows the texture-mapped element in full frame. Dragging with the left mouse button inside the preview window rotates the camera.
- The [Preview] button in the [File-Export-Element], will change to the [Preview Close] button and also a name of the dialog box will change to [Merge Texture]. In the [Merge Texture] dialog box, buttons except [OK], [Preview Close] and [Cancel] buttons will be ineffective.

### Note

- *It is not possible to rotate/move the projection plane inside the preview window.*
- *Shortcut keys cannot be used while the preview window is active.*
- *It is not possible to change view mode for the element view window.*

## 6 Click the [OK] button.

The element containing the color image projected on the projection plane will be exported in the specified format.

- When the element has been exported, the [Merge Texture] dialog box will close. If the image window and temporary window are open, they will be closed and all the element view windows will open instead.

- Clicking the [Preview Close] button will close the image and preview windows and display all the element view windows. The [Preview Close] button will change to the [Preview] button.
- If the image and preview windows are closed, the [Preview Close] button will change to the [Preview] button. All the element view windows will be displayed.

- Clicking the [Cancel] button will cancel all the operations that have been performed after the [Merge Texture] dialog box was opened. If the image window and preview window are open, they will be closed and all the element view windows will open instead.

## File – Export – Images

### Exporting Image Data as Various Formats

This command is used to export the color image data of the selected elements in various data formats.

#### Operating Procedure

- 1 From the element list, select the elements to be exported.

#### Memo

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

- 2 From the [File] menu, select [Export] and then click [Images].

The [File-Export-Images] dialog box will appear.

If two or more elements have been selected, their names will be displayed in the order they are displayed in the element list.



- 3 If you want to change the file name, enter a new file name.

#### Note

The file name must consist of alphanumeric characters only.

- 4 From the “File as type” pull-down menu, select the desired format.

The following image data file types are available.

- TIFF (\*.tif)
- BMP (\*.bmp)
- PPM/PGM (\*.ppm)
- JPEG (\*.jpg)

- 5 Click the [Export] button.

The first element will be exported, and a dialog box for the next element will appear.

When all the elements are exported, the dialog box will close.

If you click the [Cancel] button, the next element and subsequent elements will not be exported.

Parameters for [File-Export-Images] Dialog Box

Export in	Select the folder for exporting data.
File name	Input the name of data file to export.
File as type	Select format for exporting data.

## File – Remove Elements

### Removing the Selected Element(s)

This command is used to remove element(s) selected in the element list.

#### */Memo/*

The **File – Remove Elements** command has the same functions as the **Edit – Delete – Elements** command.

*/Ref./* For details of the **Edit – Delete – Elements** command, refer to page 169.

### Operating Procedure

- 1 From the element list, select the element to be removed.**

#### */Memo/*

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

- 2 Click [Remove Elements] on the [File] menu.**

A message dialog box asking you whether to delete all the selected elements will appear.



- 3 Click the [OK] button.**

All the selected elements and their corresponding points will be removed.

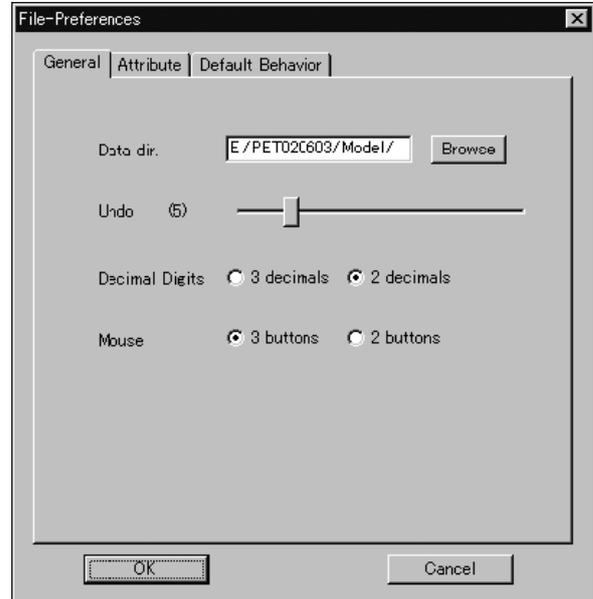
## File – Preferences

### Displaying Information for Setting Conditions

This command is used to display information related to various settings.

#### Operating Procedure

- 1 Click **[Preferences]** on the **[File]** menu.  
The **[File-Preferences]** dialog box will appear, showing the setting conditions.



- 2 Click the desired tab and make the desired setting for each parameter.

- 3 Click the **[OK]** button.  
The dialog box will close and the settings made at step 2 will be saved.

#### Note

*If the Undo number is reduced, the old information corresponding to the amount of reduction will be deleted and cannot be restored.*

#### Memo

Clicking the **[OK]** button will effectuate all the changes made in the **[General]** and **[Attribute]** tabs immediately. The settings made in the **[Default Behavior]** tab will be saved, and will be effective when this software is started next time.

Parameters for [General] Tab of [File-Preference] Dialog Box		Default Settings
Data dir.	Used to set the default directory in which data is to be saved. When you specify the default directory or click the <b>[Browse]</b> button, a dialog box allowing you to select a directory will appear, so select the desired default directory.	Directory from which the software is started
Undo	Used to set the number of times Undo is to be performed (1 to 20). Move the slide bar to set.	5
Decimal Digits	Used to set the number of point coordinate digits to be displayed. The setting made here will be reflected for ASCII output, <b>Info – Points</b> and <b>Info –Picked Point</b> , that can be set when <b>File – Export – Elements</b> is selected.	2
Mouse	Used to set the type of mouse to be used (3 buttons or 2 buttons). The status bar will vary with the number of buttons.	3 buttons

Parameters for [Attribute] Tab of [File-Preference] Dialog Box		Default Settings
<b>Wireframe</b>		
Selected	Used to set the wireframe color of the currently selected elements.	Pink
Unselected	Used to set the wireframe color of the currently unselected elements.	Dark gray
Line width	Used to set the wireframe line width (0~10).	1
<b>Shading</b>		
Selected	Used to set the shading color of the currently selected elements. But note that if you have checked the [Auto] checkbox, the program will automatically set the shading color for each element using a prearranged color scheme.	Dark green
Unselected	Used to set the shading color of the currently unselected elements.	Dark gray
<b>Vertex</b>		
Selected	Used to set the color and size of the currently selected points.	Red, Size: 2
Unselected	Used to set the color and size of the currently unselected points.	Blue, Size: 2
Auxiliary	Used to set the color and size of auxiliary points	White, Size: 2
<b>Normal</b>		
Color	Used to set the color and size of the normal.	Green Size: 10
<b>Window</b>		
Background Color	Used to set the window's background color.	

**Memo**

- To set a color, click the color button and select the desired color from the dialog box that appears. Point and line sizes must be set numerically.
- The selected and unselected colors will be hidden if the size of “Selected Color” and “Unselected Color” for [Vertex] is set to “0”, respectively.
- If you set the wireframe line width to “0”, the display will show points only-and if you are using LOD at the same time, then no data at all will appear. If setting the line width to “0”, therefore, please also sure to set the [Use LOD] setting to “Off”.

Parameters for [Default Behavior] Tab of [File-Preference] Dialog Box		Default Settings
Simplify unselected elements	Selects whether the program displays unselected elements in simplified form (On) or in detailed form (Off).	On
Move input elements to origin	Effective when loading camera data. If the setting is On, the program moves input elements to the origin. If the setting is Off, the program displays the elements at their original input coordinates.	Off
Select points of input elements	If this setting is On, the program sets the all input elements into selected state when loading the data.	Off
Use CAD views as initial windows	Selects the window display mode used when the program starts up. If this setting is On, the program starts up using CAD views. If this setting is Off, the program starts up using single-window (isometric) view.	On
Show points	Sets display of points to On or Off.	Off
Show normals	Sets display of normals to On or Off.	Off
Show axis	Sets axis display to On or Off.	On
Flat shading	Selects the shading condition, flat shading (On) or smooth shading (Off).	Off
Rendering mode	Sets the default rendering mode.	Shading
Use LOD	Selects whether the program shows simplified display (On) or detailed display (Off) during editing of elements. Also sets the level between 1 and 100%.	Off

## File – Select Digitizer

### Selecting a Digitizer

This command is used to select the VIVID connected to the computer from the digitizer list.

#### Operating Procedure

### 1 Click [Select Digitizer] on the [File] menu.

The [File-Select Digitizer] dialog box will appear, showing the currently selected digitizer.

#### **Memo**

After installed this software, the dialog box shows “None” until selecting the **File-Select Digitizer** command.

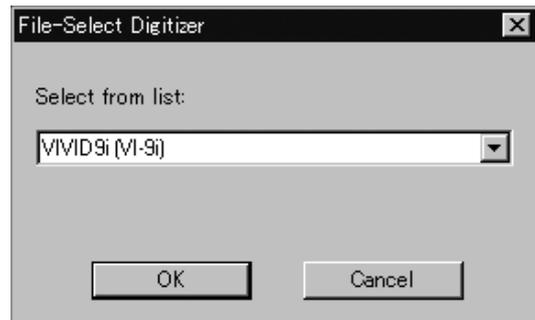
### 2 Select the digitizer you want to use, and click the [OK] button.

The selected digitizer can be controlled via the menus that appear when **File – Import – Digitizer** commands will be selected.

#### **Memo**

If a digitizer has already been selected and you switch it to another digitizer, the new digitizer will be usable when this software is started next time.

<b>VIVID 9i (VI-9i)</b>	Select to use the “VIVID 9i (VI-9i)” digitizer.
<b>VIVID 910 (VI-910)</b>	Select to use “VIVID 910 (VI-910)” digitizer with the new GUI like the one for “VIVID 9i (VI-9i)” digitizer.
<b>VIVID 900/910 (VI-900/910)</b>	Select to use the “VIVID 900 (VI-900)” or “VIVID 910 (VI-910)” digitizer. * When using 2 or more “VIVID 910 (VI-910)” digitizers, select this item.
<b>VIVID 700 (VI-700)</b>	Select to use the “VIVID 700 (VI-700)” digitizer.
<b>VIVID 300 (VI-300)</b>	Select to use the “VIVID 300 (VI-300)” digitizer.
<b>TS-1000</b>	Select to use the “TS-1000” digitizer.



This command is used to exit the Polygon Editing Tool.

### Operating Procedure

#### 1 Click [Exit] on the [File] menu.

The software will be exited.

- If modifications have been made to an element after it has been imported or saved, the “Some elements are modified. Do you want to save them?” message dialog box will appear.
- To save the element data, click the [Yes] button.
- Clicking the [No] button will exit the software without saving the element data.

**[Ref.]** For details of how to save elements, refer to the **File – Save – Elements** command (page 26).





# View Menu

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## View – Orbit

[O] (Effective while held down)

Rotating / moving camera (view point) position

This command is used to rotate the camera at the point of interest. In addition, camera position can also be moved (dragged).

### **Memo**

Use of a mouse equipped with wheel function enables screen zoom-in/-out by turning the wheel.

### **Note**

- This command is effective only for the “Isometric” or “Perspective” element view window.
- View – Orbit mode will be active when this command is selected. To cancel the View – Orbit mode, execute the View – Orbit command again. However, if you are executing this command using the shortcut key, the View – Orbit mode can be canceled by releasing the key.

	Left	: Rotates the camera in the desired direction.
	Middle ([Shift] + Left)	: -
	Right	: Moves the camera position (Drags Camera). * Enables screen zoom-in/-out by turning the wheel.

## Operating Procedure

### 1 Click [Orbit] on the [View] menu.

### 2 Drag the item in an element view window while holding down the left mouse button.

The element will rotate in the direction it is dragged.

- Camera position can be moved while holding down the right mouse button and dragging. Use of a mouse equipped with wheel function enables screen zoom-in/-out by turning the wheel.
- Dragging while holding down the right button will move the camera position.

### **Memo**

Element will be displayed in simple form while camera position is moved (dragged). It will be displayed in detailed form when dragging is canceled.



## View – Zoom

**[Z] (Effective while held down)**

Enlarging/Reducing the Displayed Item

This command is used to enlarge (zoom-in) or reduce (zoom-out) the displayed item, or to move the camera to change the view angle.

**[Ref.]** For a description of camera position, refer to the *View – Camera Settings* command (page 155).

**[Note]**

*View – Zoom mode will be active when this command is selected. To cancel the View – Zoom mode, execute the View – Zoom command again. However, if you are executing this command using the shortcut key, the View – Zoom mode can be canceled by releasing the key.*



Left : zoom-in, zoom-out  
Middle ([Shift] + Left) : –  
Right : Drags the camera.

### Operating Procedure

**1** Click [Zoom] on the [View] menu.

**2** Drag the item in an element view window while holding down the left mouse button.

Dragging the item upward will enlarge it (zoom-in) and dragging it downward will reduce it (zoom-out).

- To move the camera (i.e. drag the camera), drag while holding down the right mouse button.

**[Memo]**

The element will be displayed in simple form during zoom and drag. It will be displayed in detailed form when zooming or dragging is canceled.

	<b>View – Full Frame All</b> <span style="float: right;"><b>[Shift] + [F]</b></span>
	Displaying Data Fully in all Windows

This command is used to fully frame the data completely in each element view window.

### Operating Procedure

**1 Click [Full Frame All] on the [View] menu.**

The currently displayed elements will be zoomed in so that they are fully framed in their corresponding windows.

	<b>View – Full Frame</b> <span style="float: right;"><b>[F]</b></span>
	Displaying Data Fully in Active Windows

This command is used to fully frame the data displayed in the active window.

### Operating Procedure

**1 Click [Full Frame] on the [View] menu.**

The element currently displayed in the active window will be zoomed in so that it is fully framed.

Use this command to set the camera's rotation center point, and to rotate the camera in any direction.

**[Ref.]** To find the camera's current position and point-of-interest, use the **View – Camera Settings** command (page 155).

**[Note]**

This command is effective in element view windows whose view direction is set to *Isometric* or *Perspective*.



Left : Rotates the camera in any direction  
 Middle ([Shift] + Left) : –  
 Right : Sets the center of rotation.

**Operating Procedure**

**1** Open the **[View]** menu and click **[Area Orbit]**.

**2** Hold down the left mouse button, and drag the element (in the element view window) to rotate it about its center.

Dragging left or right rotates the element horizontally, while dragging up or down rotates it vertically.

- The image rotates around the center point that you select by right-clicking on the element view window.

**[Memo]**

The program automatically switches to simplified element display while the camera is in motion. When you finish dragging, the program displays from the new camera position using the originally selected display type.

**3** Press the **[ESC]** key.  
**View–Area Orbit** mode will be canceled.



## View – Area Zoom

[X] (Effective while held down)

Enlarging/Reducing Item Enclosed by Specified Rectangle

This command is used to enlarge (zoom-in) the item enclosed by a rectangle or reduce (zoom-out) the currently displayed item so that it is displayed within the rectangle, by defining a rectangle to be used as a scale on the element view window.

	Left	: zoom-in
	Middle ([Shift] + Left)	: –
	Right	: zoom-out

### Operating Procedure

**1** Click [Area Zoom] on the [View] menu.

**2** Locate the mouse pointer to the start point of the desired area (rectangle), drag it, then release the mouse button at the end point.

The rectangle to be used as a scale will be defined. Dragging while holding down the left mouse button will enlarge the item, and dragging while holding down the right button will reduce it.

**3** Press the [ESC] key.  
View – Area Zoom mode will be canceled.

This command is used to set the display depth by changing the position (Near Plane) where the target element starts to appear and the position (Far Plane) where it starts to disappear.

	Left	: Near Plane
	Middle ([Shift] + Left)	: Near Plane/Far Plane
	Right	: Far Plane

### Operating Procedure

**1** Click [Move Plane] on the [View] menu.

**2** Click the point on the element where you want to set the display range.

- If you click with the left mouse button, the Near Plane will be set on the point you clicked. If you click with the right mouse button, the Far Plane will be set on the point you clicked.
- If you click with the middle mouse button ([Shift] + Left), the Near Plane/Far Plane (fixed depth) will be centered on the point you clicked.

**3** To move the plane, drag it.

- If you drag with the mouse left button pressed, the Near Plane will move. If you drag with the mouse right button pressed, the Far Plane will move.
- If you drag with the middle mouse button ([Shift] + Left) pressed, the Near Plane/Far Plane (fixed depth) will move.

**4** Press the [ESC] key.

View-Move Plane mode will be canceled.

## View – Move Light

### Moving the Light

This command is used to move the light, for instance when the element is displayed in shading mode.

#### **Memo**

- The light is a pseudo light designed to produce a shadow when the element view window is in shading mode.
- The position of the light is set relative to the point of view and line of vision of the window. By default, the light is located in the rear right quarter of the line of vision.
- One point light must be used as the light.



- Left : Moves the light perpendicular to the line of vision.  
Middle ([Shift] + Left) : –  
Right : Moves the light along the line of vision.

### Operating Procedure

#### **1 Click [Move Light] on the [View] menu.**

The active window will be set in shading mode.

#### **2 Drag the item in an element view window while holding down the left mouse button.**

The light will move on a plane perpendicular to the line of vision, causing the view of the element to change accordingly.

- Dragging upward while holding down the right mouse button will move the light forward along the line of vision, and dragging downward will move the light backward along the line of vision.

#### **Memo**

Dragging while holding down the [Shift] key will increase the movement of the light.

#### **3 Press the [ESC] key.**

**View–Area Orbit** mode will be canceled.

However, the element will remain displayed in shading mode.

## View – Camera Settings

### Setting the Camera Parameters

This command is used to set the camera parameters.

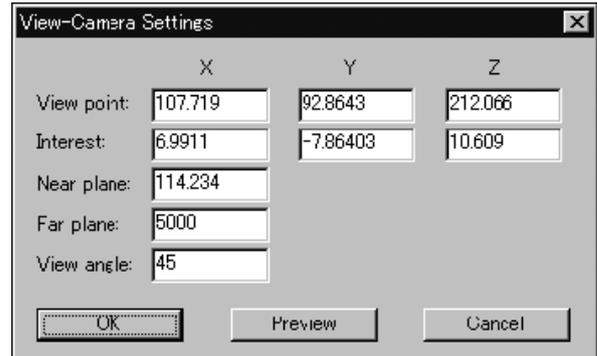
**[Memo]**

- The camera indicator is provided to help you understand the direction in which the image displayed in “Isometric” or “Perspective” element view window is taken. (The image displayed in “Isometric” or “Perspective” element view window is the image of the object viewed from the camera position.)
- The point of interest indicates the direction in which the image is taken by the camera.

### Operating Procedure

#### 1 From the [View] menu, select [Camera] and then click [Settings].

The [View-Camera Settings] dialog box will appear.



#### 2 Set the camera parameters.

**[Note]**

*If the window view is not set to Isometric or Perspective, some parameters settings are disabled. In particular, it will not be possible to set the “View angle” or to set some of the “View point” and “Interest” values, as follows.*

- *If view is set to Front or Back: Only the Z parameters can be set.*
- *If view is set to Top or Bottom: Only the Y parameters can be set.*
- *If view is set to Right or Left: Only the X parameters can be set.*
- *If view is set to Isometric, all parameters other than “View angle” can be set.*
- *If view is set to Perspective, all parameters can be set.*

#### 3 Click the [Preview] button.

The changes made to the camera parameters for the active window will be effective, and the contents of the element view window will change accordingly.

#### 4 Click the [OK] button.

The dialog box will close and the changes made to the element view window will be confirmed.

Parameters for [View-Camera Settings] Dialog Box	
View point	Camera position
Interest	Position of the point of interest
Near plane	Position (distance from camera) at which subject becomes visible
Far plane	Position (distance from camera) at which subject goes out of sight
View angle	View angle of the camera

## View – Image

### Displaying Color Images

This command is used to display color images of the element currently selected in the element list.

#### Operating Procedure

- 1 From the element list, select the desired element.

- 2 Click [Image] on the [View] menu.

An image window will open and display a color image of the selected element.

#### *Memo*

If the element includes multiple color images, you can switch among color images by placing the mouse pointer over the element view window, opening the pop-up menu, and selecting the **Change Image** command.

## View – Show Element List/Hide Element List

### Displaying/Hiding the Element List

This command is used to display or hide the element list.

#### Operating Procedure When the element list is not displayed:

- 1 Click [Show Element List] on the [View] menu.

The element list will be displayed.

#### Operating Procedure When the element list is displayed:

- 1 Click [Hide Element List] on the [View] menu.

The element list will be closed.

## View – Show Toolbar

### Displaying the Toolbar

This command is used to display the toolbar.

#### Operating Procedure When the toolbar is not displayed:

- 1 Click [Show Toolbar] on the [View] menu.

The toolbar will appear.

#### *Memo*

Nothing will happen if the toolbar is already displayed.

# Select Menu

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## Select – Point

### Selecting/Unselecting a Point by Clicking the Mouse

This command is used to select or unselect the clicked point.

**Memo**

Selected points will be displayed in red, and unselected points will be displayed in blue.



Left : Selects one point present within the rectangle area by clicking the mouse.

Middle ([Shift] + Left) : –

Right : Unselects one point present within the rectangle area by clicking the mouse.

#### Operating Procedure

### 1 From the element list, select the desired element.

### 2 Click [Point] on the [Select] menu.

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

### 3 Click the desired point.

The point will be selected if it is left-clicked and unselected if it is right-clicked.

**Memo**

- Selected points will be displayed in red, and unselected points will be displayed in blue.
- If the **Select – Select Front** command is switched on (i.e. the command name is checked in the menu), the **Select– Point** command will operate only on points comprising polygons that are at the front and that are visible, and the mouse cursor will change to “+<sub>F</sub>”. If the **Select – Select Front** command is off (unchecked), the **Select – Point** command will operate on all points, and the mouse cursor will change to “+”.

### 4 Press the [ESC] key.

**Select – Point** mode will be canceled.



## Select - Rectangle

[E] (Effective while held down)

Selecting/Unselecting Points within Specified Rectangle Area

This command is used to select/unselect the points present within a rectangle area drawn using the mouse.

### **Memo**

Selected points will be displayed in red, and unselected points will be displayed in blue.

