

Eden260 3-D Printer System



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Using This Guide

This user guide provides instructions for installing, operating and maintaining Eden260 3-D printing systems. It explains how to use features, and provides practical examples to guide you as you use the system.

The text and figures in this guide are based on Eden260 version 26.0.0.2 and Objet Studio version 8.0.1.3.

This guide assumes that:

- all the hardware, software, and network components of your Eden system are installed, configured, and operating correctly.
- the operator has a working knowledge of the Windows® PC platform.

For More Information

Visit <http://www.2objet.com/> for more details about Objet's technology, products and consumables, and for service and support contacts.

For other documents that relate to Eden260 3-D printing systems, and for this document in other languages, contact your regional Objet Customer Support office.

If you have any questions about the information presented in this document, or if you have any comments or suggestions for future editions, please send a message to support@2objet.com.

Terms Used in This Guide

Eden printer	The Eden260 3-D printer referred to in this guide.
resin	The base substance from which photopolymer materials are made for use in Eden printers. In Objet and Eden software, “resin” refers to cartridges of model and support materials.
model material	Material used for building models.
support material	Material used for supporting the structure of models during production.
STL	The file type used with Objet software. (For more information, see page 3-3.)
SLC	The file type used with Objet software. (These files are bitmaps of individual slices of the object. For more information, see page 3-3.)
OTF (Objet Tray Format)	The file type containing all of the information needed for a model-building job on Objet 3-D printers.
host/server workstation	The workstation on which the full version of Job Manager is installed. This workstation interfaces directly with the Eden printer and is typically positioned next to it.
client/user workstation	The workstation on which Objet software is installed, used for preparing build trays for production on Eden printers. (There is no limit to the number of client workstations in the local network.)
Eden computer	The computer inside the Eden printer that operates it. (This is sometimes referred to as the “embedded” computer.)
Objet Studio	The software with which users prepare jobs for producing models.
Job Manager	The software that manages production jobs before they are sent to the Eden printer.
Eden software	Software running on the computer inside the Eden printer that controls all printer operations.
Eden printer interface	The GUI (graphical user interface) used for controlling the Eden printer.
build tray	<p><i>In Objet Studio:</i> The surface displayed on the screen that represents the actual build tray in the Eden printer.</p> <p><i>In the Eden printer:</i> The surface upon which models are produced.</p>

Safety

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Safety Features

Eden260 3-D printers are designed and manufactured to comply with CE and FCC standards. It is equipped with the following safety features:

Cover lock

The cover is locked while the printer is working. It is released when the printer reverts to *pause* or *stop* mode.



WARNING: Do not defeat the safety lock. Doing so could result in serious personal injury. If the safety lock does not function correctly, contact your service provider.

Cover interlock switch

The internal AC power supply (to the UV lamp, motion motors and the tray heater) is turned off when the cover is opened.



WARNING: Do not defeat the interlock switch. Doing so could result in serious personal injury. If the interlock does not function correctly, contact your service provider.

UV screen

The transparent section of the cover blocks harmful UV radiation, allowing the operator to view the model as it is being made.

Circuit breaker

The main power supply is turned off by an internal switch in case of an electrical malfunction.

Grounded chassis






The frame and chassis of the printer are grounded to prevent electrical shock.



If the Eden system is not used as specified in this guide, the safety features may not provide adequate protection.

Symbols and Warnings

This following table lists the warning labels located on or in Eden printers.

Warning Symbol	Meaning	Location	Comments
	Hazard (general)	The main label on the back of the printer.	Caution.
	Hot surface	Near head block.	Risk of burns. Do not touch this surface when hot.
	High voltage	Near UV lamp connectors, on the rear, left and right covers of the UV enclosure.	Risk of electric shock.
	Ultra Violet radiation	Near UV lamp	Risk of injury from ultraviolet radiation. Always use protective eyewear during operation.
	Moving parts	Near tray Near UV power supply	Risk of injury from moving parts.

Safety Guidelines

The following general guidelines, together with the instructions provided throughout this user guide, ensure user safety while operating and maintaining the Eden260 system. If the system is not operated as specified, the user's safety may be compromised.

Eden Printer

- Installation and removal of the Eden printer should only be done by qualified service personnel.
- The Eden printer should only be operated by persons trained by an Objet customer-support representative.
- Service operations should be performed only by personnel who have been instructed in relevant safety precautions.
- All personnel operating or maintaining the Eden printer should know the location of first aid and emergency equipment and how to use it. Never block access to this equipment.
- Never attempt to open the main cover of the printer while it is working.
- Never bypass the interlock safety switch.
- If the interlock safety switch ever fails, or if servicing is ever necessary while the main cover is open, never stare directly at the UV lamp without glasses that screen out UV radiation. For this purpose, ordinary sunglasses with UV screening are adequate.
- Never connect the power plug to a socket that does not have a ground (earth) wire, and never disconnect the ground. Doing so may expose the operator to serious danger from electric shock.
- The power cable should be connected at an easily accessible electric socket near the printer.
- Never insert screwdrivers, wires, or other objects into the power supply housing.
- Leave a minimum of 15 centimeters between ventilation openings and walls or other objects.
- Several parts of the printer remain extremely hot even after it has stopped operating. Avoid touching the main power supply, the UV-lamp power supply, UV lamps, and the printing heads.
- Notify co-workers and those who have access to the Eden system before beginning non-routine and hazardous work.
- Report any potential dangers and safety-related accidents to your safety officer or to other appropriate authorities.

Model and Support Material

Model and support materials are made of resins. Although precautions must be taken when handling resins directly, all model and support materials used by the Eden system are handled in sealed cartridges. Normally, operators of the Eden printer should never be directly exposed to dangerous materials. Most of the following recommendations for handling resins apply to the unlikely event of a leak or spill. If this should occur, follow the specific instructions printed on the resin cartridge used.

- Resins are flammable. Store cartridges of model and support materials indoors, in a dry area with adequate ventilation, between 16-27 degrees Celsius (60-81 degrees Fahrenheit). Never expose them to flames, heat or sparks.
- Keep resins away from areas where food and drink are stored, prepared and consumed.
- Uncured resin is toxic. Ensure that resin does not come in contact with the eyes. If there is any chance that resin may splash into the eyes, wear safety goggles. Minimize direct contact with the skin to prevent irritation and other health hazards. Prolonged contact may cause burns.
- To prevent respiratory irritation, ventilate all areas where resins are directly handled or exposed to the air. The ventilation system should totally replace the air 20 times per hour.
- Clean resin spills with disposable towels or other absorbent, non-reusable material, such as sawdust or activated charcoal. Rinse the spill area with denatured or isopropyl alcohol (IPA), followed by soap and water. Dispose of the absorbent material in accordance with local regulations.
- Do not wash contaminated clothing at home; clothing should be professionally laundered.
- Dispose of contaminated shoes, belts and other leather items. Absorbed resin may re-expose the user when these items are worn again.

First Aid for Working With Resins

In general, try to avoid direct contact with uncured resin. If skin or eyes comes into contact with resin, wash the area immediately and thoroughly with water, and follow the first-aid instructions below.

Contact with Skin

If uncured resin comes in contact with skin, wash the affected area immediately and thoroughly with soap and cool water, then remove contaminated clothing. Pay particular attention to flushing the hair, ears, nose and other parts of the body that are not easily cleaned.

- Use cool water to prevent skin pores from opening, so that the resin does not easily penetrate the skin.
- Do not use solvents to clean skin.
- If large areas of skin have been exposed to resin, or if prolonged contact results in blisters, seek medical attention.
- Avoid the accidental transfer of resin from the hands to other areas of the body, especially to the eyes.
- If protective cream was used, do not reapply it until the skin has been completely cleansed.

Contact with Eyes

If uncured resin comes in contact with the eyes, flush immediately with large amounts of water for 15 minutes and seek medical attention.

- Avoid sunlight, fluorescent light, and other sources of ultraviolet radiation.

The wearing of contact lenses when working near resin is not recommended. If resin splashes into the eyes when contact lenses are worn, immediately remove the lenses and flush the eyes with water.

- Clean and disinfect the contaminated lenses.
- Do not wear contact lenses until eye irritation disappears.

Ingestion

If resin is swallowed, refer to the cartridge label for specific instructions. *Seek medical attention immediately.*

Inhalation

Resin vapors can be irritating to the respiratory system. If respiratory irritation occurs, expose the victim to fresh air immediately.

- If the victim has stopped breathing, perform artificial respiration or cardiopulmonary resuscitation.
- Seek medical attention immediately.
- Keep the patient warm but not hot.
- Never feed anything by mouth to an unconscious person.
- Oxygen should be administered by authorized personnel only.

Waste Disposal

Fully cured resins present no special safety or health-related issues. However, check if local regulations regard cured and partially cured resins as hazardous industrial waste, and comply with all applicable regulations governing their disposal.

- When removing the waste container from the Eden printer, protective gloves are not required. When directly handling uncured resins, neoprene or nitrile gloves are recommended.
- When handling cured materials that may not be completely cured on the surface, common latex gloves are adequate.
- Even if not classified as hazardous industrial waste or otherwise regulated, resin materials must be packaged and disposed of in a manner that prevents human contact with the waste. Therefore, take steps to prevent the contamination of both groundwater and surface water.
- Empty resin cartridges are sealed to prevent leakage. Do not attempt to reuse them, and do not puncture them.
- Discard contaminated clothing, shoes, empty containers, etc., in accordance with any applicable laws and regulations.

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Figure 3-1: The Eden260 3-D Printer

Work Configurations

The Eden260 3-D printing system can be set up as a single-station system or as a multi-station system. When connected to a local computer network, the system can serve multiple users. In such configurations, each user workstation (client) prepares files with Objet Studio software for production. A server (host), typically next to the 3-D printer, acts as a job manager that sends production jobs to the printer for production.

Figure 3-2 shows the Eden260 printer set up in a multi-client configuration.

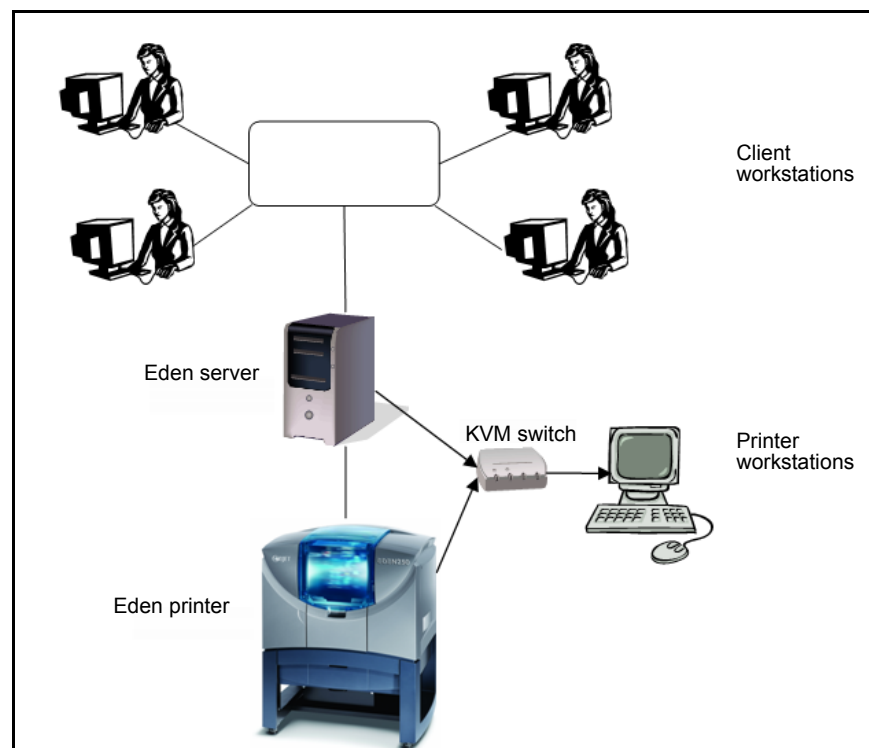


Figure 3-2: Multi-client network configuration

When installing the Objet software, you choose whether to install it as a client station or as a master station (server or standalone station).

The Objet software arranges the jobs it receives according to their priorities, resin type, and other factors. In multi-workstation configurations, the operator of the server—typically the production administrator—has total control over the jobs sent to the 3-D printer, and can prioritize and delete jobs, review job history and reprint a job, and so on.

Source Files

Eden 3-D printing systems produce three-dimensional models designed with most 3-D CAD tools and with other job-specific 3-D applications.

Eden systems accept:

- STL files
- SLC files

Eden systems feature the capability of producing both types of model files simultaneously.

STL Files

STL is short for *Standard Triangulation Language*. This language views any object as a collection of surfaces, and describes each surface of the object as a collection of triangles.

For example, a square can be described as two triangles; a cube (six squares) as 12 triangles. Curved surfaces need more triangles to describe them. The higher the tolerance (for smooth surfaces), the more triangles are needed. The result is that high-quality object descriptions mean very heavy files.

Most CAD software can export STL files. The Eden system utilizes these files for building models (rapid prototyping), and also for directly making molds for mass-producing items.

STL files are ASCII (text) files. The content of each file begins with “solid” and ends with “end-solid” (both lower case). Between these keywords is a list of the triangles that describes the faces of the solid model. Each triangle defines a single normal vector directed away from the solid’s surface, followed by its X-Y-Z coordinates. These are expressed as Cartesian coordinates and are floating-point values. The coordinates of all triangles should be positive and should fall within the volume of the model.

SLC Files

SLC is short for *Stereo-Lithography Contour*. SLC files describe two-dimensional contours of the three-dimensional models. These contour lines are polylines.

SLC files are ASCII (text) files that save models as a series of slices. This means that models based on SLC files cannot be orientated; only their scale (size) and position on the build tray can be controlled. For this reason, the model’s orientation must be suitable for production before it is saved as an SLC file. Because of the nature of SLC files, the appearance of models in Objet Studio may be different than the solid-object images displayed from STL files.

Resins

Model and support materials used for producing models with Eden printers are made of resins, which are composed of reactive monomers and oligomers. Care must be taken when storing and handling them, both to protect operators and the environment, and to ensure their effectiveness.

Signs of premature polymerization in the resin cartridge include bulging, leaking, the emission of heat, and unusual odor. Exposure to heat can cause resin to gel in the cartridge. To prevent this, observe the following guidelines when handling and storing Eden modeling and support materials.

Storage

Resins used with Eden systems are supplied in UV-proof cartridges.

- To ensure product stability, do not allow resins to come into contact with metal. Plastics made from monomer-soluble materials (such as polystyrene or polyvinyl chloride) are not suitable for storing resins.
- When not in use, keep resin cartridges tightly sealed to prevent contamination, the effects of exposure to UV radiation, and accidental spillage.
- Store cartridges of resins indoors, in a dry area with adequate ventilation, between 16–27 degrees Celsius (60–81 degrees Fahrenheit). If exposed to heat or flames, cartridges may burst or ignite.
- Make sure that resins are stored in accordance with all local regulations and other applicable requirements.

Shelf Life

Eden resins have a limited shelf life. The expiry date on the label is valid when properly stored in an undamaged, unopened cartridge. Always rotate your stock of resin, so that the cartridge with the earliest date is used first.

Light

When resin is not in its sealed cartridge, make sure to shield it from sunlight and other sources of UV radiation, such as fluorescent and mercury-vapor lights. Exposure to UV radiation causes an increase in viscosity and, eventually, solidification.

Safety Considerations

Before it is cured, resins are toxic and flammable. To prevent possible health hazards:

- Do not expose resins to flames, heat or sparks.
- Minimize contact with resins.
- Ventilate areas where they are handled.
- Keep them separate from food and drink.

Cured plastic parts, however, are safe. They can be handled and stored without precautions.

Disposal

Dispose of cartridges of Eden model and support material in accordance with all applicable laws and regulations. If necessary, the cartridges can be disassembled for recycling.



You can find more safety information about resins in “Safety Guidelines” on page 2-4, and “First Aid for Working With Resins” on page 2-6.

Work Environment

Extreme heat and humidity conditions can adversely affect the operation of the Eden 3-D printer. Therefore, it is recommended that you use ventilation or air-conditioning systems, if necessary, to keep the work area within the following ranges:

- 18°–25° C (64°–77° F)
- 30%–70% relative humidity

Workstation Requirements

	Server/ Stand-alone Station	Client Workstation
Processor	Pentium 4, 3.0 GHz (min.)	Pentium 4, 3.0 GHz (min.)
Operating System	Microsoft Windows XP or Windows 2000	Microsoft Windows XP or Windows 2000
Graphics Card	Supporting open GL, with 256 MB of memory	Supporting open GL, with 256 MB of memory
RAM	2 GB (min.)	1 GB (min.)
CD Drive	IDE CD ROM	IDE CD ROM
Hard-Disk Drive	40 GB (min.)	40 GB (min.)
Network Adaptor Card	2 x LAN TCP/IP	1 x LAN TCP/IP
Communications Cable	Crossed connection (1) Standard cable (1)	Standard cable

Preparing Files for Use with Eden 3-D Printing Systems

Before using files with Eden 3-D printing systems, you must convert them in your CAD program to either STL files or SLC files. (For an explanation of these file formats, see “Source Files ” on page 3-3.)

