



Z CORPORATION

ZScanner™ 700

Self-Positioning Handheld 3D Scanner

ZScan™ 1.3 User Guide

CAUTION NOTES	1
LASER WARNING	2
WARNING LABELS AND LOCATIONS	3
WHAT'S NEW	4
System Overview	5
System description	5
General care	7
Scanner Manipulation	7
Connecting the scanner	8
Storing your ZScanner 700	9
Specifications	10
Concept	11
ZScan™	12
ZScan minimal required configuration	12
System Installation / Start-up	12
ZScan Software installation	13
License and configuration files update	18
ZScan software removal	18
General Concepts	19
File Types	19
Positioning Features	19
References	20
Surface and Volume	20
Facets, Edition and Multi-resolution	20
Menu	21
Toolbar	23
Scan tree	26
Expanding Panel	27
3D viewer controls	30
Status Bar	31
Sensor Configuration	31
Sensor Calibration	33
Build Reference	34
Scanning procedures	35
Object preparation	35
Applying targets	35
Reference targets	36
Starting the Software	37
Adjusting the surface settings	37
Configuring the sensor	39
Importing positioning targets	40
Acquiring data	40
Proper distance digitizing	41
Editing the scan	43
Saving your work	43
Troubleshooting	44



CAUTION NOTES

PLEASE READ THE COMPLETE MANUAL BEFORE USE. OPERATING YOUR ZScanner 700 LASER SCANNER USING PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

AVOID DIRECT EYE CONTACT WITH THE LASER BEAM.

ELECTROSTATIC DISCHARGES COULD DISCONNECT THE DEVICE.

DISREGARDING ANY OF THE RULES AND CARE RECOMMENDATION INCLUDED IN THIS MANUAL MAY VOID THE SYSTEM WARRANTY.

Please read and follow all WARNING statements throughout this manual

USER LICENSE

The ZScanner 700 system and the ZScan software are provided according to a license agreement. Any partial or complete copying of this software without proper authorization is prohibited. Distribution of the software without a written authorization from Z Corporation is forbidden. The Purchaser shall not reproduce or duplicate, disassemble, decompile, reverse engineer, sell, transfer or assign, in any manner the Scanner, the Software and the System. ZScanner 700 is a trademark of Z Corporation.

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LASER WARNING

This system uses a class II laser which is considered eye and skin safe but can cause eye damage if exposed directly for a prolonged time. Natural human reflexes will normally make the subject blink or look away before any damage is inflicted to the eyes. Any usage procedures other than those specified in this document could result in hazardous laser radiation exposure. Use the following usage precaution:

- Never stare into the beam, neither directly nor from a mirror-like surface. Human skin is not considered as a reflective surface.
- MEDICAL USAGE: warn subject not to stare into the beam. Subjects under effect of any medication and young children could possibly have their natural aversion reflex affected and it may be advisable to wear a blindfold.
- The ZScanner 700 should NEVER be opened for any reason as there are no internal adjustments. In case of a malfunction, contact the manufacturer or distributor.

WARNING LABELS AND LOCATIONS



Figure I - Laser labels and locations

WHAT'S NEW NEW!

ZScan 1.3

- Full compatibility with Windows Vista 32 bits OS
- Enhanced, more functional and efficient facet edition mode
- New reliable, fast and powerful memory management algorithms (up to 70% more laser curves than 1.2)
- Session title added to the title bar
- Help menu
- Enhanced overall look & feel
- Enhanced copy features functionality
- Enhanced surface reconstruction speed (up to 40% faster than 1.2 on Dual Core CPUs)
- Multi-Operations enabled volume settings with live preview
- New Fit Volume functionality
- Calibration information added to the calibration window.
- Faster and more reliable than ever!

ZScan 1.2

- Automatic isolated patches remover (see 2.7.4.6)
- Positioning model optimizer (see 2.7.4.1)
- Multilingual support (French and English available, more to come)
- Improved performance and memory management
- Improved surface reconstruction for thin surfaces
- Clearer and sharper boundaries
- Possibility to import targets acquired with photogrammetry (see 3.5)
- Full support for UNICODE characters
- Improved multi-resolution
- Support for user selectable measurement units
- Support for reference adapters

System Overview

System description

The ZScanner 700 system includes the following components:

- ZScanner 700 scanner
- Ergonomic stand
- Reflective targets
- Calibration verification plate
- Carry-on case
- Firewire PCMCIA card
- Firewire cable
- Firewire power supply
- Laptop computer (optional)
- ZScan software
- Instruction manual (PDF)

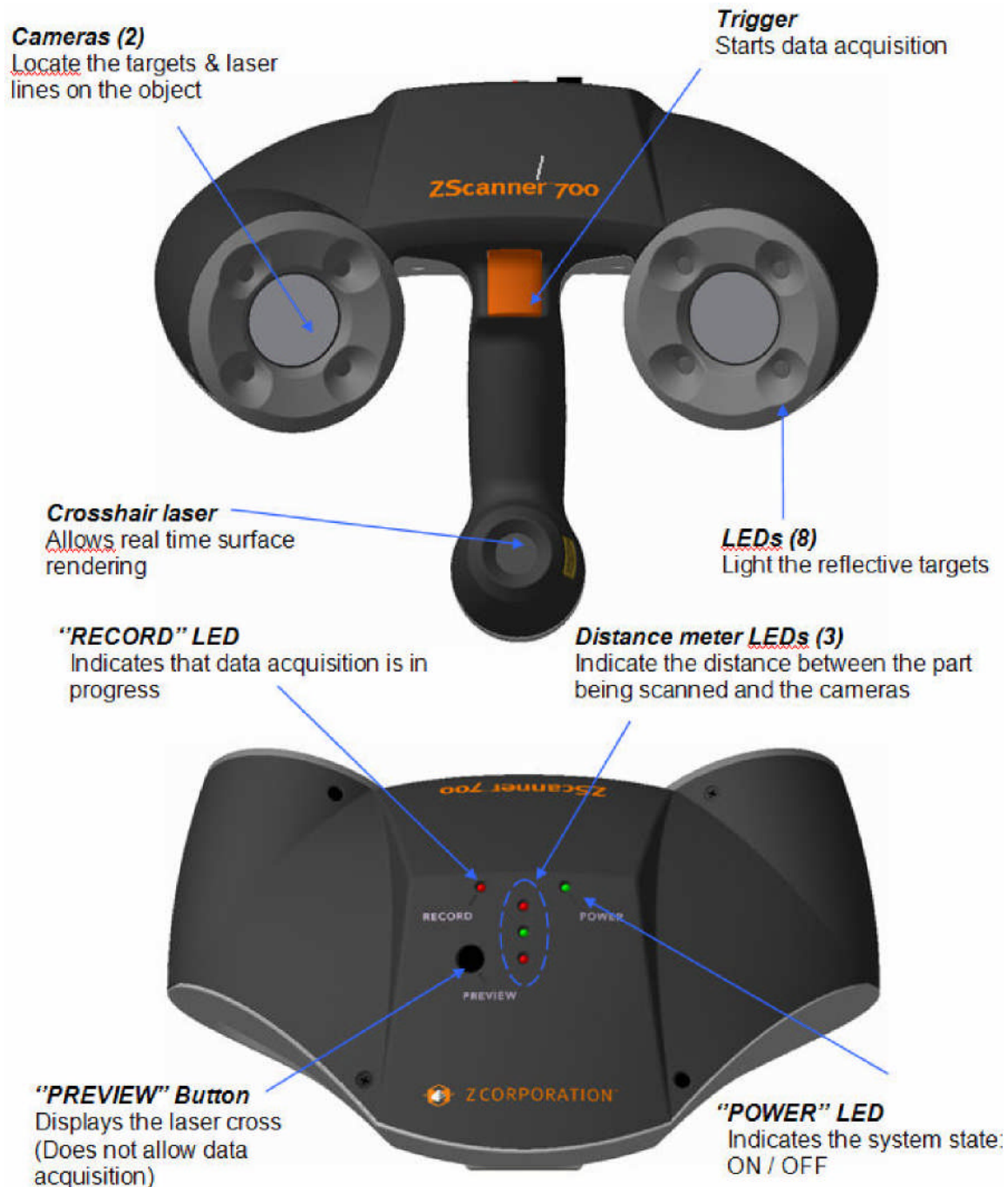


Figure 1.1 - ZScanner 700

General care

The ZScanner 700 contains optical precision parts and must be handled with care to avoid damage to the components or the calibration system. For transportation, the system must be placed in the carry-on case provided with the kit. The system must be stored in a dry, dust-free place and kept at ambient temperature.

The scanner must be kept on its support or in its carrying case when not used.

Clean the interference filters with a clean and dry cloth.

Never open any of the system's components. By doing so, the user may inadvertently damage the system and the ZScanner 700 will have to be recalibrated. Only Z Corporation staff or authorized technicians are qualified to work on the scanner. No maintenance is required by the end user. If the system shows troubles or dysfunctions, it must be sent to Z Corporation or to an authorized reseller.

Scanner Manipulation NEW!

The first step when it comes to scanning with the ZScanner 700 is to be able to connect the system properly. Also, in order to avoid recalibration, the ZScanner 700 should always be properly stored in its case.

Connecting the scanner

The first step is to turn on the computer.
Safely place the ZScanner 700 on its stand.