### **Note**

*When Windows Vista or Windows 7 is used, it may occur that the object cannot be drawn. In this case, please set the window design other than Windows Aero. To change the window design, right-click on the desktop and select Personalize – Window Color and Appearance.*



Left : Selects all the points present within the rectangle area.

Middle ([Shift] + Left) : -

Right : Unselects all the points present within the rectangle area.

## Operating Procedure

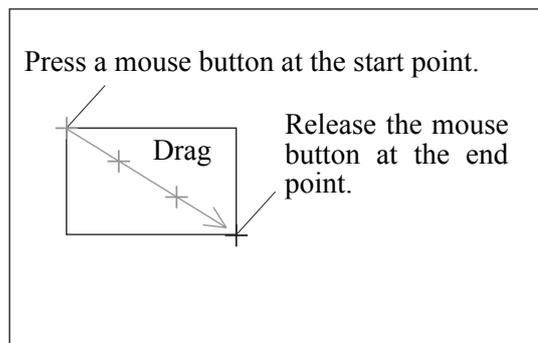
### 1 From the element list, select the desired element.

### 2 Click [Rectangle] on the [Select] menu.

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

### 3 Locate the mouse pointer to the start point of the desired area (rectangle), press the left mouse button and drag it, then release the mouse button at the end point.

A rectangle will be drawn as illustrated, and all the points inside the rectangle will be selected if the rectangle is drawn while the left mouse button is pressed or they will be unselected if it is drawn while the right mouse button is pressed.



### **Memo**

- Selected points will be displayed in red, and unselected points will be displayed in blue.
- If using the shortcut key (default is [E]), note that you must hold the key down while setting the range of points to be selected (or deselected). The shortcut key works only on visible parts of the element.
- If the **Select – Select Front** command is switched on (i.e. the command name is checked in the menu), the **Select – Point** command will operate only on points comprising polygons that are at the front and that are visible, and the mouse cursor will change to “+<sub>F</sub>”. If the **Select – Select Front** command is off (unchecked), the **Select – Point** command will operate on all points, and the mouse cursor will change to “+”.

### 4 Press the [ESC] key.

**Select – Rectangle** mode will be canceled.



## Select – Bezier

### Selecting Points within Specified Bezier Curve

This command is used to select the points present within a Bezier curve drawn using the mouse.

#### Note

- No any other commands can be executed until this command is canceled. To execute another command, press the [ESC] key to cancel the Select – Bezier mode.
- All the steps must be carried out within the same window. The size of the window (full or 1/4) must be set in advance.

#### Memo

Selected points will be displayed in red, and unselected points will be displayed in blue.

#### Note

When Windows Vista or Windows 7 is used, it may occur that the object cannot be drawn. In this case, please set the window design other than Windows Aero. To change the window design, right-click on the desktop and select Personalize – Window Color and Appearance.



- Left : Sets control points/Edits control points if the curve is closed.
- Middle ([Shift] + Left) : Confirms the curve if it has been closed/Unselects the points and exits the menu.
- Right : Closes the curve/Confirms the curve if it has been closed/Selects the points and exits the menu.

## Operating Procedure

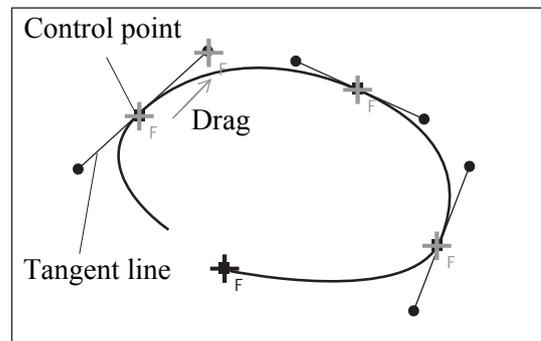
### 1 From the element list, select the desired element.

### 2 Click [Bezier] on the [Select] menu.

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

### 3 Enclose the desired area with a Bezier curve.

Clicking the left mouse button will create a control point. Dragging it will create a tangent line for the created control point. Locate the mouse to the next desired point, and click the left button to create another control point. Repeat the above steps until the desired area is enclosed with a Bezier curve.



#### Memo

- The Bezier curve will be shown in white and the control points in yellow.
- If the Select – Select Front command is switched on (i.e. the command name is checked in the menu), the Select – Point command will operate only on points comprising polygons that are at the front and that are visible, and the mouse cursor will change to “+<sub>F</sub>”. If the Select – Select Front command is off (unchecked), the Select – Point command will operate on all points, and the mouse cursor will change to “+”.

### 4 Click the right mouse button.

The Bezier curve will be closed and edit mode is activated.

**5 To edit the Bezier curve, drag control points or tangent lines while holding down the left button.**

**6 Click the right or middle mouse button.**

If the right button is clicked, the Bezier curve will be confirmed, and the points present within the curve will be selected.

If the middle button is clicked, the Bezier curve will be confirmed, and the points present within the curve will be unselected.

**/Memo/**

- Selected points will be displayed in red, and unselected points will be displayed in blue.
- If the **Select – Select Front** command is switched on (if the command name is checked in the menu), then the **Select – Bezier** command operates only on points comprising polygons that are at the front and that are visible. If the **Select – Select Front** command is off (unchecked), then the **Select – Bezier** command operates on all points.

**7 Press the [ESC] key.**

**Select – Bezier** mode will be canceled.



## Select – Boundary – Elements

### Selecting Only the Boundary of Holes of Element(s)

This command is used to select only the points on the boundary of holes among those comprising the selected element(s).



Selected points will be displayed in red, and unselected points will be displayed in blue.

#### Operating Procedure

**1 From the element list, select the desired element(s).**

**2 From the [Select] menu, select [Boundary] and then click [Elements].**

Among the points comprising the currently selected element(s), the points on the boundary of holes will be selected and the other points will be unselected.

- The selected element(s) will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Select – Boundary – Points

### Selecting Only the Boundary of Holes of Points

This command is used to select only the points on the boundary of holes, among those currently selected.



Selected points will be displayed in red, and unselected points will be displayed in blue.

#### Operating Procedure

**1 From the element list, select the desired element.**

**2 Select the desired points.**

**3 From the [Select] menu, select [Boundary] and then click [Points].**

Among the selected points, the points on the boundary of holes will be selected and the other points will be unselected.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Select - Color

### Selecting Points within Specified Homogeneous Area

This command is used to select the points corresponding to the homogeneous areas that are selected by specifying sample color data (sample point) on the color image window.

#### Memo

Selected points will be displayed in red, and unselected points will be displayed in blue.



- Left : Selects the sample color data (sample points).
- Middle ([Shift] + Left) : Selects the sample color data to be excluded from the area enclosed by a dotted line.
- Right : Cancels the previous operation (Undo).

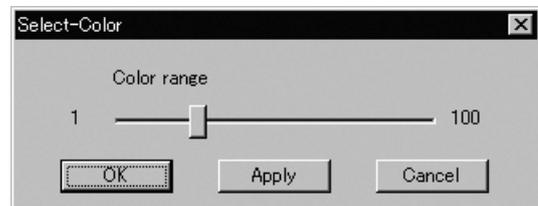
### Operating Procedure

#### 1 From the element list, select the desired element.

#### 2 Click [Color] on the [Select] menu.

The [Select-Color] dialog box will appear.

The cursor will switch to a cross cursor when it is located over the color image window.

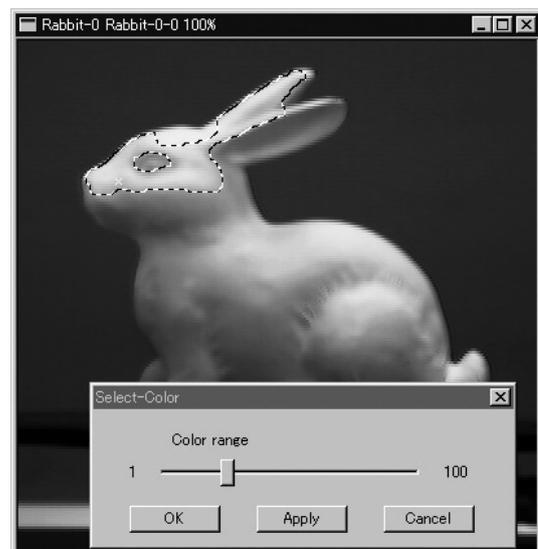


- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.
- If the image window that displays a color image has not been opened, it will be displayed when this command is selected. If the color image window of an element other than the selected element is currently displayed, it will be closed.

#### 3 On the color image window, locate the cross cursor to the point (sample point) containing the desired color, then click the left mouse button.

An "x" mark will be displayed on the sample point, and the homogeneous color area around the sample point will be enclosed by a blinking dotted line. The size of the area changes according to the value set in [Color range].

#### 4 While observing the selected area, adjust the Color range (1 to 100) in the [Select-Color] dialogbox.



- The larger the color range is, the larger the enclosed area.
- If the color range is changed after the sample point is specified, the selected area (the area enclosed by a dotted line) will change accordingly.

**5 If the enclosed area contains an unwanted area, locate the cursor to the sample point of that area and click the middle mouse button ([Shift] + Left button).**

The corresponding area on the color image will be excluded from the enclosed area, according to the [Color range].

**6 If you need another sample area, locate the cursor to another sample point, then click the left button.**

A new enclosed area will be created on the color image.

- Clicking the right mouse button over an image window will cancel the selections made by clicking the left button or middle button ([Shift] + Left button), and will cause the previously selected areas to be displayed. (This will also cancel the sample points.)  
Only the one previous selection can be canceled. Older selections will not be canceled.

**7 Click the [Apply] button.**

The points corresponding to the selected areas on the color image will be selected.

- Only the points comprising front-facing surfaces will be selected.
- Points on back surfaces, points forming back-facing surfaces and isolated points that are not forming a surface will not be selected.

**Memo**

- Each time the [Apply] button is clicked, the previously selected areas and selection state of the points in those areas will be canceled, and the points within the currently selected areas will be selected.
- If sample areas are selected on more than two color image windows and the color image window is switched from one to another, the sample areas (i.e. areas enclosed by a dotted line) on the previous color image window will be deleted. The state of the points selected by clicking the [Apply] button on the previous color image window will be confirmed, and those selected by clicking the [Apply] button from the sample area on the new color image window will be added to the confirmed points.

**8 Click the [OK] button.**

Selection state of the points on the element view window will be confirmed, and the dialog box will be closed.



## Select – Toggle Points

Reversing Selection State of Points of Selected Element(s)

This command is used to reverse the selection state of all the points present in the currently selected element(s).

*/Memo/*

Selected points will be displayed in red, and unselected points will be displayed in blue.

### Operating Procedure

**1 From the element list, select the desired element.**

**2 Click [Toggle Points] on the [Select] menu.**

Selection state of all the points present in the currently selected element will be reversed.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Select – Select by Elements [Ctrl] + [A]

Selecting All the Points of Element(s)

This command is used to select all the points present in the currently selected element(s).

*/Memo/*

Selected points will be displayed in red, and unselected points will be displayed in blue.

### Operating Procedure

**1 From the element list, select the desired element.**

**2 Click [Select by Elements] on the [Select] menu.**

All the points present in the selected element will be selected.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



## Select – Unselect by Elements

### Unselecting All the Points of Element(s)

This command is used to unselect all the points present in the currently selected element(s).



Selected points will be displayed in red, and unselected points will be displayed in blue.

#### Operating Procedure

### 1 From the element list, select the desired element.

### 2 Click [Unselect by Elements] on the [Select] menu.

All the points present in the selected element will be unselected.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



## Select – Select Front

### Selecting Only the Points Comprising Polygons that are Both Visible and at the Front

This command is used to limit point selection to only the points that comprise visible, front-facing polygons (as determined by the current view direction of the selected element).

#### Operating Procedure

### 1 Click [Select Front] on the [Select] menu.

A check mark will be placed and cleared alternately each time this command is selected. (**Select Front** is enabled when a check mark is placed, and disabled when no check mark is placed.)

- This command determines the action of the **Select – Point**, **Select – Rectangle** and **Select – Bezier** commands. Specifically, if the **Select – Select Front** command is active (if a checkmark appears next to the command name in the menu), then the **Select – Point**, **Select – Rectangle** and **Select – Bezier** commands will only operate on points comprising front-facing, visible polygons. In this case, the mouse cursor will change to “+<sub>F</sub>”.
- If no check mark is placed, all the points in the selecting area will be selected. In this case, the mouse cursor will change to “+”.

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## Edit – Undo

[Ctrl] + [Z]

### Canceling the Previous Operation

This command is used to cancel the previous operation. This command can be performed for the number of times specified by the **File – Preferences** command.

**Note**

*Execution of this command may not display simplified data.*

**Ref.** For details of the **File – Preferences** command, refer to page 142.

#### Operating Procedure

##### 1 Click [Undo] on the [Edit] menu.

The state in effect before the previous operation was performed will be restored. (In the case of a command that activates a mode, the state in effect before that command was performed will be restored.)

**Memo**

The Undo function cannot be used for the following.

- Commands in the [File] menu, except for those provided to import camera data and element data
- Commands in the [Info], [View], [File Import Digitizer] and [Window] menus
- Selection and display in the element list
- Commands in pop-up menus, except for those provided to delete elements.
- Changes to window properties
- Selection/unselection of elements in the element view windows
- Operations on image windows

## Edit – Redo

[Ctrl] + [Y]

### Performing the Canceled Operation

This command is used to perform the previous operation that has been canceled by the **Edit – Undo** command. It is possible to repeat this command up to the state in effect before the **Edit – Undo** was started.

**Note**

*Execution of this command may not display simplified data.*

**Ref.** For details of the **Edit – Undo** command, refer to page 168.

#### Operating Procedure

##### 1 Click [Redo] on the [Edit] menu.

The previous operation that has been canceled by the **Edit – Undo** command will be performed.

**Memo**

This command can be repeated until the state in effect before the **Edit – Undo** was performed is restored.

## Edit – Delete – Elements

### Deleting the Selected Elements from the Element List

This command is used to delete the element(s) selected from the element list.

**/Memo/**

The **Edit – Delete – Elements** command has the same function as the **File – Remove Elements** command.

**/Ref/** For details of the **File – Remove Elements** command, refer to page 141.

#### Operating Procedure

- 1 From the element list, select the element(s) you want to delete.**

**/Memo/**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

- 2 From the [Edit] menu, select [Delete] and then click [Elements].**

A message dialog box asking you whether to delete all the selected elements will appear.



- 3 Click the [OK] button.**

All the selected elements and their corresponding points will be removed.



## Edit – Delete – Points

[Ctrl] + [X]

### Deleting the Selected Points

This command is used to delete the point(s) selected for the currently displayed element.

**Note**

*Execution of this command may not display simplified data.*

#### Operating Procedure

- 1 From the element list, select the desired element.

**Memo**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

- 2 Select the point(s) you want to delete.

- 3 From the [Edit] menu, select [Delete] and then click [Points].

The selected point(s) will be deleted.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**Memo**

If all the points of the element are deleted, the element will be deleted from the element list.

## Edit – Delete – Polygons

### Deleting Polygons Comprised of Selected Points

This command is used to delete the polygon(s) that are comprised of the points selected in the currently displayed element.

#### Operating Procedure

- 1 From the element list, select the desired element.

**Memo**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

- 2 Select the polygon(s) you want to delete.

To select a polygon, all the constituent vertices must be selected.

- 3 From the [Edit] menu, select [Delete] and then click [Polygons].

The selected polygon(s) will be deleted.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**Memo**

Even if a polygon is deleted, the vertices comprising that polygon will not be deleted.

## Edit – Images

### Editing the Texture of Selected Element

This command is used to edit or output color images of the selected element.

#### Operating Procedure

**1** From the element list, select the desired element.

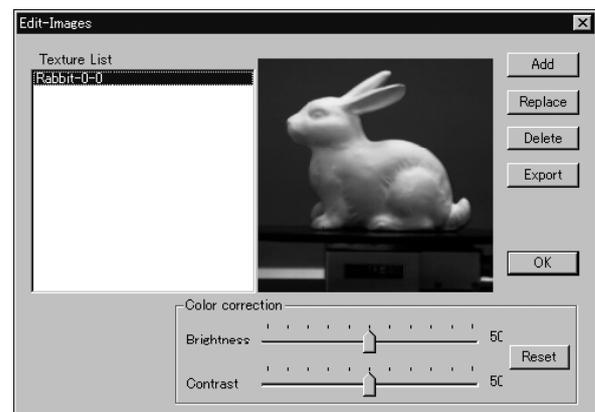
**2** From the [Edit] menu, and then click [Images].

The [Edit-Images] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.
- If image windows for displaying color images have been opened, they will be closed when this command is selected.

The [Texture List] will show the names of the images that belong to the selected element.

- Clicking an image name will display its corresponding color image.



**Note**

*An error message will appear if an element that has no images is selected. In this case, the command will not be executed.*

**3** Add, delete or replace textures.

**4** Click the [OK] button.

The [Edit-Images] dialog box will close, and the texture changes made at step 3 will be effected.

## ■ Adding a Texture ([ADD] button)

The [Add] button allows you to add a texture to the element.

### Operating Procedure

Before starting the following procedure, make sure that the [Edit-Images] dialog box is displayed.

#### 1 Click the [Add] button.

The [Edit-Images-Open Image] dialog box will appear.

#### 2 Select the desired texture file.

- To display files of a certain format only, select the desired format from the [Files of type] pull-down menu.

#### 3 Click the [Open] button.

The [Edit-Image] and [Edit-Images-Open Image] dialog boxes will close, the data of the selected file will be loaded, then the [Point Set] dialog box will appear.

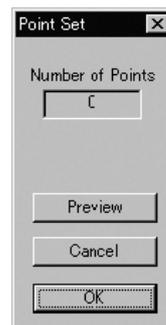
- All the element view windows will disappear (be hidden), an image window to display the color image of the loaded data and an image window to display the color image of the element will appear.

#### 4 On the first image window click the desired point using the left mouse button, then click the left button at its corresponding point on the second image window.

When the left mouse button is clicked on an image window, a marker (“x” mark) will be displayed. A red marker will be displayed for the point you are currently designating, and a black marker for those that have already been designated.

#### Note

- *An alarm will be heard if a point that has no data is clicked in the image window showing the color image of the element, or if the left button is clicked twice or more continuously in the same window.*
- *It is not possible to close image windows.*



## 5 Repeat step 4 until six or more pairs of corresponding points are designated.

The order of designating points in the first and second image windows for the first pair can differ from that for the second pair.

### **/Memo/**

For satisfactory registration of the images, approximately 12 pairs of corresponding points must be designated.

## 6 To delete a pair of corresponding points, click either of those points with the left mouse button while holding down the [Shift] button.

The pair of corresponding points will be deleted.

- Even when designating corresponding points, they can be deleted by clicking with the left mouse button while holding down the [Shift] button.
- An alarm will be heard if a point other than those designated is clicked with the left mouse button while holding down the [Shift] button.

## 7 Click the [Preview] button.

A temporary window will appear, showing the preview image.

- The temporary window is a Perspective view, and is displayed in texture mapping mode.
- Dragging while holding down the left mouse button inside the preview window will rotate the camera.

### **/Note/**

- *An error message will appear if only five or less pairs of points have been designated.*
- *An error message will appear if calculation cannot be made based on the designated points.*

### **/Memo/**

If registration is not satisfactory, designate more corresponding points or delete unsatisfactory corresponding points.

## 8 Click the [OK] button.

A new image will be added to the element.

- All the image windows, [Point Set] dialog box and the temporary window (if it is open) will close, and the [Edit-Image] dialog box will appear. All the element view windows will also appear.

The added image will be displayed in the [Texture List] in the [Edit-Image] dialog box.

## ■ Replacing a Texture ([Replace] button)

The [Replace] button allows you to replace a texture with a new one.

### Operating Procedure

Before starting the following procedure, make sure that the [Edit-Images] dialog box is displayed.

#### 1 From the Texture List, select the desired image.

#### 2 Click the [Replace] button.

The [Edit-Images-Open Image] dialog box will appear.

#### 3 Select the desired texture file.

- To display files of a certain format only, select the desired format from the [File of type] pulldown menu.

#### 4 Click the [Open] button.

The data of the selected file will be loaded, replacing the image selected from the [Texture List] with the one loaded.

- The [Edit-Images-Open Image] dialog box will close, and the name of that new image will be displayed in the [Texture List] in the [Edit-Image] dialog box.

#### Note

*If the aspect ratio of the selected image differs from the aspect ratio of the image selected in the Texture list, the program will display an error message. In this case, the texture will not be replaced.*



## ■ Deleting a Texture ([Delete] button)

The [Delete] button allows you to delete a texture from the element.

### Operating Procedure

Before starting the following procedure, make sure that the [Edit-Images] dialog box is displayed.

1 From the [Texture List], select the desired image.

2 Click the [Delete] button.

A message dialog box asking you whether to delete the selected image will appear.

3 Click the [OK] button.

The selected image will be deleted.

- The name of the deleted image will be removed from the [Texture List] in the [Edit-Image] dialog box.



Chapter 2

Edit  
Menu

## ■ Exporting a Texture ([Export])

The [Export] button lets you output the selected texture in any of a variety of data formats.

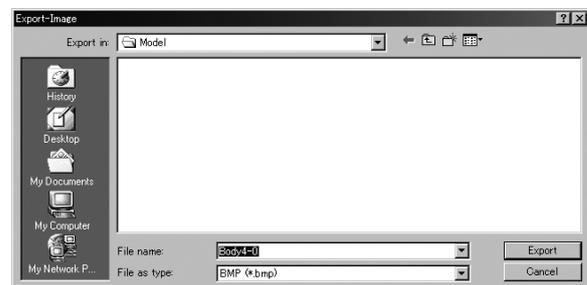
### Operating Procedure

Open the [Edit-Images] dialog box before starting the following procedure.

1 Click on the appropriate image name in the [Texture List] of the [Edit-Images] dialog box.

2 Click the [Export] button.

The [Export-Image] dialog box will appear.



#### **[Memo]**

Now proceed in the same way as if using the **File-Export-Images** command.