After converting the model files, it is recommended that you check them for defects in an STL-repair application (such as Magics, by Materialise) before opening them in Objet Studio and producing the model.

Converting CAD Files to STL Format

This procedure may vary slightly, depending on the CAD software used, but the following instructions generally apply.

To convert a file to STL format (in a CAD program):

1. From the File menu, select **Save As**.
2. In the **Save As** dialog box, open the **Save As Type** pull-down menu and select ***.STL**.

3. Click Options and set the following parameters:
 - Total Quality — approximately 0.1 mm (deviation tolerance / linear-dimension tolerance)
 - Detail Quality — approximately 4° (angle tolerance)

Note: Lowering these values produces more accurate models, but results in larger files and longer loading and processing times. For this reason, it is generally not recommended that you use lower values.
4. In the file format option, choose *binary* or *ASCII*. (Binary files are smaller than files saved in ASCII format; they are, however, functionally identical in Objet Studio.)
5. Click OK or Save.

Converting Files to SLC Format

When converting files to SLC format, it is recommended that you set a layer thickness of 15 microns (0.015 mm). Since SLC files cannot be orientated in Objet Studio, it is important that models are properly orientated before being saved as SLC files. Considerations for suitable model orientation are explained in “Model Orientation” on page 5-9.

Objet Software

Objet software for the Eden 3-D printing system consists of two applications:

- Objet Studio
- Job Manager

Objet Studio

With Objet Studio, you prepare source files for production in Eden 3-D printers. Objet Studio offers you a wide variety of file-preparation options, but always consists of the following basic procedure:

1. Inserting one or more objects on the *build tray*
2. Positioning the object(s) on the tray
3. Configuring object and tray parameters
4. Saving the tray configuration as an *otf* (Objet Tray Format) file
5. Sending the *otf* file to the Eden 3-D printer for production

Using Objet Studio to perform these tasks is described in detail in chapter 5, “Using Objet Studio.”

Job Manager

The Job Manager application is different for client workstations and for the computer connected directly to the Eden 3-D printer.

- Job Manager installed on the directly-connected computer (server) displays the queue and status for all jobs sent to the 3-D printer by the client computers on the network, and allows editing and manipulation of all jobs.
- Job Manager installed on client computers displays the queue and status only for jobs sent to the 3-D printer server from that computer, and allows the user to edit only these jobs.

Using Job Manager is described in detail in chapter chapter 6, “Using Job Manager.”



Client computers can be connected, via the local network, to different Eden 3-D printers, but only to one at a time. The client Job Manager displays the status of the 3-D printer to which the client is currently connected.

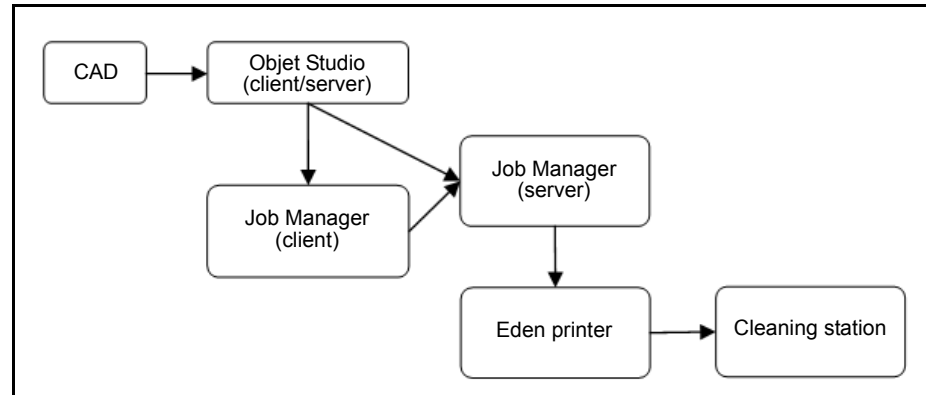


Figure 3-3: Flow chart for producing 3-D-models with the Eden system

4

Installing Objet Software

How to Install Software for the Eden 3-D Printing System2

How to Install Software for the Eden 3-D Printing System

The Objet Studio setup wizard guides you when installing the Objet software. During installation, you must choose to install either the server (“host”) application or the client application.

To install Objet software:

1. Insert the Objet Studio CD into the disk drive.
2. Right-click the **Start** button and select **Explore** (or use any other method for displaying files on the computer).
3. Open the CD-drive folder and select **Setup**.

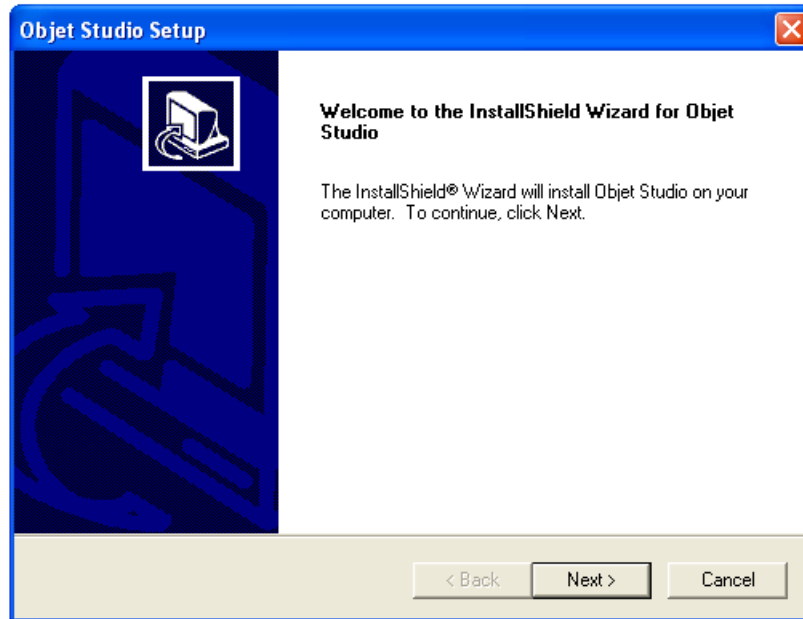


Figure 4-1:Objet Setup—installation wizard *Welcome* screen

4. When the *Welcome* screen appears, click **Next**.

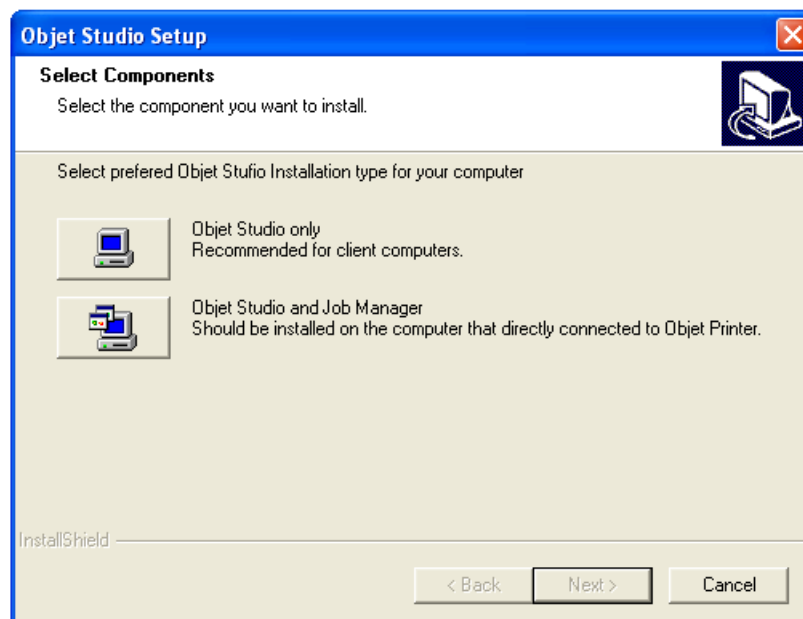


Figure 4-2: Objet Setup—*Select Components* screen

5. When the *Select Components* screen appears, select one of the installation options, then click **Next**.
 - Select **Objet Studio only** for client workstations
 - Select **Objet Studio and Job Manager** for the server (host) station and for a standalone station—that is, the computer directly connected to the Eden printer.

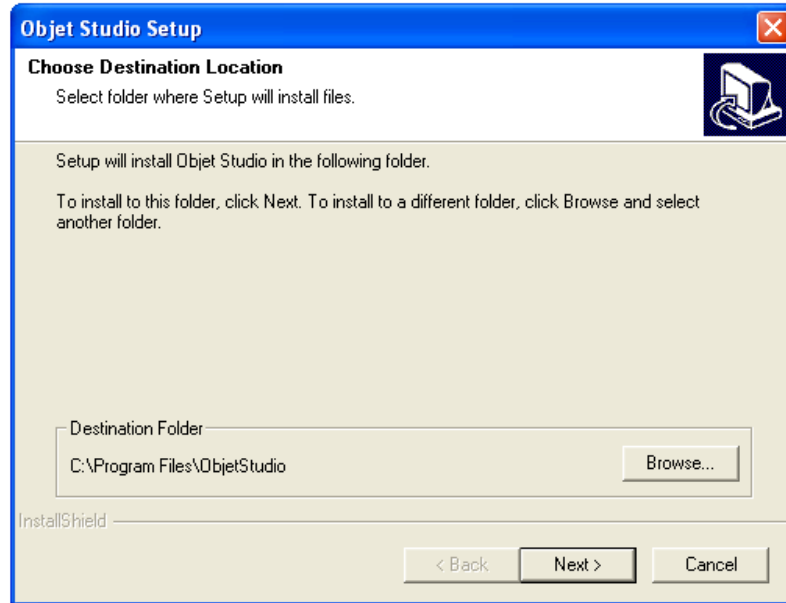


Figure 4-3: Objet Setup—*Choose Destination Location* screen

6. In the *Choose Destination Location* screen, verify the destination folder and click **Next**.



It is recommended that you do not change the default destination folder.

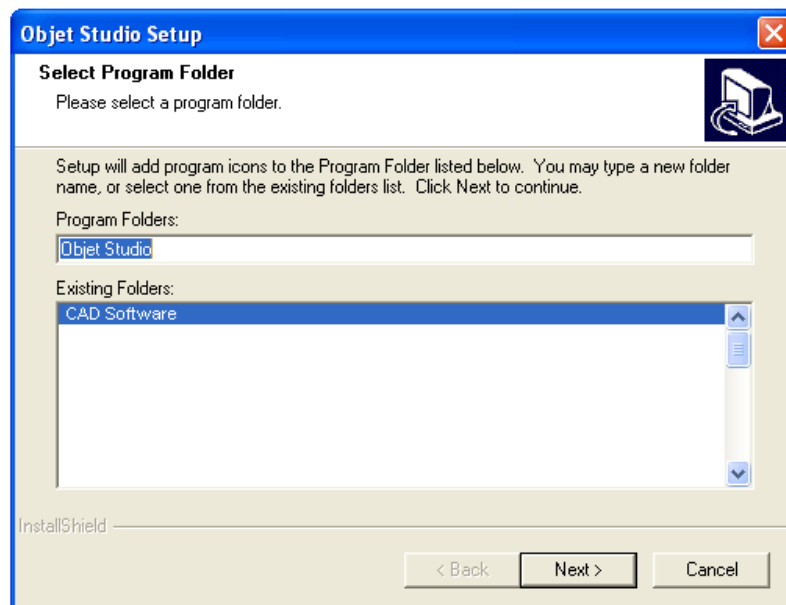


Figure 4-4: Objet Setup—*Select Program Folder* screen

7. In the *Select Program Folder* screen, verify the pre-selected folder in which the Objet Studio icons will be installed.
 - To install the icons in another program folder, select it.
 - To continue, click **Next**.

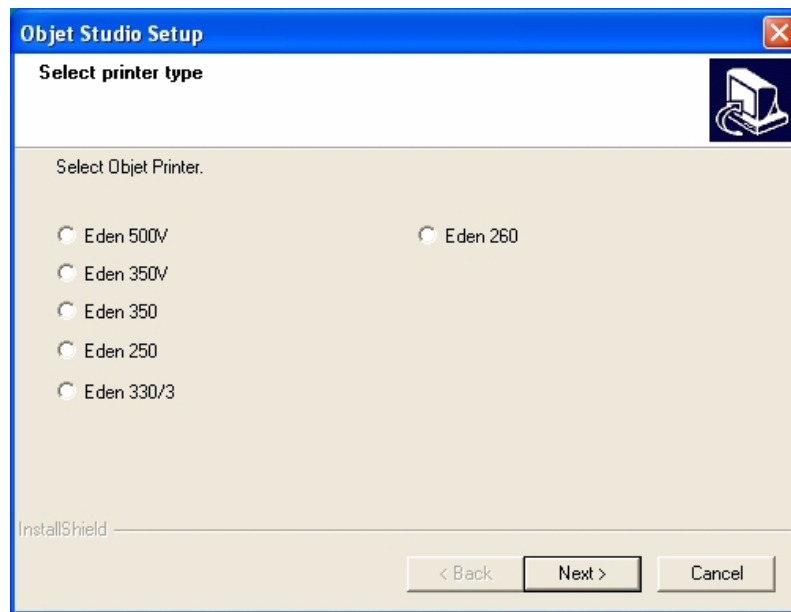


Figure 4-5: Object Setup—*Select Printer Type* screen

8. In the *Select Printer Type* screen, select the Objet 3-D printer used for producing models.
To continue, click **Next**.

Installation begins and the *Setup Status* screen appears, showing the progress of the installation process.

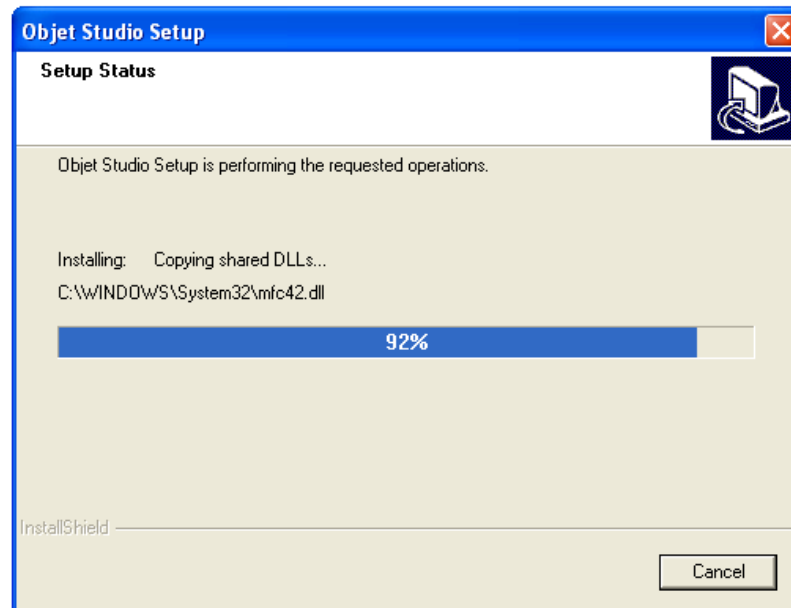


Figure 4-6: Object Setup—*Setup Status* screen

When the Objet program installation is complete, the final InstallShield Wizard screen appears.

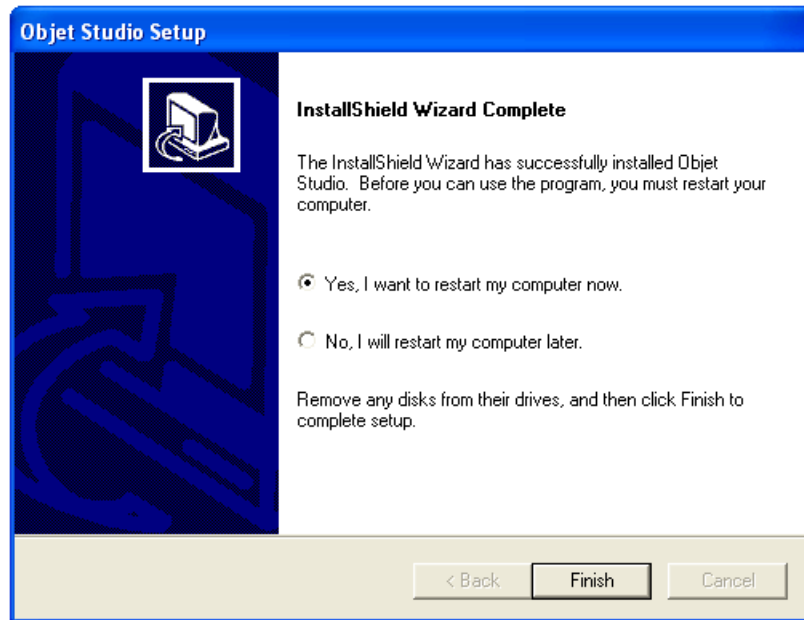


Figure 4-7: Objet Setup—final wizard screen

9. To complete installation, you must restart the computer. To do so, remove the CD from the disk drive, select "Yes..." and click Finish.