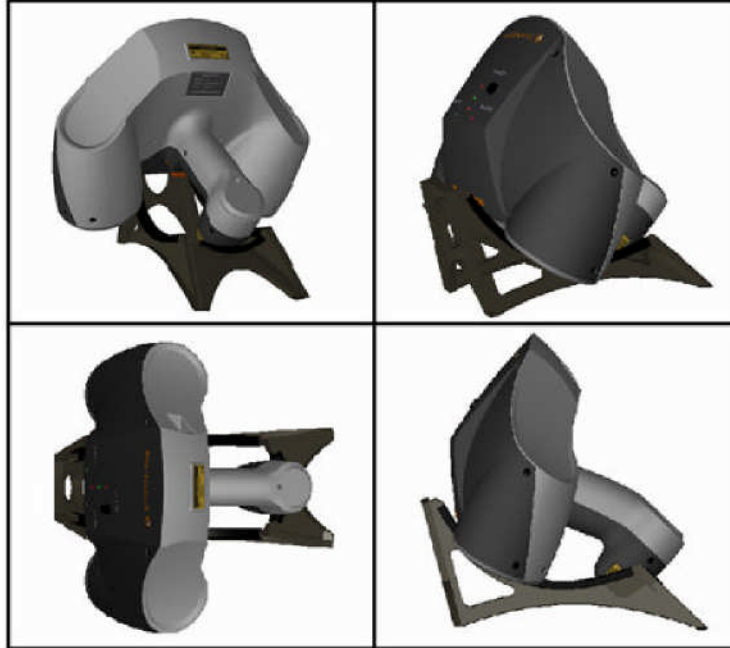


Figure 1.2 Position of the ZScanner 700 on the support

Next, the FireWire adapter should be plugged into the computer with the cables plugged in. The connections are shown on the pictures below:

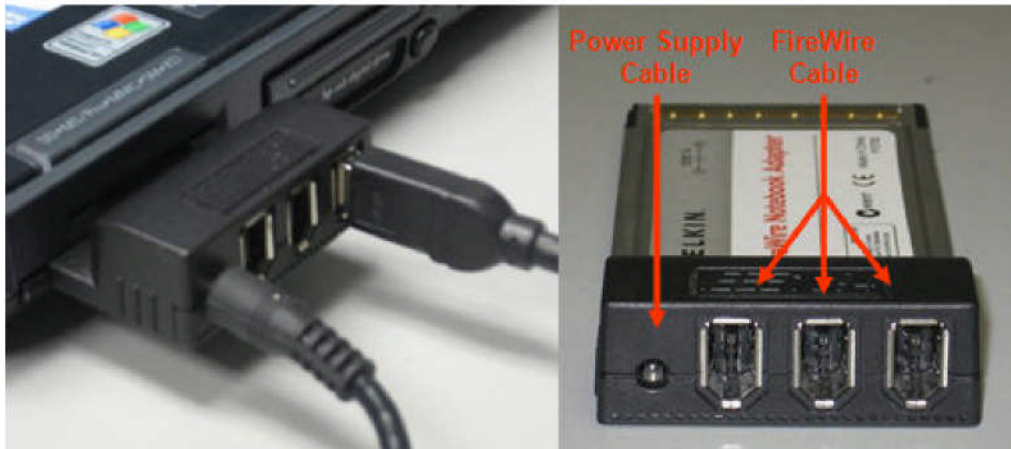


Figure 1.3 Scanner's connection on the computer

The outlet end of the power supply cable should be plugged into a power outlet using the appropriate outlet adapter. The end of the FireWire cable with the right-angle 6-pin plug should be plugged into the ZScanner 700.

Launch ZScan.

Storing your ZScanner 700

First of all, the calibration plate should be stored at the bottom of the case, underneath the foam. The calibration plate is a fragile piece of equipment and must be handled with care. It should only be taken out of its case at the time of use. The targets used on that plate are not the usual targets. It is important to avoid touching them with your fingers since human skin fats could affect the reflectivity.

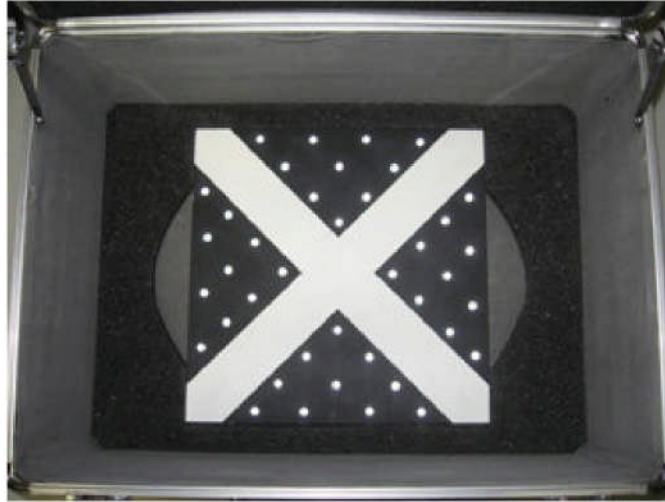


Figure 1.5 Scanner's calibration plate location

Next, after putting the foam back in place, every item should be stored properly into its specific location:

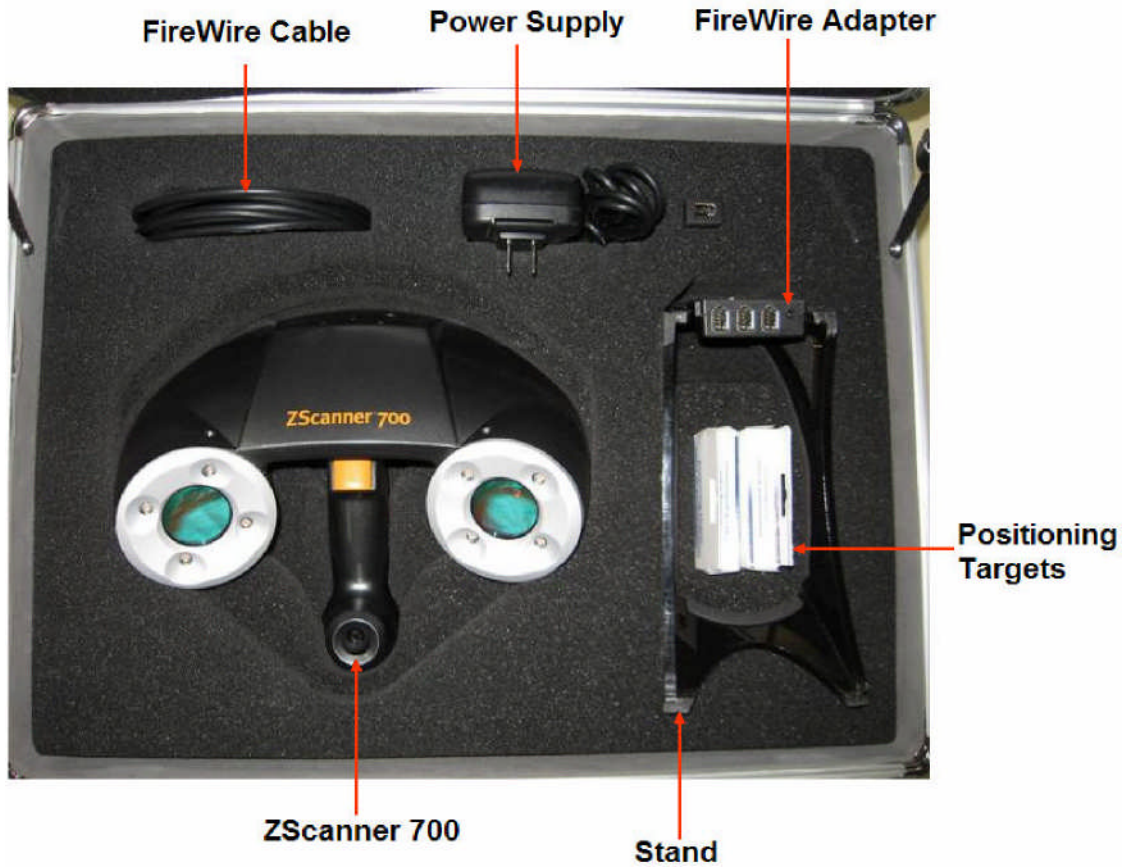


Figure 1.6 System content stored properly

Specifications

Features	Values
Laser class	II
Wave length	660nm (0.000026 in)
Depth of field	300 mm (12 in)
Power	35 mW
Weight	980 g (2.1 lbs)
Operating temperature	15°C > T > 35°C 59°F > T > 95°C

Table 1.1 - System specifications

Concept

The ZScanner 700 was designed to allow easier and faster digitization. With its easy to use interface, this system does not require any specific knowledge of the laser-digitizing field. Its principle is based on the alignment of 3D curves of the part scanned. The surface created will then generate a model that will be exported for treatment.

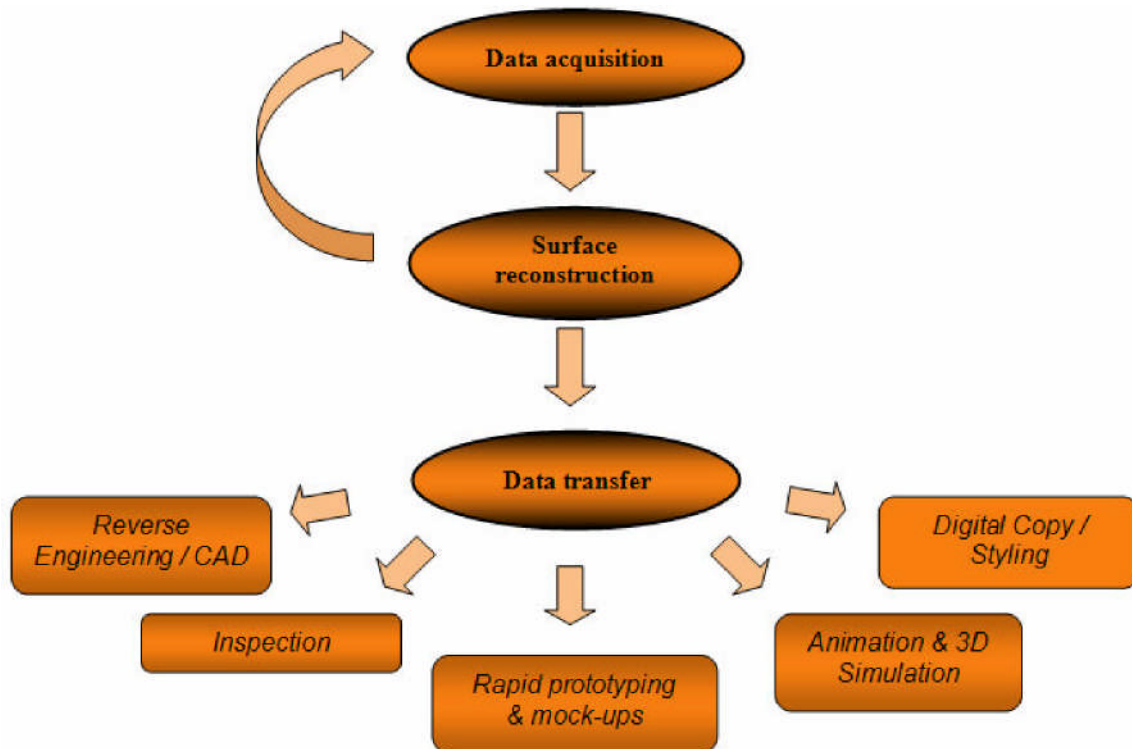


Figure 1.7 - ZScanner 700 concept

ZScan

ZScan minimal required configuration

- Processor with HT (Hyper Threading) or Dual Core technology (Dual Core recommended).
- Dedicated Graphical card with at least 128 Mb on board memory.
- Windows XP 32 bits operating system, or Windows Vista x32.
- 1 GB RAM (2 GB recommended).
- CD-Rom drive.
- PCMCIA slot
- Access to a user account with administrator's privileges for installation only.

System Installation / Start-up

The cables provided with the system are:

- A FireWire cable (IEEE 1394) to connect the scanner to the computer
- A power supply cable for the PCMCIA card (scanner)
- Firewire PCMCIA card

If you did not purchase the computer from Z Corporation or if you are using a different computer than the one provided with the system, you need to install ZScan BEFORE connecting the sensor cables. Please ensure that your laptop model is approved by Z Corporation.