**[Ref.]** For information about the **File- Export -Images** command, see page 115.

9i

910

900

700

300

## ■ Changing a Texture’s Brightness ([Brightness])

---

Use the [Brightness] sidebar to adjust the brightness of the selected texture.

### Operating Procedure

---

Open the [Edit-Images] dialog box before starting the following procedure.

.....

**1 Click on the appropriate image name in the [Texture List] of the [Edit-Images] dialog box.**

.....

**2 Adjust the brightness by moving the [Brightness] sidebar.**

The brightness changes as you move the sidebar.

.....

**3 If you want to return to the original brightness, click [Reset].**

The [Reset] button resets both the brightness and contrast to their original settings.

.....

**4 When you are satisfied with the brightness, click [OK].**

The program registers the new brightness setting, and the dialog closes.

- The program will also register your new setting if you change the name selection in the [Texture List] of the [Edit-Images] dialog box.

## ■ Changing a Texture’s Contrast ([Contrast])

---

Use the [Contrast] sidebar to adjust the contrast of the selected texture.

### Operating Procedure

Open the [Edit-Images] dialog box before starting the following procedure.

.....

**1 Click on the appropriate image name in the [Texture List] of the [Edit-Images] dialog box.**

.....

**2 Adjust the contrast by moving the [Contrast] sidebar.**

The contrast changes as you move the sidebar.

.....

**3 If you want to return to the original contrast, click [Reset].**

The [Reset] button resets both the brightness and contrast to their original settings.

.....

**4 When you are satisfied with the contrast, click [OK].**

The program registers the new contrast setting, and the dialog box will close.

- The program will also register your new setting if you change the name selection in the [Texture List] of the [Edit-Images] dialog box.

This command is used to define the points selected for the currently selected element(s) as a new element.

**Operating Procedure**

**1 From the element list, select the desired element(s).**

**2 Select the desired points.**

**3 Click [Define] on the [Edit] menu.**

The [Edit-Define] dialog box will appear.

- The selected element(s) will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

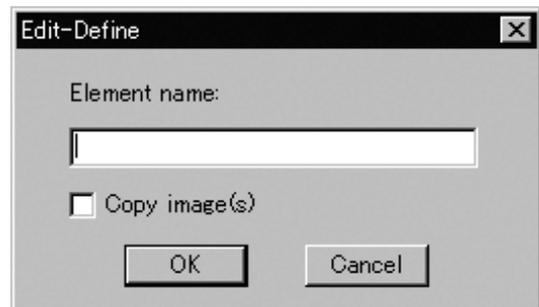
**4 Enter the desired element name, and set parameters.**

- To copy the color image data of the original element, check the [Copy image(s)] checkbox.

**5 Click the [OK] button.**

The selected points will be defined as an element.

- The defined element will be displayed in the window. The name of the element will also appear in the element list, indicating that the element has been selected.
- All the elements except for those newly defined will be hidden in all windows and cannot be selected.

**Note**

*The element name must consist of up to 31 alphanumeric characters.*

## Edit – Recalc LOD

### Recalculating the Simplified Display Data

This command is used to recalculate the simplified display data of the element(s) selected in the element list.

**Note**

*This feature is disabled if you have set [Use LOD] to “Off” in the File-Preferences dialog (Default Behavior tab).*

**Memo**

The simplified display data is displayed, for example, while the camera is dragged. If recalculation is not performed, the data in effect when the element(s) was simplified lastly will be displayed. If necessary, recalculate the simplified display data after the data is edited.

#### Operating Procedure

- 1 From the element list, select the desired element.**

- 
- 2 Click [Recalc LOD] on the [Edit] menu.**

The simplified display data of the selected element will be recalculated.

**Note**

*An error message may appear if the selected element contains an excessively small number of polygons.*

9i

910

900

700

300

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## Build – Registration – Initial – Manual

### Performing Initial Registration of Elements Manually

This command is used to perform registration of elements by designating corresponding points.

-  Left : Designates corresponding points.  
 Middle ([Shift] + Left) : Cancels designation of corresponding points  
 Right : Performs registration.

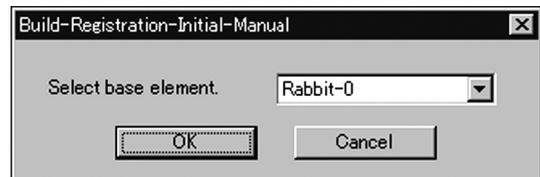
#### Operating Procedure

#### 1 From the element list, select the desired elements.

#### 2 From the [Build] menu, select [Registration], [Initial] and then click [Manual].

The [Build-Registration-Initial-Manual] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



#### 3 Select the basis element in the dialog box, and click the [OK] button.

All the currently displayed windows will be hidden, and the temporary window for each selected element will appear.

- Each temporary window is a “Isometric” or “Perspective” view and displayed in texture mapping mode (if the element has a color image) or in shading mode (if the element has no color image). One element will be displayed in each temporary window. The elements will be fully framed.
- It is not possible to change the view mode and rendering mode for the temporary windows.

#### 4 On the first window click the desired point using the left mouse button, then click the left button at the corresponding point on the second window.

When the left mouse button is clicked on a window, a marker (■ mark) will be displayed. Different colors of markers are available, and each pair of corresponding points will have a different color.

#### **Memo**

Dragging a corresponding point with the left mouse button will move it.

#### **Note**

*An alarm will be heard if a point that has no data is clicked in a window or if the left button is clicked twice or more continuously in the same window.*

#### 5 Repeat step 4 until three or more pairs of corresponding points are designated.

The order of designating points in the first and second windows for the first pair can differ from that for the second pair.

**6 To delete a pair of corresponding points, click either of those points with the middle button ([Shift] + Left).**

The marker will be deleted.

**/Memo/**

Even when designating corresponding points, they can be deleted by clicking with the middle button ([Shift] + Left).

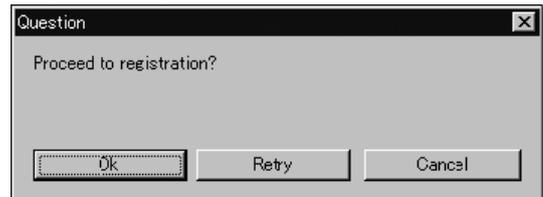
**/Note/**

*An alarm will be heard if a point other those designated is clicked with the middle button ([Shift] + Left).*

**7 After designation of corresponding points has been completed, click the right mouse button.**

The initial registration will start, and the result will be displayed in the window.

A message dialog box asking whether the result is satisfactory will appear.



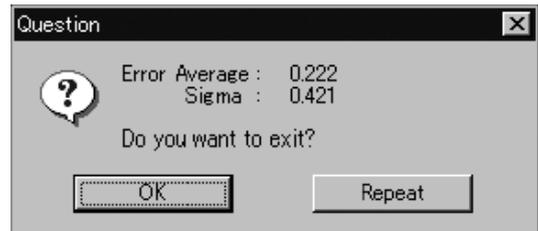
**8 Click the [OK] button.**

The program executes fine registration, and opens a dialog asking whether the results are satisfactory.

- If you click [Retry], the program will reopen the temporary windows so that you can reset the correspondences again.
- If you click [Cancel], fine registration will be canceled and closes the menu.

**9 Click the [OK] button.**

All temporary registration windows close, and the program reopens the windows that were on display when you started the command.



- To continue fine registration processing, click the [Repeat] button.

**/Memo/**

The [Error Average] and [Sigma] values are indicators of the correctness of the registration (the alignment). In general, the closer to zero they are, the more accurate alignment is.

## Build – Registration – Initial – Auto

### Performing Initial Registration of Elements Automatically

This command is used to automatically detect data overlap of each element to perform registration of the elements.

#### Operating Procedure

#### 1 From the element list, select the desired elements.

##### Memo

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

#### 2 Select the desired points for each selected element.

The selected points will be subjected to detection of overlapped data.

#### 3 From the [Build] menu, select [Registration], [Initial] and then click [Auto].

The [Build-Registration-Initial-Auto] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



#### 4 Select the basis element in the dialog box, and click the [OK] button.

Initial registration will start. A bar will be displayed to indicate progress of initial registration.

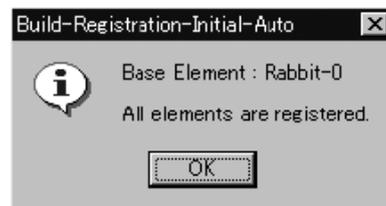
##### Note

An error message will appear if the number of points selected in the elements is below a certain number.

The dialog box shown on the right will appear when initial registration was successful for all the elements.

##### Memo

- If registration with the selected basis element fails for any elements, a new basis element will be selected automatically from the elements whose relative positions are known.
- If 50% or more of the element data overlap or if elements are angled at less than approximately 60 degrees, initial registration may be satisfactory. (However, it may still fail depending on the shape of the elements.)



The dialog box shown on the right will appear if initial registration was unsuccessful for any of the elements.

- The elements that have failed initial registration will be hidden in all windows.



#### 5 Click the [OK] button.

The menu will be exited.

## Build – Registration – Fine – Elements

### Performing Fine Registration of Elements

This command is used to perform registration of the selected elements.

#### Operating Procedure

**1 From the element list, select the desired elements.**

*Memo*

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

**2 From the [Build] menu, select [Registration], [Fine] and then click [Elements].**

The [Build-Registration-Fine-Elements] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

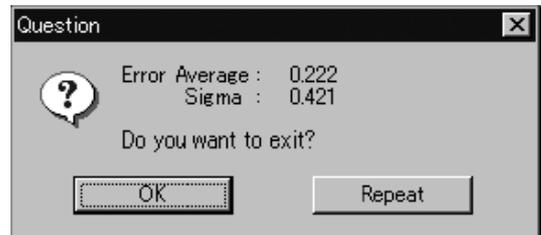


**3 Set the base element, and then click the [OK] button.**

The program executes fine registration for the selected elements, and displays a dialog asking whether results are satisfactory.

**4 Click the [OK] button.**

The menu will be exited.



- To continue fine registration processing, click the [Repeat] button.

*Memo*

The [Error Average] and [Sigma] values are indicators of the correctness of the registration (the alignment). In general, the closer to zero they are, the more accurate alignment is.

## Build – Registration – Fine – Points

### Performing Fine Registration of Selected Points

This command is used to perform fine registration of the points present in the selected elements.

#### Operating Procedure

#### 1 From the element list, select the desired elements.

##### *Memo*

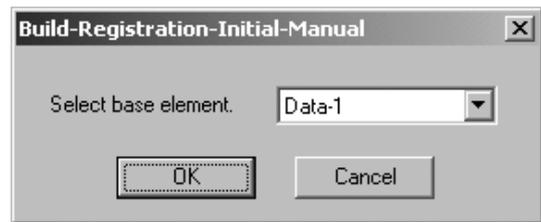
- It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.
- Among the selected elements, the element located first in the element list will be used as the basis element for registration.

#### 2 From each selected element, select the points to be subjected to fine registration.

#### 3 From the [Build] menu, select [Registration], [Fine] and then click [Points].

The [Build-Registration-Fine-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

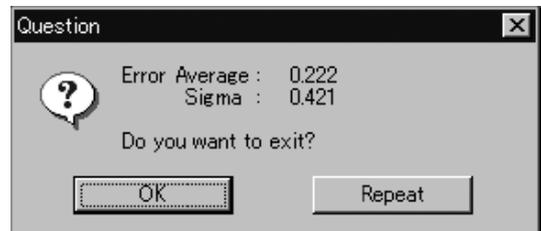


#### 4 Set the base element, and then click the [OK] button.

The program executes fine registration for the selected points in the selected elements. It then displays a dialog asking whether results are satisfactory.

#### 5 Click the [OK] button.

The menu will be exited.



- To continue fine registration processing, click the [Repeat] button.

##### *Memo*

The [Error Average] and [Sigma] values are indicators of the correctness of the registration (the alignment). In general, the closer to zero they are, the more accurate alignment is.

This command is used to move the selected point(s).

**Note**

*Execution of this command may not display simplified data.*



- Left : Moves the point(s) using the mouse.
- Middle ([Shift] + Left) : Moves the point(s) along the major axis.
- Right : Moves the point(s) by entering values.

**Operating Procedure**

## 1 From the element list, select the desired elements.

## 2 Select the point(s) you want to move.

## 3 From the [Build] menu, select [Move] and then click [Points].

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

- If you select all of the element's points at Step 2 above, this command becomes equivalent to the **Build – Move – Elements** command.

**Ref.** For information about the **Build – Move – Elements** command, see page 189.

## 4 Drag the points with the left mouse button.

The point(s) will move accordingly.

- Dragging with the middle (or [Shift] + Left) button will move the point(s) along the major axis.

## 5 Press the [ESC] key.

**Build – Move – Points** mode will be canceled.

## ■ Moving the Point(s) by Entering Values

To move the point(s) by specifying how much they must be moved, follow the procedure given below.

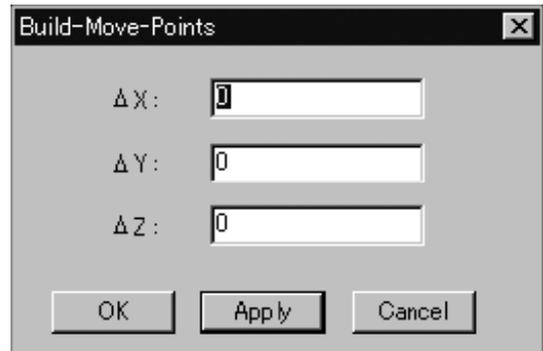
### **Note**

If **Build – Move – Points** mode was activated using the shortcut key, the point(s) cannot be moved by this method.

**Operating Procedure** The following steps must be carried out in **Build – Move – Points** mode.

### 1 Click the right mouse button.

The [Build-Move-Points] dialog box will appear.



### 2 Enter the desired amount of movement for X, Y and Z.

The amount can be entered for all the axes at the same time.

### 3 Click the [Apply] button.

The selected point(s) will move according to the values entered.

- If you change a value(s) and click the [Apply] button, the point(s) will move again according to the new value(s).  
New values will not be added to the previous values. They are absolute values from the original position.
- Clicking the [Cancel] button will cancel all the operations that have been performed since the dialog box was opened.

### 4 Click the [OK] button.

The [Build-Move-Points] dialog box will close, movement of the point(s) will be confirmed, and the **Build-Move-Points** mode will be canceled.



This command is used to move the selected element(s).



- Left : Moves the element(s) using the mouse.
- Middle ([Shift] + Left) : Moves the element(s) along the major axis.
- Right : Moves the element(s) by entering values.

### Operating Procedure

#### 1 From the element list, select the desired element(s).

#### 2 From the [Build] menu, select [Move] and then click [Elements].

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

#### 3 Drag with the left mouse button.

The element(s) will move accordingly.

- Dragging with the middle (or [Shift] + Left) button will move the element(s) along the major axis.

**Memo**

The element will be displayed in simple form during drag. It will be displayed in detailed form when dragging is canceled.

#### 4 Press the [ESC] key.

**Build – Move – Elements** mode will be canceled.

## ■ Moving the Element(s) by Entering Values

To move the element(s) by specifying how much they must be moved, follow the procedure given below.

**Note**

*If **Build – Move – Elements** mode was activated using the shortcut key, the element(s) cannot be moved by this method.*

**Operating Procedure** The following steps must be carried out in **Build – Move – Elements** mode.

### 1 Click the right mouse button.

The [Build-Move-Elements] dialog box will appear.

### 2 Enter the desired amount of movement for X, Y and Z.

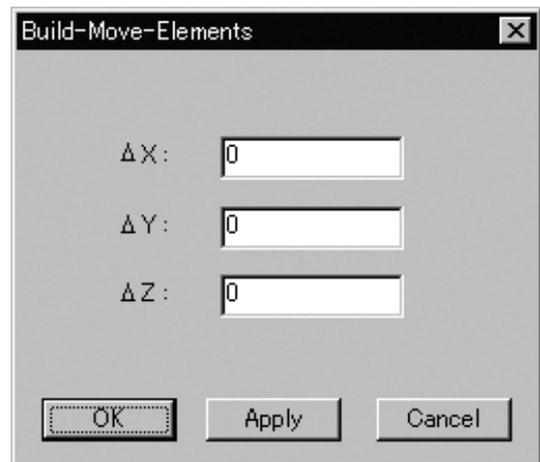
The amount can be entered for all the axes at the same time.

### 3 Click the [Apply] button.

The selected element(s) will move according to the values entered.

### 4 Click the [OK] button.

The [Build-Move-Points] dialog box will close, movement of the point(s) will be confirmed, and the **Build-Move-Points** mode will be canceled.



- If you change a value(s) and click the [Apply] button, the element(s) will move again according to the new value(s).  
New values will not be added to the previous values. They are absolute values from the original position.
- Clicking the [Cancel] button will cancel all the operations that have been performed since the dialog box was opened.

## Build – Move – To Origin

### Moving the Element(s) to the Origin

This command is used to move the selected element(s) to the origin.

#### Operating Procedure

---

**1** From the element list, select the desired element(s).

**2** From the [Build] menu, select [Move] and then click [To Origin].

The selected element(s) will move in such a way that the center of gravity of all the constituent points is located at the origin.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Build – Move – To X-Y-Z

### Converting the Coordinate System of Elements

This command is used to convert the coordinate system of the currently selected element(s) to the specified coordinate system.

**Note**

When you execute this command, all screen display modes change to Show Vertex.

#### Operating Procedure

**1 From the element list, select the desired element(s).**

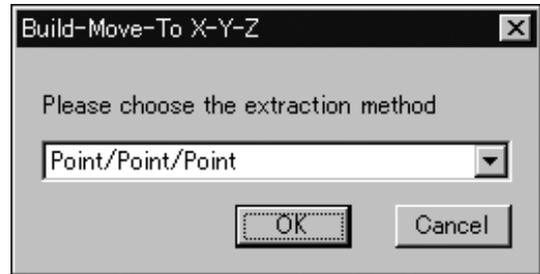
**Memo**

It is possible to select two or more elements by clicking them while holding down the [Shift] or [Ctrl] key.

**2 From the [Build] menu, select [Move] and then click [To X-Y-Z].**

The [Build-Move-To X-Y-Z] dialog box will appear.

- The selected element(s) will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed (i.e. the windows that are not set to “Selective”).



**3 At the pull-down menu, select the desired method for setting the new coordinate system. Then click the [OK] button.**

**4 Extract the desired face, lines and points.**

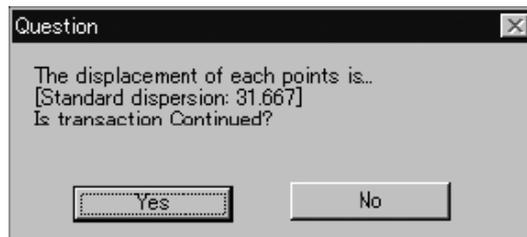
- If you have selected [Point/Point/Point], extract three points in succession.
- If [Face/Point/Point] is selected, extraction will be performed in the order of face, point and point.
- If [Face/Point/Line] is selected, extraction will be performed in the order of face, point and line.
- If [Face/Line/Line] is selected, extraction will be performed in the order of face, line and line.

When all the elements are extracted, they will be displayed in the new coordinate system. And [Confirmation (for Coordinate)] dialog box will appear.

## 5 Save the coordinate system.

If you selected [Point/Point/Point]:

- Once you have extracted the three points, the program displays the input design values and the standard deviations of the extracted points. Click [Yes] to continue. Click [No] if you wish to re-enter the design values.



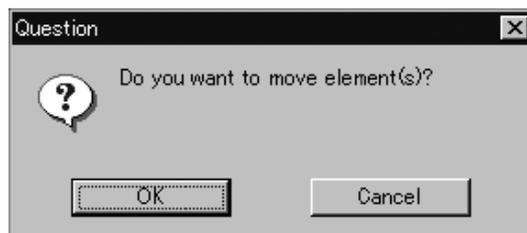
If you selected [Face/Point/Point], [Face/Point/Line], [Face/Line/Line]:

- You can use the [Reverse] button to invert the normal vector of the face that you extracted in Step 4 above. If you select [Reverse], the program will invert the face, recalculate the coordinate system, and then redraw the display accordingly.



## 6 Click the right mouse button.

The [Question] dialog box will appear.



## 7 Click the [OK] button.

Coordinate conversion will be performed.

Parameters for [Build-Move-To X-Y-Z] Dialog Box	
Point/Point/Point	You set up a new coordinate system by extracting three points, one at a time, from among the selected points. The program generates the origin and axes of the new coordinate system based on the coordinate positions and design values of the three extracted points.
Face/Point/Point	Extracts a face and two points from the selected points sequentially to set a new coordinate system. Two axes and origin on the face are calculated based on the attribute of face and the coordinate/design values of the extracted points to generate a new coordinate system.
Face/Point/Line	Extracts a face, point, and line (in that order) from the selected points set. Calculates the origin or the new coordinate system based on the face attribute and the coordinate/design values of the extracted points; determines a single axis from the extracted line attribute; and generates the new coordinate system accordingly.
Face/Line/Line	Extracts a face and two lines from the selected points sequentially to set a new coordinate system. The origin and two axes are calculated based on the attribute of face and two lines to generate a new coordinate system.

## ■ Extracting a Face

Extract a face from the selected points as explained below.

**Operating Procedure** The following steps must be carried out in **Build – Move – To X-Y-Z** mode.

### 1 Select the desired points.

**Memo**

- Select the points using the Select and View menu commands.
- After operation, please cancel the Select or View menu command.

### 2 Click the right mouse button.

The [Select Face Attribute] dialog box will appear.



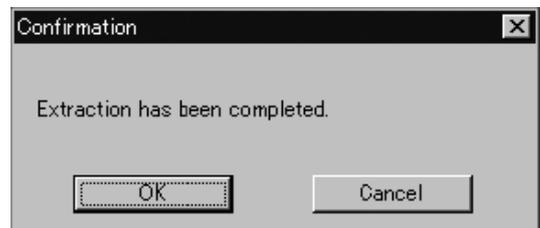
### 3 Select the desired face attribute from the pull-down menu.