The computer shuts down and restarts, and the software installs the appropriate icon(s) on the computer desktop:

- Objet Studio
- Job Manager (for servers and standalone stations)
- Stop Job Manager (for servers and standalone stations)

Using Objet Studio

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Opening Objet Studio



After you install Objet Studio, a launch icon  appears on the Windows desktop. Open the application by double-clicking this icon, or by selecting Objet Studio from the Start > Programs menu.

Objet Studio opens, displaying an empty build tray.

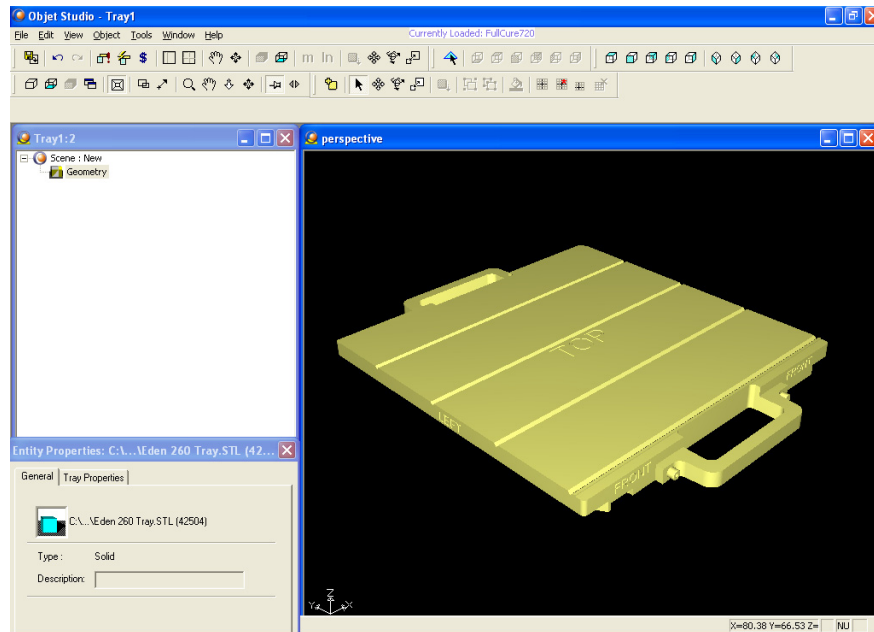


Figure 5-1: Objet Studio opening screen

The icons shown in this chapter are available only when relevant toolbars are displayed. You can control the toolbars displayed at any time, and you can re-arrange them on the screen.

To customize the toolbars displayed in Objet Studio:

1. From the *View* menu, select *Toolbars*.
2. In the *Customize* dialog box, select the toolbars you wish to display, and click *OK*.

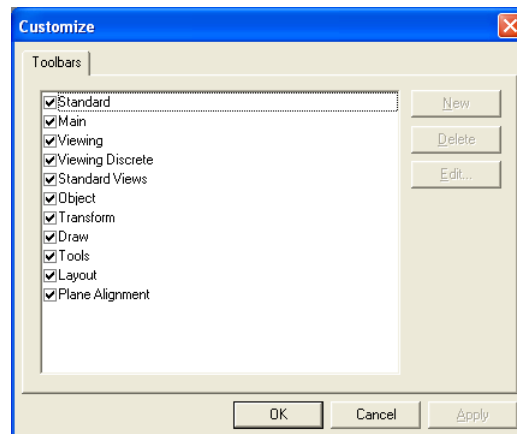


Figure 5-2: Toolbar selection dialog box

3. Click and drag the toolbars to position them as you wish on the Objet Studio screen.

Preparing Models for Production


To produce models from model files, you must select one or more files and position the models on the Objet Studio build tray. If you know what type of modeling material will be used to produce the models, make sure it is selected in the toolbar.



Figure 5-3: Modeling material selection toolbar

Note: It is not necessary to select the modeling material now, but it is recommended—each type of modeling material has unique characteristics that may affect the valid positioning of objects on the build tray.

To place a model on the build tray:

1. Open the *Insert* dialog box —
 - From the *Object* menu, select *Insert*.
 or —
 - On the toolbar, click the *Insert Model* icon .
 or —
 - Right-click on the build tray, and select *Insert*.

The *Insert* dialog box appears.

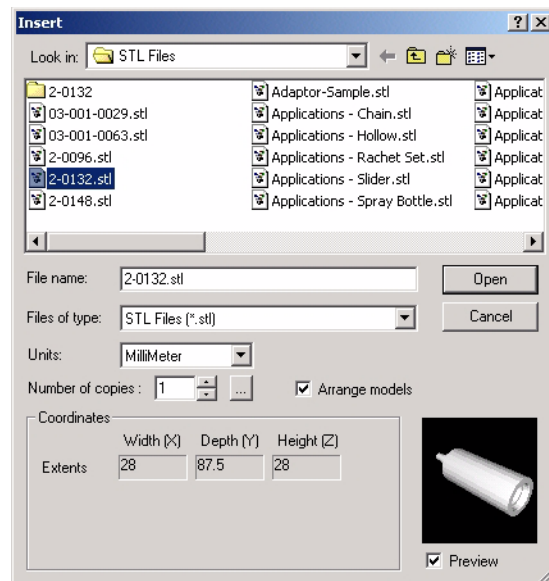


Figure 5-4: Insert dialog box

2. In the *Look in* field, display the appropriate folder.
3. In the *Files of type* field, select the file types to display (*stl*, *slc*).
4. Select the desired file, and make sure that it appears in the *File name* field.

If the *Preview* check box is selected, *stl* files are displayed in the preview box, as shown in figure 5-4.

5. Select any of the following options, as required:
 - **Units**—Choose *millimeters* or *inches* for the object's units of measure.
 - **Number of copies**—Choose how many copies of this model to place on the build tray.
 - **Arrange models**—Select this check box to automatically position models on the build tray for efficient model building.

Note: The 3-D file contains the object's proportions, but not its units of measure. Therefore, make sure to correctly select either *millimeters* or *inches* when inserting an object. Otherwise, the size of the object on the build tray will be either much too large or much too small.



The *Extents* values displayed at the bottom of the dialog box represent the maximum dimensions of the object on each axis. These dimensions correspond to the virtual “bounding box” surrounding the object (see figure 5-24 on page 5-17).

6. Click Open.

The dialog box closes and Objet Studio places the model(s) on the build tray.

You can place additional models on the build tray by repeating this procedure.

Arranging the Objet Studio Screen

The default screen layout displays the *perspective* view of the build tray and the tray hierarchy pane, which lists the elements placed on the tray.

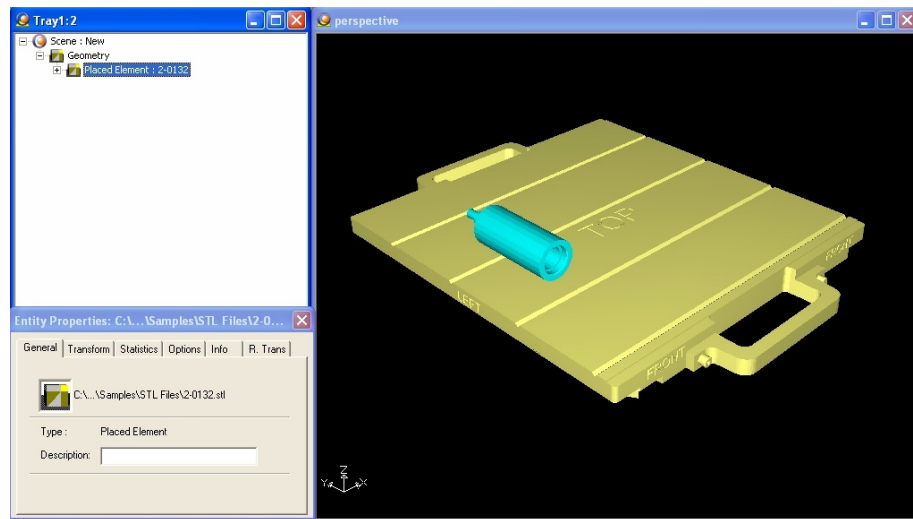


Figure 5-5: 2-view (default) screen layout

You can view models from different angles by changing the default screen layout.

To change the Objet Studio screen layout:

- From the *View* menu, select *Layout*, then the desired number of build-tray views.
 - ☐ 2 Views is the default screen layout, already displayed (see figure 5-5).
 - By default, the *Entity Properties* dialog box is also displayed.
 - ☐ 3 Views adds *top* and *front* views to the default screen layout (see figure 5-7).
 - ☐ 4 Views displays *top*, *front* and *right* views (see figure 5-8).
 - ☐ 1 View expands the *perspective* view to fill the screen (see figure 5-9).
- You can also change the screen layout with toolbar icons.



Figure 5-6: Screen layout icons

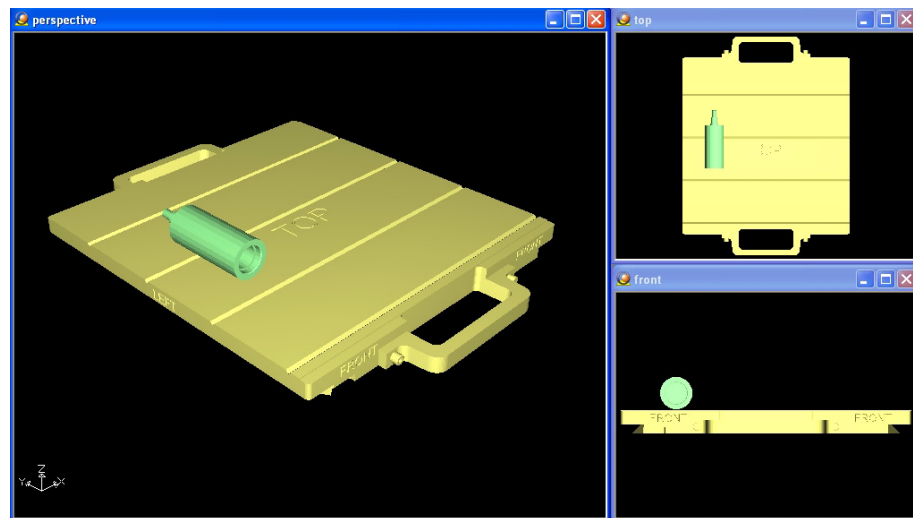


Figure 5-7: 3-view screen layout

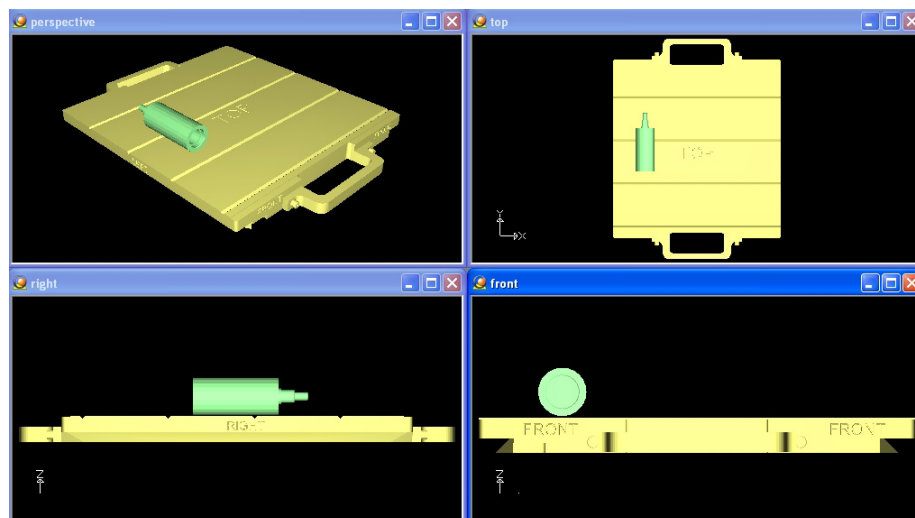


Figure 5-8: 4-view screen layout

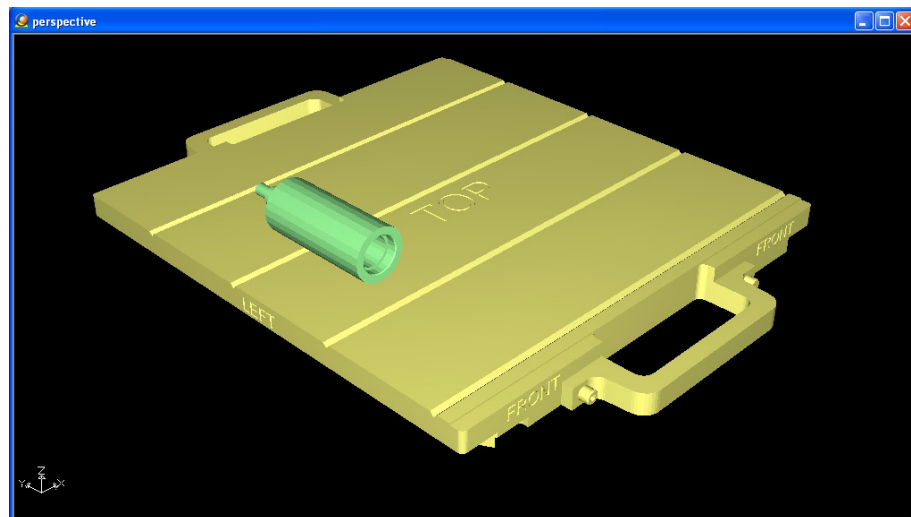


Figure 5-9: 1-view screen layout

You can change the perspective of the active viewing pane by clicking any of the nine viewing icons.

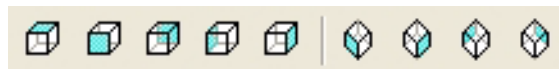


Figure 5-10: Viewing-pane perspective icons

Placing Duplicate Objects on the Build Tray

In addition to initially placing multiple copies of the object on the build tray from the *Insert* dialog box (figure 5-4 or figure 5-12), you can decide later to duplicate objects on the tray. You can, of course, insert the same object from its file more than once. An easier way, however, is to copy and paste the object.

Selecting Objects

You select an object by clicking it, either on the tray or in the tray hierarchy pane. Its image on the build tray changes color (to light blue) and its name is highlighted in the tray hierarchy pane.

Copying and Pasting Objects

You access the *Copy* and *Paste* commands as in other Windows applications:

- by opening the Edit menu on the main toolbar
- by opening the right-click pop-up menu
- by using keyboard shortcuts (Ctrl+C and Ctrl+V, respectively)

The *Paste Special* command enables you to place duplicate objects even more efficiently:

- You can specify the number of duplicates to place on the build tray at once.
- You can set the distance, on each axis, between the duplicate objects.
- You can place mirror images of the original object.



Figure 5-11: Paste Special dialog box

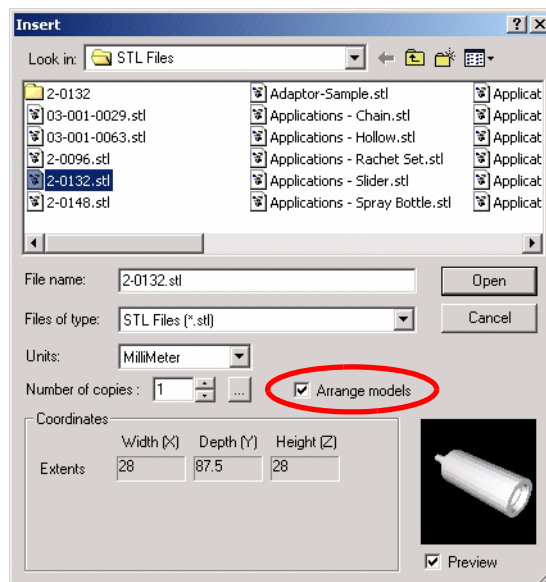
Positioning Objects on the Build Tray

To produce models efficiently and with the required finish, it is important to carefully position objects on the build tray. Objet Studio features the automatic positioning of objects. However, you should check to make sure that the objects are orientated logically for your needs, according the considerations explained in “Model Orientation” on page 5-9.

Automatic Positioning

There are two ways to have Objet Studio position the items on the build tray.

- Anytime you insert an object onto the build tray, select **Arrange models** in the *Insert* dialog box.

Figure 5-12: *Arrange models* option in the Insert dialog box

When you click **Open**, Objet Studio inserts the new object and arranges all of the objects on the build tray.

- After placing several objects on the build tray, select **Tools > Automatic Placement**.

The effects of automatic placement are shown in figures 5-13 and 5-14.