Follow the indications to connect the cables to the system:

1. Insert the Firewire PCMCIA card into the laptop computer's PCMCIA bay (location may vary depending on the computer).
2. Push firmly to make sure that the card is inserted.
3. Connect the power supply to the PCMCIA card
4. Connect the power supply to the power source (use adapter as needed).
5. Connect the Firewire (IEEE1394) cable to the scanner and to the PCMCIA card.

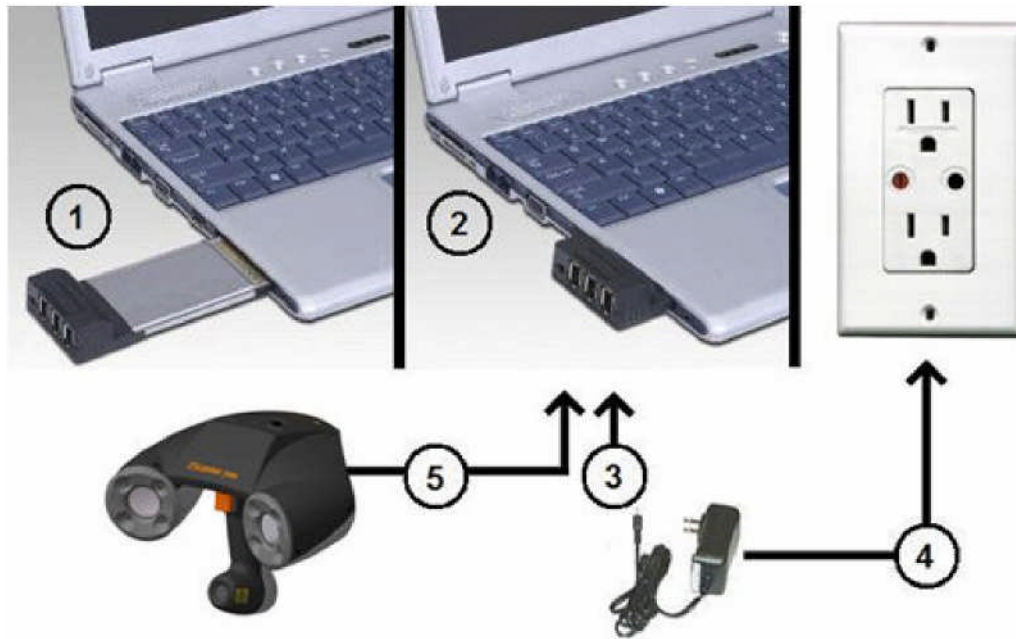


Figure 2.1 - System connections

ZScan Software installation

If the computer was purchased from Z Corporation with the ZScanner 700 sensor, the software is already installed. Follow these instructions only to install the software on another computer.

Verify that all requirements are met on the computer. **Note that administrator's privileges are required to complete the installation correctly.**

Unplug any connected sensor (scanner) from the computer and close all active applications.

Insert the ZScan CD-ROM in the drive and double click on Setup.exe to launch the Installation application.



Figure 2.2

Click Next to access installation options.

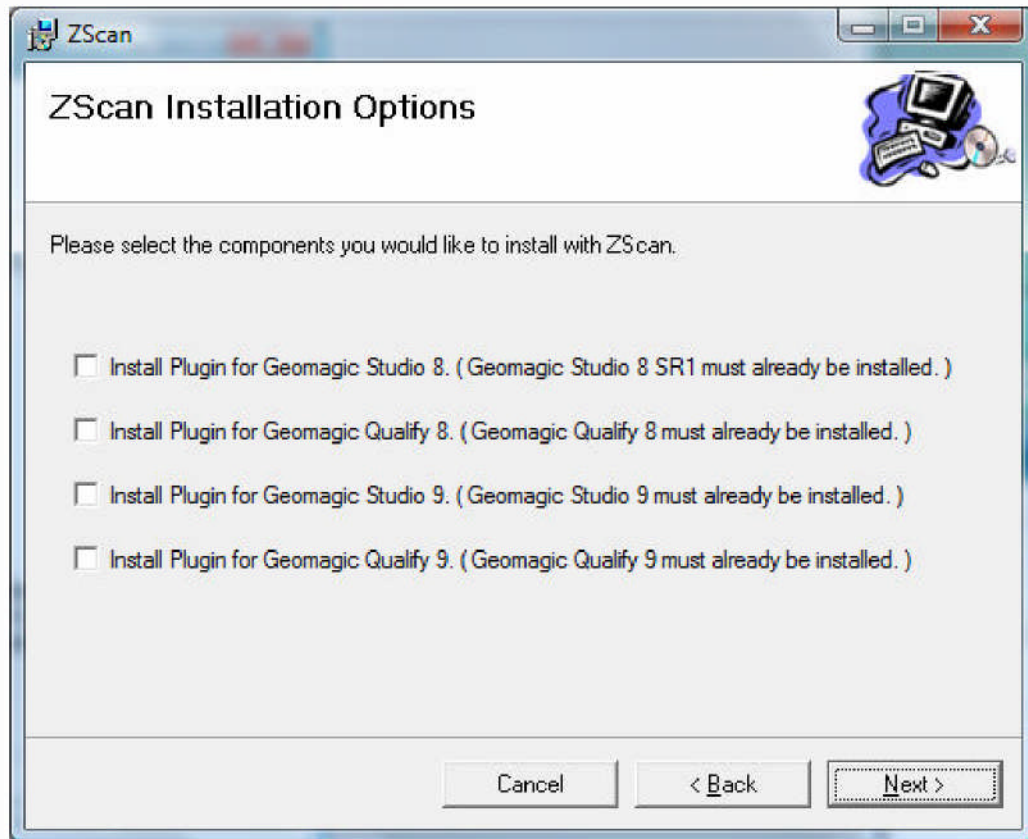


Figure 2.3

Select components to install and click “Next”.

Note that if you wish to install the plug-in for Geomagic, it must already be installed. If this is not the case, cancel the installation, install Geomagic and start over the procedure to install ZScan. If you do not need the plug-in, click “Next”.

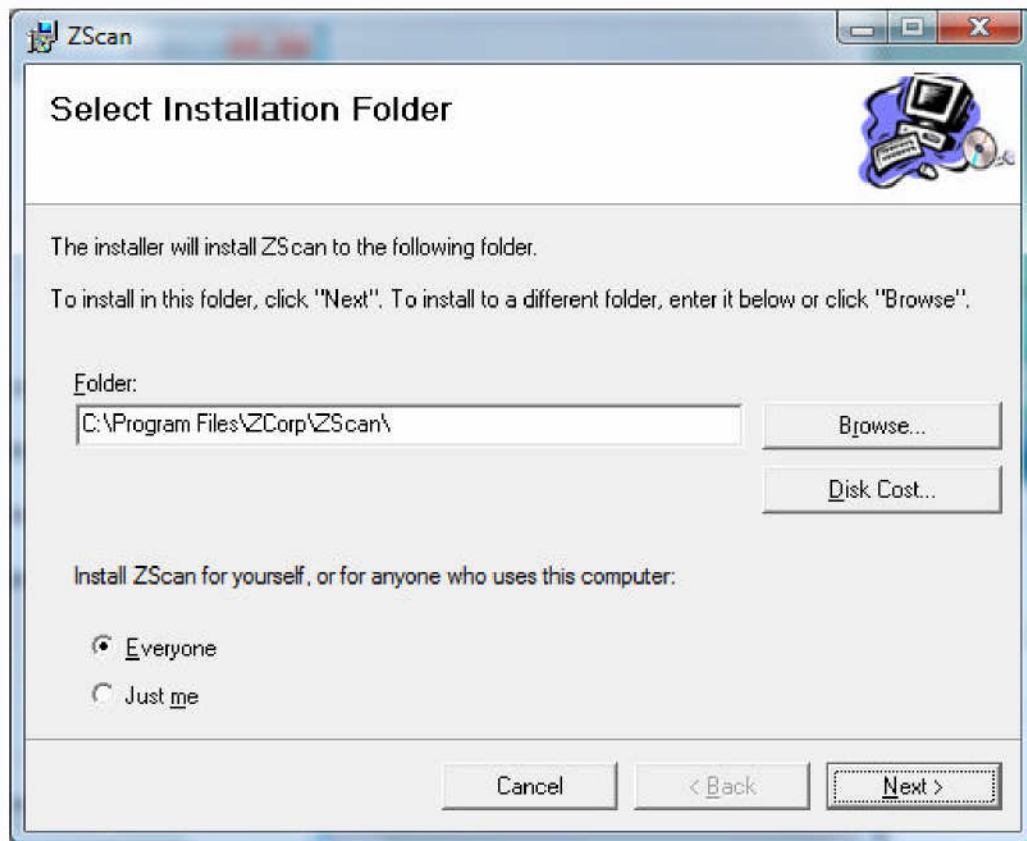


Figure 2.4

Select installation folder with the Browse button. Select in which profile the installation should be done. The "Everyone" option is recommended.

Click "Next" to launch the installation. The application will install all required files in the selected directory. It will also create shortcuts in the start menu of the desktop and install drivers for the ZScanner 700.

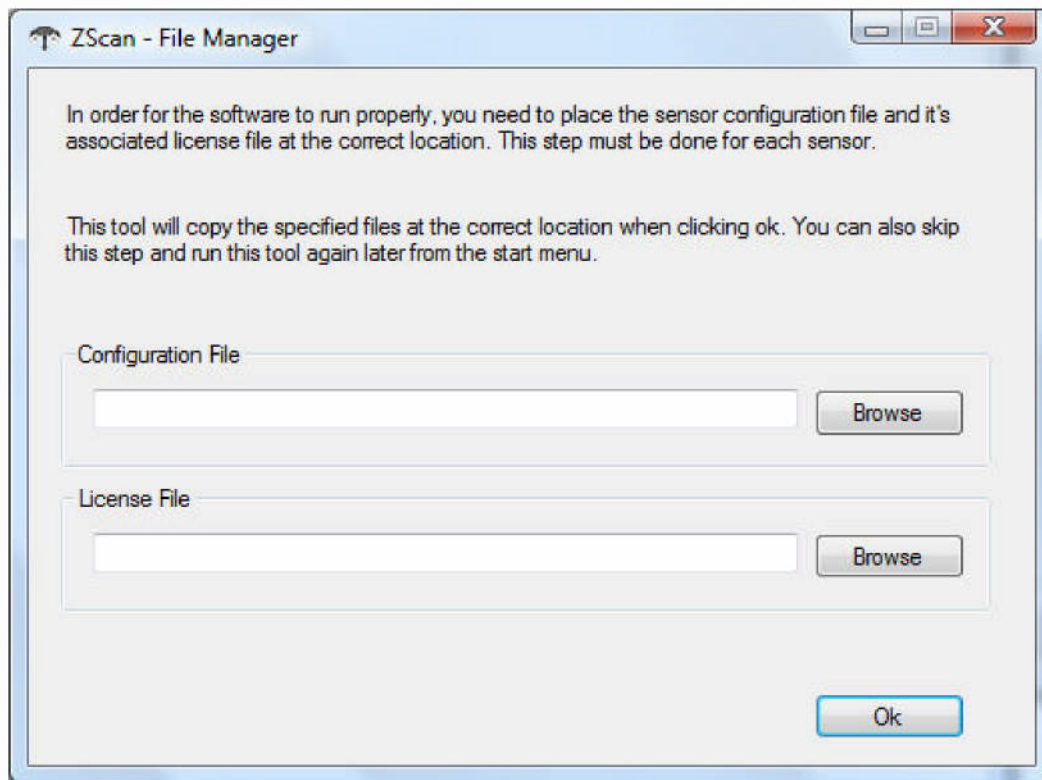


Figure 2.6

The ZScan file manager window will open. You can select the configuration file and the license file.