When the selected attribute of the face is “XY-Plane”, Z-Axis is made in agreement with the face normal.

But the direction of the axis is calculated by the algorithm. If the direction is not suitable, click the [Reverse] button in [Confirmation(for coordinate)] dialog box to reverse the axis direction.

### 4 Click the [OK] button.

The generated face will be displayed, and the [Confirmation] dialog box will appear.



### 5 Click the [OK] button.

Proceed to the extraction procedure for the next element (point or line).

Parameters for [Select Face Attribute] Dialog Box

XY-Plane	Generates a XY plane based on the selected points.
YZ-Plane	Generates a YZ plane based on the selected points.
ZX-Plane	Generates a ZX plane based on the selected points.

## ■ Extracting a Point

Extract a point from the selected points as explained below.

**Operating Procedure** The following steps must be carried out in **Build – Move – To X-Y-Z** mode.

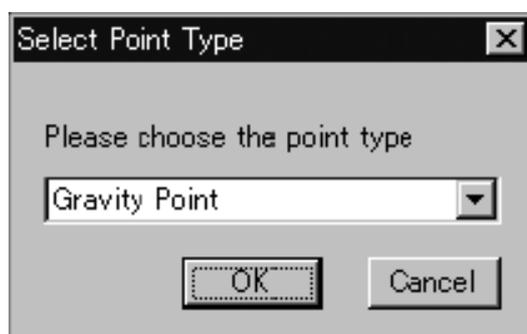
### 1 Select the desired points.

*Memo*

- Select the points using the Select and View menu commands.
- After operation, please cancel the Select or View menu command.

### 2 Click the right mouse button.

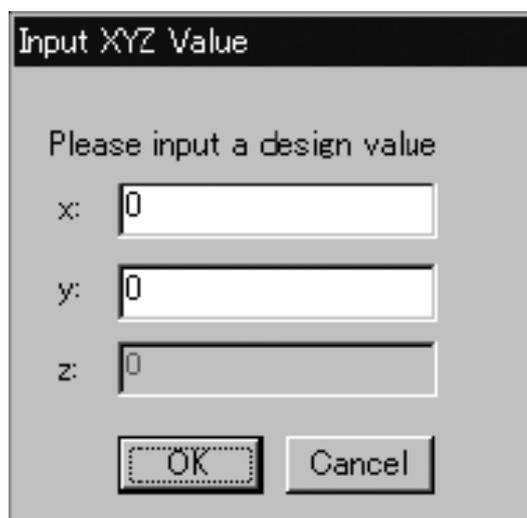
The [Select Point Type] dialog box will appear.



### 3 Select the desired point type from the pull-down menu.

### 4 Click the [OK] button.

The [Input XYZ Value] dialog box will appear.



### 5 Enter the design values for the point.

*Memo*

For certain types of extraction, you will only be able to enter values for two of three axes. For instance, if XY-Plane is selected, the text box for Z value will be inactive since it is not necessary to enter the Z-coordinate value.

### 6 Click the [OK] button.

The generated point will be displayed, and the [Confirmation] dialog box will appear.



## 7 Click the [OK] button.

Proceed to the extraction procedure for the next element (point or line).

- When you have completed extraction of all elements: Right-click the mouse to open the Question dialog, and proceed to convert to the new coordinate system.

Parameters for [Select Point Type] Dialog Box

Gravity Point	Generates the gravity point based on the selected points.
Center of Circle	Generates the center of circle based on the selected points.
Center of Sphere	Generates the center of sphere based on the selected points.

## ■ Extracting a Line

Extract a line from the selected points as explained below.

**Operating Procedure** The following steps must be carried out in **Build – Move – To X-Y-Z** mode.

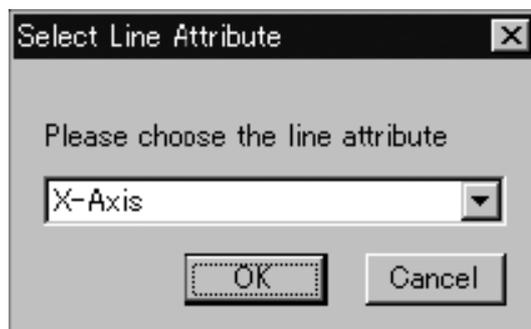
### 1 Select the desired points.

**Memo**

- Select the points using the Select and View menu commands.
- After operation, please cancel the Select or View menu command.

### 2 Click the right mouse button.

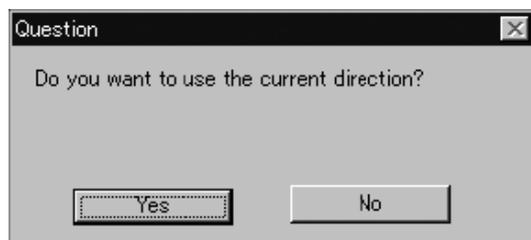
The [Select Line Attribute] dialog box will appear.



### 3 Select the desired line attribute from the pull-down menu.

### 4 Click the [OK] button.

The line direction will be displayed, and the [Question] dialog box will appear.

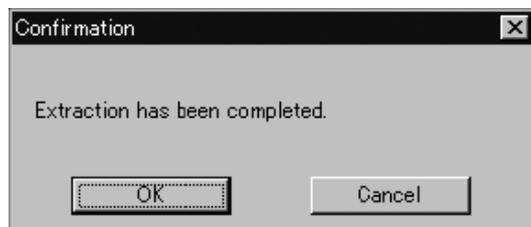


### 5 If you want to change the direction, click the [No] button.

The line direction will be changed, and the [Question] dialog box will reappear.

### 6 Click the [Yes] button.

The generated line will be displayed, and the [Confirmation] dialog box will appear.



### 7 Click the [OK] button.

Proceed to the extraction procedure for the next element (point or line).

- When you have completed extraction of all elements: Right-click the mouse to open the Question dialog, and proceed to convert to the new coordinate system.

Parameters for [Select Line Attribute] Dialog Box	
X-Axis	Generates the X-axis based on the selected points.
Y-Axis	Generates the Y-axis based on the selected points.
Z-Axis	Generates the Z-axis based on the selected points.



This command is used to rotate the selected element(s).



- Left : Rotates the element(s) using the mouse.  
Middle ([Shift] + Left) : Rotates the element(s) along the major axis.  
Right : Rotates the element(s) by entering values.

### Operating Procedure

#### 1 From the element list, select the desired element(s).

#### 2 From the [Build] menu, select [Rotate] and then click [Elements].

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

#### 3 Drag while holding down the left button.

The element(s) will rotate at their center of gravity.

- Dragging with the middle (or [Shift] + Left) button will rotate the element(s) along the major axis.

**Memo**

The element will be displayed in simple form during drag. It will be displayed in detailed form when dragging is canceled.

#### 4 Press the [ESC] key.

**Build – Rotate – Elements** mode will be canceled.

## ■ Rotating the Element(s) by Entering a Value Directly

To rotate the element(s) by specifying the rotating angle, follow the procedure given below.

**Note**

If **Build – Rotate – Elements** mode was activated using the shortcut key, the element(s) cannot be moved by this method.

**Operating Procedure** The following steps must be carried out in **Build – Rotate – Elements** mode.

**1 Click the right mouse button.**

The [Build-Rotate-Elements] dialog box will appear.

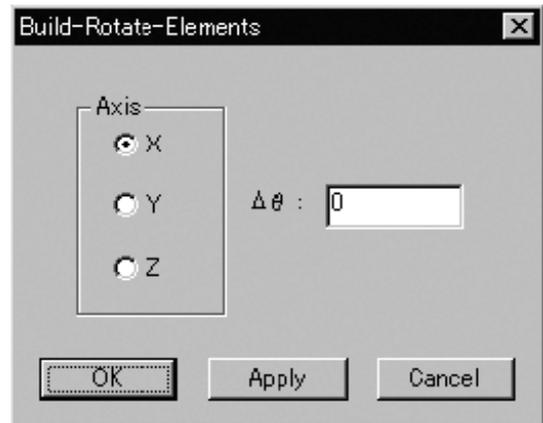
**2 Select X, Y or Z to be used as the pivot, and enter the desired rotating angle.**

**3 Click the [Apply] button.**

The selected element(s) will rotate by the specified angle.

**4 Click the [OK] button.**

The [Build-Move-Points] dialog box will close, movement of the point(s) will be confirmed, and the **Build-Move-Points** mode will be canceled.



- If you change the angle and click the [Apply] button, the element(s) will rotate again according to the new angle. The new angle will not be added to the previous angle. It is an absolute angle from the original position.
- Clicking the [Cancel] button will cancel all the operations that have been performed since the dialog box was opened.



This command is used to merge elements that have been subjected to registration.

#### Operating Procedure

### 1 From the element list, select the elements to be merged.

### 2 Click [Merge] on the [Build] menu.

The [Build-Merge] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

### 3 Set the merge smoothness using the scale bar.

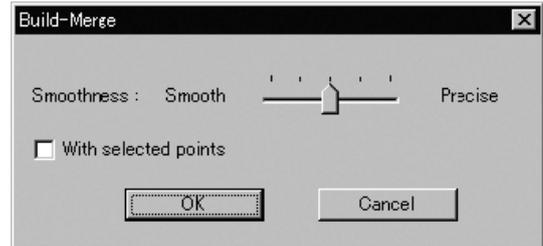
### 4 Click the [OK] button.

A dialog box asking you to enter a new element name will appear.

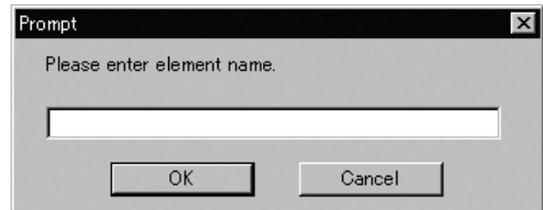
### 5 Enter the new element name, and click the [OK] button.

The program merges the elements to create a new element. The new element is given the name that you just entered.

- The elements in effect before merging started will be hidden.
- The registered data will be ready to be displayed in all windows, and will be displayed in the active window as well as the windows for which all the elements are set to be displayed.



- To merge only the points selected in the elements, check the [With selected points] checkbox.



#### Note

*The element name must consist of up to 31 alphanumeric characters.*



## Build – Fill Holes – Manual

### Filling Holes Manually

This command is to create polygon data using the mouse for the holes (i.e. areas where no data is present) located in the area selected in the currently displayed element.

-  Left : Designates a point.  
Middle ([Shift] + Left) : –  
Right : Cancels designation.

#### Operating Procedure

### 1 From the element list, select one desired element.

### 2 Select the points on the boundary of the hole for which you want to create polygon data.

### 3 From the [Build] menu, select [Fill Holes] and then click [Manual].

The system will search for holes present within the area of the selected points. A bar will be displayed during search to indicate progress. If a hole is found, only the points on its boundary will be selected.

- If no holes are found, a message dialog box will appear. Clicking the [OK] button will close the dialog box and exit the menu.

### 4 Among the selected points, click the three nodes of a triangular polygon with the left mouse button, one by one in a counter-clockwise direction (when viewed from the front of the polygon).

When the node is clicked, a white rubber band will appear between that node and the mouse pointer.

When all the three nodes are clicked, a polygon composed of those three nodes will be formed.

- Selection of the points which are no longer on the boundary of the hole due to the created polygon will be canceled.
- To cancel designation of the points or created polygon, click the right mouse button. By clicking the right button repeatedly, it is possible to return to the state in effect before this command was selected.

#### Note

- *It is not possible to designate nodes if they have not been selected.*
- *It is not possible to designate nodes of a triangle facing opposite the adjacent polygons.*
- *While a rubber band is displayed, it is not possible to switch the view and designate a point or change the window size.*

### 5 When the hole is filled, click the [ESC] key.

Selection state of points will remain and **Build – Fill Holes – Manual** mode will be canceled.



## Build – Fill Holes – Auto

### Filling Holes Automatically

This command is to create polygon data automatically for the holes (i.e. areas where no data is present) located in the area selected in the currently displayed element. However, some complicated holes may not be filled.

#### Operating Procedure

**1** From the element list, select one desired element.

**2** Select the points on the boundary of the hole for which you want to create polygon data.

**3** From the [Build] menu, select [Fill Holes] and then click [Auto].

The system will search for holes present within the area of the selected points. A bar will be displayed during search to indicate progress. If a hole is found, only the points on its boundary will be selected.

- If no holes are found, a message dialog box will appear. Clicking the [OK] button will close the dialog box and exit the menu.

All the element view windows will be hidden, and the temporary window and [Build-Fill Holes-Auto] dialog box will appear.

- The hole for which you want to create polygon data will be displayed in the temporary window. The points comprising the hole will be highlighted (yellow). The selected holes will be processed one by one, starting with the hole composed of the largest number of points.

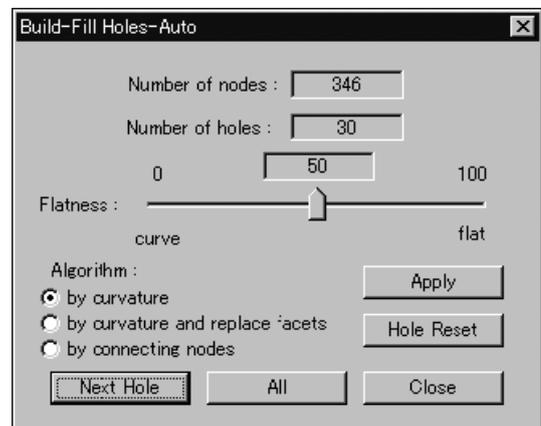
#### Note

*It is not possible to close the temporary window.*

**4** Set the [Flatness] and [Algorithm] parameters, and click the [Apply] button.

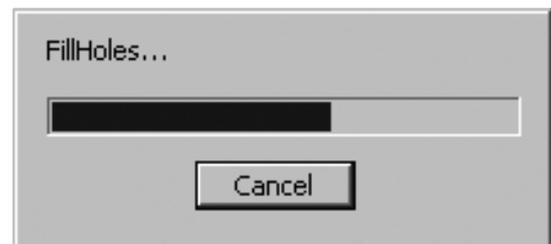
The program merges the elements to create a new element. The new element is given the name that you just entered.

A progress bar shows the progress while the fill is being carried out. If you click the progress bar's [Cancel] button, the program suspends fill processing and displays a dialog showing results up to that moment.



#### Memo

If the number of remaining holes (Number of holes) is 1, the [OK] button will be displayed instead of the [Next Hole] button.



#### Memo

The program retains the fill data generated up to the time when you clicked the [Cancel] button. If you wish to resume the fill operation, click the [All] button. Filling will then continue from the hole at which the operation was suspended.

- If you mchange the “Flatness” and “Algorithm” parameter settings and click the [Apply] button, the holes will be filled according to the new parameter settings.
- To restore the initial state (i.e. holes are not filled), click the [Hole Reset] button.
- To fill all the holes, click the [All] button.
- All the holes which have not been filled will be filled according to the parameter settings.
- After filling the holes, the program closes the dialog and the temporary window, and then displays a dialog indicating the results.

## 5 Click the [Next Hole] button.

The dialog box will close and a new dialog box will appear.

The hole to be filled next will be displayed in the window.

## 6 Repeat step 4 until all the desired holes are filled.

- If you click the [Next Hole] button without clicking the [Apply] button, nothing will happen, and the dialog box will close and a new dialog box will appear.
- If you click the [Close] button, the program will close the dialog box, windows, and menu. All hole fills that you have executed will be retained.

## 7 Click the [OK] button.

The dialog box and window will close, and the menu will be exited.

All the element view windows will be displayed.

Parameters for [Build-Fill Holes-Auto] Dialog Box	
Number of nodes	Number of points comprising the hole to be filled
Number of holes	Number of remaining holes to be filled
Flatness	A parameter provided for hole filling. Used to decide whether the hole is to be filled with flat surfaces or with curved surfaces. (100: Flat, 0: Curved, Default: 50)
Algorithm	
by curvature	Used to fill holes by creating meshes inside the holes.
by connecting nodes	Used to fill holes by creating meshes and then replacing polygons on the boundary with the created meshes.
by curvature and replace facets	Used to fill holes by connecting the vertices of the holes.

## Build – Smooth – Element

### Smoothing the Selected Element

This command is used to make the selected element smooth as well as to regularize surface points density.

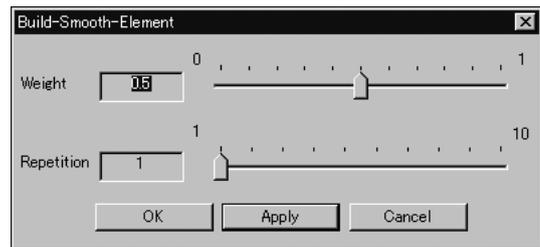
#### Operating Procedure

**1** From the element list, select one desired element.

**2** From the [Build] menu, select [Smooth] and then click [Element].

The [Build-Smooth-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**3** Set the parameters.

**4** Click the [Apply] button.

The selected element will be smoothed according to the parameter settings and then displayed.

- If you change the parameter settings and click the [Apply] button again, the element will be smoothed according to the new parameter settings.

**5** Click the [OK] button.

This will confirm execution of smoothing and close the dialog box.

Parameters for [Build-Smooth-Element] Dialog Box

Weight	Used to set level of regularization of surface points density.
Repetition	Used to set level of smoothness.

	<h2 style="margin: 0;">Build – Smooth – Points</h2> <h3 style="margin: 0;">Smoothing the Selected Points</h3>
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This command is used to make the boundary of the points selected in the currently displayed element smooth as well as to regularize surface points density.

#### Operating Procedure

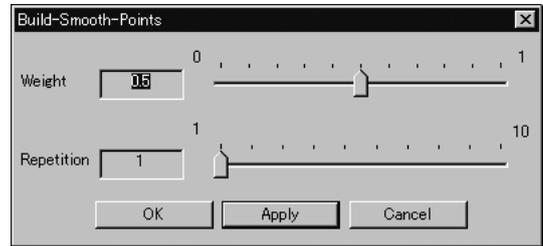
**1 From the element list, select one desired element.**

**2 Select the desired points.**

**3 From the [Build] menu, select [Smooth] and then click [Points].**

The [Build-Smooth-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**4 Set the parameters.**

**5 Click the [Apply] button.**

The boundary of the selected points will be smoothed according to the parameter settings and then displayed.

- If you change the parameter settings and click the [Apply] button again, the element will be smoothed according to the new parameter settings.

**6 Click the [OK] button.**

This will confirm execution of smoothing and close the dialog box.

Parameters for [Build-Smooth-Points] Dialog Box	
Weight	Used to set level of regularization of surface points density.
Repetition	Used to set level of smoothness.

## Build – Subsample – Uniformly – Element

### Reducing the Number of Points of the Selected Element Uniformly

This command is used to reduce the data of the points of the selected element so that surface points density becomes uniform.

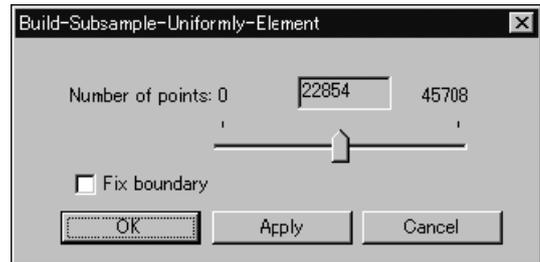
#### Operating Procedure

**1** From the element list, select one desired element.

**2** From the [Build] menu, select [Subsample] –[Uniformly] and then click [Element].

The [Build-Subsample-Uniformly-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**3** Set the parameters.

**4** Click the [Apply] button.

The data of the points comprising the selected element will be reduced according to the parameter settings so that the surface points density becomes uniform.

#### */Memo/*

In some cases, the number of vertices present after data reduction may not match the specified number.

**5** Click the [OK] button.

This will confirm execution of data reduction and close the dialog box.

- If you change the parameter settings and click the [Apply] button again, the data comprising the element will be reduced according to the new parameter settings.

Parameters for [Build-Subsample-Uniformly-Element] Dialog Box

Number of points	Reduces the current number of points to the specified number. When the [Apply] button is clicked, the current number of vertices will be displayed. (The default for the “Number of points” parameter is set so that the number of selected points will be reduced by 50%).
Fix boundary	Among the points comprising the selected element, the points present on the boundary of the hole will be excluded from data reduction.

## Build – Subsample – Uniformly – Points

### Reducing the Selected Points Uniformly

This command is used to reduce the points selected in the currently displayed element so that surface points density becomes uniform.

#### Operating Procedure

**1** From the element list, select one desired element.

**2** Select the desired points.

**3** From the [Build] menu, select [Subsample] –[Uniformly] and then click [Points].

The [Build-Subsample-Uniformly-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**4** Set the parameters.

**5** Click the [Apply] button.

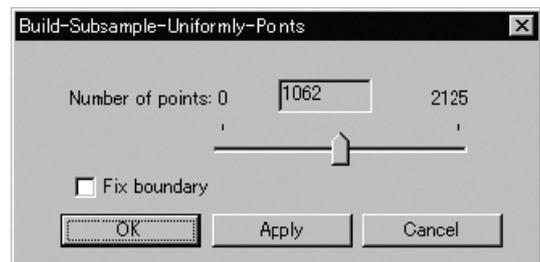
The data of the selected points will be reduced according to the parameter settings so that the surface points density becomes uniform.

#### **Memo**

In some cases, the number of vertices present after data reduction may not match the specified number.

**6** Click the [OK] button.

This will confirm execution of data reduction and close the dialog box.



- If you change the parameter settings and click the [Apply] button again, the data comprising the points will be reduced according to the new parameter settings.

Parameters for [Build-Subsample-Uniformly-Points] Dialog Box

Number of points	Reduces the current number of points to the specified number. When the [Apply] button is clicked, the current number of vertices will be displayed. (The default for the “Number of points” parameter is set so that the number of selected points will be reduced by 50%.)
Fix boundary	Among the selected points, the points present on the boundary of the hole will be excluded from data reduction. <b>Memo</b> Processing may take time if the element is composed of many points.