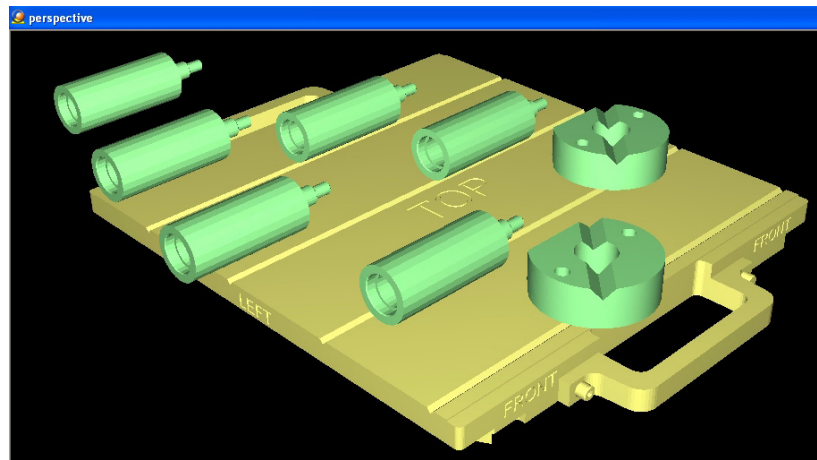


Figure 5-13: Tray before objects are properly arranged

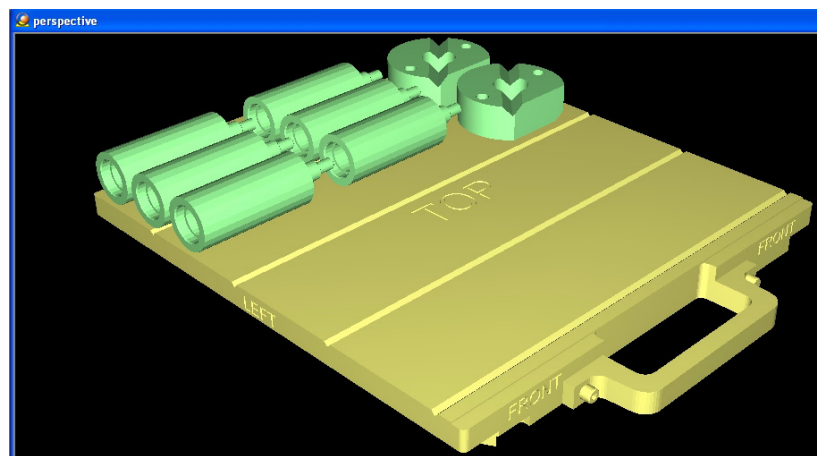


Figure 5-14: Tray after objects have been automatically arranged



Because of the unique characteristics of each type of modeling material, it is recommended that you select the material *before* inserting objects on the tray with automatic positioning or running Automatic Placement.

Manual Positioning

You can manually position objects on the build tray—even if they were inserted using automatic placement (with the *Arrange models* option selected in the *Insert* dialog box). Considerations for positioning objects are reviewed in “Model Orientation” on page 5-9. Tools for changing the position of objects are described in “Repositioning Objects” on page 5-11.

Model Orientation

The orientation of models on the build tray affects how quickly and efficiently they will be produced by the 3-D printer, where and how much support material is used, and whether or not model parts will have a gloss finish. Therefore, you should consider a variety of factors when deciding how to place models on the tray, using the following positioning rules.

X-Y-Z Rule

This rule considers a model's outer dimensions.

- Since the printing heads move back and forth along the X-axis, the printing time along this axis is relatively short, compared to printing time along the Y-axis and Z-axis. From this point of view, it is advisable to place the object's *longest* dimension along the X-axis.
- Since high-resolution models are built up, on the Z-axis, in 16-micron layers, it is very time-consuming to print a tall object. From this point of view, it is advisable to place the object's *smallest* dimension along the Z-axis.
- Since the printing heads measure about 2 inches (5 centimeters) on the Y-axis, models measuring less than this (on the Y-axis) are printed in one pass. From this point of view, it is advisable to place the object's *intermediate* dimension along the Y-axis.

Tall-Left Rule

This rule considers models where, after being orientated on the build tray according to other considerations, one side is taller than the other.

- Since the printing heads move along the X-axis from left to right, taller sections on the right require the printing heads to scan unnecessarily from the left until reaching them. If, on the other hand, the taller sections are positioned on the left of the tray, the printing heads only have to scan the model until printing these sections—once the lower parts have been completed. Therefore, you should position the taller side of the model, when possible, *on the left*.

The following rules are based on the fact that support material is not required on the top of the printed model.

Recess-Up Rule

This rule considers models containing surface recesses.

- Recesses in the surface (like hollows, drill holes, etc.) should, when possible, be positioned *face-up*.

Fine-Surface Rule

This rule considers models that have one side on which there are fine details (like the keypad side of a telephone).

- The side of the model containing fine details should, when possible, be positioned *face-up*. This results in a smooth finish.

Avoid Support-Material Rule

This rule considers models that have large holes or hollows, open on at least one side (like a pipe or a deep shell).

- It may be advantageous to print a model *standing up*, so support material does not fill the hollow, even though printing the model lying down would be much faster.

Selecting and Manipulating Objects on the Build Tray

Selecting Objects

You select an object by clicking it, either on the tray or in the tray hierarchy pane. Its image on the build tray changes color (to light blue, by default) and its name is highlighted in the tray hierarchy pane. You can select multiple objects by pressing the Ctrl or Shift keys while clicking additional objects (either on the tray or in the tray hierarchy pane).


Object Position on the Z-Axis

When you use automatic positioning to arrange objects on the build tray (see “Automatic Positioning” on page 5-7), the objects are positioned directly on the tray. If you do not insert objects with automatic positioning, they often appear either above or below the tray.



In practice, the Eden system prints all models on the build tray on a one-millimeter bed of support material. The importance of positioning objects directly on the build tray with Objet Studio is to correctly display the objects on the screen.

To position objects directly on the tray:

1. Select the object.
2. Click the *Lay On* icon .

or —

From the *Object* menu, select *Lay On*.

To ensure that objects are always directly positioned on the tray:

1. From the *Tools* menu, select *Options*, and display the *Settings* tab.

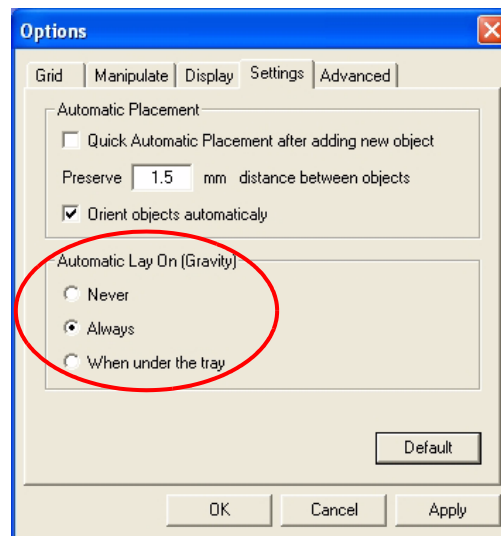


Figure 5-15: Options dialog box, Settings tab





2. In the *Automatic Lay On (Gravity)* section, select *Always*. (This is the default setting.)


Other z-axis options (in the *Automatic Lay On* section):

- When under the tray—The display of objects that are below the build tray is automatically changed so that the object is at tray level.
- Never—The display of objects that are above or below the build tray is not changed.













Repositioning Objects

You can select and manipulate objects on the build tray after selecting the following icons or menu options.

Icon	Menu Option	Purpose	What to do
	(none)	For selecting an object.	Click the object on the build tray.
	Object > Translate	For selecting and moving an object with the mouse.	Click the object to select it. Drag the object to a new location while holding down the mouse button.
	Object > Rotate	For selecting and rotating an object on the Z-axis.	Click the object to select it. Hold down the left mouse button and move the mouse left/right.
	Object > Scale	For selecting and changing the size an object.	Click the object to select it. Hold down the left mouse button and move the mouse left/right.

After using these repositioning icons once, they are disabled, *unless* you first click the *Sticky Mode* icon . After clicking this icon, the repositioning icon used remains active until you click the *Sticky Mode* icon again to release it.

Another way of repositioning objects on the build tray is by using the icons on the *Transform* toolbar that nudge the selected object in different ways.

-   Click to move the object 20 mm along the X-axis.
-   Click to move the object 20 mm along the Y-axis.
-   Click to move the object 30 degrees on the Z-axis.
-   Click to rotate the object 30 degrees on the X-axis.
-   Click to rotate the object 30 degrees on the Y-axis.
-   Click to rotate the object 30 degrees on the Z-axis.

Viewing Object Properties

After you manually manipulate an object with the mouse, its new properties are displayed in the *Transform* tab of the *Entities Properties* dialog box.



The *Entities Properties* dialog box is displayed by default (see figure 5-5 on page 5-4) and whenever the screen layout is changed or refreshed (see “Arranging the Objet Studio Screen” on page 5-4).

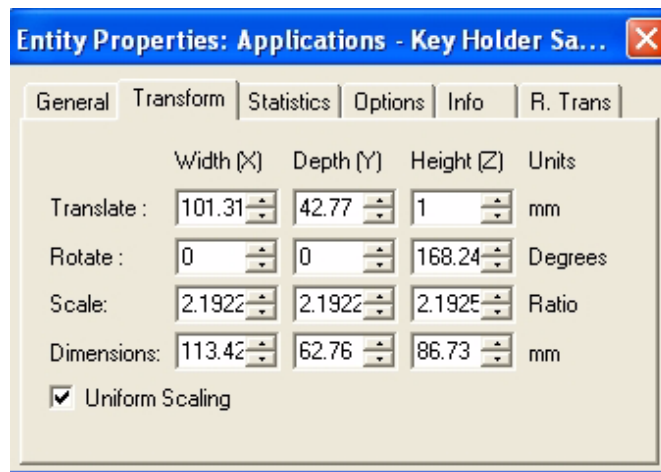


Figure 5-16: *Entities Properties* dialog box, *Transform* tab

You can make precise changes to the object on the build tray by selecting the object (either on the tray or in the tray hierarchy pane) and changing its values in the dialog box.

Note: You can only change the height of the objects on the build tray if this is allowed by the Objet Studio settings (see “Object Position on the Z-Axis” on page 5-10.)

The properties displayed in the *Transform* tab of the *Entities Properties* dialog box are *absolute* values, representing the actual position of the object on the build tray. Another way of repositioning objects on the tray using precise values is by applying changes to object properties *relative to the current position*. There are two *Relative Transform* dialog boxes available:

- The *R. Trans* tab of the *Entities Properties* dialog box.

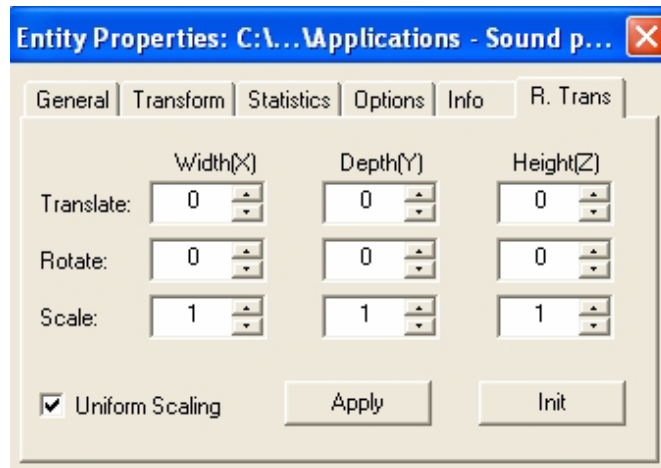


Figure 5-17: *Entities Properties* dialog box, *R. Trans* tab

- The *Relative Transform* dialog box, accessible from the *Object* menu.

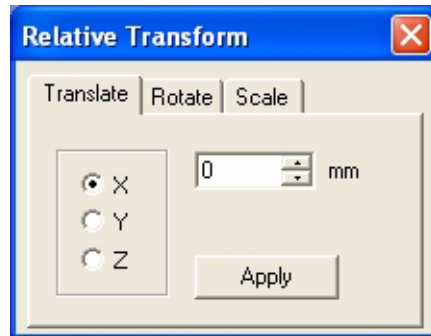



Figure 5-18: *Relative Transform* dialog box

Valid Object Placement

To ensure that models do not overlap when you position them on the build tray, you can select the *Dynamic Checking* icon  from the Tools toolbar. When selected, Objet Studio only allows the positioning of objects if they do not interfere with other objects on the tray. Note that the space occupied by an object includes the “bounding box” surrounding it (see figure 5-24 on page 5-17).

Note: Because of the unique characteristics of each type of modeling material, it is recommended that you select the material *before* precisely positioning objects on the tray.

Grouping Objects

You can group two or more objects on the build tray so that they can be manipulated together.

To group objects:

1. Select the objects (“Selecting Objects” on page 5-10).
2. Click the *Group* icon .

or—

From the *Object* menu, select *Group*.

In the tray hierarchy pane, the objects now appear under “Group Element.”

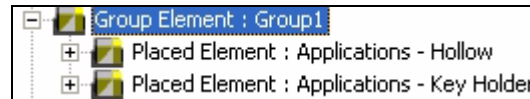



Figure 5-19: Group Element in the tray hierarchy pane

To separate grouped objects:





1. Select the group element (either on the build tray or in the tray hierarchy pane).
2. Click the *Ungroup* icon .

or—

From the *Object* menu, select *Ungroup*.

Using a Grid to Position Objects

Displaying a grid on the image of the build tray can be useful when positioning objects. You can make use of this feature by clicking the grid toolbar icons or by selecting menu options.

Icon	Menu Option	Result
	Tools > Grid	Displays a grid over all build tray views.
	Tools > Snap to grid	When moving the object, it aligns with the nearest grid line.
		Enables you to change the grid origin (X- and Y-axis meeting point) by clicking on the build tray.
		Cancels the changes made to the grid origin and restores the default grid.

You can review and configure grid settings—and apply them—from the *Options* dialog box.

To use the Options dialog box:

1. From the *Tools* menu, select *Options*, and display the *Grid* tab.

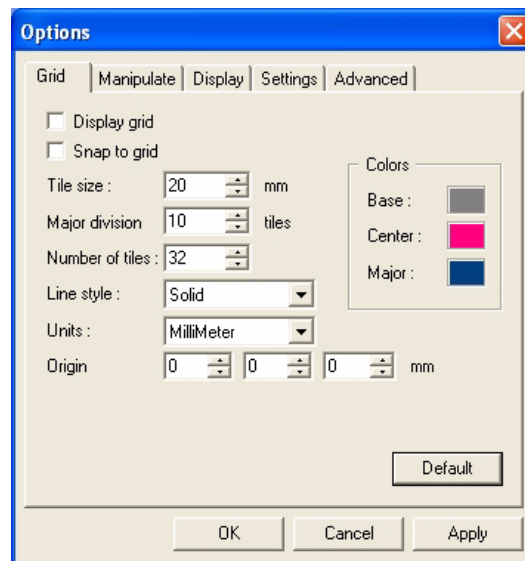


Figure 5-20: *Options* dialog box, *Grid* tab, showing the default settings

The dialog box displays the current grid settings.

2. As required, make changes to the settings, and select or clear the check boxes.
3. Click *Apply* or *OK*.

Changing an Object's Orientation

There are several methods for changing the orientation of objects on the build tray.

To rotate an object:

- Select the object and use the *Rotate* icon or *Object* menu options (see "Repositioning Objects" on page 5-11).

To select an object's plane and re-align it with one of six basic directions:

- From the *Plane Alignment* toolbar:

1. Click the *Select Plane* icon .
2. Click a plane on an object displayed on the build tray.
3. Click the appropriate align icon —

 Align Bottom

 Align Top

 Align Front

 Align Back

 Align Left

 Align Right

- From the *Tools* menu:

1. Select *Plane Alignment > Select Plane*.
2. Click a plane on an object displayed on the build tray.
3. Select *Plane Alignment > Align Bottom/Top/Front/Back/Left/Right* (as appropriate).

Note: When you are finished re-aligning the plane of objects on the build tray, release the *Select Plane* icon or clear *Select Plane* from the *Tools > Plane Alignment* menu.

To flip an object 180 degrees on any axis:

1. Select the object.
2. From the *Object* menu, select *Flip > Flip X / Flip Y / Flip Z*.

To make precise changes to the object's orientation on any axis:

1. Select the object.
2. Display the *Transform* tab or the *R. Trans.* tab of the *Entities Properties* dialog box (see figures 5-16 and 5-17 on page 5-12):

or —

From the *Object* menu, select *Relative Transform* (see figure 5-18 on page 5-13).

3. Change the *Rotate* values for the desired axis.

Freezing an Object's Orientation

If you manipulate an object on the build tray, you can freeze its orientation so that it does not change when you perform Automatic Placement (see “Automatic Positioning” on page 5-7).