Every ZScanner 700 sensor has its own configuration file containing the calibration parameters. It also has its own license file which is required to use the device with the ZScan application.

Click "Browse" for each file and choose the correct files for your sensor.

The configuration File is located in the Configuration directory of the ZScan CD-ROM and is called "YourSensorSerialNumber.cst".

The license File will be emailed to an end user contact or to your certified ZScanner dealer and is called "YourSensorSerialNumber.clf".

Click "OK" to install the selected files on your computer.

Click "Close" to complete the installation.

Connect the scanner. Wait for approximately 5 seconds or until the computer emits a sound indicating that the device is connected.

Double-click the ZScan icon on the desktop to launch the application.

License and configuration files update

If the sensor has been recalibrated after maintenance or if a new license has been generated for you, you may have to update your sensor configuration or license files with new ones.

To update your configuration, you can use the ZScan File Manager as described in the installation procedure (Figure 2.6). The File Manager can be launched by clicking on the icon in the start menu.

Administrator's privileges are required to use this tool.

ZScan software removal

The software can be completely removed with the option « Add/Remove Programs » in the Windows Control Panel.

1. Click on Start button - Settings - Control Panel
2. Open the Add/Remove Programs panel.
3. Select Change or Remove Programs and select ZScan in the list. Click the "Remove" button to uninstall the software
4. Follow instructions on the screen.

General Concepts

File Types

.CLF

CLF is the license that makes ZScan functional. A specific license is required for each ZScanner 700 sensor.

.CST

CST file contains configuration data unique to each ZScanner 700 sensor. The file includes calibration parameters and information needed to create a new session.

.CSF

CSF file contains all the data related to a previously saved session such as the scans, the resolution parameters, the deleted facets, etc.

.STL

STL files are used to export facets. This format can be read or processed by most post-treatment software.

.TXT

TXT files are used to save data in ASCII files. The positioning model containing all the positioning features is saved under this format.

.OBC **NEW!**

.OBC files are used to import photogrammetry positioning models acquired with AICON 3D Systems software.

Positioning Features

To position itself in space, the ZScanner 700 sensor uses a positioning model which is a combination of many positioning features. These correspond to the positioning targets that were affixed on the object before scanning. The positioning model can be built before scanning the surface. To do so, select the “Scan Features” mode in the software. It can also be built during data acquisition by selecting the “Scan Surface” mode. While scanning, every positioning targets acquired by the ZScanner 700 will be added to the positioning model. Each positioning targets can be activated, deactivated or deleted from the positioning model. Note that a deactivated positioning target is no longer included in the calculation of the sensor position or orientation.

References

To draw a surface in STL format, the system uses many small triangles. Each triangle is formed by 3 vertices represented in a 3D coordinate system. By default, 3D data are represented in the “sensor reference frame” which is determined from the first sensor position and orientation when you start scanning.

You can change the coordinate system either automatically with the “auto-detected” reference model, or manually by creating another reference with the Reference Building tool. Detailed explanations on how to use this tool will be provided in following sections of this User Guide.

Each reference available in the selected scan can be renamed, deleted or set to be used as the origin of a new reference frame.

Surface and Volume

The Scanning Volume Bounding box can be resized, moved or rotated. The Surface Resolution can also be adjusted according to the level of details you need. Detailed explanations on how to do this will be provided following sections of this User Guide.

Facets, Edition and Multi-resolution

The final output of the scan are the facets which make the STL file. Facets are composed of many triangles. Before saving facets in an STL file, they can be edited to remove some unwanted surfaces, patches or to change the resolution of some parts of the object.

For example, you may want to get a higher resolution on a specific detail of the surface to accentuate its edges. You may also wish to remove an unwanted part of the surface by deleting it.

Deleted facets are moved into the recycle bin and can be restored at a later time.

Main Software Interface Description

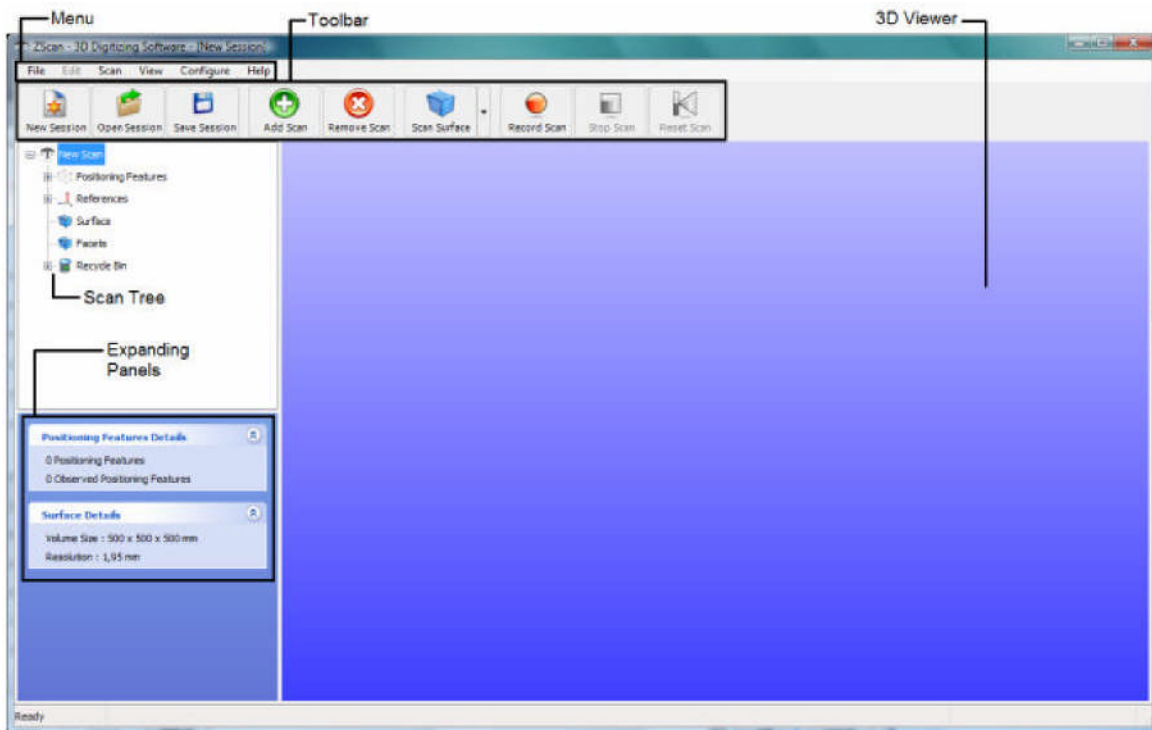


Figure 2.11 - ZScan user interface

Menu

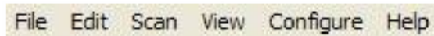


Figure 2.12 - Menu bar

File:

- | | |
|-----------------------------|---|
| • New Session | Start a new session. |
| • Open Session | Open an existing session file (.CSF) |
| • Open Positioning Features | Open existing positioning targets file (.TXT, .OBC) |
| • Save Session | Save current session (.CSF) |
| • Save Facets | Save current facets (.STL) |
| • Save Positioning Features | Save current positioning targets (.TXT) |
| • Quit | Quit the ZScan application. |

Edit: (options will appear only when available)

- Copy Positioning Features Copy features from current to a new scan
- Edit Mode Changes edition mode (Increase/Decrease Resolution, Delete)
- Selection Changes selection mode (rectangle, free form, brush, select through/visible) or Clear selection
- Move Object Activate move object mode when checked
- Build Reference Launch the Add Reference Wizard
- Move Volume Enter Move Volume mode
- Center Volume Automatically centers the part in the volume
- Fit Volume Automatically centers the part and resizes the volume to smallest value containing all the curves
- Edit Facets Enter Edit Facets mode

Scan:

- Add Scan Add a new scan in the active session
- Remove Scan Remove current scan from the session
- Change Scan Mode Selection of scanning mode (surface or Positioning Features)
- Record Scan Start data acquisition
- Reset Scan Clear all data acquired in the current session

View:

- Scan Scan visualization
- Positioning Features Positioning targets visualization
- Surface Surface mode visualization
- Facets Facets mode visualization
- Recycle Bin Bin for deleted facets

Configure:

- Sensor Configuration Sensor configuration according to the color and texture of the object being scanned
- Sensor Calibration Scanner calibration verification
- Diagnostic Mode Key activated diagnostic mode for use by customer support
- Options Options dialogue for ZScan

Help:

- Content Opens ZScan help in Contents tab
- Search Opens ZScan help in Search tab
- Index Opens ZScan help in Index tab
- About Information about the ZScan version

Toolbar

The most frequently used features from the menu are accessible through the toolbar. Available buttons are related to the selected item in the scan tree. Note that the choice of buttons available depends on the selected nodes in the scan tree.

Session and Scan functionalities



New Session

New Session: Start a new session.



Open Session

Open Session: Open an existing session file (.CSF)



Save Session

Save Session: Save the current session (.CSF)



Add Scan

Add Scan: Add a scan to the current session.



Remove Scan

Remove Scan: Remove the current scan from the session.



Scan Surface

Scan Mode: Click on the arrow to select the scan mode. Options: Surface or Positioning Features



Record Scan

Record Scan: Start data acquisition.



Stop Scan

Stop Scan: Stop data acquisition.



Reset Scan

Reset Scan: Reset the current scan.

Positioning Features functionalities



Open Features

Open Features: Open existing positioning targets file (.TXT)



Copy Features

Copy Features: Copies positioning targets to a new scan.