## Build – Subsample – Adaptively – Element

### Reducing the Number of Points of the Selected Element Adaptively

This command is used to reduce the data of the points of the selected element so that surface points density in simple-shaped areas is lower than that in complicated-shaped areas.

**/Memo/**

The elements selected before execution of this command will be divided to triangular polygons.

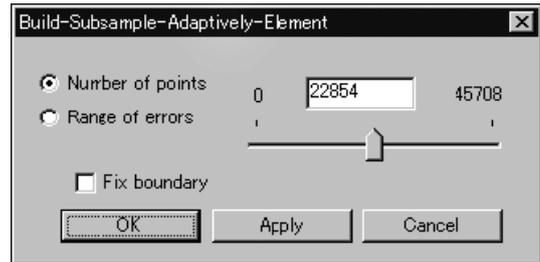
#### Operating Procedure

#### 1 From the element list, select one desired element.

#### 2 From the [Build] menu, select [Subsample] –[Adaptively] then click [Element].

The [Build-Subsample-Adaptively-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



#### 3 Set the parameters.

#### 4 Click the [Apply] button.

The data of the points comprising the selected element will be reduced according to the parameter settings so that surface points density in simple-shaped areas is lower than that in complicated-shaped areas.

- The polygons comprising the selected element will be triangulated.

- If you change the parameter settings and click the [Apply] button again, the data comprising the element will be reduced according to the new parameter settings.

**/Memo/**

In some cases, the number of vertices present after data reduction may not match the specified number.

#### 5 Click the [OK] button.

This will confirm execution of data reduction and close the dialog box.

Parameters for [Build-Subsample-Adaptively-Element] Dialog Box

Number of points	Reduces the current number of points to the specified number. When the [Apply] button is clicked, the current number of vertices will be displayed. (The default for the “Number of points” parameter is set so that the number of selected points will be reduced by 50%.)
Range of errors	The program reduces data in accordance with the value that you enter. The value serves as a general yardstick for the amount of reduction-induced change in model tolerance. <b>/Memo/</b> The default setting is “0.2”.
Fix boundary	Among the points comprising the selected element, the points present on the boundary of the hole will be excluded from data reduction.

## Build – Subsample – Adaptively – Points

### Reducing the Selected Points Adaptively

This command is used to reduce the points selected in the currently displayed element so that surface points density in simple-shaped areas is lower than that in complicated-shaped areas.

**/Memo/**

The elements selected before execution of this command will be divided to triangular polygons.

#### Operating Procedure

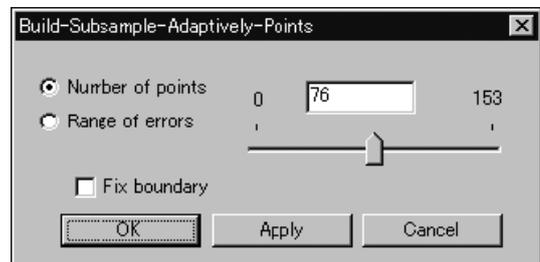
### 1 From the element list, select one desired element.

### 2 Select the desired points.

### 3 From the [Build] menu, select [Subsample] –[Adaptively] then click [Points].

The [Build-Subsample-Adaptively-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



### 4 Set the parameters.

### 5 Click the [Apply] button.

The data of the selected points will be reduced according to the parameter settings so that surface points density in simple-shaped areas is lower than that in complicated-shaped areas.

- The polygons comprising the selected element will be triangulated.

**/Memo/**

In some cases, the number of vertices present after data reduction may not match the specified number.

- If you change the parameter settings and click the [Apply] button again, the data comprising the points will be reduced according to the new parameter settings.

### 6 Click the [OK] button.

This will confirm execution of data reduction and close the dialog box.

Parameters for [Build-Subsample-Adaptively-Points] Dialog Box

Number of points	Reduces the current number of points to the specified number. When the [Apply] button is clicked, the current number of vertices will be displayed. (The default for the “Number of points” parameter is set so that the number of selected points will be reduced by 50%.)
Range of errors	The program reduces data in accordance with the value that you enter. The value serves as a general yardstick for the amount of reduction-induced change in model tolerance. <b>/Memo/</b> The default setting is “0.2”.
Fix boundary	Among the selected points, the points present on the boundary of the hole will be excluded from data reduction.

## Build – Modify – Element

### Rebuilding the Selected Element by Deleting Small Polygons

This command is used to rebuild the selected element by deleting small polygons.

**Memorandum**

The element selected before execution of this command will be divided to triangular polygons.

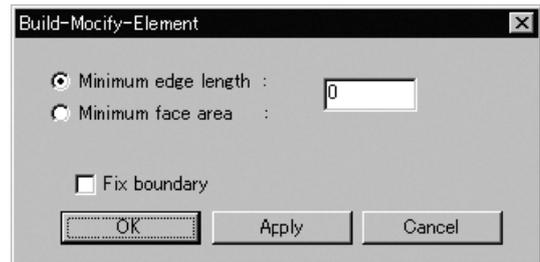
#### Operating Procedure

**1 From the element list, select the desired element.**

**2 From the [Build] menu, select [Modify] and then click [Element].**

The [Build-Modify-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**3 Set the parameters.**

**4 Click the [Apply] button.**

Polygons smaller than the specified size will be deleted from the selected element.

- The polygons comprising the selected element will be triangulated.

- If you change the parameter settings and click the [Apply] button again, the data comprising the element will be reduced according to the new parameter settings.

**5 Click the [OK] button.**

This will confirm execution of data reduction and close the dialog box.

Parameters for [Build-Modify-Element] Dialog Box

Minimum edge length	Used to set the minimum edge length of polygons to be deleted.
Minimum face area	Used to set the minimum face area of polygons to be deleted
Fix boundary	Among the points comprising the selected element, the points present on the boundary of the hole will be excluded from data reduction.

## Build – Modify – Points

### Rebuilding the Selected Points by Deleting Small Polygons

This command is used to rebuild the points selected in the currently displayed element by deleting small polygons.

**Memo**

The elements selected before execution of this command will be divided to triangular polygons.

#### Operating Procedure

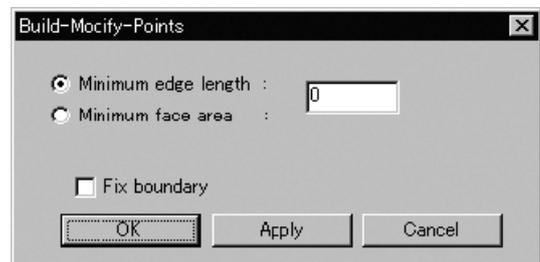
**1 From the element list, select one desired element.**

**2 Select the desired points.**

**3 From the [Build] menu, select [Modify] and then click [Points].**

The [Build-Modify-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**4 Set the parameters.**

**5 Click the [Apply] button.**

Polygons smaller than the specified size will be deleted from the selected points.

- The polygons comprising the selected element will be triangulated.

- If you change the parameter settings and click the [Apply] button again, the data comprising the points will be reduced according to the new parameter settings.

**6 Click the [OK] button.**

This will confirm execution of data reduction and close the dialog box.

Parameters for [Build-Modify-Points] Dialog Box	
Minimum edge length	Used to set the minimum edge length of polygons to be deleted.
Minimum face area	Used to set the minimum face area of polygons to be deleted
Fix boundary	Among the points comprising the selected element, the points present on the boundary of the hole will be excluded from data reduction.

## Build – Subdivision – Element

### Rebuilding the Selected Element by Dividing Large Polygons

This command is used to rebuild the selected element by dividing large polygons.

#### *Memorandum*

The element selected before execution of this command will be divided to triangular polygons.

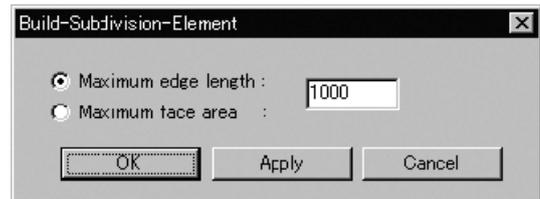
#### Operating Procedure

#### 1 From the element list, select the desired element.

#### 2 From the [Build] menu, select [Subdivision] then click [Element].

The [Build-Subdivision-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



#### 3 Set the parameters.

#### 4 Click the [Apply] button.

The data of the points comprising the selected element will be rebuilt according to the parameter settings.

- The polygons comprising the selected element will be triangulated.

- If you change the parameter settings and click the [Apply] button again, the data for the selected element will be rebuilt according to the new parameter settings.

#### 5 Click the [OK] button.

This will confirm execution of data rebuilding and close the dialog box.

Parameters for [Build-Subdivision-Element] Dialog Box

Maximum edge length	Used to set the maximum edge length of element to be rebuilt.
Maximum face area	Used to set the maximum face area of element to be rebuilt.

## Build – Subdivision – Points

### Rebuilding the Selected Points by Dividing Large Polygons

This command is used to rebuild the points selected in the currently displayed element by dividing large polygons.

#### **Memo**

The elements selected before execution of this command will be divided to triangular polygons.

#### Operating Procedure

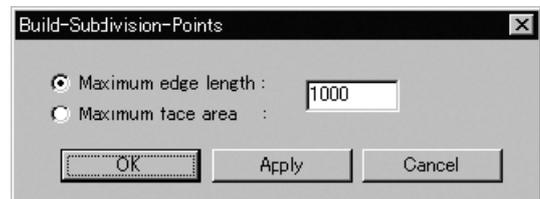
**1 From the element list, select one desired element.**

**2 Select the desired points.**

**3 From the [Build] menu, select [Subdivision] then click [Points].**

The [Build-Subdivision-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



**4 Set the parameters.**

**5 Click the [Apply] button.**

The data for the selected points will be rebuilt according to the parameter settings.

- The polygons comprising the selected element will be triangulated.

- If you change the parameter settings and click the [Apply] button again, the data for the points will be rebuilt according to the new parameter settings.

**6 Click the [OK] button.**

This will confirm execution of data rebuilding and close the dialog box.

Parameters for [Build-Subdivision-Points] Dialog Box

Maximum edge length	Used to set the maximum edge length of polygons to be divided.
Maximum face area	Used to set the maximum face area of polygons to be divided.

## Build – Triangulate – Elements

### Dividing Polygons in Elements into Triangles

This command is used to divide polygons of the selected element(s) into triangles.

#### Operating Procedure

**1** From the element list, select the desired element(s).

**2** From the [Build] menu, select [Triangulate] then click [Elements].

The polygons comprising the selected element(s) will be divided into triangles.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Build – Triangulate – Polygons

### Dividing Selected Polygons into Triangles

This command is used to divide the polygon(s) composed of the points selected in the currently displayed element into triangles.

#### Operating Procedure

**1** From the element list, select the desired element(s).

**2** Select the polygons you want to divide into triangles.

A polygon can be selected by selecting all the vertices of which it is comprised.

*/Memo/*

It is possible to select polygons in more than one element.

**3** From the [Build] menu, select [Triangulate] and then click [Polygons].

Polygons comprised of the selected points will be divided into triangles.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

## Build – Texture Blending

### Blending Textures

This command is used to make the edges of color image of registered element smooth.

#### Operating Procedure

**1** From the element list, select one desired element.

**2** Click [Texture Blending] on the [Build] menu.

All the element view windows will be hidden, and the temporary window and [Build-Texture Blending] dialog box will appear.

- The temporary window is displayed in texture mapping mode, and the selected element will be fully framed in that window.
- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**Note**

- *An error message will appear if an element that has no images is selected.*
- *It is not possible to close the temporary window.*

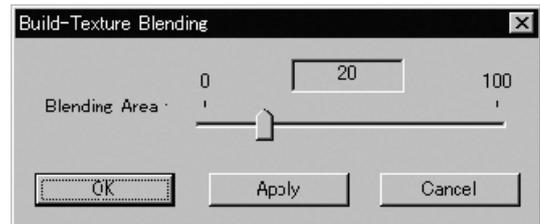
**3** Set the parameters.

**4** Click the [Apply] button.

Junctures of textures will be smoothed according to the parameter settings.

**5** Click the [OK] button.

This will confirm execution of texture blending and close the dialog box.



- If you change the parameter settings and click the [Apply] button again, the junctures of textures will be smoothed according to the new parameter settings.

#### Parameters for [Build-Texture Blending] Dialog Box

Blending Area	Sets the area over which blending occurs, with the area increasing as you raise the value. If you set this value too high, colors will bleed together excessively and the result will be unsatisfactory. If you set this value to 0, there will be no blending at all.
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## Build – Check Polygons – Element

### Checking for Illegal Polygons in Element

This command is used to check for illegal polygons among those comprising the selected element.

#### Operating Procedure

**1** From the element list, select one desired element.

**2** From the [Build] menu, select [Check Polygons] then click [Element].

The [Build-Check Polygons-Element] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**Note**

*An error message will appear if more than one element is selected.*

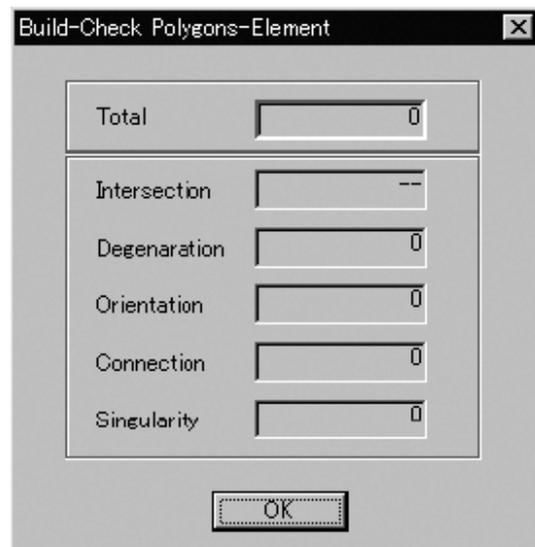
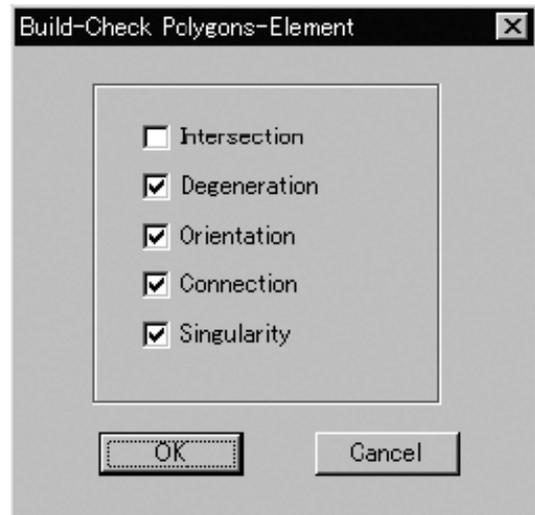
**3** Check the checkboxes of the parameter items to be checked.

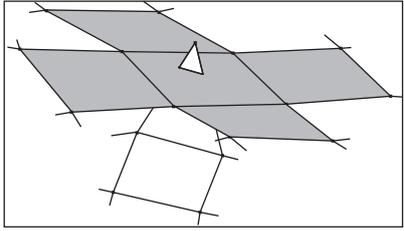
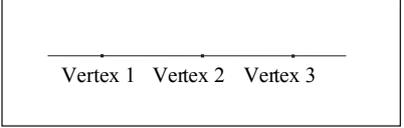
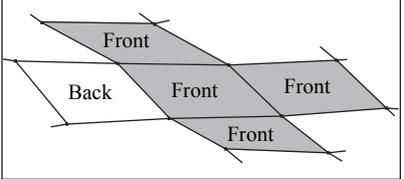
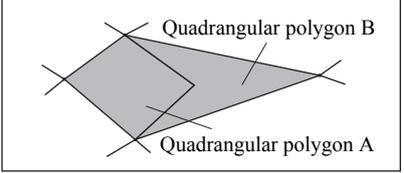
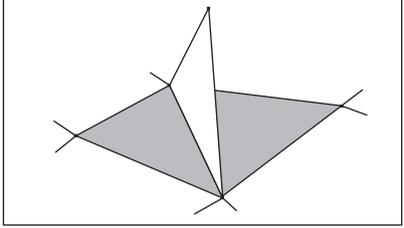
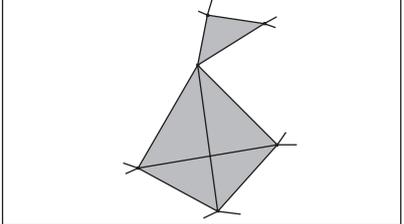
**4** Click the [OK] button.

Illegal polygons will be detected and the following dialog box will appear.

**5** Click the [OK] button.

Only the vertices comprising the illegal polygons will remain selected, the dialog box will close and the menu will be exited.



Parameters for [Build-Check Polygons-Element] Dialog Box	
Intersection	<p>Checks for polygons intersecting with another polygon at points other than at shared vertices and edges.</p> <p>ex.) Polygons intersecting with each other</p> 
Degeneration	<p>Checks for polygons whose edges intersect with each other at points other than at shared vertices.</p> <p>ex.) Triangular polygon whose three vertices are positioned on a straight line</p> 
Orientation	<p>Checks for polygons that share an edge and face opposite each other.</p> <p>ex.) Polygons sharing one edge and facing opposite each other</p> 
Connection	<p>Checks for polygons that share more than three vertices or two non-edge vertices.</p> <p>ex.) Quadrangular polygons sharing three vertices</p> 
	<p>ex.) Triangular polygon having as an edge the diagonal edge of a quadrangular polygon</p> 
Singularity	<p>Checks for polygons connected to a vertex of conical polygons.</p> <p>*All the polygons connected to a vertex will be detected.</p> <p>ex.) Triangular polygon sharing its vertex with a conical polygon</p> 

## Build – Check Polygons – Polygons

### Checking for Illegal Polygons Composed of Selected Points

This command is used to check illegal polygons composed of the selected points in the selected element.

#### Operating Procedure

**1** From the element list, select one desired element.

**2** Select the points that contain polygons to be checked

Only the polygons for which all vertices are selected will be checked.

**3** From the [Build] menu, select [Check Polygons] and then click [Polygons].

The [Build-Check Polygons-Polygons] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

**Note**

*An error message will appear if more than one element is selected.*

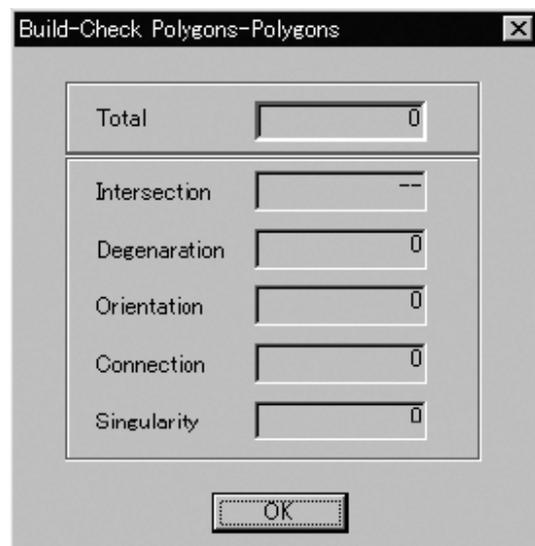
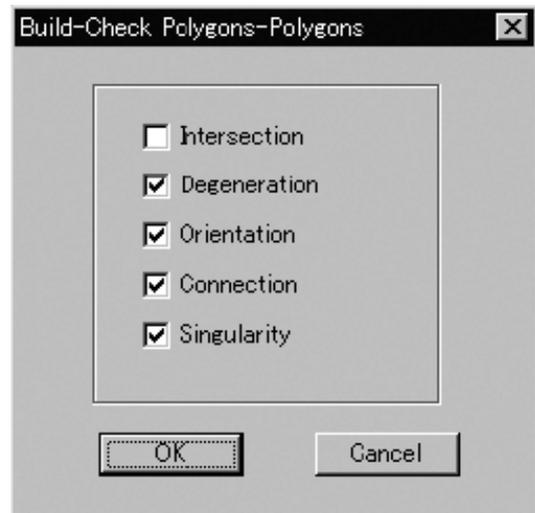
**4** Check the checkboxes of the parameter items to be checked.

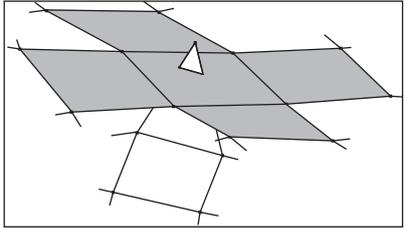
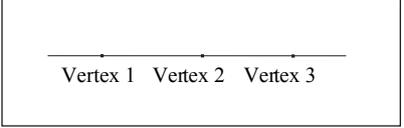
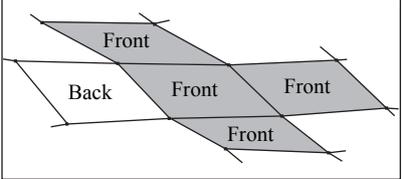
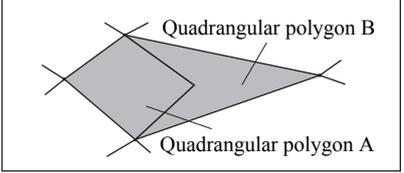
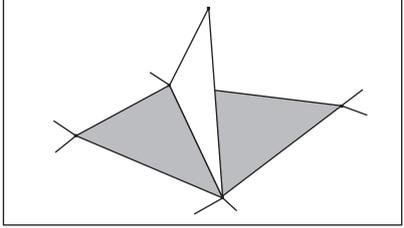
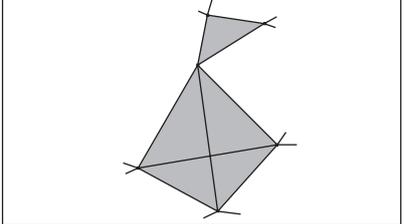
**5** Click the [OK] button.

Illegal polygons will be detected and the following dialog box will appear.

**6** Click the [OK] button.

Only the vertices comprising the illegal polygons will remain selected, the dialog box will close and the menu will be exited.