To freeze an object's orientation:

1. Select a model on the build tray.
2. In the *Options* tab of the *Entity Properties* dialog box, click **Advanced**.

The *Advanced Properties* dialog box opens.

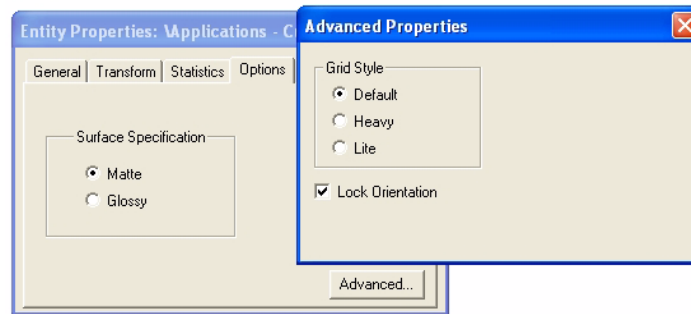


Figure 5-21: *Advanced Properties* dialog box—“Lock Orientation” selected

3. Select the *Lock Orientation* check box.
4. Close the *Advanced Properties* dialog box.

Display Options

From the *View* menu, you can change the way objects are displayed on the screen. The default method for displaying models on the build tray is as solid (“shaded”) objects.

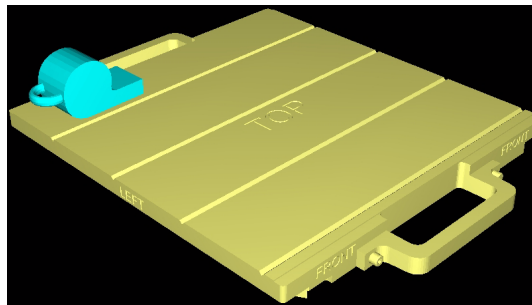



Figure 5-22: Tray and model displayed in *shaded* view

The other display options are *wire frame* and *points*.

To display the build tray in *wire frame* view:

- Select **View > WireFrame** or click the *WireFrame* icon .

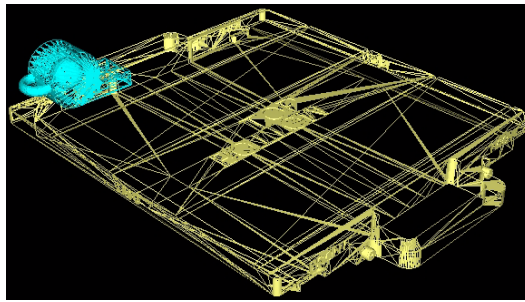



Figure 5-23: Tray and model displayed in *Wire frame* view

To revert to the *shaded* view:

- Select View > Shaded or click the *Shaded* icon .

To display objects as boxes, showing their maximum dimensions instead of the model geometry:

- Select View > Display Bounding Box.

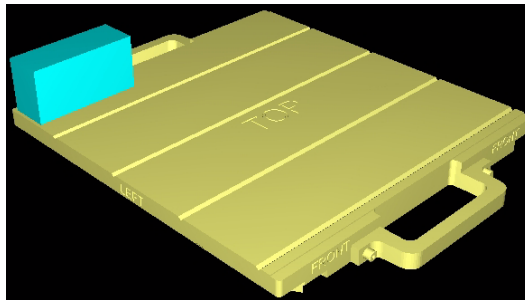


Figure 5-24: Model displayed with bounding box

To display the area around objects needed for support material (to produce a matte finish):

- Select View > Display Thickening Box.

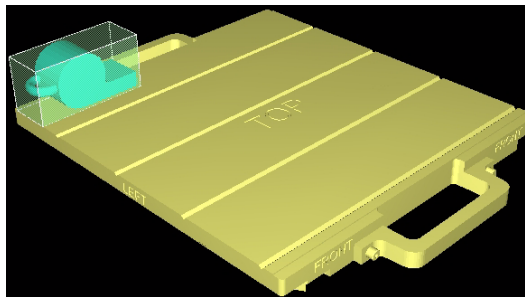



Figure 5-25: Model displayed with thickening box

To change the display color of an object:

1. Select the object.
Its color changes to blue, indicating that the object has been selected.
2. From the *Object* menu, select Fill Color or click the *Fill Color* icon .
3. Select a color from the color palette and click OK.

When the object is de-selected, it appears in the new color.

Note: You can repeat this procedure for other objects, so that different objects on the build tray are displayed in different colors.



















Objet Studio displays objects to be produced with matte and glossy finishes in different colors. See “Surface Finish” on page 5-19 and “Object Color Codes” on page 5-21

Tray Viewing Options

The Objet Studio toolbars contain several icons for changing the appearance of the display screen, enabling you to view the tray and objects in different magnifications and from various perspectives.

Note: You must display the relevant toolbar(s) to access many of the icons described below (see “To customize the toolbars displayed in Objet Studio:” on page 5-2).

Icon	Tool Tip Name	Purpose
	Zoom Full	Reverts to normal view after using various zoom options. (The same as)
	Zoom Object	Fills the viewing pane with the selected object(s).
	Zoom Work Area	Reverts to normal view after using various zoom options. (The same as)
	All Windows	If enabled, and effect all viewing panes.
	Perspective/Parallel	When selected, the tray is displayed with depth perspective—closer objects appear bigger. When not selected, the tray is displayed in two dimensions—identical objects appear the same size, regardless of their position on the screen.
	Zoom By Rectangle	Fills the active viewing pane with an area of the build tray after you select it with the mouse.
	Zoom Dynamic	Continuously zooms in/out of the point at which you click and hold down the left mouse button, when you move the cursor up and down.
	Pan By Line	Moves the build tray in the viewing pane according to the line you extend on the screen with the left mouse button.
	Pan Dynamic	Moves the build tray in the viewing pane as you move the cursor on the screen while holding down the left mouse button.
	Walk Dynamic	Zooms and moves the build tray as you hold down the left mouse button and move the cursor on the screen.
	Study Dynamic	Enables you to inspect the build tray from every angle and perspective. As you hold down the left mouse button and move the cursor on the screen, the view of the build tray changes.

Icon	Tool Tip Name	Purpose
	Spin Mode	When used with  and  , the movement of the build tray continues after you release the mouse button. To stop the movement, click in the active view pane or click one of these icons.
	Zoom In	Each mouse click zooms one step to the center of the active viewing pane.
	Zoom Out	Each mouse click zooms-out one step from the center of the active viewing pane.
	Pan Left	Each mouse click moves the build tray to the left in the viewing pane by one step.
	Pan Right	Each mouse click moves the build tray to the right in the active viewing pane by one step.
	Pan Up	Each mouse click moves the build tray up in the active viewing pane by one step.
	Pan Down	Each mouse click moves the build tray down in the active viewing pane by one step.
F	Advance Forward	The same as  . Each mouse click zooms in to the tray displayed in the active viewing pane.
B	Advance Backward	The same as  . Each mouse click zooms out of the tray displayed in the active viewing pane.
	Rotate Left	Each mouse click rotates the build tray to the left in the active viewing pane by one step.
	Rotate Right	Each mouse click rotates the build tray to the right in the active viewing pane by one step.
	Rotate Up	Each mouse click rotates the build tray up in the active viewing pane by one step.
	Rotate Down	Each mouse click rotates the build tray down in the active viewing pane by one step.
	Camera	Displays a virtual camera and its viewing angle of the tray.

Surface Finish

Models can be produced with a matte or glossy finish. To create a matte finish, the model is completely surrounded by a thin layer of support material.

Models produced with a glossy finish are printed with a resolution of 300 dpi (dots per inch) along the Y-axis, instead of the standard 600 dpi resolution.

Note: You can print a tray that contains models having both glossy and matte finishes. However, they will all be printed with a Y-axis resolution of 300 dpi.

To choose the finish type for a model:

1. Select the model.
2. In the *Options* tab of the *Entity Properties* dialog box, select *Matte* or *Glossy*.

or—

1. Right-click the model on the build tray.

At the bottom of the pop-up menu, the current finish type is *not* enabled (that is, you *cannot* select it).

2. To change the finish type, select the other (enabled) option.

Note: To distinguish between models with different finishes, the color of objects displayed on the build tray—when they are not selected—is different for each type. To view and change the color settings, see “Object Color Codes” on page 5-21.

Handling Completed Trays

After you have properly placed all objects on the build tray, you save the tray as an *otf* file, which is sent to the 3-D printer for production. But before saving the tray, you can check that there would be no problem producing it. You can also calculate how much material would be consumed during production and how much time this would take.

Tray Validation Before sending a job to the Eden printer for production, you should check that the tray is “valid” and can be printed.

Note: Because of the unique characteristics of each type of modeling material, make sure that the correct material is selected *before* performing Tray Validation.

To validate that the tray can be printed:

- From the *Tools* menu, select Tray Validation.

or—

- Click .

If the tray is not valid, the color of the problematic models on the tray changes according to a pre-set color code. If a warning message appears, click OK to close it.



Figure 5-26: Tray validation warning

Object Color Codes

To view the color code for objects displayed:

- From the *Tools* menu, select Constraints Settings.

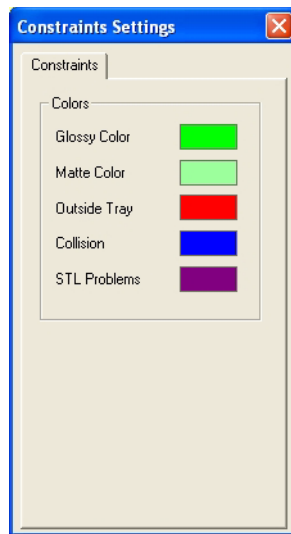


Figure 5-27: *Constraints Settings* dialog box, showing object color codes

To change the color settings:

1. Click the current color displayed in the *Constraints Settings* dialog box.
2. From the color palette that opens, select a color and click OK.

Note: The color of objects already displayed does not change automatically. The color change takes effect the next time an object's state is changed.

Production Estimate

Objet Studio enables you to calculate the time and material resources needed for producing trays before sending them to the Eden printer. The time it takes Objet Studio to make this calculation depends on the number of objects on the tray and their complexity. Calculating the production estimate for a full tray could take up to 15 minutes, depending on your computer's specifications. The results displayed are accurate within 10 percent of the actual resources needed.

To calculate the time and materials needed for producing the current tray:

- From the *Tools* menu, select Estimate Consumptions.

or —

- Click .

When Objet Studio finishes calculating the production resources, the results appear at the bottom of the screen.

Model Consumption __ 137 g, Support Consumption __ 56 g, Building Time (HH:MM) __ 02:28 Size __ 48.3 MB, N. triangles __ 336408

Figure 5-28: Production resource calculation

Saving the Tray File

Trays are saved as *off* files. You can save a tray before it is ready for production, and open it at another time to continue preparing it. When you send the tray to the Eden 3-D printer, it is first saved. If the tray was previously saved, the original file is overwritten at this time.

To save the tray file:

- From the *File* menu, select *Save Tray* or *Save Tray As*.

or—

- Click .

Printing the Tray File

When a tray is ready to be printed, its *otf* file is sent to Job Manager, where it is placed in the production queue. Job Manager pre-processes this file to create slices, and feeds them to the 3-D printer for production.

To send the tray to the production queue:

- From the *File* menu, select *Build Tray*.

or—

- Click .

The tray file is sent to Job Manager. Objet Studio closes and Job Manager opens, so you can monitor the progress of your trays.

Note: To return to Objet Studio, click the *New Job* icon .

Additional Objet Studio Features

Dividing Objects

You can use the Split Object feature to produce objects larger than the build tray by dividing the model into separate parts. You can also use this feature to produce only a specific section of a model.

To split an object:

1. Select the object.
2. From the *Object* menu, select *Split*.
3. In the *Split Object* dialog box, enter the values to determine how Objet Studio will divide the object. You can divide an object along any of its axes, by entering either exact measurements or the number of parts.

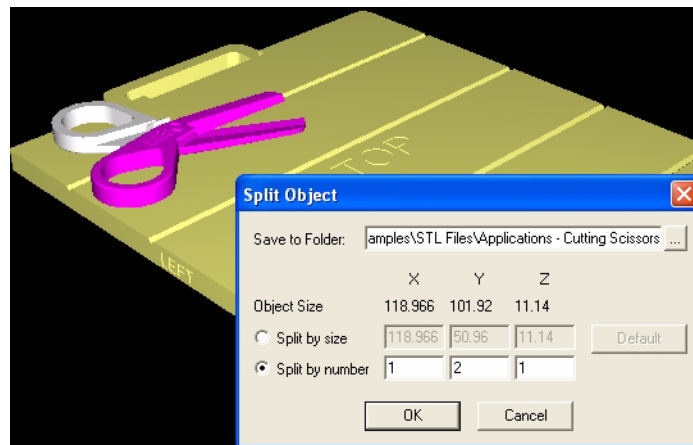


Figure 5-29: *Split Object* dialog box

4. In *Save to Folder*, enter the folder name.
5. Click OK.

The composite parts are saved as new *stl* files with “Part 1,” “Part 2,” etc., added to the original file name.

Note: Before printing the newly created *stl* files, it is recommended that you check them for defects in an STL-repair application, such as *Magics*, by Materialise.

Choosing the Support Strength

When producing models, support material fills some hollow and empty sections (see “Model Orientation” on page 5-9). Objet Studio allows you to adjust the strength of the structure formed with the support material. This adjustment is useful when producing either large/massive models or small/delicate models. For most purposes, the default setting provides adequate support strength.

To change the strength of the support structure used when printing a model:

1. Select a model on the build tray.
2. In the *Options* tab of the *Entity Properties* dialog box, click *Advanced*.

The *Advanced Properties* dialog box opens.

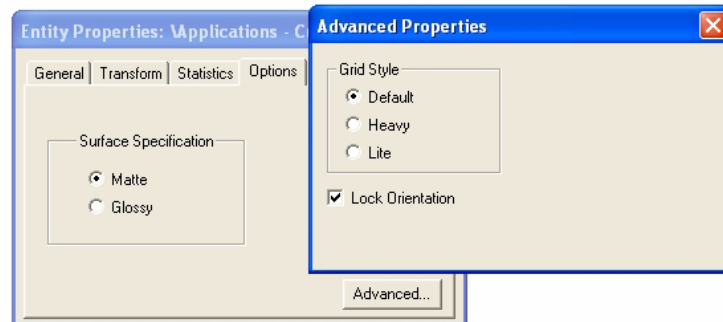


Figure 5-30: *Advanced Properties* dialog box—Grid Style selection

3. In the *Grid Style* section, choose the support strength suitable for the selected model:
 - **Heavy**—for large models needing much support.
 - **Lite**—for delicate models needing little support.
 - **Default**—for models needing average support (most models).

Note: You can select a different support strength for each model on the build tray.

4. Close the *Advanced Properties* dialog box.



The *Lock Orientation* option is not connected to the Grid Style selection. This setting is described in “Freezing an Object’s Orientation” on page 5-16.


Displaying the Cross Section of Objects

The *Section* feature enables you to view the interior of an object by “slicing” it on any axis. You can then manipulate the object to inspect the interior from different angles. This may be important for deciding on the type of support necessary when producing the model (see “Choosing the Support Strength” on page 5-23). Displaying an object’s cross section only affects how the tray is displayed on the screen; it does not change the object itself.

To display a cross section of the tray:

1. From the *Tools* menu, select *Section*.

or—

Click  on the toolbar.

The *Section* dialog box opens.

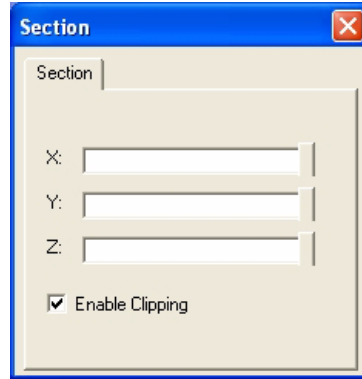


Figure 5-31: Section dialog box

2. Select the *Enable Clipping* check box.
3. Use the slider controls for the X-, Y-, and Z-axes to cut the tray so that you see the cross section you want.

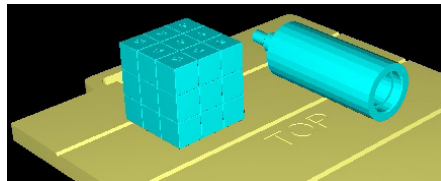


Figure 5-32: Whole view

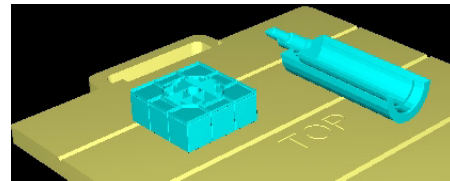


Figure 5-33: Cross-section view, after using the Z-slider

Printing the Screen Display on Paper

You can print the view displayed in the active pane on a regular (paper) printer. Before printing, you can configure how the tray will be printed on the page, and you can display a screen preview of the printed page.