Save Features

Save Features: Save positioning targets in file (.TXT)

References functionalities



Add Reference

Add Reference: Open the Build Reference window to add a user defined axis system to the scan.

Volume functionalities



Move Volume

Move Volume: Move the surface volume bounding box while the object remains stationary.



Center Volume

Center Volume: Centers the bounding box around the object.



NEW! Fit Volume: Centers the bounding box around the scan and resizes it to the smallest possible value that will include all laser

Fit Volume

curves, inside or outside the volume, deleted or not.

Selection functionalities



Move Object

Move Object: When selected, buttons on the mouse are used to move the object in the 3D Viewer.



Rectangle

Selection Mode: When selected, buttons on the mouse are used for selection in the 3D Viewer. Click on the arrow to change selection mode. (Rectangle, Freeform or Brush)



Rectangle: Uses a rectangle for selection.

Freeform: Uses a custom form for the selection.

Brush: A brush is used for selection. 3 sizes of brushes are available: small, medium and large.

**Shift +
Selection**

Shift + C Clears all selection

Unselects the selected facets.

Facets functionalities



Edit: To edit facets

Save Facets: Saves the facets file (.STL)

Delete Facets: Deletes selected facets

Increase Res: Resolution of the selected area is increased.

Decrease Res: Resolution of the selected area is decreased.

Protect Facets from Removal functionalities



Protect: Protects facets from being removed by the Remove Isolated Patches functionality

Unprotect: Unprotects facets from being removed by the Remove Isolated Patches functionality

TIP: Buttons visibility is based on the selected node in the scan tree. Buttons for positioning features functionalities, references, surfaces or facets functionalities will be visible only when their corresponding tree node is selected. See the following section (Scan Tree) for details.

Scan tree

Visually shows functions of the « View » menu: -

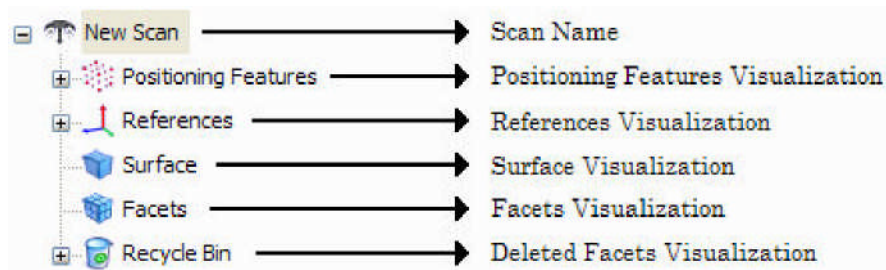


Figure 2.13 - Tree view

New scan

- Root node that regroups every components of the current scan.
- Allows naming or renaming of the scan.
- When selected, each node will be displayed in the 3D viewer.
- When selected, each node's details will be displayed in the expanding panel.

Positioning Features

- Node containing all positioning features in the current positioning model. Each target can be selected, activated, deactivated or deleted.
- When selected, positioning features and their related buttons can be activated in the toolbar.
- When selected, positioning features will be displayed in the 3D viewer.
- When selected, positioning features details will be displayed in the expanding panel.

References

- Node that contains all references in the current scan. Each reference can be renamed, removed or set as the origin of a new reference frame.
- When selected, the "Build Reference" button will be activated in the toolbar.
- When selected, references and facets will be displayed in the 3D Viewer.
- When selected, references details will be displayed in the expanding panel.

Surface

- When selected, the surface is displayed in the 3D Viewer. The surface is a representation of the object being scanned from a specific view points, this is not the final result of the scan.
- When selected, volume operation buttons are activated in the toolbar.
- When selected, surface details and parameters will be displayed in the expanding panel.

Facets

- When selected, the facets are displayed in the 3d Viewer. The facets are the final result of the scan. They are the final STL.
- When selected, facets operation buttons are activated in the toolbar.
- When selected, facets details are displayed in the expanding panel.

Recycle Bin

- Node that contains all deleted facets patch for the current scan. Each patch can be selected and restored in the active facets.
- When selected, deleted patch will be displayed in the 3D viewer.
- When selected, recycle bin details will be displayed in the expanding panel.

Expanding Panel

This expanding panel will be shown when the Positioning Features root node is selected in the tree. It contains general information about the positioning model.

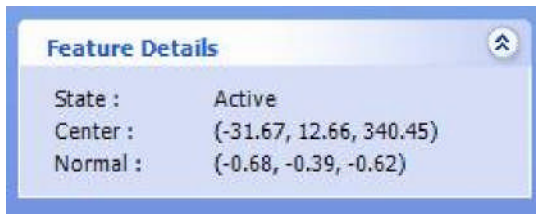
Positioning Features Details



This expanding panel will be shown when the Positioning Features root node is selected in the tree. Optimize Positioning Model will work on the whole model to optimize features positions and reduce deviation.

Figure 2.14 - Positioning features details

Feature Details



This expanding panel will be shown when a specific positioning feature node is selected in the tree. It contains detailed information about the selected positioning feature.

Figure 2.15 - Features details

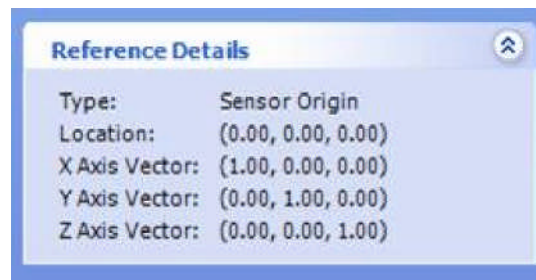
References Details



This expanding panel will be shown when the References root node is selected in the tree. It contains general information about the references.

Figure 2.16 - References details

Reference Details



This expanding panel will be shown when a specific reference node is selected in the tree. It contains detailed information about the selected reference.

Figure 2.17 - References details

Surface Details and Parameters

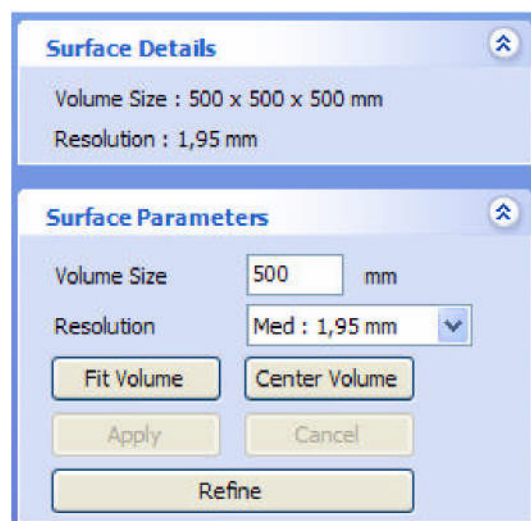


Figure 2.18 - Surface details and parameters

The Surface Details and Surface Parameters expanding panels will be shown when the surface node is selected in the tree. The Surface Details expanding panel contains a summary of the surface reconstruction settings such as the volume size and the resolution.

The Surface Parameters expanding panel allows you to adjust surface reconstruction settings according to your needs. Here, the volume size and resolution level can be changed.

In ZScan 1.3, you do not have to rebuild every time you change a setting. A live preview will appear as you change parameters, click Apply or Refine to apply changes. NEW!

Surface Details and Parameters (continued)

Note that changing the volume size has a direct impact on the resolution level. Click Apply to confirm the setting or Cancel to restore previous settings. See the [Toolbar Section](#) to find more information about the Fit and Center Volume options.

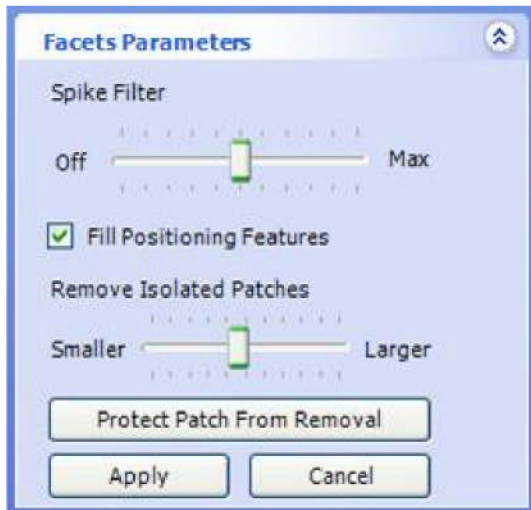
Refine The refine button will use the neighboring laser curves and look for inconsistent data to try to remove it. The surface will then be rebuilt with the new parameters.

Figure 2.18 - Surface details and parameters

TIP: Higher resolution does not necessary means better results. Planes surfaces could be noisier as more unwanted part imperfections could be caught. It is highly recommended in most cases to scan in medium resolution and use the increase resolution functionality to increase the resolution locally where needed.

Facets details and parameters

The Facets Details and Facets Parameters expanding panels will be shown when the facets node is selected in the tree.



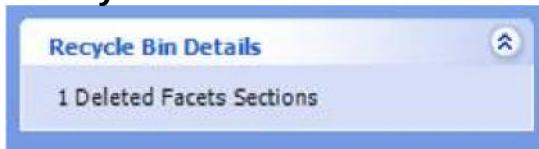
The Facets Details expanding panel contains general information about the facets.

The Facets Parameters expanding panel contains facets construction settings such as the spike filter level and the option to fill holes created by the positioning features on the object.

Remove Isolated Patches allows the user to automatically remove isolated patches. Protect Patch From Removal allows the user to keep small patches from being removed.

Figure 2.19 - Facets details and parameters

Recycle Bin Details



This expanding panel will be shown when the Recycle Bin root node is selected in the tree. It contains general information about the deleted facets.

Figure 2.20 - Recycle bin details

Deleted Facets Details



This expanding panel will be shown when a specific deleted section is selected in the tree. It contains detailed information about the selected facets section.

Figure 2.21 - Deleted facets details

3D viewer controls

Depending on the mode selected on the Viewer, some mouse buttons will behave differently.

Left button:

- | | |
|---------------------|---|
| • Move Object Mode: | Click and hold this button to rotate the object. |
| • Selection Mode: | Click and hold this button to draw a selection box. |
| • Move Volume Mode: | Click and hold to rotate the volume bounding box. |

Mouse wheel:

Scroll up or down to zoom in or out.

- | | |
|---------------------|--|
| • Move Object Mode: | Click and hold the wheel button to translate the object. |
| • Move Volume Mode: | Click and hold the wheel button to translate the object. |

Right button:

Click this button to display a context menu containing display options.

Left + Right buttons:

- | | |
|--------------------|--|
| • Move Object Mode | Click both buttons to rotate the object on the optical axis of the current view point. |
|--------------------|--|

- Move Volume Mode

Click both buttons to rotate the volume on the optical axis of the current view point.