Parameters for [Build-Check Polygons-Polygons] Dialog Box	
<p>Intersection</p>	<p>Checks for polygons intersecting with another polygon at points other than at shared vertices and edges. ex.) Polygons intersecting with each other</p> 
<p>Degeneration</p>	<p>Checks for polygons whose edges intersect with each other at points other than at shared vertices. ex.) Triangular polygon whose three vertices are positioned on a straight line</p> 
<p>Orientation</p>	<p>Checks for polygons that share an edge and face opposite each other. ex.) Polygons sharing one edge and facing opposite each other</p> 
<p>Connection</p>	<p>Checks for polygons that share more than three vertices or two non-edge vertices. ex.) Quadrangular polygons sharing three vertices</p>  <p>ex.) Triangular polygon having as an edge the diagonal edge of a quadrangular polygon</p> 
<p>Singularity</p>	<p>Checks for polygons connected to a vertex of conical polygons. *All the polygons connected to a vertex will be detected. ex.) Triangular polygon sharing its vertex with a conical polygon</p> 

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# Info Menu

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## Info – Elements

### Displaying Information for the Element(s)

This command is used to display information related to the selected element.

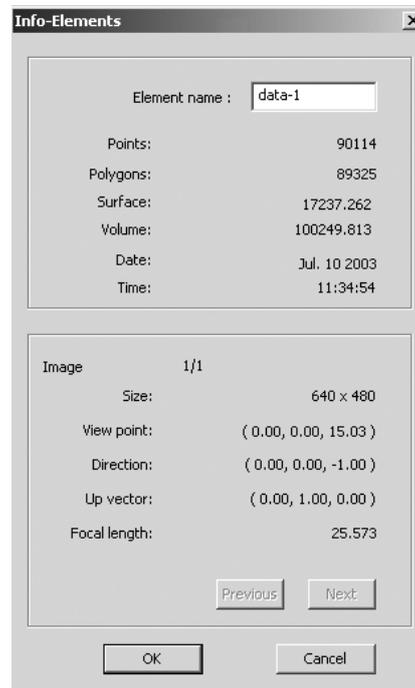
#### Operating Procedure

**1** From the element list, select one desired element.

**2** Click [Element] on the [Info] menu.  
The [Info-Element] dialog box will appear.

**3** If you want to change the element name, enter a new name.

**4** Click the [OK] button.  
The dialog box will close.



Parameters for [Info-Elements] Dialog Box

Element name	Name of the element
Points	Number of points comprising the element
Polygons	Number of polygons comprising the element
Surface	Element's surface area
Volume	Element's volume
Date	Acquisition date ("N/A" will be displayed in the case of merged element data)
Time	Acquisition time ("N/A" will be displayed in the case of merged element data)
Image	Image No. (for the image whose information is displayed)/Total number of images
Size	Size of the image
View point	Coordinates of the view point
Direction	Vector of the line of view
Up Vector	Upward vector
Focal length	Focal distance
Previous	Displays information for the previous image.
Next	Displays information for the next image.

#### **Memo**

The program calculates the surface area by calculating the triangles comprising the element, and then summing the surface areas of these triangles.

The program calculates the volume by estimating the volume enclosed by the polygons comprising the element. Results may not be precise if elements have many broken parts.

## Info – Points

### Displaying Information for Points

This command is used to display information related to the points comprising the polygon selected in the selected element.

#### Operating Procedure

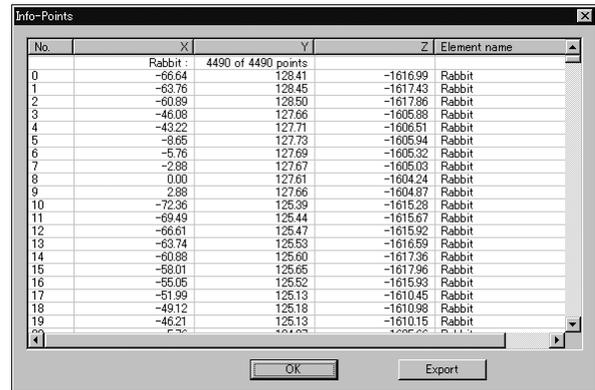
**1** From the element list, select one desired element.

**2** Select the desired point(s).

**3** Click [Points] on the [Info] menu.

The [Info-Points] dialog box will appear.

- The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.



The screenshot shows the 'Info-Points' dialog box with a table of points. The table has columns for 'No.', 'X', 'Y', 'Z', and 'Element name'. The data is as follows:

No.	X	Y	Z	Element name
Rabbit : 4490 of 4490 points				
0	-66.64	126.41	-1616.99	Rabbit
1	-63.76	128.45	-1617.43	Rabbit
2	-60.89	128.50	-1617.86	Rabbit
3	-46.08	127.66	-1606.88	Rabbit
4	-43.22	127.71	-1606.51	Rabbit
5	-8.65	127.73	-1605.94	Rabbit
6	-5.76	127.69	-1605.32	Rabbit
7	-2.88	127.67	-1605.03	Rabbit
8	0.00	127.61	-1604.24	Rabbit
9	2.88	127.66	-1604.87	Rabbit
10	72.36	125.39	-1615.28	Rabbit
11	-69.49	125.44	-1615.67	Rabbit
12	-66.61	125.47	-1615.92	Rabbit
13	-63.74	125.53	-1616.59	Rabbit
14	-60.88	125.60	-1617.36	Rabbit
15	-58.01	125.65	-1617.96	Rabbit
16	-55.05	125.52	-1615.93	Rabbit
17	-51.99	125.13	-1610.45	Rabbit
18	-49.12	125.18	-1610.98	Rabbit
19	-46.21	125.13	-1610.15	Rabbit

#### Note

Information for up to 20,000 points can be viewed. If the number of selected points exceeds 20,000, the information for those extra points will be omitted.

**4** If you wish to output the displayed information, click the [Export] button.

The program outputs the point coordinate data, in ASCII format.

**5** Click the [OK] button.

The dialog box will close.

Parameters for [Info-Points] Dialog Box

No.	Serial No. of each point
X, Y, Z	X, Y and Z coordinates
Element name	Name of the element to which the point(s) belong

## Info – Picked Point

### Displaying Information for the Picked Point

This command is used to display information related to a point selected by clicking it.

Left : Selects one point.  
Middle ([Shift] + Left) : -  
Right : -

#### Operating Procedure

#### 1 From the element list, select the desired element.

#### 2 Click [Picked Point] on the [Info] menu.

The selected element will be ready to be displayed in all windows. It will be displayed if it is not displayed in the active window or the windows for which all the elements are set to be displayed.

#### 3 Click the point whose information you want to display.

The information of the left-clicked point will be displayed.

```
No. : 1196
X Y Z : -30.31 67.23 -1526.42
Element : Rabbit
```

#### 4 Press the [ESC] key.

Info – Picked Point mode will be canceled.

Parameters for [Info-Picked Point] Dialog Box

No.	Serial No. of each point
X Y Z	X, Y and Z coordinates
Element	Name of the element to which the point(s) belong

# Window Menu

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## Window – New – Front/Right/Left/Back/Top/Bottom/Isometric/Perspective

### Changing Direction of View of Element View Window

This command is used to open a new window by selecting the orientation of the image displayed in the window from [Front], [Right], [Left], [Back], [Top], [Bottom], [Isometric] and [Perspective].

#### Operating Procedure

- 1 From the [Window] menu, select [New] and then click [Front], [Right], [Left], [Back], [Top], [Bottom], [Isometric] or [Perspective].

A new window will open in the selected view orientation.

The data will be fully framed in the new window.

#### **Memo**

- It is possible to open two or more windows having the same orientation.
- If [Perspective] or [Isometric] is selected, the image can be rotated in different directions using a View command.

## Window – Clone

### Cloning an Element View Window

This command is used to clone (duplicate) the active element view window.

#### Operating Procedure

- 1 Click [Clone] on the [Window] menu.

The active window will be cloned.

## Window – Close

### Closing Active Element View Window

This command is used to close the active element view window.

#### Operating Procedure

##### 1 Click [Close] on the [Window] menu.

The active window will close.

- If only one element view window is present and modifications have been made to an element after it has been imported or saved, the “Some elements are modified. Do you want to save them?” message dialog box will appear.

① Click the [YES] button.

If an element file has been imported, its data will be overwritten.

If the selected elements are not those explained above (i.e. if they are newly created elements or those that have been imported in another file format), the [File-Save as-Elements] dialog box will appear, displaying the names of the non-saved elements at the top of the element list. (If you want to change the file names, change them) Click the [Save] button to save them one by one. When all the elements are saved, the dialog box and the selected windows will close.

## Window – Cascade

### Cascading Element View Windows

This command is used to cascade all the currently displayed windows.

#### Operating Procedure

##### 1 Click [Cascade] on the [Window] menu.

The currently displayed windows will be cascaded from the top left to bottom right in the element view window area.

## Window – Tiling

### Tiling Element View Windows

This command is used to tile all the currently displayed windows.

#### Operating Procedure

**1 Click [Tiling] on the [Window] menu.**

The currently displayed windows will be fully tiled in the element view window area.

## Window – Layout – 1/4

### Displaying an Element View Windows in 1/4 Layout

This command is used display windows in 1/4 layout.

#### Operating Procedure

**1 From the [Window] menu, select [Layout] and then click [1/4].**

Four views will appear, with Top view in the top left, Isometric view in the top right, Front view in the bottom left and Right view in the bottom right.

## Window – Layout – 1/1

### Displaying an Element View Window in 1/1 Layout

This command is used to fully display a window in the element view window area.

#### Operating Procedure

**1 From the [Window] menu, select [Layout] and then click [1/1].**

The active window will be maximized and displayed fully in the element view window area.

## Window – Layout – Format A

### Displaying an Element View Window in Format A Layout

This command is used to display windows in Format A layout.

#### Operating Procedure

- 1 From the [Window] menu, select [Layout] and then click [Format A].

All the windows except for the active window will close, and a window having the same display properties of that active window will be created. It will be displayed in Format A from certain different viewing angles.

## Window – Layout – Format B

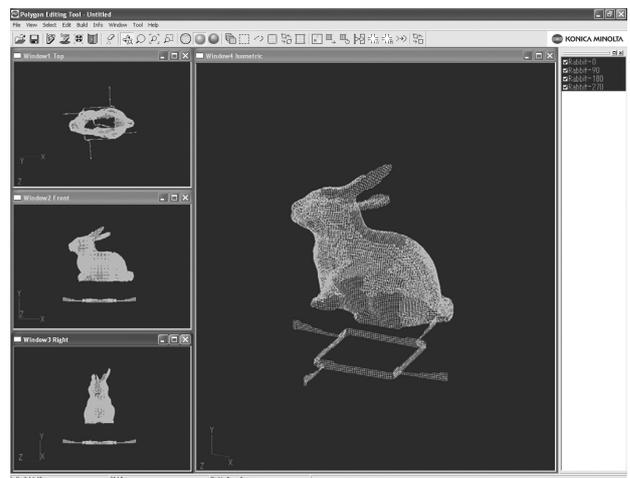
### Displaying an Element View Window in Format B Layout

This command is used to display windows in “Format B” layout.

#### Operating Procedure

- 1 From the [Window] menu, select [Layout] and then click [Format B].

All the windows except for the active window will close, and a window having the same display properties of that active window will be created. It will be displayed in the format shown on the right from certain viewing angles.



## Window – Property

### Displaying Window Properties

This command is used to display and set various types of information related to all the currently displayed windows.

#### Operating Procedure

### 1 Click [Property] on the [Window] menu.

The [Window – Property] dialog box will appear.

### 2 Set the parameters.

Clicking the [View reset] button will change the Camera Settings as follows:

- Interest: 0.000, 0.000, -1000.000
- Near plane: 500.000
- Far plane: 5000.000
- View angle: 45.0

To change the element for only the windows for which parameters have been set, check the [Select] checkbox and place a check mark for those elements.

“Selective” will appear in the window’s title bar.

- For those elements set in the element list to be hidden, it is not possible to set them to be shown by checking the [Select] checkbox.
- The [Flat] and [Smooth] radio buttons cannot be selected if Wireframe is selected as Rendering mode.

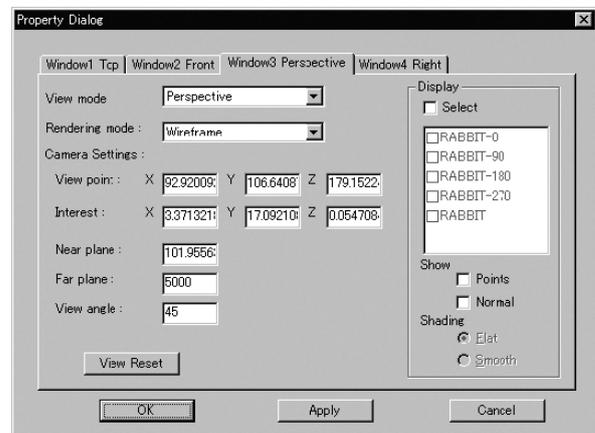
### 3 Click the [Apply] button.

The windows will be updated according to the parameter settings

- If you change the parameter settings and click the [Apply] button again, the windows will be updated according to the new parameter settings.

### 4 Click the [OK] button.

This will confirm execution of window property change and close the dialog box.



#### Note

For window views other than “Isometric” or “Perspective” view, it is not possible to set [View angle] and certain “View point” and Interest” parameters.

- For “Front” and “Back” views, only [Z] parameter can be set.
- For “Top” and “Bottom” views, only [Y] parameter can be set.
- For “Right” and “Left” views, only [X] parameter can be set.
- For “Isometric” view, all parameters other than [View angle] can be set.
- For “Perspective” view, all the parameters can be set.

Parameters for [Window – Property] Dialog Box	
View mode	Click the pull-down menu, and select the desired view mode from [Front], [Back], [Top], [Bottom], [Right], [Left], [Isometric] and [Perspective] from the list that appears.
Rendering mode	Click the pull-down menu, and select the desired rendering mode from [Wireframe], [Shading], [Texture Mapping], [Wireframe + Shading] and [Wireframe + Texture Mapping].
Parameters for Camera Settings	
View point	Camera position
Interest	Position of the point of interest
Near plane	Position (distance from camera) at which subject becomes visible
Far plane	Position (distance from camera) at which subject goes out of sight
View angle	View angle of the camera
Parameters for Display	
Select	Used to select the elements to be displayed in windows.
Points	Used to set whether to show or hide vertices.
Normal	Used to set whether to show or hide normal.
Shading	Used to select flat shading or smooth shading by the [Flat] and [Smooth] radio buttons.

## Window – Next

Displaying Next Element View Window

This command is used to switch the next window to the active window.

### Operating Procedure

---

#### 1 Click [Next] on the [Window] menu.

Among the windows listed in the [Window] menu, the window listed below the currently active window will be active.

## Window – Previous

Displaying Previous Element View Window

This command is used to switch the previous window to the active window.

### Operating Procedure

---

#### 1 Click [Previous] on the [Window] menu.

Among the windows listed in the [Window] menu, the window listed above the currently active window will be active.

# Tool Menu

Measure .....	234
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## Tool – Measure

### Measuring Dimensions within the Selected Element(s)

This command measures specified dimensions within the selected element.

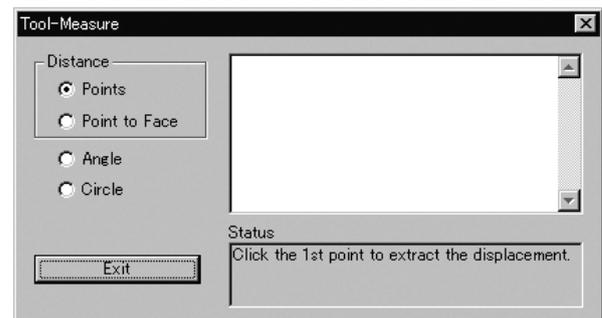
#### Operating Procedure

- 1 From the element list, select the desired elements

- 2 Select the [Measure] from the [Tool] menu.

The [Tool – Measure] dialog box will appear.

- 3 Select the type of measurement you want to perform by checking on the radio button.



#### /Memo/

The measurement results is displayed in the upper-right window. Note that the content of this window can be edited. The measurement procedure is indicated sequentially in the Status window.

- 4 Click the [Exit] button.

Tool – Measure mode will be canceled.

Parameters for [Tool-Measure] Dialog Box

Points	Measures the distance between multiple points on the element (the distance between two selected points, or the dimensions of the “bounding box” fitted to three or more selected points).
Point to Face	Measures the distance between a specified point and a selected face (where the face is specified by selection of multiple points).
Angle	Measures the angle formed by three specified points.
Circle	Measures the circle formed by multiple points (the circle defined by three specified points, or the circle formed by fitting of multiple selected points.)

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## ■ Measuring the Distance Between Two Points ([Points])

Use the following procedure to measure the distance between two specified points on the selected element.

### Operating Procedure

#### 1 Check on the [Points] of the [Distances] category.

#### 2 Specify the first point on the element by clicking on it.

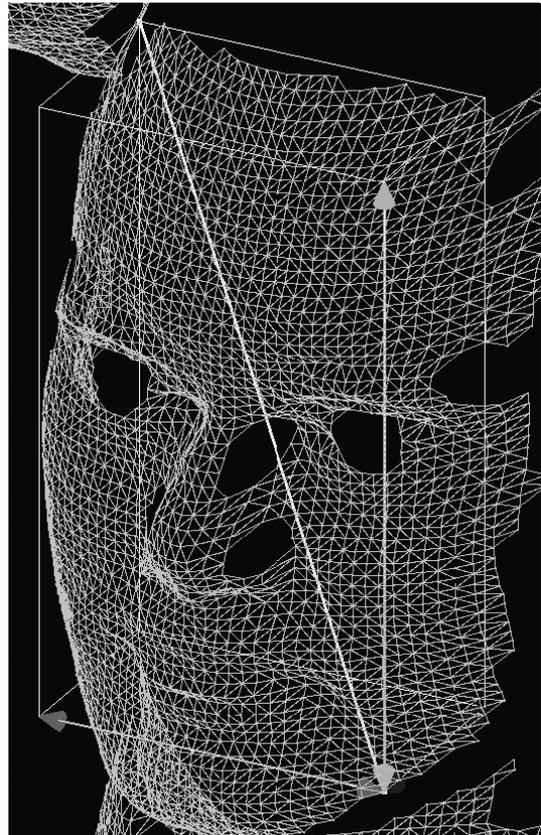
The specified point is displayed in an element view window.

**[Memo]**

If you want to redo the point specifying, click the Right mouse button at anywhere.

#### 3 Specify the second point on the element by clicking on it.

The distance between the two points is measured, and the calculated results will be displayed in the upperright window of the [Tool – Measure] dialog box, and the two specified points and line connecting them will be displayed in an element view window.



Parameters Returned When Measuring Distance Between Two Points ([Points])	
Dist.	Length of the straight line connecting the two points. (Yellow line in an element view window.)
dx	Distance along x-axis between the two points. (Red arrow in an element view window.)
dy	Distance along y-axis between the two points. (Green arrow in an element view window.)
dz	Distance along z-axis between the two points. (Blue arrow in an element view window.)
Point 1	Coordinates of the first point. (First white point in an element view window.)
Point 2	Coordinates of the second point. (Second white point in an element view window.)

## ■ Measuring a Bounding Box ([Points])

Use the following procedure to measure the dimensions of the bounding box fitted to specified points on the selected element.

**[Memo]**

A “bounding box” is the rectangular box formed with the shortest boundary lines bounding the selected points.

### Operating Procedure

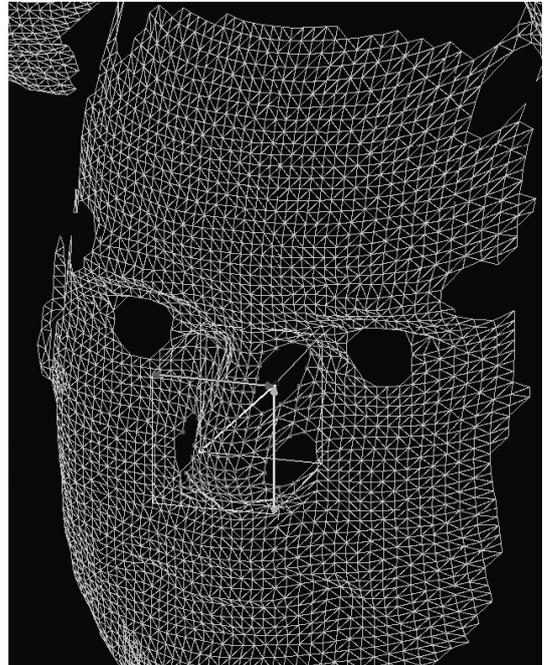
#### 1 Check on the [Points] of the [Distance] category.

#### 2 Select the points on the element by using the Select menu.

**[Ref]** For details of *Select* commands, refer to page 157 to 166.

#### 3 Click the Right mouse button.

The bounding box that covers the selected points is calculated, and the calculated results will be displayed in the upper-right window of the [Tool – Measure] dialog box, and the bounding box fitted to the specified points will be displayed in an element view window.



Parameters Returned When Measuring a Bounding Box ([Points])

Dist.	Length of the diagonal across the bounding box. (Yellow line in an element view window.)
dx	Length of bounding box in the x direction. (Red arrow in an element view window.)
dy	Length of bounding box in the y direction. (Green arrow in an element view window.)
dz	Length of bounding box in the z direction. (Blue arrow in an element view window.)
Point 1	Coordinate at one end of diagonal crossing the box. (White point in an element view window.)
Point 2	Coordinates at the other end of diagonal crossing the box. (White point in an element view window.)

## ■ Measuring the Distance Between a Specified Point and a Specified Face ([Point to Face])

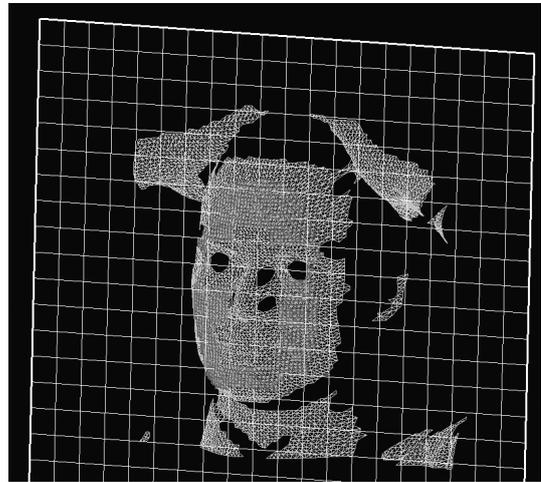
Use the following procedure to measure the distance between a specified point and a specified face on the selected element.