To access the paper printing controls:

- From the *File* menu, select—
 - ☐ Page Setup...
 - ☐ Page Preview...
 - ☐ Print

You can also print a paper copy of the tray by using the standard Windows keyboard shortcut for printing: **Ctrl+P**.

Saving the Screen Display as an Image File

You can save the image displayed in the active viewing screen as a graphic file.

To save the screen display as an image:

1. From the *File* menu, select *Save Bitmap...*

The *Save Bitmap* dialog box opens.

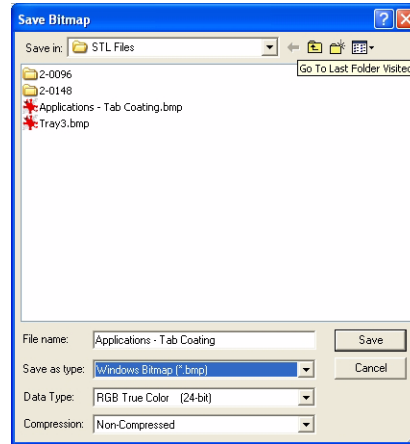


Figure 5-34: *Save Bitmap* dialog box

2. At the top of the dialog box, select the appropriate folder.
3. At the bottom of the dialog box, enter a file name.
4. Open the *Save as type* pull-down menu, and select the file format.
5. Click *Save*.

Exporting and Importing Objet Build Trays

When you save build trays in Objet Studio, they are saved as *otf* files. These files contain instructions to Objet Studio and to Eden 3-D printers for displaying and producing the *stl* files used on the tray. To save all of the files that comprise the build tray, for storage or transfer to another location, Objet Studio compresses them into one *ozf* file. To open an *ozf* file in Objet Studio, the file must first be expanded and its component files saved.

To create an *ozf* file:

1. From the *File* menu, select *Export Packed Job...*
The *Save As* dialog box opens.
2. Select the appropriate folder and change the file name (if necessary).
3. Click *Save*.

To open an *ozf* file:

1. From the *File* menu, select *Import Packed Job...*
2. In the *Open* dialog box, display the appropriate folder and select the file.
3. In the *Browse for Folder* dialog box, display the folder in which you want Objet Studio to expand the compressed file, and click *OK*.

The *otf* file and associated *stl* files are expanded and placed in the selected folder, and the tray is displayed in Objet Studio.

Advanced Features

The Objet Studio features described in this section are only accessible if the application is set to *Advanced* mode.

To see the current Objet Studio setting:

- Open the *Tools* menu.

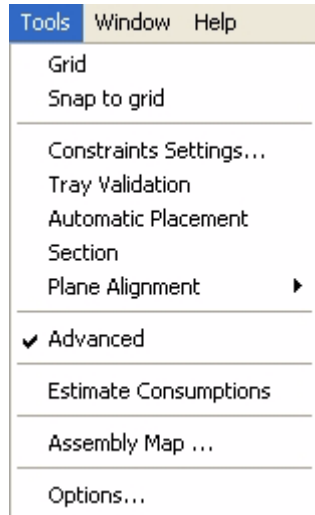


Figure 5-35: *Tools* menu, showing *Advanced* mode selected

If *Advanced* is checked, the advanced features are enabled.

To change the *Advanced* setting:

- Click *Advanced* in the *Tools* menu.

The following message is displayed, reminding you that the change will only take effect the *next time* you open Objet Studio, even though the check mark in the *Tools* menu appears/disappears after you make the change.

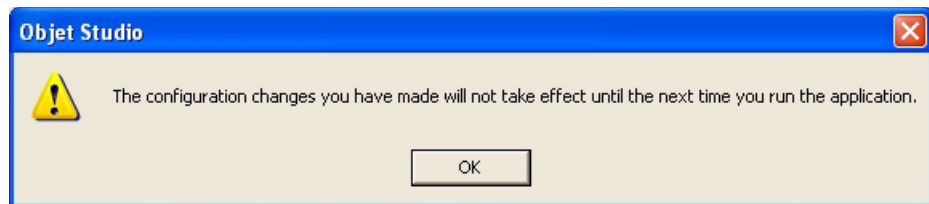


Figure 5-36: Configuration-change message

Save Tray As... In addition to saving the tray as an *otf* file, for printing with an Eden 3-D printer, you can save a group of objects positioned on the tray as an *stl* file. You can then use this file as any other *stl* file, both in Objet Studio and in other applications. You can also display this and other *stl* files as “floating” objects, without the build tray. This is useful for inspecting objects from every angle.

To save the build tray as an *stl* object:

1. From the *File* menu, select *Save Tray As...*

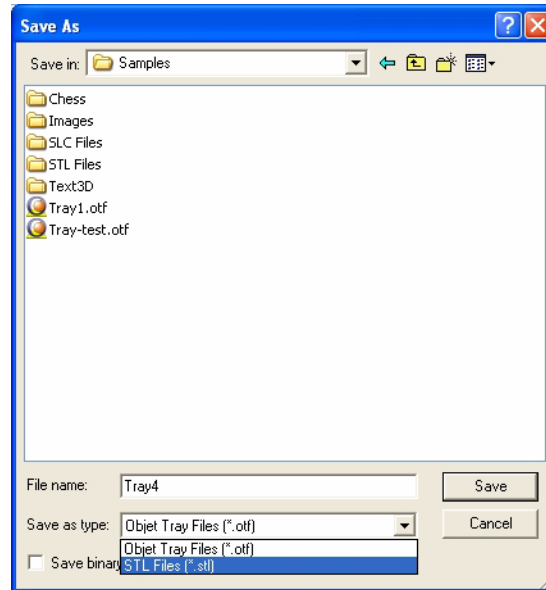


Figure 5-37: *Save As* dialog box

2. At the top of the dialog box, select the appropriate folder.
3. At the bottom of the dialog box, enter a file name.
4. Open the *Save as type* pull-down menu, and select *STL Files (*.stl)*.
5. Click *Save*.

To display *stl* files without the build tray:

1. From the *File* menu, select *Open Tray*.
2. In the *Open* dialog box, open the *Files of type* pull-down menu, and select *STL Files (*.stl)*.
3. Click *Open*.

A three-dimensional image of the file is displayed. You can use many of the Objet Studio tools to manipulate the image on the screen.

Configuring the GL Driver

The GL driver displays 3-D graphics on your screen. There is normally no reason to adjust its settings. If you suspect a problem with the way Objet Studio displays objects, you can use the OpenGL Driver Configuration tool to check and configure the driver settings.

To access the OpenGL Driver Configuration dialog box:

1. From the *Tools* menu, select *Options*.
2. In the *Options* dialog box, display the *Advanced* tab and click *OpenGL Driver Configuration...*



Figure 5-38: Accessing GL-driver configuration

Note: If the *Advanced* tab is not displayed, activate the *Advanced* setting in the *Tools* menu and restart Objet Studio.

The dialog box that opens contains tabs that display the pixel format ID (index) for the window and the memory.

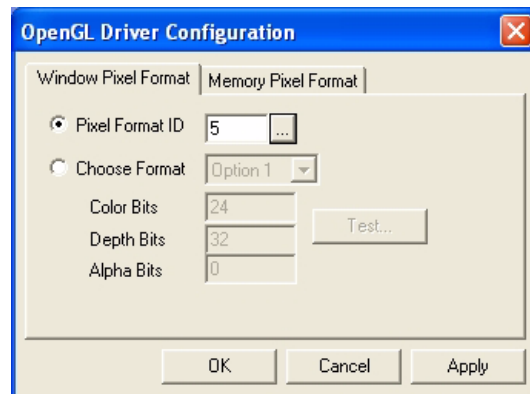



Figure 5-39: OpenGL Driver Configuration dialog box

You can display the values and make changes to them by clicking . Alternately, you can select *Choose Format* and change the values in this dialog box.

To perform a test of the driver configuration and enter the suggested pixel format ID:

1. Select Choose Format.
2. Click Test.

Objet Studio returns the recommended pixel format ID.

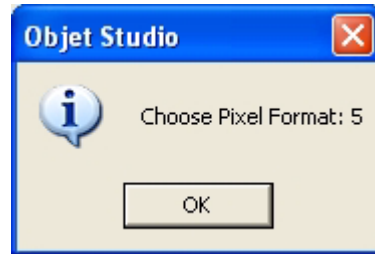


Figure 5-40: Recommended pixel format ID

3. Click OK.
4. In the OpenGL Driver Configuration dialog box (figure 5-39), select Pixel Format ID and enter this number.
5. Click Apply.
6. Display the other pixel format tab, and repeat this procedure.

Using Job Manager

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The Job Manager application is different for client workstations and for the computer connected directly to the Eden 3-D printer.

- Job Manager installed on client computers displays the queue and status only for jobs sent to the 3-D printer server from that computer, and allows the user to edit only these jobs.



If there are several printers on the local network, client computers can connect to any of them, but only one at a time.

- Job Manager installed on the computer directly connected to a specific 3-D printer displays the queue and status for all jobs sent to that 3-D printer by client computers on the network. It also allows editing and manipulation of all jobs, and enables re-sending previously-printed jobs to the printer.

Client Job Manager

When you open the client Objet Studio / Job Manager software for the first time, a dialog box opens prompting you to connect to an Eden server computer. To do this, the server computer must be operating and connected to the local network.

- Click **Browse** to find and select the name of the required server computer and then click **OK** to close the dialog box.

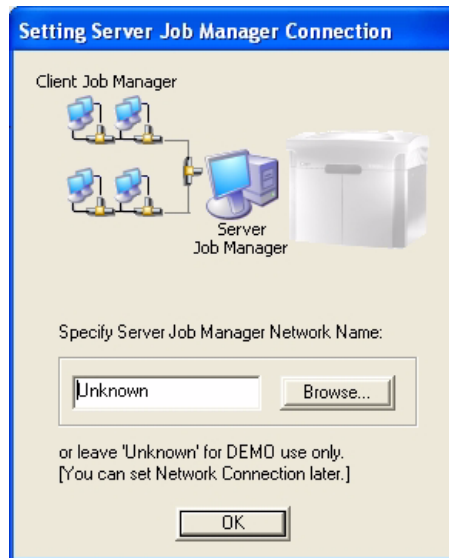



Figure 6-1: Server connection dialog box

To change the server-computer connection (to connect to another printer):

- From the *Job Manager* screen, click the *Connect* icon  on the toolbar, or open the 3-D Printer menu and select **Set Printer**.

Job Manager Screen

On a client computer, Job Manager displays the queue of jobs sent by that computer to the Eden printer server.

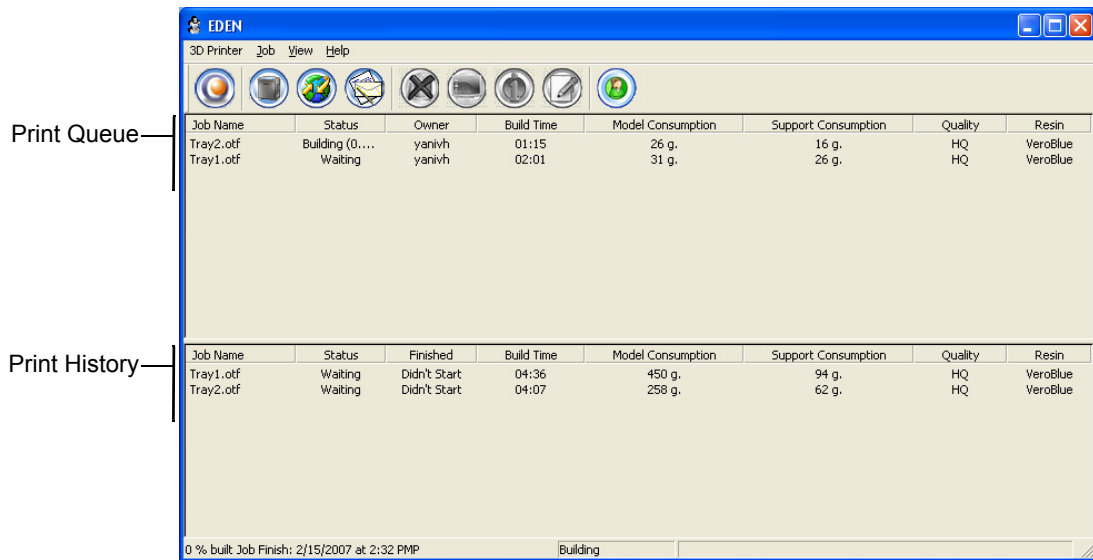



Figure 6-2: Client Job Manager screen

Information for each of the queued jobs is displayed, including the job status:

Status	Meaning
Waiting	Printing of this job has not started.
Building	Printing of this job is in progress.
Paused	Printing of this job began, but was interrupted by the administrator before being completed.
Stopped	Printing of this job was terminated by the administrator, and was put in the print queue again.
Error	Errors occurred during the printing of this job, and it was placed in the print queue again.
Editing	This job is now being edited in Objet Studio.
Previewing	The operator at the server computer is inspecting the model's slices.
Spooling	The job file is being spooled in the Eden printer.
Preprocessing	The Eden printer is readying itself for printing: the cover locks, print heads warm up and are put in starting position, UV lamps are turned on, build-tray level is adjusted.










Even after sending a build tray to the 3-D printer, you can inspect the tray—and make changes to it, if necessary—as long as it is still in the print queue.


To inspect the build tray:

1. Select the job.
2. Click the *Edit Job* icon  or open the *Job* menu and select *Edit*.

Objet Studio opens, displaying the build tray. To make changes to it, see “Making changes to a Job” on page 6-9.

The following operations are available from the client Job Manager interface:

Icon	Menu Option	Purpose
	3-D Printer > New Job	Launches Objet Studio; to prepare new trays.
	3-D Printer > Set Printer	Displays a network-browsing dialog box, to connect to an Eden server computer. To specify a computer, it must be operating and connected to the local network.
	--	Displays the status of the Eden 3-D printer (see figure 6-3).
	3-D Printer > Report	Displays options for user messages and alerts (paper printer, e-mail, SMS—see “User Alerts” on page 6-5).
	Job > Delete...	Removes the selected job from the queue.
	Job > View...	Opens a window displaying the selected tray. In this window, you can view the tray from different angles.
	Job > Properties	Opens a window displaying the properties of the selected model.
	Job > Edit	Launches Objet Studio and loads the current tray, to enable making changes to the tray after it is sent to the server but before it is printed.
	Help > About...	Displays the Job Manager version.

The 3-D printer Status screen enables clients to monitor the progress of printing jobs. To display the screen, click the *Machine Status* icon .

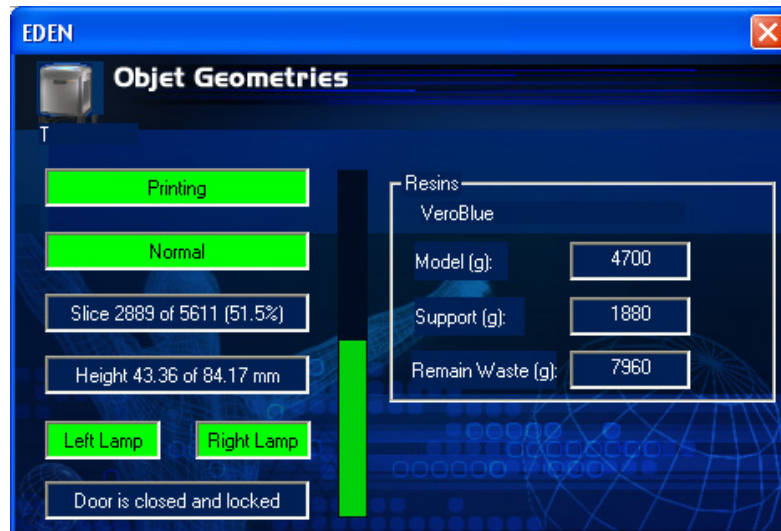


Figure 6-3: Eden printer status screen

User Alerts

Job Manager can alert you and others to the status of the jobs sent to the server for printing. The following events can be reported:

- The level of model or support material is low.
- The job was interrupted.
- The job was completed successfully.

To send messages, make sure that e-mail software supporting MAPI is installed on the Eden server computer. To send SMS messages, the e-mail program must convert the messages and transmit them. Microsoft *Outlook*, for example, can do this; *Outlook Express* cannot. In addition, the cellular phone service must support the transmission of e-mail messages by SMS. With SMS alerts, only the subject line of the e-mail message is transmitted.

Note: In the e-mail program, make sure the security settings are set to “low” and add the server Job Manager to the “trusted” list (select Tools > Options, Security tab).

To configure Job Manager to send notifications and alerts for your jobs:

1. Click  or select Report from the 3-D Printer menu.

The *Preferences/Reports* dialog box opens.