Edition Mode Shortcuts **NEW!**

- Shift + Selection Unselects the selected area
- Shift + C Clears all selections
- Ctrl + Left mouse button Enable Move Object instead of the selection while in selection mode. Selection mode is reactivated when released.

TIP: When in Move Volume mode, hold down the Ctrl key on the keyboard to use the mouse to move the object instead of the volume

Status Bar

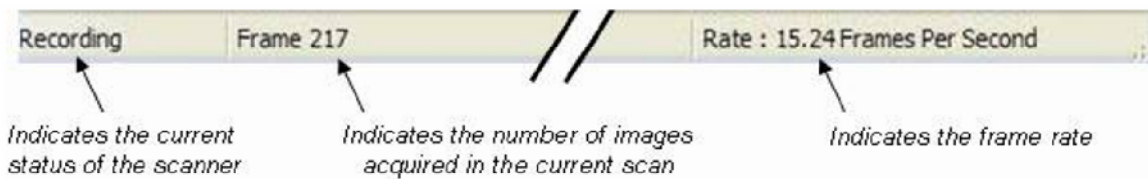


Figure 2.22 - Status bar

Sensor Configuration

This tool is used to configure sensor's laser power and the cameras shutter time according to the type of surface you wish to scan.

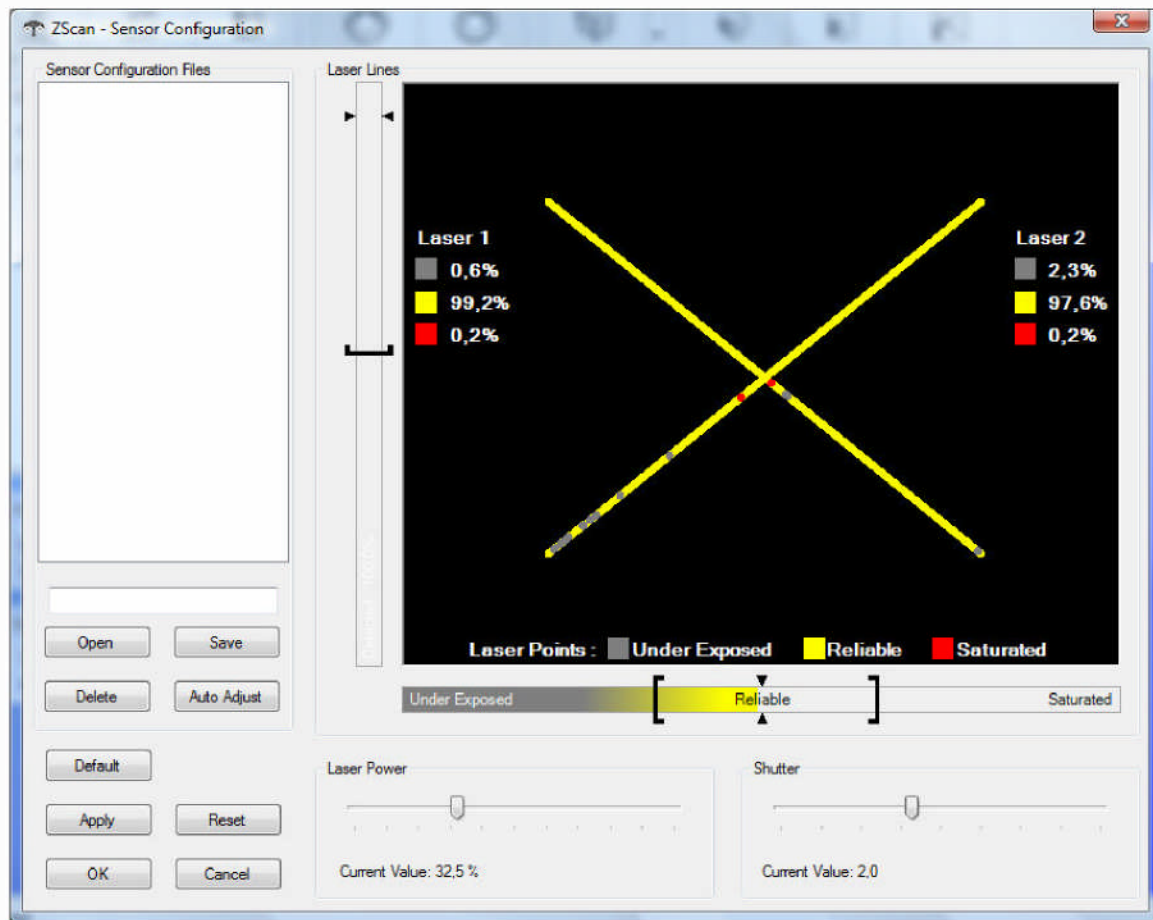


Figure 2.23 - Sensor configuration window

To configure the sensor correctly, the parameters should be set to have a majority of detected laser points included in the reliable zone. This step can be done manually by moving the sliders at the bottom of the screen or automatically by clicking on the Auto Adjust button.

Note: In cases where there is too many under exposed points, the laser traces are not detected correctly. On the other hand, in cases where there is too many saturated points, the laser traces detection is not as precise.

Sensor parameters can be saved and restored later with the control buttons at the bottom left of the screen.

Sensor Calibration

This tool is used to verify and optimize sensor calibration.

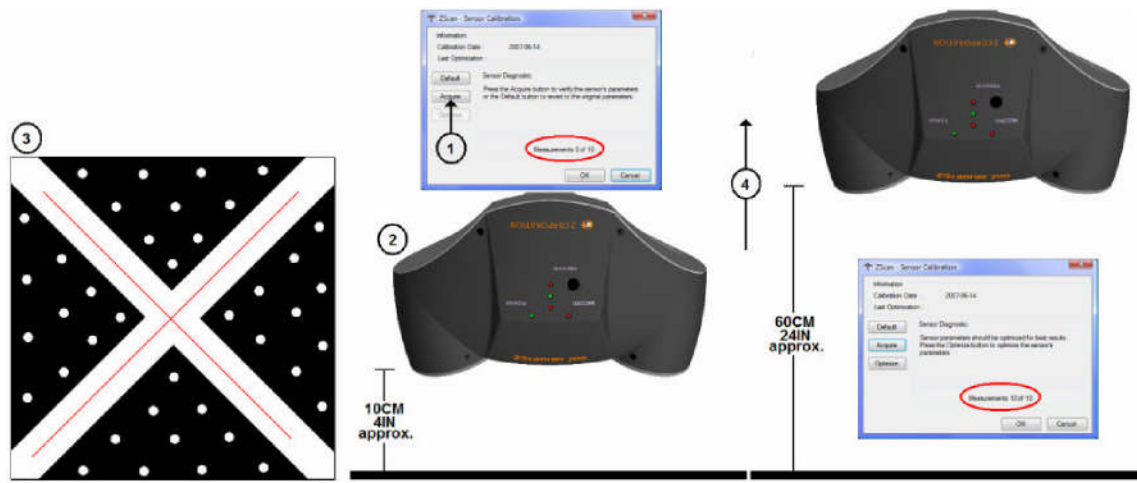


Figure 2.24 - Sensor calibration

To complete the optimization process, follow this procedure:

Press the Acquire button to activate the sensor

Lay the calibration plate on a stable plane surface. Position the scanner at approximately 10 cm (4 in) from the calibration plate

Use the Preview button on the ZScanner 700 to position the laser cross in the white cross of the calibration plate

Press the trigger and move the scanner slowly away from the plate to an approximate distance of 60 cm (24 in) or until the 10 measurements are taken. Make sure that the laser's cross-hair stays in the white cross of the calibration plate.

Follow recommendations displayed in the Sensor Diagnostic area.

NEW! In ZScan 1.3, more information is available in that window. It is now possible to see your factory calibration date as well as last optimization date. Please note that to be able to see your factory calibration date; your scanner must have been calibrated after the ZScan 1.3 release date.

TIP: Press the Default button to reset the sensor calibration to its factory settings. Use this functionality only if the optimization process fails to give valid results.

Build Reference

This tool is used to manually build a new reference that could be used as the origin of the new reference frame for the facets.

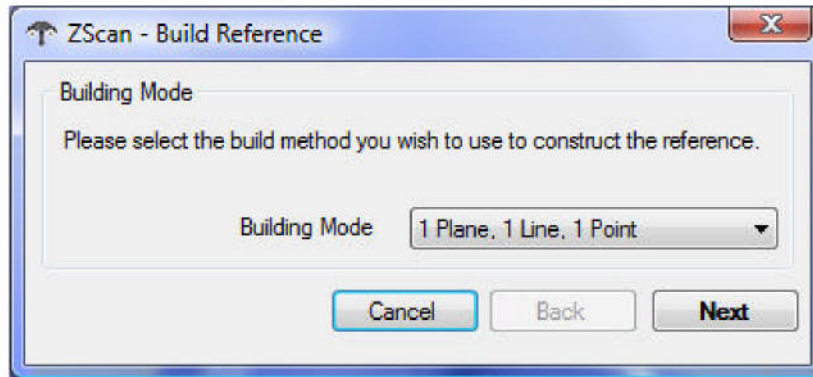


Figure 2.25 - Build reference window

You can choose between 5 building modes:

- Duplicate Reference: Create a new reference from an existing one.
- 3 Planes: Create a reference by specifying positioning features from 3 planes that will define the axes of the coordinate system.
- 1 Plane, 1 Line, 1 Point: Create a reference by specifying positioning features on base plane, on a reference line and a reference point.
- 3 Positioning targets: Create a reference by specifying the position of three targets.
- 3 References: Create a reference with 3 other pre-defined references.

NEW! In ZScan 1.3, it is now possible to rotate generated references around the axes.

TIP: Follow the displayed instructions carefully to complete the reference building procedure correctly.

Scanning procedures

Object preparation

Applying targets

It is essential to prepare the object prior to scanning. Reflective targets must be affixed randomly on the object with a minimal distance of 20 mm (0.75 in) between them. For flat surfaces or with a slight curvature, the distance between each target can reach 100 mm (4 in). Those targets will enable the system to position itself in space. Positioning targets must be applied on plane surfaces keeping at least 12 mm from the edges on every side.

Here is an example of proper target distribution.