### Operating Procedure

#### 1 Check on the [Point to Face].

#### 2 Select the points on the element by using the Select menu.

**[Ref.]** For details of *Select* commands, refer to page 157 to 166.



#### 3 Click the Right mouse button.

A face is fitted with the selected points, and the fitted face will be displayed in an element view window.

**[Memo]**

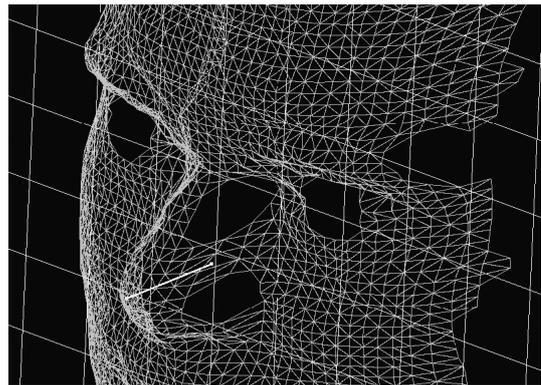
If you want to redo the face extracting, click the Right mouse button again.

#### 4 Specify a single point on the element by clicking on it.

The distance between the specified point and the face is calculated, and the calculated results will be displayed in the upper-right window of the [Tool – Measure] dialog box, and the line showing the distance will be displayed in an element view window.

**[Memo]**

You can specify a different point by clicking on it. If you want to change the specified face, click the Right mouse button at anywhere.



Parameters Returned When Measuring Distance Between Specified Point and Specified Face ([Point to Face])	
Dist.	Distance between point and face. (White line in an element view window.)
Point	Coordinates of the circle's center point. (White point in an element view window.)
Plane normal	Value of selected face's normal vector.
Point on the plane	Coordinates of a point on the selected plane. (Yellow on-face point in an element view window.)

## ■ Measuring an Angle ([Angle])

Use the following procedure to measure the angle formed by three specified points on the selected element.

### Operating Procedure

#### 1 Check on the [Angle].

#### 2 Specify the first point on the element by clicking on it.

The specified point will be displayed in an element view window.

**/Memo/**

If you want to redo the point specifying, click the Right mouse button at anywhere.

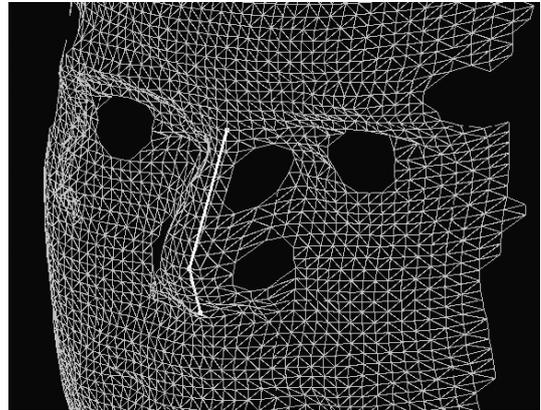
#### 3 Specify the second point by clicking on it.

**/Memo/**

If you want to redo the point specifying, click the Right mouse button at anywhere.

#### 4 Specify the third point by clicking on it.

The angle defined by the three specified points is calculated, and the calculated results will be displayed in the upper-right window of the [Tool – Measure] dialog box, and two lines - connecting the first point to second point and second point to third point - will be displayed in an element view window.



**/Memo/**

To calculate the next angle, click the Right mouse button on the next point.

Parameters Returned When Measuring an Angle ([Angle])

Parameters Returned When Measuring an Angle ([Angle])	
Angle	Angle formed by the three points, in degrees. (White lines in an element view window.)
Point 1	Coordinates of the first specified point. (Yellow point in an element view window.)
Point 2	Coordinates of the second specified point. (Yellow point in an element view window.)
Point 3	Coordinates of the third specified point. (Yellow point in an element view window.)

## ■ Measuring the Circle Passing Through Three Specified Points ([Circle])

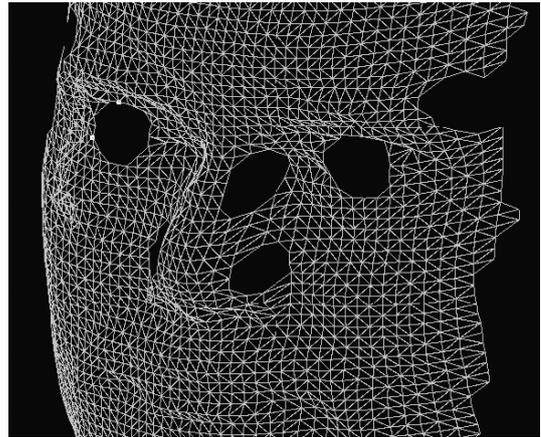
Use the following procedure to measure the circle fitted to coincide with three specified points on the selected element.

### Operating Procedure

#### 1 Check on the [Circle].

#### 2 Specify the first point on the element by clicking on it.

The specified point will be displayed in an element view window.



**Memo**

To redo the point specifying, click the Right mouse button at anywhere.

Chapter 2

Tool  
Menu

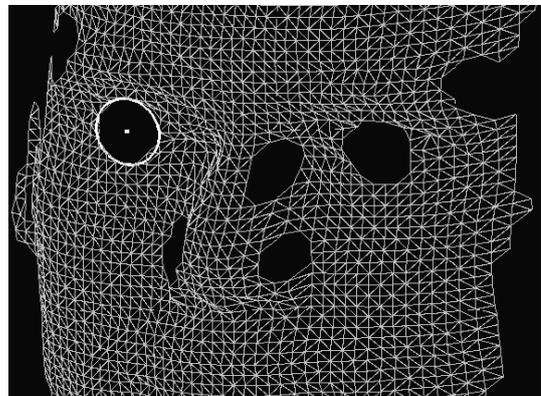
#### 3 Specify the second point by clicking on it.

**Memo**

To redo the point specifying, click the Right mouse button at anywhere.

#### 4 Specify the third point by clicking on it.

The circle fitted to coincide with the specified three points is calculated, and the calculated results will be displayed in the upper-right window of the [Tool – Measure] dialog box, and the fitted circle will be displayed in an element view window.



**Memo**

To calculate the next circle, click the Right mouse button on the next point.

9i  
910  
900  
700  
300

## ■ Measuring a Circle Comprised of Multiple Selected Points ([Circle])

Use the following procedure to measure the circle created by fitting of multiple selected points on the selected element.

### Operating Procedure

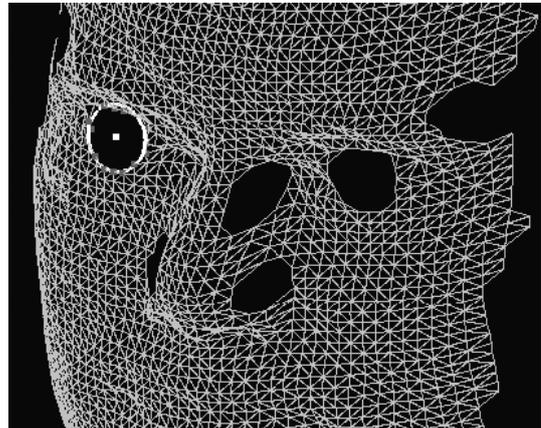
#### 1 Check on the [Circle].

#### 2 Select the points on the element by using the Select menu.

**[Ref.]** For details of **Select** commands, refer to page 157 to 166.

#### 3 Click the Right mouse button.

The circle fitted with multiple specified point is calculated, and the calculated results will be displayed in the upper-right window of the [Tool – Measure] dialog box, and the fitted circle will be displayed in an element view window.



Parameters Returned When Measuring a Circle Comprised of Multiple Selected Points ([Circle])

Center	Coordinates of the circle's center point. (White point in an element view window.)
Radius	Radius of the circle.
Circle normal	Value of vector normal to the circle plane.

9i

910

900

700

300

## Tool – Menu Add

### Adding a Menu

#### Operating Procedure

- 1 Click the [Menu Add] on the [Tool] menu.**

The program opens a file-load dialog.

- 2 Select the appropriate menu-addition file.**

Operation is guaranteed only for well-formed menu-addition files. Operation may not proceed correctly if you select the wrong type of file.

- 3 Click the [Open] button.**

The program opens a confirmation dialog based on the content of the menu-addition file.

- 4 Click the [OK] button.**

The program executes the menu addition in accordance with the content of the file.

## Tool – Menu Del

### Deleting an Added Menu

#### Operating Procedure

- 1 Click the [Menu Del] on the [Tool] menu.**

The program opens a menu-deletion dialog.

- 2 Select the appropriate menu name from the list.**

Operation is guaranteed only for well-formed deletion lists. Operation may not proceed correctly if you select an improper list.

- 3 Click the [OK] button.**

The program deletes the selected menu.

## Tool – Shortcut Keys

### Displaying a List of Shortcut Keys

This command is used to display a list of shortcut keys. By default, shortcut keys have already been assigned to popular commands. By using this command, you can add or modify shortcut keys.

#### **Memo**

Shortcut keys can also be assigned to commands given in pop-up menus.

### Operating Procedure

#### 1 Click [Shortcut Keys] on the [Tool] menu.

The [Tool-Shortcut Keys] dialog box will appear.

#### 2 In the [Shortcut Key] text boxes, specify the desired keys or combinations of keys.

If you want to modify a shortcut key, overwrite it. To add a new shortcut key, just enter it.

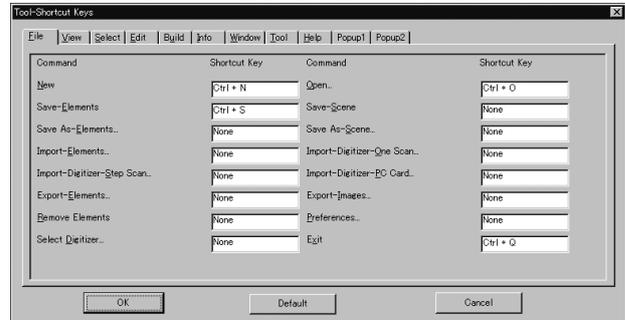
- Alphabet keys, [Shift] key, [Ctrl] key and their combinations can be assigned. However, to use a function key, it cannot be assigned in combination.
- For instance, if you press the [Ctrl], [Shift] and [a] keys at the same time, “Ctrl + Shift + a” will be displayed in the text box.

To restore the following default shortcut key assignment, click the [Default] button.

- |   |               |
|---|---------------|
| • [File] – [New]                        | [Ctrl] + [N]  |
| • [File] – [Open]                       | [Ctrl] + [O]  |
| • [File] – [Save] – [Elements]          | [Ctrl] + [S]  |
| • [File] – [Exit]                       | [Ctrl] + [Q]  |
| • [View] – [Orbit]                      | [O]           |
| • [View] – [Zoom]                       | [Z]           |
| • [View] – [Full Frame All]             | [Shift] + [F] |
| • [View] – [Full Frame]                 | [F]           |
| • [View] – [Area Orbit]                 | [W]           |
| • [View] – [Area Zoom]                  | [X]           |
| • [View] – [Move Plane]                 | [A]           |
| • [Select] – [Rectangle]                | [E]           |
| • [Select] – [Select by Elements]       | [Ctrl] + [A]  |
| • [Edit] – [Undo]                       | [Ctrl] + [Z]  |
| • [Edit] – [Redo]                       | [Ctrl] + [Y]  |
| • [Edit] – [Delete] – [Points]          | [Ctrl] + [X]  |
| • [Build] – [Move] – [Elements]         | [M]           |
| • [Build] – [Move] – [Points]           | [P]           |
| • [Build] – [Rotate] – [Elements]       | [R]           |
| • [Popup 1] – [Show Vertex/Hide Vertex] | [F9]          |

#### 3 Click the [OK] button.

The dialog box will close, and changes made to shortcut key assignment will be effective. The changes will be saved in the user preference file.



- A list of shortcut keys is shown for each menu category. To display a list for a certain category, click the corresponding tab with the left mouse button.

#### **Note**

- For commands to which no shortcut key is assigned, “None” will be displayed in their text boxes.
- When assigning a shortcut key, an error message will appear if it has already been assigned.
- Some commands do not support shortcuts that use [shift] + [Ctrl]. Attempting to set such a shortcut combination for these commands will produce an error message.

#### **Note**

To use a shortcut key, make sure that the mouse cursor is located in a window in the view area.

# Pop-up Menus in Element View Window

Clicking the right mouse button on an element view window while holding down the [Ctrl] key will display a pop-up menu, allowing you to make various settings.

View Mode – Front/Right/Left/Back/Top/Bottom/Isometric/Perspective .....	244
Rendering Mode – Wireframe/Shading/Texture Mapping/ Wireframe + Shading/Wireframe + Texture Mapping .....	244
Show Vertex/Hide Vertex .....	244
Show Normal/Hide Normal .....	245
Show Axis/Hide Axis .....	245
Smooth Shading/Flat Shading .....	245
Select element from window .....	246
Create clone window .....	247
Close window .....	247
Property .....	248

## View Mode – Front/Right/Left/Back/Top/Bottom/Isometric/Perspective

### Changing View Mode

This command is used to change view mode for windows.

#### Operating Procedure

- 1 Select **[View Mode]** from a pop-up menu, and then click **[Front]**, **[Right]**, **[Left]**, **[Back]**, **[Top]**, **[Bottom]**, **[Isometric]** or **[Perspective]**.

The view mode will be changed.

## Rendering Mode – Wireframe/Shading/Texture Mapping/Wireframe + Shading/Wireframe + Texture Mapping

### Changing Rendering Mode

This command is used to change rendering mode for windows.

#### Operating Procedure

- 1 Select **[Rendering Mode]** from a pop-up menu, and then click **[Wireframe]**, **[Shading]**, **[Texture Mapping]**, **[Wireframe + Shading]** or **[Wireframe + Texture Mapping]**.

The rendering mode will be changed.

- If **Shading** mode is selected, rear-facing surfaces will be displayed in Wireframe mode.



## Show Vertex/Hide Vertex

**[F9]**

### Showing or Hiding Vertices

This command is used to set whether to show or hide vertices.

#### Operating Procedure

When Vertices are Currently Hidden

- 1 From the pop-up menu, click **[Show Vertex]**.  
The vertices will be shown.

#### Operating Procedure

When Vertices are Currently Shown

- 1 From the pop-up menu, click **[Hide Vertex]**.  
The vertices will be hidden.

<b>Show Normal/Hide Normal</b>
Showing or Hiding Normal Vectors

This command is used to set whether to show or hide the normal.

**Operating Procedure** When the Normal is Currently Hidden

- 1 From the pop-up menu, click **[Show Normal]**.  
The normal will be shown.

**Operating Procedure** When the Normal is Currently Shown

- 1 From the pop-up menu, click **[Hide Normal]**.  
The normal will be hidden.

<b>Show Axis/Hide Axis</b>
Showing or Hiding Axes

This command is used to set whether to show or hide axes.

**Operating Procedure** When Axes are Currently Hidden

- 1 From the pop-up menu, click **[Show Axis]**.  
The axes will be shown.

**Operating Procedure** When Axes are Currently Shown

- 1 From the pop-up menu, click **[Hide Axis]**.  
The axes will be hidden.

<b>Smooth Shading/Flat Shading</b>
Changing Shading Mode

This command is used to change shading mode.

**Operating Procedure** When Window is Currently in Flat Shading Mode

- 1 From the pop-up menu, click **[Smooth Shading]**.  
The window will be displayed in smooth shading mode.

**Operating Procedure** When Window is Currently in Smooth Shading Mode

- 1 From the pop-up menu, click **[Flat Shading]**.  
The window will be displayed in flat shading mode.

## Select element from window

### Changing Displayed Element by Windows

This command is used to switch the currently selected element to another. This is possible only for the window in which a pop-up menu is displayed.

**Note**

*For those elements set in the element list to be hidden, it is not possible to set them to be shown by checking the [Select] checkbox.*

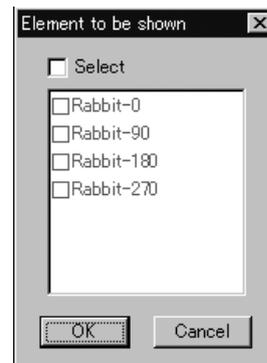
#### Operating Procedure

**1 From the pop-up menu, click [Select element from window].**

The [Element to be shown] dialog will appear.

- If all the elements are set to be shown (i.e. not set to “Selective”), the dialog box will appear with the [Select] checkbox unchecked.

Otherwise, the dialog box will appear with the [Select] checkbox checked.



.....

**2 Check the [Select] checkbox (i.e. a check mark is placed).**

This allows you to set whether to show or hide elements.

.....

**3 Check the checkbox of the desired elements to be shown.**

.....

**4 Click the [OK] button.**

The dialog box will close and the selected elements will be displayed.

“Selective” will appear in the window’s title bar.

## Create clone window

### Cloning an Element View Window

This command is used to clone (duplicate) the active element view window.

#### Operating Procedure

#### 1 From the pop-up menu, click [Create clone window].

The active window will be cloned.

## Close window

### Closing an Element View Window

This command is used to close the currently selected element view window.

#### Operating Procedure

#### 1 From the pop-up menu, click [Close window].

The currently selected element view window will close.

- If only one view window is present and modifications have been made to an element after it has been imported or saved, the [Some elements are modified. Do you want to save them?] message dialog box will appear.

Press [YES].

If an element file has been imported, its data will be overwritten.

If they are newly created elements or those that have been imported in another file format, the [File-Save as-Elements] dialog box will appear, displaying the names of the non-saved elements at the top of the element list. (If you want to change the file names, change them.) Click the [Save] button to save them one by one.

When all the elements are saved, the dialog box and the selected windows will close.

## Property

### Displaying Window Properties

This command is used to display and set various types of information related to all the currently displayed windows.

**/Memo/**

This command has the same functions as the **Window – Property** command.

**/Ref./** For details of the **Window – Property** command, refer to page 230.

#### Operating Procedure

**1 From the pop-up menu, click [Property].**

The [Window – Property] dialog box will appear.

**2 Set the parameters.**

**3 Click the [Apply] button.**

- If you change the parameter settings and click the [Apply] button again, the windows will be updated according to the new parameter settings.

**4 Click the [OK] button.**

This will confirm execution of window property change and close the dialog box.

# Pop-up Menus in Element List

Clicking the right mouse button on the element list while holding down the [Ctrl] key will display a pop-up menu, allowing you to make various settings.

Show Element/Hide Element .....	250
Delete Elements .....	250
View Image .....	251
Set Wireframe Color .....	251
Set Shading Color .....	252
Rename Element .....	252

## Show Element/Hide Element

### Showing/Hiding Elements

This command is used to show or hide the element(s) selected in the element list.

**/Memo/**

This command has the same effect as when a check mark is placed for the desired elements in the element list.

**/Note/**

*If a pop-up menu is displayed in areas other than element name area in the element list, the menu items [Show Element] and [Hide Element] will not be displayed.*

#### **[Operating Procedure]** When Elements are Currently Hidden

- 1 Click the element(s) to be shown with the right mouse button, and select [Show Element] from the pop-up menu that appears.**

The element(s) will be shown.

#### **[Operating Procedure]** When Elements are Currently Shown

- 1 Click the desired element(s) to be hidden with the right mouse button, and select [Hide Element] from the pop-up menu that appears.**

The element(s) will be hidden.

## Delete Elements

### Deleting Elements from the Element List

This command is used to delete the element(s) selected from the element list.

**/Memo/**

The Delete Elements command has the same function as the **File – Remove Elements** and **Edit – Delete – Elements** command.

**/Ref./**

- For details of the **File – Remove Elements** command, refer to page 141.
- For details of the **Edit – Delete – Elements** command, refer to page 169.

#### **[Operating Procedure]**

- 1 Click the element(s) to be deleted with the right mouse button, and select [Delete Elements] from the pop-up menu that appears.**

A message asking you whether to delete all the selected elements will appear.



**/Memo/**

If two or more elements have been selected by clicking them while holding down the [Shift] or [Ctrl] key, they can be deleted.

- 2 Click the [OK] button.**

All the selected elements and their corresponding points will be removed.

## View Image

### Displaying Color Images

This command is used to display color images of the element(s) currently selected in the element list.

#### Operating Procedure

- 1 Click the desired element(s) whose color images are to be shown with the right mouse button, and select [View Image] from the pop-up menu that appears.

The color images of the selected element(s) will be displayed.

#### **Memo**

If two or more elements have been selected by clicking them while holding down the [Shift] or [Ctrl] key, the color images for those elements can be displayed.

## Set Wireframe Color

### Changing Wireframe Color

This command is used to set the wireframe color for the element(s) selected in the element list.

#### **Note**

*If a pop-up menu is displayed without elements selected in the element list, [Set Wireframe Color] will not be displayed in the menu.*

#### Operating Procedure

- 1 Click the element(s) for which you want to set wireframe color with the right mouse button, and select [Set Wireframe Color] from the pop-up menu that appears.

A color palette dialog box will appear.

#### **Memo**

If two or more elements have been selected by clicking them while holding down the [Shift] or [Ctrl] key, the wireframe color for those elements can be set.

- 2 Select the desired color from the color palette.

- 3 Click the [OK] button.

The wireframe color(s) for the selected element(s) will be changed to the one selected at step 2.

## Set Shading Color

### Changing Shading Color

This command is used to set the shading color for the element(s) selected in the element list.

**Note**

*If a pop-up menu is displayed without elements selected in the element list, [Set Shading Color] will not be displayed in the menu.*

#### Operating Procedure

- 1 Click the element(s) for which you want to set shading color with the right mouse button, and select [Set Shading Color] from the pop-up menu that appears.**

A color palette dialog box will appear.

**Memo**

If two or more elements have been selected by clicking them while holding down the [Shift] or [Ctrl] key, the shading color for those elements can be set.