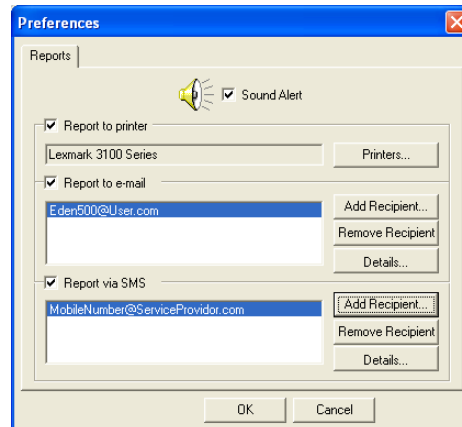


Figure 6-4: User alerts settings

2. For e-mail and SMS alerts, click **Add Recipient** in the respective sections.
3. To choose the events reported to you by Job Manager, click **Details** in the relevant sections.

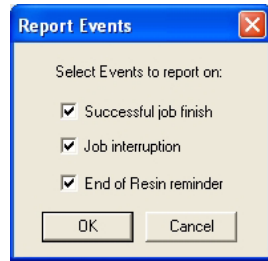


Figure 6-5: Event selection for alerts

4. Select the desired events for sending alerts and click **OK**.



The parameters for “Low level of material” alerts are set on the Eden server computer.

Server Job Manager

When you open the server Objet Studio / Job Manager for the first time, you are prompted to connect to an Eden 3-D printer. To do this, the printer must be on and connected to the local network. If you click **Yes**, the Setting Network Connection dialog box opens.

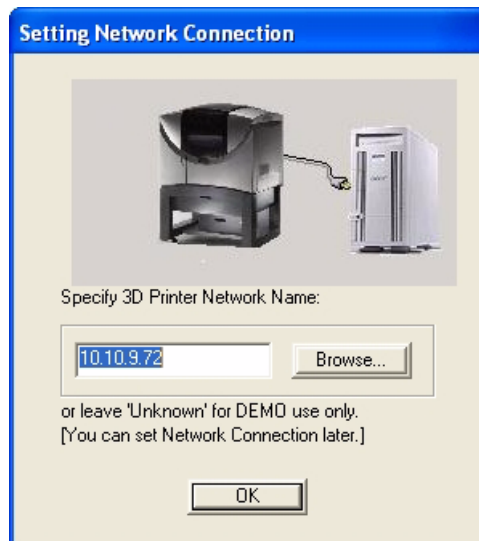


Figure 6-6: Eden-printer connection dialog box

Click **Browse** to find and select the name of the computer inside the Eden printer and then click **OK** to close the dialog box.

Job Manager Screen

On a server computer, Job Manager displays the queue of jobs sent to it by all client computers. In addition, it lists details of the last 15 jobs sent to the printer, and information about the job currently being printed.

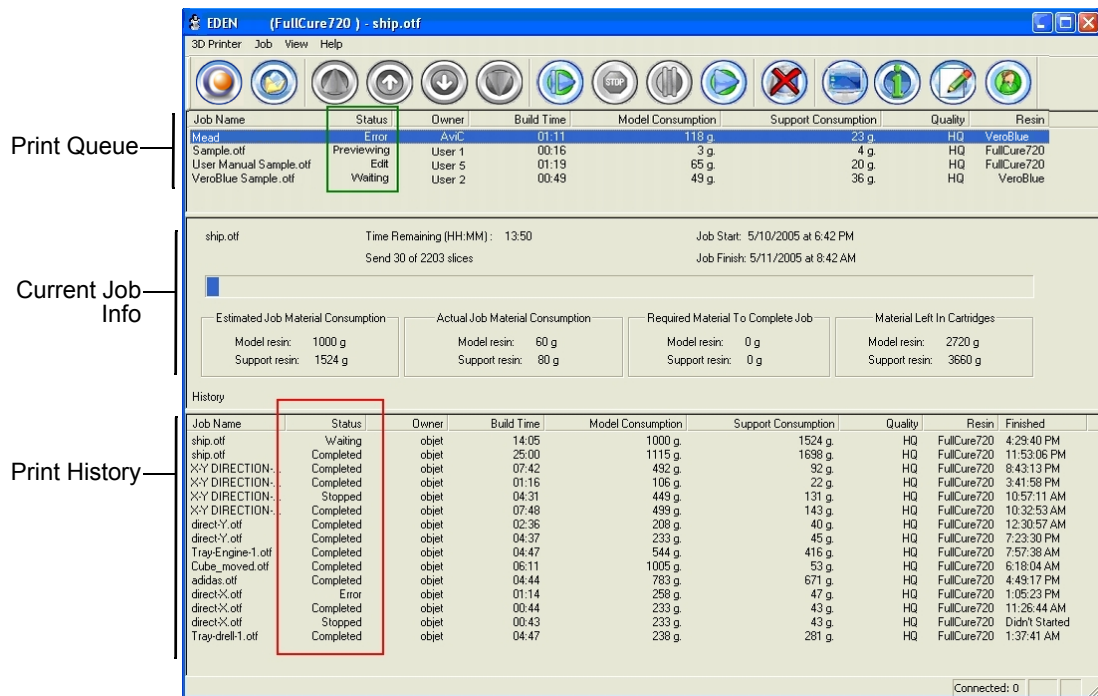


Figure 6-7: Server Job Manager screen

Print Queue


Information for each of the queued jobs is displayed, including the job status:

Status	Meaning
Waiting	Printing of this job has not started.
Building	Printing of this job is in progress.
Paused	Printing of this job began, but was interrupted by the administrator before being completed.
Stopped	Printing of this job was previously terminated by the administrator, and later put in the print queue again.
Error	Errors previously occurred during the printing of this job, and it was placed in the print queue again.
Editing	This job is now being edited (with Objet Studio) on the Eden server computer.
Previewing	The slices of this job are being displayed in a separate window. (To display the job tray, open the Job menu and select Preview Slices.)
Spooling	The job file is being spooled in the Eden printer.
Preprocessing	The Eden printer is readying itself for printing: the cover locks, print heads warm up and are put in starting position, UV lamps are turned on, build-tray level is adjusted.

Job History

The *History* section of the Job Manager screen lists details of the last 15 jobs sent for printing, showing the job's final status. A job can be returned from the *History* section to the print queue in order to print the tray again.

To move a job from *History* to the print queue:

1. Select the job in the *History* section.
2. Click the *Resume* icon .

The job moves from the *History* section to the end of the print queue.







Note: Alternatively, you can drag the job from the *History* section to the print queue.












To manipulate jobs in other ways, see “Job Manager Operations,” below.

Job Manager Operations

The following table summarizes the main operations available from the server Job Manager interface. Many of the icons are active only if a job is selected.


Icon	Menu Option	Purpose
	3-D Printer > New Job	Launches Objet Studio for preparing new trays.
	3-D Printer > Set Printer	Displays a network-browsing dialog box, to connect to an Eden server computer. To specify a computer, it must be operating and connected to the local network.
	3-D Printer > Add Job...	Enables you to load previously-saved jobs (<i>otf</i> files).
	3-D Printer > Report	Displays options for user messages and alerts (paper printer, e-mail, SMS—see “User Alerts” on page 6-5).
	— — —	Moves the selected job to the head of the print queue.
	— — —	Moves up the selected job by one step in the print queue. Note: It is recommended that you group together jobs to be printed with the same type of model material. This way, the need for changing model material between jobs is reduced.
	— — —	Moves down the selected job by one step in the print queue.
	— — —	Moves the selected job to the end of the print queue.

Icon	Menu Option	Purpose
	Job > Restart Job	<i>For a stopped job in the print queue:</i> Starts printing the selected job from the beginning. <i>For a selected job in the History section:</i> Moves the job to the print queue and changes its status to <i>Waiting</i> .
	Job > Stop...	Instructs the Eden printer to stop printing after curing the currently printed slice. (Printing can be continued with the <i>Resume</i> icon or menu option.)
	Job > Pause...	Instructs the Eden printer to stop printing after curing the currently printed slice. <i>Use instead of Stop when you intend to continue printing the job shortly.</i>
	Job > Resume	Continues printing the current job after printing was stopped with the <i>Stop</i> or <i>Pause</i> icon or menu option.
	Job > Delete Job...	Removes the selected job from the queue.
	Job > Review Job...	Opens a window displaying the selected tray. In this window, you can view the tray from different angles.
	Job > Job Info...	Opens a window displaying the properties of the selected model.
	Job > Edit Job...	Launches Objet Studio and loads the selected tray, to enable making changes to it before being printed. (See “Making changes to a Job,” below.)
	Help > About...	Displays the Job Manager version.

Making changes to a Job

From the job (“print”) queue of Job Manager, you can open jobs to make changes to them before printing.

To make changes to a job:

1. Select the job in the print queue.
2. Click the *Edit Job* icon  or open the *Job* menu and select *Edit*.
Objet Studio opens, displaying the build tray. (The status of the job in Job Manager changes from “Waiting” to “Editing.”)
3. Make changes to the build tray in Objet Studio (see chapter 5, “Using Objet Studio”).
4. In Objet Studio, save the changes by selecting **File > Save Tray** (or by pressing **Ctrl+S**).
5. Close Objet Studio.

The status of the job in Job Manager changes back to “Waiting.”

User Alerts

Job Manager can alert you and others to the status of the jobs sent to the server for printing. This is especially useful during long printing jobs, when the operator is away from the Eden 3-D printer. The following events can be reported:

- The level of model or support material is low.
- The job was interrupted.
- The job was completed successfully.

For details on how to configure alert messages, see “User Alerts” on page 6-5.

To set parameters for “Low level of material” alerts:

1. From the *3-D Printer* menu, select *Material Consumption...*
2. In the dialog box that opens, set the time or the material weight remaining that triggers the alert message.

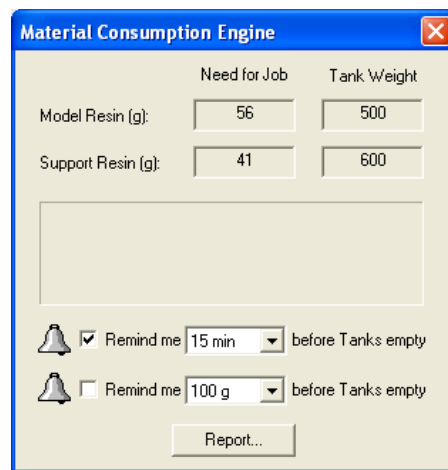
The image shows a software dialog box titled "Material Consumption Engine" with a standard Windows-style title bar (blue with a close button). The dialog has a light beige background. At the top, there are two column headers: "Need for Job" and "Tank Weight". Below these, there are two rows of input fields. The first row is for "Model Resin (g):" with a value of "56" in the "Need for Job" column and "500" in the "Tank Weight" column. The second row is for "Support Resin (g):" with a value of "41" in the "Need for Job" column and "600" in the "Tank Weight" column. Below these input fields is a large empty rectangular box. At the bottom of the dialog, there are two bell icons representing alerts. The first alert is checked and labeled "Remind me 15 min before Tanks empty". The second alert is unchecked and labeled "Remind me 100 g before Tanks empty". At the very bottom center is a button labeled "Report...".

Figure 6-8: Materials Consumption alert dialog box

The dialog box shown above also pops up over the Job Manager screen to alert the operator that there is not enough material loaded in the printer to complete the current job. As long as this condition exists, a warning icon appears in the lower-right corner of the Job Manager screen.

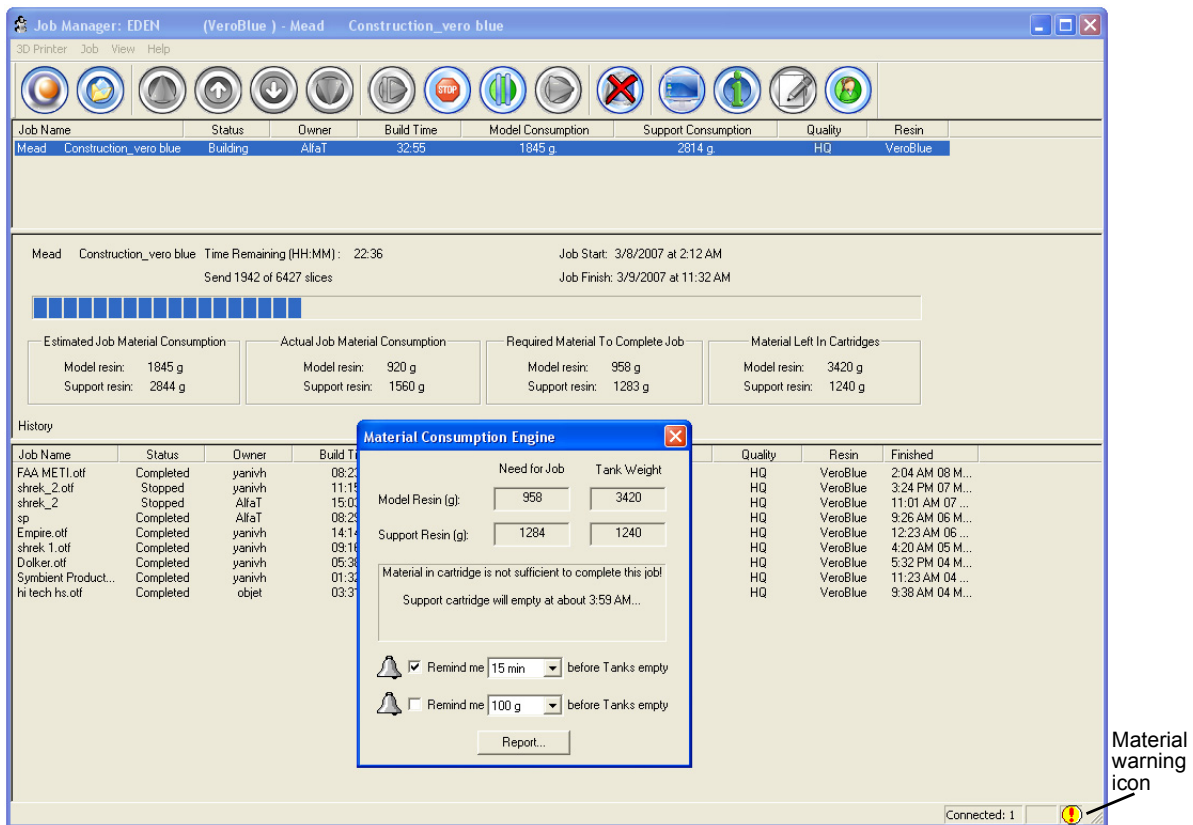


Figure 6-9: Insufficient material warning

When the time set in the dialog box triggers the remote alert message, the warning icon changes color—from a yellow to a red background.

Sending the Tray to the 3-D printer for Production

If there is a job in the print queue, it is sent automatically to the Eden printer—as long as it is on, there is a connection to the printer, and the printer is on line. Chapter 7 describes starting and operating the Eden printer.

Operating & Maintaining the Eden 3-D Printer

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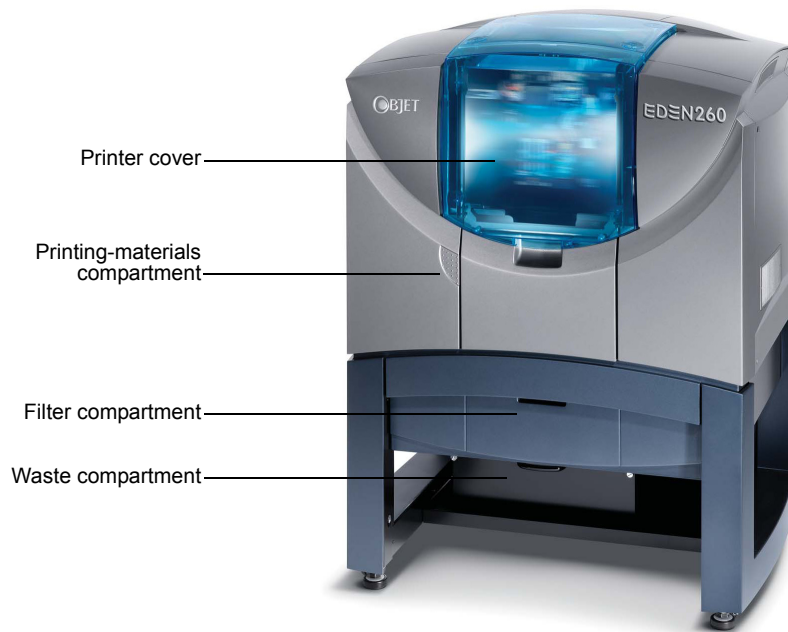


Figure 7-1: The Eden260 3-D Printer

Starting the Eden260 3-D Printer



CAUTION!

- Do not attempt to operate the Eden printer before being trained by an Objet customer-support representative.
- Observe all safety warnings and follow the safety guidelines described in chapter 2.