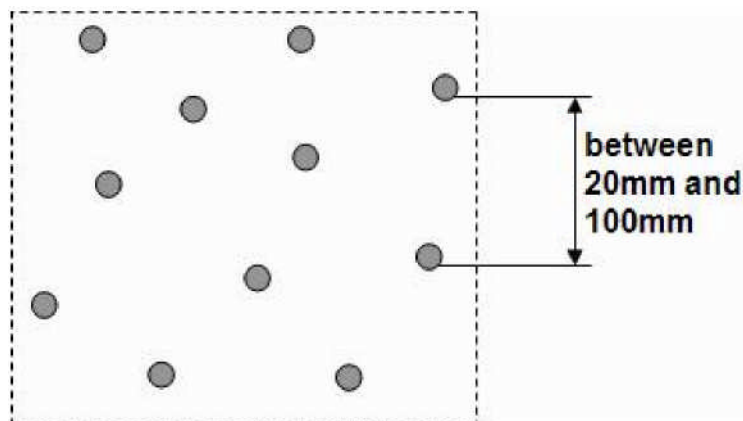
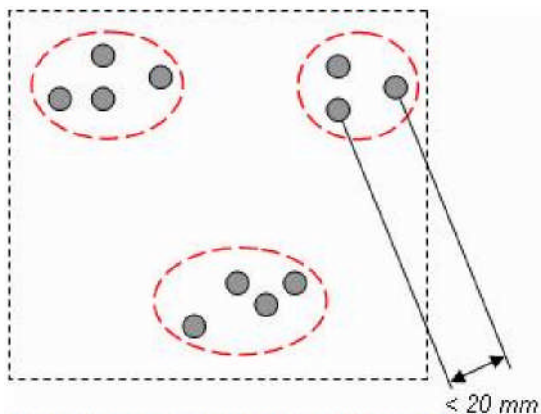
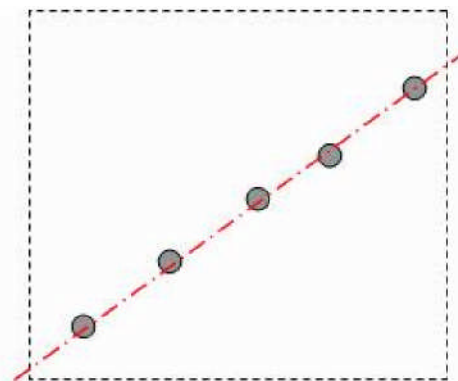


Figure 3.1 - Proper target distribution



Avoid a compact distribution of the targets with a short distance between them.



Avoid aligned and regular distribution of the targets

Figure 3.2 - Improper targets distributions

TIP: For better digitization, any object that is shiny, black, transparent or reflective, (mirrored, glossy or metallic surface) might need to be covered with a white powder in order to give it a matte finish.

TIP: Proper target distribution may be difficult to obtain in some cases such as small surfaces (small objects). It is then suggested to distribute the targets on a plane (preferably black/dark and matte) and place the object on this plane, often referred to as a target pad.

Reference targets

It is now possible to use special reference targets on the part to insert references recognized automatically by ZScan. These reference targets can be bought from your local reseller in many models to create multiple references in the same scan.

To use them, simply acquire the targets on it. When the acquisition stops, ZScan will recognize it and automatically insert a new reference at that point. This new reference can be used as the origin of the scan. Many of them can be used to reference multi-scans projects. Three of them can be used to create a new reference from known points. More information on these items is also available from method sheets on our website via the customer portal.

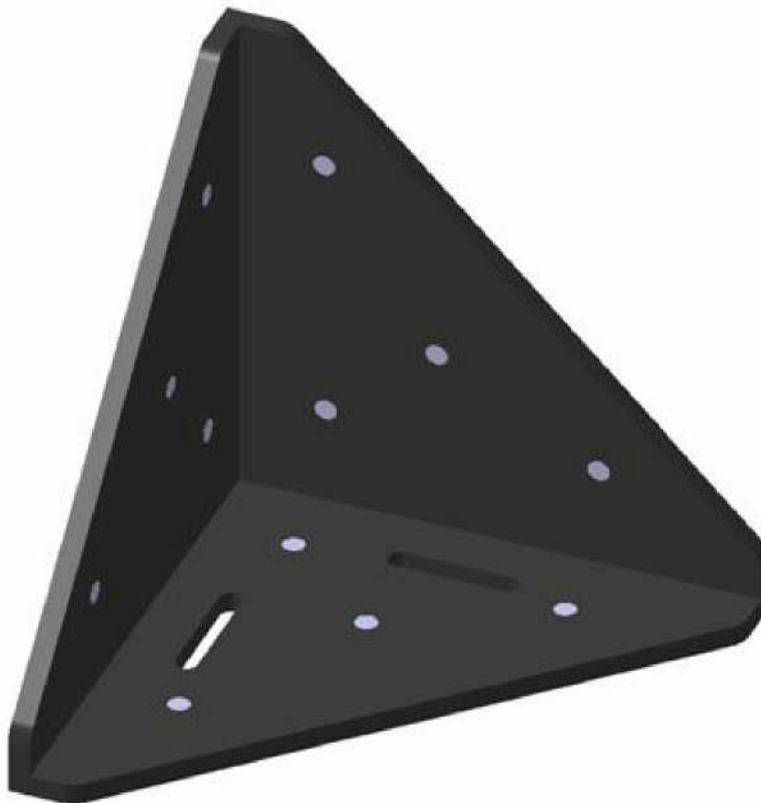


Figure 3.3 – Reference target

Starting the Software

- Connect the scanner to the system as explained in section 2.2.
- To start, launch the ZScan application by clicking on the ZScan icon on the desktop or from the start menu.



The scanner must be connected to the computer prior to launching ZScan

TIP: You can rename the current scan from “New Scan” to the name you want by clicking on it.

Adjusting the surface settings

In the Menu click View - Surface or click on the surface node in the tree. The following expanding panels will be displayed.

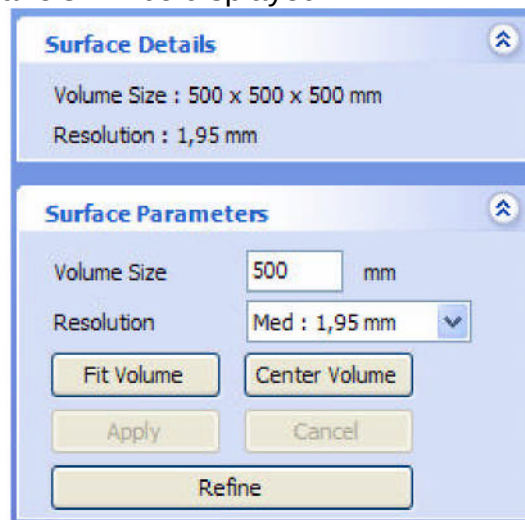


Figure 3.4 - Surface mode expanding panel

NEW! In ZScan 1.3, you do not have to rebuild every time you change a setting. A live preview will appear as you change parameters, click apply or refine to apply changes.

Surface Details

Displays a summary of the current settings: dimensions of the volume bounding box and the current resolution.

Surface Parameters

- Adjusts the volume of the digitizing box according to the object size.
- The resolution setting depends on the volume of the Bounding Box set previously. However, it is possible to choose from 3 levels of resolutions: High, Medium and Low.
- Click on Apply to confirm the setting.

More information on the Fit and Center Volume is available in the section on Volume Functionalities on page 24 of this User Guide.

TIP: It is possible to change the settings following the completion of the scanning. Click Apply to confirm.

Configuring the sensor

Configure the laser power and the cameras integration time according to the digitizing conditions (object nature, light, color, texture...)

In the Menu, click Configure - Sensor

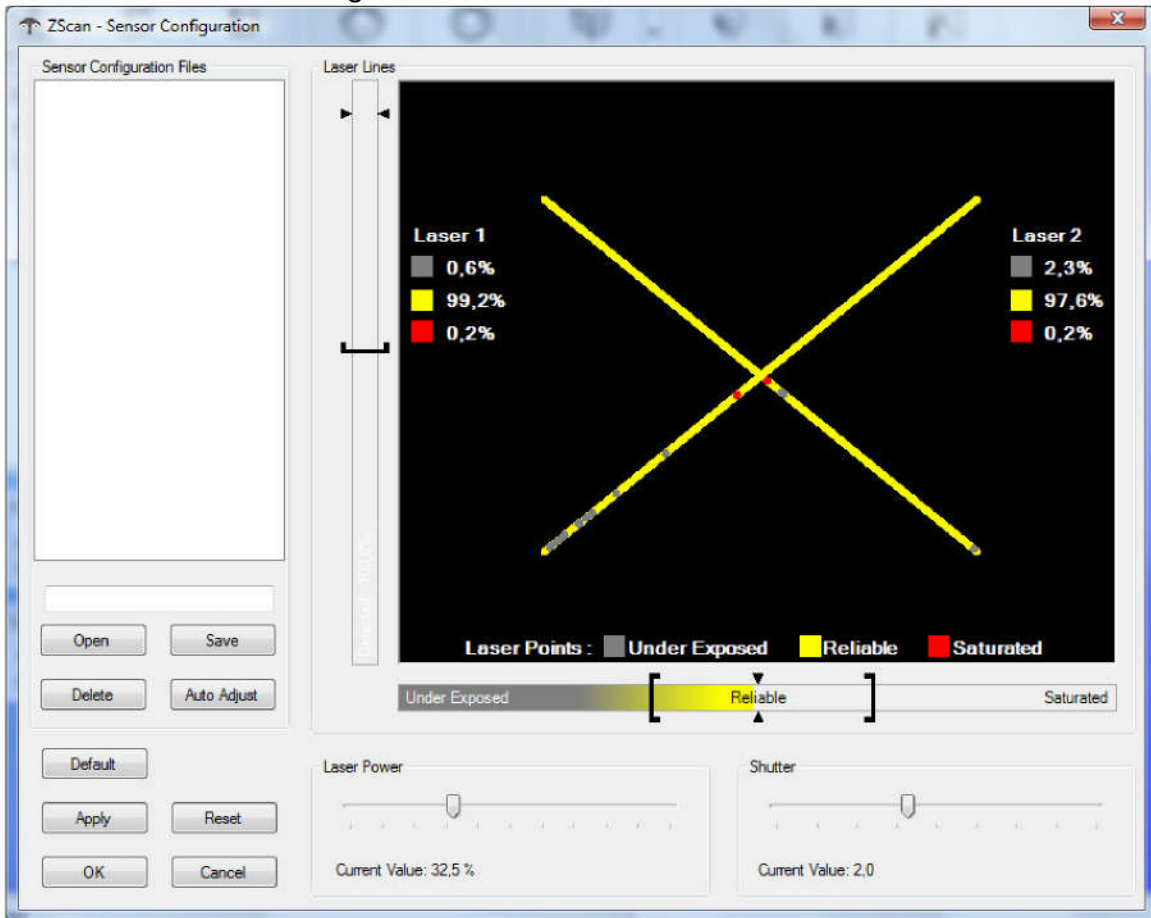


Figure 3.5 - Sensor configuration window

Two settings modes are possible: manual and automatic.

In manual mode, trigger towards the surface to be digitized in order to adjust the settings of the laser power and integration time. Colors will describe the exposure state.

Grey: underexposed

Yellow: OK

Red: overexposed

In automatic mode, click on Auto Adjust and trigger towards the surface.