- 2 Select the desired color from the color palette.**

- 3 Click the [OK] button.**

The shading color(s) for the selected element(s) will be changed to the one selected at step 2.

## Rename Element

### Changing an Element Name

This command is used to rename the element(s) currently selected in the element list.

**Memo**

It is also possible to rename an element by double-clicking it in the element list with the right mouse button.

**Note**

*If a pop-up menu is displayed without elements selected in the element list, [Rename Element] will not be displayed in the menu.*

#### Operating Procedure

- 1 Click the element(s) to be renamed with the right mouse button, and select [Rename Element] from the pop-up menu that appears.**

It is now possible to enter a new element name.

**Note**

*The element name must consist of up to 31 alphanumeric characters.*

**Memo**

If two or more elements have been selected by clicking them while holding down the [Shift] or [Ctrl] key, they can be renamed.

- 2 Enter the desired element name, and press the [ENTER] key.**

The element will be renamed.

# Pop-up Menu in Image Window

Clicking the right mouse button on an image window while holding down the [Ctrl] key will display a pop-up menu, allowing you to make various settings.

Change Image .....	254
Overlay .....	254
Zoom In .....	254
Zoom Out .....	255
Actual Pixels .....	255
Close .....	255

## Change Image

### Changing the Color Image

This command is used to change the currently displayed color image with a new one.

#### Operating Procedure

**1 From the pop-up menu, click [Change Image].**

A sub menu will appear.

**2 Select the desired color image.**

The currently displayed color image will be replaced with the selected one.

## Overlay

### Displaying Wireframe on a Color Image

This command is used to overlay wireframe on the currently displayed color image.

#### Operating Procedure

**1 From the pop-up menu, click [Overlay].**

Wireframe will be overlaid on the element image.

**Note**

*However, if the currently displayed color image is the one that has been added to the data taken by the VIVID (VI) series digitizer, no wireframe will be displayed.*

## Zoom In

### Changing the Color Image

This command is used to enlarge the currently displayed color image.

#### Operating Procedure

**1 From the pop-up menu, click [Zoom In].**

The color image will be enlarged in steps by the following magnification ratio each time this command is selected.

1/12, 1/8, 1/6, 1/4, 1/3, 1/2, 2/3, 1, 2, 3, 4, 5, 6, 7 and 8

- If the image is enlarged beyond the image window, a scroll bar will appear.

## Zoom Out

Reducing the Color Image

This command is used to reduce the currently displayed color image.

### Operating Procedure

**1 From the pop-up menu, click [Zoom Out].**

The color image will be reduced in steps by the following magnification ratio each time this command is selected.

1/12, 1/8, 1/6, 1/4, 1/3, 1/2, 2/3, 1, 2, 3, 4, 5, 6, 7 and 8

## Actual Pixels

Displaying the Color Image in One-to-One Pixel Mode

This command is used to display color images in one-to-one pixel mode (one data pixel = one monitor pixel).

### Operating Procedure

**1 From the pop-up menu, click [Actual Pixels].**

The color images will be displayed in one-to-one pixel mode.

## Close

Changing the Color Image

This command is used to close the currently displayed color image.

### Operating Procedure

**1 From the pop-up menu, click [Close].**

The color image will close.

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# Chapter 3

## Appendix

Chapter 3 contains Error Message explanations and Technical Terms glossary.



# Error Messages

The following error messages appear if incorrect operation is performed or an abnormality occurs. If an error message appears, take the appropriate corrective actions as shown in the table below.

Error Message (Alphabetically)	Cause	Action
AF error. Laser barrier may be closed	The digitizer was not ready due to an AF error.	Click the [OK] button to close the message dialog box.
AF error.	The digitizer was not ready due to an AF error.	Click the [OK] button to close the message dialog box.
Calculation disable.	Failed to calculate using the specified corresponding points.	Click the [OK] button to close the message dialog box. *When selecting correspondence points, you must select points so that they are sufficiently spaced and so that are within the range that can be specified within the element's colorimage window.
Cannot display wireframe.	The command was selected even though the currently displayed color image was the one added to the data taken by the digitizer.	Click the [OK] button to close the message dialog box.
Cannot show information of more than 20000 points. (Number of selected points – 20000) Points will be omitted.	More than 20000 points were selected.	Click the [OK] button to display the [Info-Points] dialog box. Information for the extra points (i.e. the points exceeding – 20000) will not be included.
Choose more than 2 points.	An attempt was made to extract a line without selecting two or more points.	Click the [OK] button to close the message dialog box.
Choose more than 3 points.	An attempt was made to extract a face or circle without selecting three or more points.	Click the [OK] button to close the message dialog box.
Choose more than 4 points.	An attempt was made to extract a sphere without selecting four or more points.	Click the [OK] button to close the message dialog box.
Create Meshes Fault!	Failed to fill holes. (This message appears if creation of meshes fails with "Fillholes by meshes" or "Replace meshed" selected.)	Click the [OK] button to close the message dialog box.
Design value is same as that of others.	The design values of the extracted point are the same as those of the extracted line.	Click the [OK] button to close the message dialog box.
Extracted line's vector overlaps	The extracted line's vector is the same as the other line's vector.	Click [OK] button to close message dialog box.
Extracted point overlaps	The extracted coordinate (X, Y, Z) is the same as the other's coordinate.	Click [OK] button to close message dialog box.
Extraction failure. Please select again.	Fail extraction of Point, Line or Face.	Click [OK] button to close message dialog box.
File write error.	A write error occurred, for instance, due to an excessively long file path name.	Click the [OK] button to close the message dialog box.
File write error: user preferences.	A write error occurred.	Click the [OK] button to close the message dialog box. No preference file will be created even if the [OK] button is clicked. (The settings will be lost if this software is exited.)

Error Message (Alphabetically)	Cause	Action
File write permission error.	An attempt was made to save a file in a directory for which no file write permission was given.	Click the [OK] button to close the message dialog box.
	An attempt was made to copy a file in a directory for which no file write permission was given when "Copy" or "Copy/All" was selected.	
File write permission error: user preferences.	No write permission was given for the preference file or directory.	Click the [OK] button to close the message dialog box. *No preference file will be created even if the [OK] button is clicked. (The settings will be lost if this software is exited.)
FillHoles Disable.	Failed to fill holes. (Failed to divide holes.)	Click the [OK] button to close the message dialog box.
FillHoles Fault! Please select other Algorithm.	Failed to fill holes. (This message appears when replacement fails even if "Replace meshes" is selected.)	Click the [OK] button to close the message dialog box.
Identical name entered. Please enter another name.	The [Rename] button was clicked even though the same file name as the original file name had been entered.	Click the [OK] button to close the message dialog box.
Illegal format file.	An attempt was made to open a file which cannot be read.	Click the [OK] button to close the message dialog box.
Invalid directory.	An attempt was made to enter a directory name which did not exist.	Click the [OK] button to close the message dialog box.
Invalid format. (VIVID 700, VI-700)	The memory card was not formatted.	Click the [OK] button to close the message dialog box.
Memory allocation error.	Failed to reserve sufficient memory to execute a command.	Click the [OK] button to close the message dialog box. Quit this software immediately.
No holes were found.	No holes were found as a result of a search.	Click the [OK] button to close the message dialog box.
No more redo. (An alarm will be heard if the shortcut key is used.)	An attempt was made to perform redo more than the specified times.	Click the [OK] button to close the message dialog box.
No more undo. (An alarm will be heard if the shortcut key is used.)	An attempt was made to perform undo more than the specified times.	Click the [OK] button to close the message dialog box.
No name entered. Please enter again. ("Element name")	The [OK] button was clicked even though no element name had been entered.	Click the [OK] button to close the message dialog box. Enter an element name, and click the [OK] button to open the file.
No name entered. Please enter again.	The [OK], [Load] or [Rename] button was clicked even though no element name had been entered.	Enter the desired file name, and click the button.
No memory card. Please insert a card. (VIVID 700, VI-700)	No memory card has been inserted.	Click the [OK] button to close the message dialog box.
No step angle entered. Please enter again.	The [Scan] button was clicked without entering a rotating angle even though "Other" was selected for [Rotation step].	Click the [OK] button to close the message dialog box.
Not Ready for Remote.	Keys on the digitizer were operated while the monitor image was displayed.	Stop operating the keys and click the [OK] button to open a message dialog box.
PC Card had reset since last update.	Power was turned Off then turned On or the memory card was replaced.	Click the [OK] button to close the message dialog box. The memory card information will be updated automatically.

Error Message (Alphabetically)	Cause	Action
PC Card had updated since last update.	A file(s) was added, deleted or renamed on the digitizer while the [File-Import-Digitizer-PC Card] dialog box was open, but the memory card was not updated.	Click the [OK] button to close the message dialog box. The memory card information will be updated automatically.
Please capture chart data again.	Not possible to make calculation for the rotary shaft using the chart's image even though the [Convert] button was clicked.	Click the [OK] button to close the message dialog box.
Please capture chart data.	The [Convert] button was clicked even though no image of the chart had been acquired.	Click the [OK] button to close the message dialog box.
Please capture data.	The [Convert] button was clicked even though no data had been acquired.	Click the [OK] button to close the message dialog box.
Please capture more than one data.	The [Convert] button was clicked even though two or more shots had not been acquired.	Click the [OK] button to close the message dialog box.
Please draw line.	The middle mouse button was clicked even though no control points had been set.	Click the [OK] button to close the message dialog box.
Please match equal to or more than 6 points.	The [OK] or [Preview] button was clicked even though more than six pairs of corresponding points had not been designated.	Click the [OK] button to close the message dialog box.
Please read element first.	An attempt was made to execute the <b>Build – Move – To X-Y-Z</b> command without first importing an element.	Click the [OK] button to close the message dialog box.
Please select 2 polygon mesh elements. (An alarm will be heard if the shortcut key is used.)	The command was selected without selecting two polygon mesh elements.	Click the [OK] button to close the message dialog box.
Please select a file.	The [Rename], [Load], [Copy] or [Delete] button was clicked even though no files had been selected.	Click the [OK] button to close the message dialog box.
Please select a polygon mesh element. (An alarm will be heard if the shortcut key is used.)	The command was selected even though no elements had been selected or elements other than polygon mesh elements had been selected.	Click the [OK] button to close the message dialog box.
Please select a sample point on the image.	The [Apply] button was clicked without selecting sample points.	Click the [OK] button to close the message dialog box.
Please select a single polygon mesh element. (An alarm will be heard if the shortcut key is used.)	The command was selected even though more than one polygon mesh elements had been selected or a polygon mesh element and an element other than polygon mesh type had been selected.	Click the [OK] button to close the message dialog box.
Please select a single scene file.	The [Open] button was clicked even though more than one scene files had been selected.	Click the [OK] button to close the message dialog box.
Please select element(s). (An alarm will be heard if the shortcut key is used.)	The command was selected even if no elements had been selected.	Click the [OK] button to close the message dialog box.
Please select multiple polygon mesh elements. (An alarm will be heard if the shortcut key is used.)	The command was selected even though more than one polygon mesh element had not been selected.	Click the [OK] button to close the message dialog box.
Please select only polygon mesh element( s). (An alarm will be heard if the shortcut key is used.)	An element(s) other than polygon mesh type element was also selected.	Click the [OK] button to close the message dialog box.

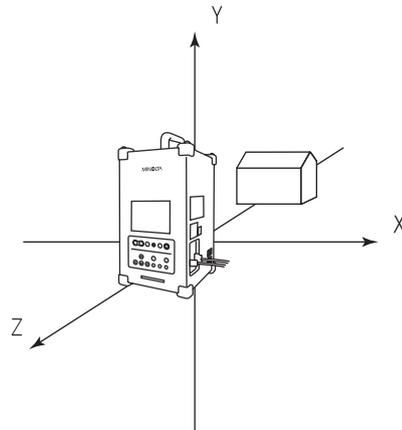
Error Message (Alphabetically)	Cause	Action
Please select only same format files.	The [Open] or [Import] button was clicked even though more than one file of different format had been selected.	Click the [OK] button to close the message dialog box.
Please select point(s). (An alarm will be heard if the shortcut key is used.)	The command was selected with no points selected.	Click the [OK] button to close the message dialog box.
Please select points within each selected element. (An alarm will be heard if the shortcut key is used.)	The command was selected even though no points had been selected or points had been selected for only some selected element but not all.	Click the [OK] button to close the message dialog box.
Please select polygon mesh element(s). (An alarm will be heard if the shortcut key is used.)	The command was selected even though no elements had been selected or elements other than polygon mesh elements had been selected.	Click the [OK] button to close the message dialog box.
Please select polygon(s). (An alarm will be heard if the shortcut key is used.)	The command was selected even though no polygons had been selected.	Click the [OK] button to close the message dialog box.
Please select three or more points. (An alarm will be heard if the shortcut key is used.)	The command was selected even though three or more points had not been selected.	Click the [OK] button to close the message dialog box.
	The right mouse button was clicked even though more than three pairs of corresponding points had not been designated.	
Same element name exists. Please enter another name. ("File name")	The same element name already exists.	Enter a new element name, and click the [OK] button to open the file.
Same element name exists. Replace?	An attempt was made to enter an element name that already exists.	To replace the existing element, click the [Replace] button.
Same file name exists.	An attempt was made to enter a file name that already exists.	To overwrite the file, click the [Overwrite] button.
SCSI read error.	An error occurred with SCSI connection. A read error from the memory card occurred in VIVID 900/910 (VI-900/ 910).	Click the [OK] button to close the message dialog box.
Select more points. We need more than 500 selected points for registration.	Among selected elements, at least one element that does not have a certain number of selected points exists.	Click the [OK] button to close the message dialog box.
Selected file "****" may be broken. Continue?	An attempt was made to read a file that had not been saved properly.	To continue to read the file, click the [Continue] button. *If the [Continue] button is clicked, an abnormal stop of the software may occur during reading.
Something wrong with VIVID.	A SCSI error other than SCSI connection error, SCSI command end error and ready error due to an AF error occurred.	Click the [OK] button to close the message dialog box.
The element has no image/The elements have no image. (An alarm will be heard if the shortcut key is used.)	The command was selected even though only the polygon mesh elements that were defined without copying images or elements other than polygon mesh elements were selected.	Click the [OK] button to close the message dialog box. *If both polygon mesh elements with images and those without images are selected, this error message will not be displayed for those elements that do not contain images.
The element has no image. (An alarm will be heard if the shortcut key is used.)	The selected element did not have any images when the command was selected.	Click the [OK] button to close the message dialog box.

Error Message (Alphabetically)	Cause	Action
The size of this image is different from the size of selected image.	The size of the selected image was different from that of the image you tried to load, due to replacement of textures.	Click the [OK] button to close the message dialog box.
There are no points. The element will be removed. ("File name")	No data points were contained.	Click the [OK] button to close the message dialog box. The element will be selected.
This element does not have multiple images.	You attempted to execute the command on an element that has only a single image.	Click the [OK] button to close the message dialog box.
This Shortcut key about [Command Name] is an invalid combination. It will be reset!	The shortcut key combination you attempted to set is not supported by this command.	Click the [OK] button to close the message dialog box.
This Shortcut key about [Command Name] is exist! Please set another!	The same shortcut key had already been assigned when you tried to assign it.	Click the [OK] button to close the message dialog box.
This version of scene file is not supported.	The [Open] button was clicked even though a scene file saved by the Utility Software VI-S1 had been selected.	Click the [OK] button to close the message dialog box.
Too Small Mesh. We can't get enough information for registration.	Among selected elements, at least one element that is composed of less than a certain number of constituent points exists.	Click the [OK] button to close the message dialog box.
Turntable not found.	The rotary stage is not connected to the digitizer or it is not turned ON.	Click the [OK] button to close the message dialog box.
Unknown PC Card (VIVID 700, VI-700)	The type of memory card is incorrect.	Click the [OK] button to close the message dialog box.
Value must be $0 < \text{value} < 10000$ .	A value outside the allowable range was entered.	Click the [OK] button to close the message dialog box.
Value must be $-100000 < \text{value} < 100000$ .	A value outside the allowable range was entered and the OK button was clicked.	Click the [OK] button to close the message dialog box.
VIVID busy.	The SCSI command did not complete.	Click the [OK] button to close the message dialog box.
VIVID not found.	VIVID (VI) series digitizer is not turned ON, cables are disconnected, or the SCSI device driver setting is not correct.	Click the [OK] button to close the message dialog box.
"Element name" Zero or few polygons found. Skip making LOD.	The selected element has an excessively small number of polygons.	Click the [OK] button to close the message dialog box.

# Explanation of Technical Terms

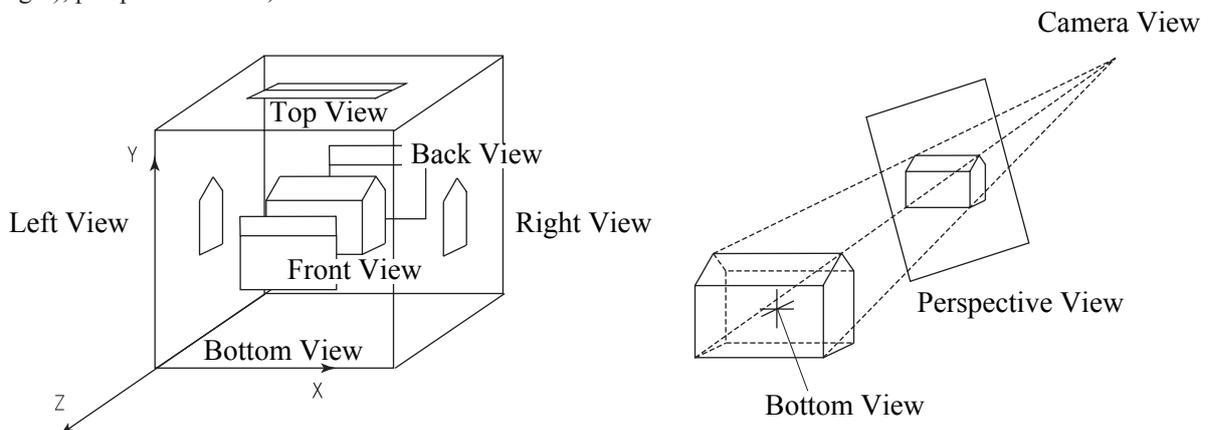
## Coordinate System

With this utility software, points located in a three-dimensional space are expressed using coordinate values of three-dimensional right-handed Cartesian coordinates. The center of the light-receiving lens of the digitizer is set as the origin of the coordinates. +Z direction refers to the direction facing the front side along the optical axis, +Y direction refers to the upward direction and +X direction refers to the direction facing the right, when viewed from the back of the light-receiving section.



## Window View

This program lets you view elements using three types of views: orthogonal views (Top, Front, Back, Bottom, Left, Right), perspective views, and isometric views.



## Vertex

Vertices refer to points in a three-dimensional space. They possess three-dimensional coordinate values, and can be selected or unselected.

They can also be edited (i.e. moved and deleted).

To edit vertices, they must be selected using the [Select] menu. (For the [Select] menu, refer to page 157.)

In addition, vertices can be shown or hidden by using the **Window – Property** command. (For details of the **Window – Property** command, refer to page 230.)

## Polygon

Polygons refer to areas (surfaces) enclosed by lines (edges) connecting vertices. Only triangular and rectangular polygons are available with this software, and they can be positioned facing toward the front or rear side.

## Color Image

When an image is acquired by the VIVID (VI) series digitizer, a range image containing distance data to each point on the surface of the object is acquired as well as a color image taken from the same view angle as the range image. With this software, color images possess information used to correspond picture elements to vertices based on color information. If images are acquired using the **Remote** command, color images will also be saved automatically. (When saving data on the VIVID 9i (VI-9i), VIVID 910 (VI-910) or VIVID 900 (VI-900), it is possible to select whether or not to save color images.)

## ■ Element

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Elements refer to data consisting of points (vertices), polygons and color images \*1.

When data acquired by the VIVID (VI) series digitizer is loaded to this software, it will always be displayed as a polygon mesh element. In addition, use of the **Edit – Define** command allows you to define a part of an existing element as a new element. Names of elements loaded to this software and those that are newly defined are displayed in the element list located at the right edge of the screen.

\*1 Some polygon mesh elements do not have color images.

For instance, a polygon mesh element created by the **Edit – Define** command without “Copy image( s)” selected does not have color images.

## ■ Scene

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A scene refers to information such as currently opened element, its view information (zoom setting, viewing direction, Shades/Lines display mode), camera \*2, point of interest \*3 and light \*4 . When a scene is saved using the **File – Save – Scene** command, all this information will be saved.

\*2 The camera indicates direction in which the image displayed in a “Isometric” or “Perspective” element view window is viewed. (The image displayed in “Isometric” or “Perspective” element view window is the image of the object viewed from the camera position.)

The camera position can be moved using the **View – Camera – Settings** or **View – Orbit** command.

\*3 The point of interest shows the direction in which the camera views the image. By moving the point of interest using the **View – Camera – Settings** command, the viewing direction of the camera can be changed.

\*4 The light provides shadow for “Shades” element view windows, and two kinds of light are available: point light source and environmental light.

With the default settings, the point light source is located behind and to the right of the camera. Position of the point light can be moved by the **View – Move Light** command.

In the SHADING display mode, the intensity of the environmental light, color of the light and material of elements (highlight, object’s color) are determined automatically.

## ■ Camera Data File

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A camera data file contains data (i.e. the data before conversion to element data) acquired by the digitizer. It is possible to set the resolution for the range image, fill holes (i.e., areas where no data exists) with points automatically and merge more than one data acquired at different angles using the optional turntable.

## ■ Element File

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An element file contains data for a single element.

## ■ Scene File

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A scene file contains data for a scene.

## ■ Dynamic Range Expansion Function

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This function expands the measurement range when the VIVID 9i (VI-9i) or VIVID 910 (VI-910) performs scanning. The laser beam of three different intensity levels (high, middle, low) is emitted to the object, and the rays reflected from the object are captured by the CCD. Among the reflected rays, the data within the CCD’s measurement range are used to expand the entire measurement range.







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