Click Apply and then Ok to confirm settings.

TIP: Darker surfaces will need more laser power and/or longer shutter time. However, longer shutter time will catch more noise. It is recommended to increase laser power first and increase shutter time afterward if needed to catch very dark surfaces. The object can be moved during digitizing without altering data acquisition as long as the reflective targets are affixed on the object.

Importing positioning targets **NEW!**

It is possible to import previously acquired positioning model in ZScan. From the 1.2 version, it will now be possible to import positioning features acquired by the ZScanner 700 or by a photogrammetry system. Please note that **ONLY ZScanner 700 TARGETS CAN BE RECOGNIZED**. Any other type of reflective target will not be usable in ZScan. Files to be imported must be composed of three columns (X Y Z) separated with a SPACE. The three columns represent the center of the target.

Imported targets will then appear as spheres as ZScan cannot know in which direction they are. He will use the center to recognize the patterns and add the normal when scanning.

Acquiring data



To start the scan, click scan - Record Scan or click on **Record Scan** in the toolbar.

- Take the ZScanner 700 in one hand and position at about 300 mm (12 in) away from the object.
- To have the laser cross displayed on the object at any time, press the preview button on the ZScanner 700 (see figure 1.1)
- To launch the scan, press the trigger button on the ZScanner 700 (see figure 1.1) Sweep the object surface while holding down the trigger button.

TIP: The quality of the results will be directly influenced by the number of times and the speed with which the surface is swept. The more you sweep the surface, the more accurate the results will be.

Proper digitizing distance

The Distance meter

While digitizing an object, a meter displayed on the screen illustrates the distance between the scanner and the object. This meter is also represented on the scanner by 3 LED lights located on the top of the ZScanner 700 (red, green, red). See pictures below for visual description.



Figure 3.6 - Graphic and physical representation of the scanner too close to the surface



Figure 3.7 - Graphic and physical representation of the scanner with a proper distance



Figure 3.8 - Graphic and physical representation of the scanner too far from the surface

TIP: When the scanner is too close to or too far from the surface, it loses tracking. This means that the cameras can no longer position the targets or that the target distribution is improper. If tracking is lost, reposition the scanner in front of a surface already scanned and trigger again or try to redistribute the targets on the surface differently.

Any dysfunction of the ZScanner 700 is identified by 2 red LEDS on the top of the scanner.

TIP: When the scanner is too close or too far from the surface, it loses tracking. This means that the cameras can no longer position the targets or that the target distribution is improper. If tracking is lost, reposition the scanner in front of a surface that has been scanned and squeeze the trigger again, or you may need to redistribute the targets on the surface differently.

Any dysfunction of the ZScanner 700 is identified by illumination of the 2 red distance LEDS on the top of the scanner.



Editing the scan

To delete a part of the scanned object, set ZScan to Facets mode. In the Menu, View - Facets or click on Facets in the tree. Set the Edition Mode by clicking the Edit Facets button and choose a selection mode.

More information on the selection tools and possible operations on the facets can be obtained in the [Toolbar](#) and [Expanding Panels](#) sections.

The deleted facets are placed in the recycle bin which can be selected in the tree by clicking on the Recycle Bin button in the menu tree.

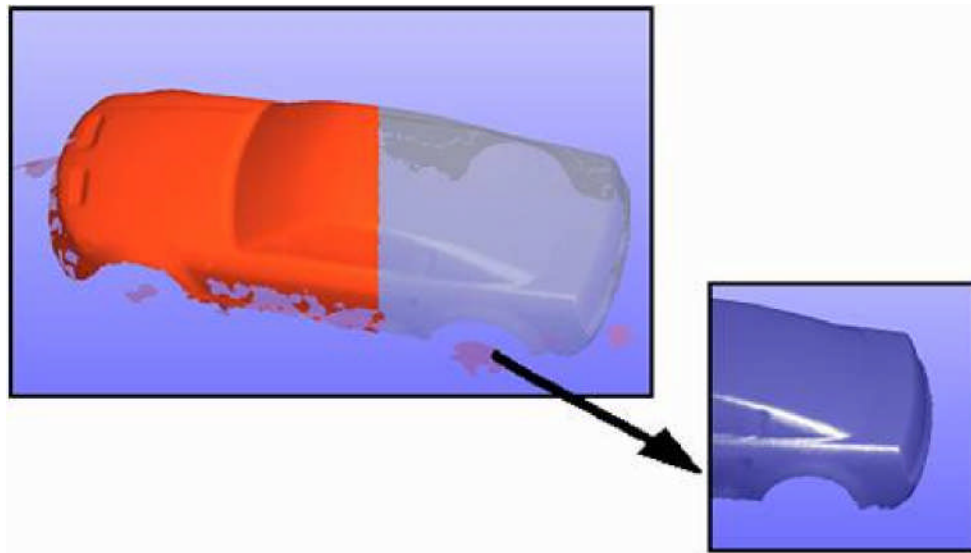


Figure 3.9 - Deleted facets

Saving your work

Use the “Save session” option to save your entire session for editing in ZScan. This is the most complete save as everything can be restored later and the scan can be continued.

Use “Save Facets” to export a file for use with post-treatment software. Only the facets will be exported. Exportation can be done in STL files (ASCII or BINARY) or the points (extremities of surface triangles)

Use “Save Positioning Features” to save your positioning model for later importation. Note that imported positioning features will be static and will not readjust their position while scanning. You will not get results from the “Optimize Positioning Model” in this case.

TIP: It is recommended to save the STL first, then the session, then the features.

Troubleshooting

You can use the Troubleshooter to help you find a solution. Also, please check the ZScanner 700 User website for additional support.

[I get the following message when I start ZScan: "The scanner is disconnected. Scan functions will be unavailable."](#)

[I get a "No Configuration File found" message when starting ZScan.](#)

[I receive an error message while scanning telling me that an internal error has occurred.](#)

[ZScan is giving a "License Expired" message and refuses to scan.](#)

[My surface doesn't appear completely when in facets view.](#)

[Some holes appear when I increase resolution.](#)

[I checked the option to install the plug-in for Geomagic but there is nothing under plug-in in Geomagic.](#)

[I have some problems hooking my ZScanner 700 to targets, it loses its position I have some difficulties scanning more dark surfaces or parts of the surface. I am not able to scan small parts.](#)

[Where can I find more information about my product?](#)

[I had a "Out of memory" error and now there is no surface or facets in my session.](#)

[I am experiencing slow frame rates when scanning.](#)

[I am experiencing display problems when using ZScan.](#)

[My scanner refuses to calibrate.](#)

[The "Power" LED on the scanner does not turn on even when I connect it.](#)

[I can't see the "3D Imaging Devices in Windows Device Manager.](#)

[How can I contact you if I can't find solution to my problem?](#)

I get the following message when I start ZScan: "The scanner is disconnected. Scan functions will be unavailable."

There is no scanner connected to your computer or there is no valid configuration file for this scanner installed on the computer. Make sure that your Configuration File is installed properly (see the ["No Configuration File found"](#) help item). Once this procedure is completed, see the Connection Troubleshooter if the problem is still there.

I get a "No Configuration File found" message when starting ZScan.

Your configuration file is not present or corrupted. Please download a fresh copy of your latest Configuration File and use ZScan File Manager to import it properly. Make sure that a file name YouSensorSerialNumber.cst is present in the following folder: [\\YourZScanInstallationPath\Configuration\](#). Don't hesitate to contact us if you feel that the license on the extranet was not updated properly.

I receive an error message while scanning telling me that an internal error has occurred.

There is a high probability that this error message was triggered by a connection problem. Please see the Connection Troubleshooter.

ZScan is giving a “License Expired” message and refuses to scan.

Your ZScan license is expired. Most of our systems are shipped with 90 days licenses by default. Use ZScan File Manager to import your new license. Make sure that a file name YouSensorSerialNumber.clf is present in the following folder: [\\YourZScanInstallationPath\License\](#).

My surface doesn’t appear completely when in facets view.

The part you are scanning may be too large or not centered in the scanning space. Make sure your scan is properly positioned using the functions available in “Surface” view.

Some holes appear when I increase resolution.

Increasing resolution requires more data. Holes can be created if there is not enough data to reconstruct surface at this resolution.

I checked the option to install the plug-in for Geomagic but there is nothing under plug-in in Geomagic.

Make sure that you chose the right plug-in for your version of Geomagic and that you can find the file ZScanGeomagic“X”PlugIn.dll where “X” should be your version of Geomagic.

I have some problems hooking my ZScanner 700 to targets, it loses its position

Please make sure that you use the calibration tool to optimize your calibration, this should be done before starting to scan every time you use it.

I have some difficulties scanning more dark surfaces or parts of the surface.

It is very important to go adjust the laser power and shutter time for each surface that has to be scanned. Refer to section 3.3.

I am not able to scan small parts.

Smaller parts require more data. Contrast is very important for the scanner to detect what to scan and what not to scan. If it doesn’t seem to catch the surface, try using a background that is the same color as the part you are trying to scan.

I had a “Out of memory” error and now there is no surface or facets in my session.

Your data was not lost in the process. The new memory manager will inform you that it is out of memory and was not able to rebuild the surface/facets. You can set your resolution to a lower level and try to rebuild the surface. If this does not

work for any reason, set the resolution to low, save your session, restart ZScan and try to open it.

I am experiencing slow frame rates when scanning.

I am experiencing display problems when using ZScan.

ZScan requires high system performances. Please make sure that you are not running your laptop computer on battery power and that you are any possible power saving options in the computer and video card settings are turned off or configured for maximum performance.

Windows Vista Users

ZScan 3D display is using the OpenGL technology. In Windows Vista, Microsoft does not natively support that technology. Video cards manufacturer are now responsible for the OpenGL support. Drivers are at an early stage and major video card manufacturers are still reporting problems under Vista.

Latest available Windows Vista drivers for the laptops sold with our systems are available for download on our website for customers under maintenance. Please install those drivers if you are using our laptops under Vista to ensure best possible performances.

My scanner refuses to calibrate.

First, make sure that you are scanning your calibration plate properly. You can also check for any reflective object as far as 2 feet around the plate on each side. You can also try to "Reset" your Configuration File by using the Default button in the [Calibration Window](#).

The "Power" LED on the scanner does not turn on even when I connect it.

First, make sure that the power supply is connected properly in the power source and in the PCMCIA card. If the LED still does not turn on, check for any damage on the power supply connectors and wires. You can also check your Fire Wire cable for any connection problem.

I can't see the "3D Imaging Devices in Windows Device Manager.

This may be a connection problem with your scanner. Please check every link of the connection chain and make sure it is well connected. If possible, try isolating the portion of the link that seems problematic. Contact customer support with all this information and your scanner's serial number.