1. Turn on the switch that controls the power outlet to which the Eden printer is connected.

When the Eden printer turns on, so does the built-in Eden computer.

2. After the computer boots, log in to Windows and launch the Eden control software:

- On the desktop, double-click the *Eden260* icon.

or —

- From the *Start* menu, select *Objet > Eden260*.

The Eden printer interface screen opens (see figure 7-2). All monitoring and controlling of the Eden printer is done from this interface.



Figure 7-2: Eden260 interface



Eden installations utilize one monitor for displaying both the computer running Objet Studio / Job Manager and the computer installed inside the Eden printer. Make sure that the KVM (keyboard-video-mouse) switch is in the correct position so that the Eden printer interface is displayed.

Loading Model and Support Cartridges

The Eden260 printer uses one cartridge of model material and one cartridge of support material, each weighing 2 kilograms when full. A graphical representation of the cartridges and their current weight appears in the Eden interface.



If you need to replace the model material currently installed with another type, see “Changing the Model Material” on page 7-8. Otherwise, make sure to replace the model cartridge with one containing the same type of material.

To load model and support cartridges:

1. On the front of the Eden printer (see figure 7-1), push the door of the printing-materials compartment to release and open it.
2. If you are replacing a cartridge, grasp its handle and pull the cartridge out, taking care not to twist or turn it.
3. Insert model and support cartridges in their respective drawers—the model cartridge on the right, and the support cartridge on the left. (Note that the cartridges only fit into their correct drawers.)
You should feel some resistance, as a needle pierces the cartridge.
4. Check the Eden interface to make sure that the new cartridge is detected and that its weight is displayed (see figure 7-2).
5. Close the printing-materials compartment door.



Tips about replacing cartridges:

- You can replace resin cartridges either before or during printing.
- You can replace partially used cartridges to avoid the need for replacing them during printing.
- You can load partially used cartridges, as long as they contain more than 100 grams of material.

Producing Models

Before beginning to produce models, it is recommended that you check the current printing quality of the printing heads by performing a pattern test (see “Pattern Test” on page 7-17).

To prepare the Eden printer for producing models:

1. Make sure that the build tray in the Eden printer is empty and clean.
2. Make sure that there is sufficient model and support material loaded in the printer, as indicated in the Eden interface (see figure 7-2). You may want to replace the cartridges of material currently loaded in the printer to avoid the need for replacing them during printing.
 - For installing material cartridges and replacing empty ones, see “Loading Model and Support Cartridges” on page 7-3.
 - For changing the type of model material currently loaded, see “Changing the Model Material” on page 7-8.
3. At the bottom of the Eden interface, click the red button to switch the printer to online mode (see figure 7-2.)

The color of the button changes from red to green. If there is a job in the Job Manager queue, it is sent (in slices) to the Eden printer. On the Eden interface, the printer mode changes from *Idle* to *Pre-print*, as the printer’s components prepare themselves for production:

- The print block is heated.
- The UV lamps are powered and they warm up.



You can monitor printer status indicators by switching the Eden interface display. To do this, click the display toggle button in the Eden interface.

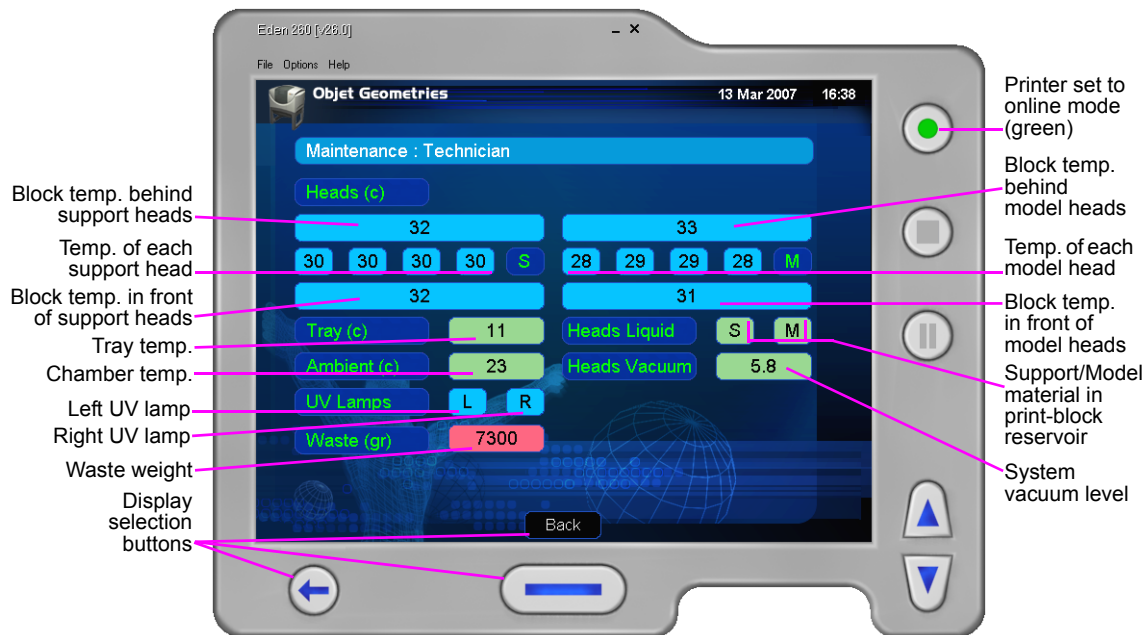


Figure 7-3: Eden printer indicators

Eden Interface Color Key

The background colors in the Eden indicator fields tell you at a glance whether or not the value or item is suitable or ready for printing.

- **Green**—suitable/ready for printing

For example, in figure 7-3:

- ❑ *Ambient*—The ambient temperature of the printing chamber is within the acceptable range.
- ❑ *Heads Liquid*—The level of model and support material in the print-block reservoir is OK.
- ❑ *Heads Vacuum*—The vacuum level in the system is within the acceptable range.

- **Red**—not suitable for printing (or indicates a warning)

For example, in figure 7-3:

- ❑ *Waste*—The weight of the waste container is 7300 grams, more than allowed when beginning a print job. (See “Replacing the Waste Container” on page 7-39.)

- **Blue**—not ready for printing

For example, in figure 7-3:

- ❑ *UV lamps*—The UV not on (or not operating at full power).
- ❑ *Heads*—The heads have not reached the temperature required for printing models.

Printing Indicators

When the printer is ready, the main Eden interface screen changes (see figure 7-4):

- The mode changes from *Pre-print* to *Printing*.
- The specific activity being performed is shown in the “current activity” field.
- Current job-printing information is displayed.
- The printing progress bar is displayed.
- The *Stop* and *Pause* buttons are enabled.



Figure 7-4: Eden interface during printing

When printing begins, Job Manager sends seven slices to the Eden printer. This is the standard buffer between the Job Manager and the printer. As each slice is printed, the Job Manager sends another slice to the printer.

Depending on the size of the model(s) to be produced, printing can take between several hours to several days. As long as there is enough model and support material in the supply cartridges, printing proceeds automatically until the job is finished.




During printing, the server computer must remain on and it must communicate with the Eden printer. Do not log-off Windows until printing is finished.

Resuming Production After Printing has Stopped

If the printing process is interrupted for any reason, Job Manager stops sending slices to the Eden printer.

To continue printing the model:

1. Switch the printer to online mode by clicking the red button at the bottom of the Eden interface (see figure 7-2 on page 7-3).
The button changes from red to green (see figure 7-3 on page 7-5).
2. Make sure that the computer network connecting the printer and Job Manager server is active.

3. In the Job Manager interface, click the Resume icon .
4. In the *Continue from Slice* dialog box that appears, confirm the slice number, after checking the Eden printer interface.

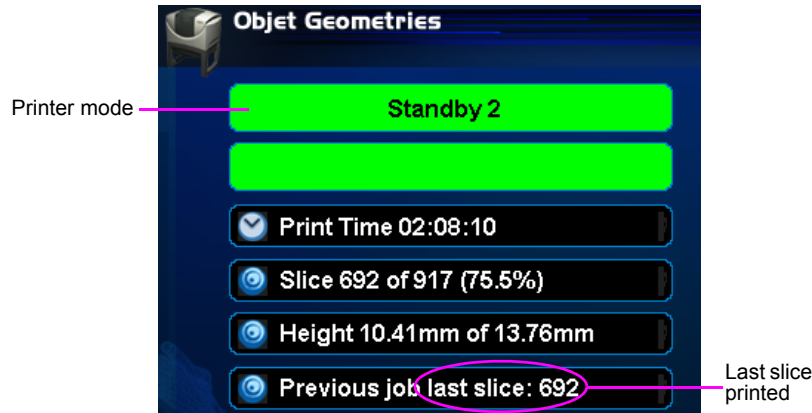


Figure 7-5: Eden interface after interrupted printing



Figure 7-6: *Continue from Slice* confirmation dialog box in server (Job Manager) interface

5. If, for any reason, the correct number does not appear in the dialog box, enter the number and click OK.

You cannot continue printing the model if:

- The number of the last slice printed does not appear in the Eden interface, even if the server computer displays the *Continue from Slice* confirmation dialog box.
- There was a relatively long interruption in printing, even if the “last slice” and “continue from slice” indicators are correct. The part of the model already printed may deform or shrink, and there might be a visible difference between it and the newly printed part. The effects of a printing stoppage on a model depend on the model size and structure, model material used, ambient temperature and the length of the stoppage.

If you cannot continue printing:

1. Cancel the print job in Job Manager.
2. Remove the partially printed model from the build tray.
3. Send the job to the Eden printer again.



You can stop and resume printing from either the Eden printer interface or the Job Manager interface, since both components are updated with this command. However, the effect of using the *Pause* button in the printer interface is local; you can only resume printing from the printer interface.

Changing the Model Material

Before producing models using a different type of material (resin) than is currently installed, you must flush the printing block and feed tubes by running the Resin Replacement wizard.

To replace the model material:

1. Start the Resin Replacement wizard from the *Options* menu.



Figure 7-7: Starting the Resin Replacement wizard from the *Options* menu

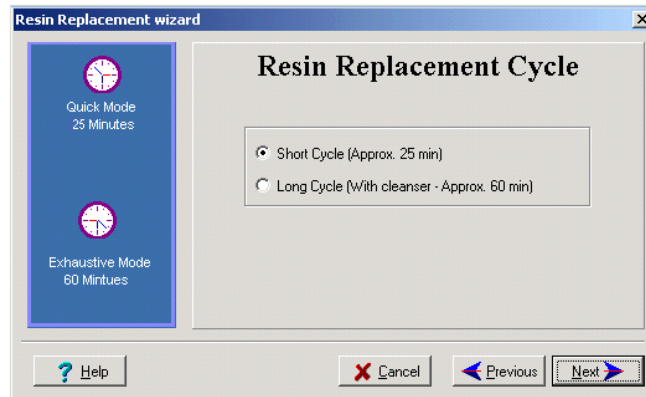
2. From the opening screen, click **Next** to display the *Resin Selection* screen.
3. From the drop-down menu, choose the type of model material (resin) you want to install, and click **Next**.



Figure 7-8: *Resin Selection* screen

Note: This selection automatically affects the resin setting in Objet Studio.

4. In the *Resin Replacement Cycle* screen, choose the appropriate cycle for the model material you want to install. Two options are available, depending on the new model material to be used:
 - *Short Cycle*, for changing to a darker and more opaque material.
During this cycle, which takes about 25 minutes, the air valve is opened, and the pump purges the material from the feed tube and printing block.
 - *Long Cycle*, for changing to a lighter and more transparent material.
During this cycle, which takes about 60 minutes, the feed tube and printing block are flushed with a cleansing solution after being purged of the current material.

Figure 7-9: *Resin Replacement Cycle* screen

Note: The short cycle does not require user intervention. The long cycle, however, requires user presence to replace material cartridges in the printer.

5. Click **Next**, and take note of the warning screen.

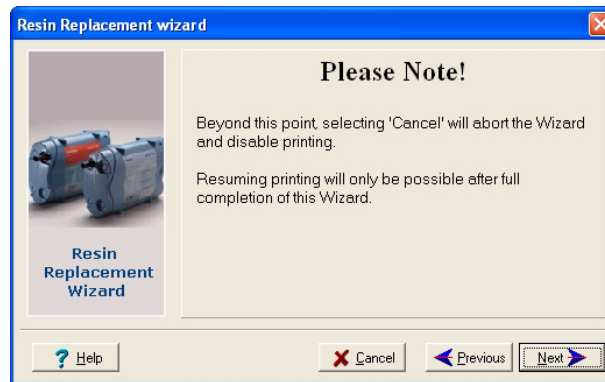


Figure 7-10: Resin Replacement warning screen

6. To continue, click **Next**.



Once you start this procedure, you must complete it before you can produce models with the Eden printer. To perform the procedure at another time, click **Cancel**. If you continue (by clicking **Next**) and you do not complete the procedure, you must start the Resin Replacement wizard again (see step 1 on page 7-8) before producing models.

7. When prompted by the wizard screen, remove the model-material cartridge. Select the check box to confirm that you have done so, and click **Next**.

- If you are performing the short resin-replacement cycle, continue with step 10.
- If you are performing the long resin-replacement cycle, continue with step 8, below.

8. When prompted, insert the cleanser cartridge in place of the model material that you removed. Select the check box to confirm that you have done so, and click **Next**.

The wizard flushes the print heads with the cleanser. This takes about 25 minutes.



Figure 7-11: Resin replacement (long cycle): flushing heads with cleanser

9. When prompted, remove the cleanser cartridge. Select the check box to confirm that you have done so, and click **Next**.

The wizard clears the print heads and feed tubes of the cleanser. This takes about 5 minutes.



Figure 7-12: Resin replacement (long cycle): clearing heads of cleanser

10. When prompted, insert the new cartridge of model material. Select the check box and click Next.

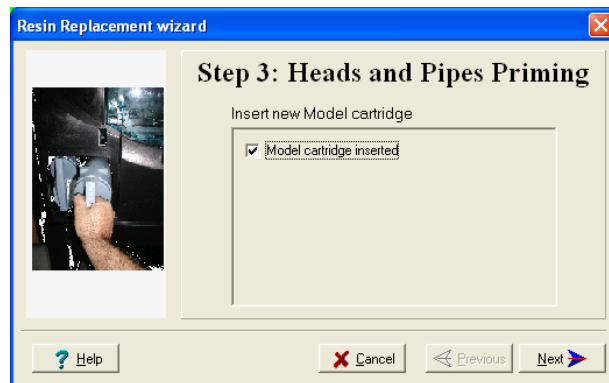


Figure 7-13: Insert New Model Container screen

The Eden printer begins the process of filling the print heads with the new model material. This may take up to 15 minutes.

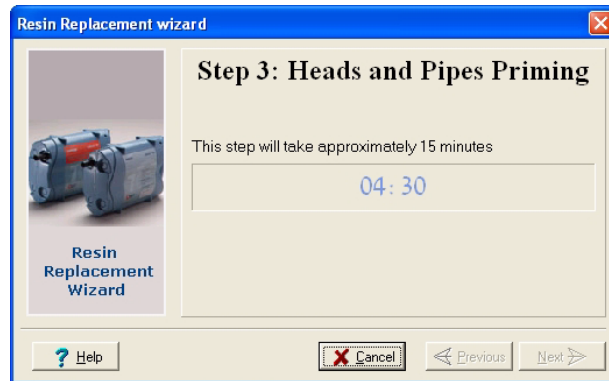


Figure 7-14: Resin replacement: filling heads with new model material

11. When the final wizard screen appears, click Done to close the wizard.



CAUTION: Dispose of cartridges of Eden model and support material in accordance with all applicable laws and regulations. If necessary, the cartridges can be disassembled for recycling. If this is done, protect the person handling the cartridges from direct exposure to uncured resins.

Keeping the Eden 3-D Printer in Idle Mode

Between printing jobs, the Eden 3-D printer can be kept on for up to one week. If the printer will not be used for more than a week, use the shutdown wizard to automatically perform the procedures that must be done before turning off the printer (see “Shutting Down the Eden 3-D Printer,” below).

When the Eden 3-D printer stops printing models, the Eden application automatically reduces the temperature of the printing heads as follows:

Time after printing	Mode	Change in heating of print heads
first 15 minutes	<i>Standby 1</i>	none
next 10 hours	<i>Standby 2</i>	heating reduced (to room temp.)
after 10 hours	<i>Idle</i>	heating stopped

Note: The printer mode is indicated in the green field on the left of the Eden interface (see figures 7-2, 7-4 and 7-5 on pages 3–7).

If, after printing a job, you know that the printer will not be used for 10 hours or more, you can immediately turn off the heating of the print heads by putting the printer into *Idle* mode.

To put the printer into *Idle* mode:

- Exit the Eden application (the Eden interface).

Note: The printer remains in *Idle* mode until you open the Eden application and begin printing again.



When the printer is in *Idle* mode, do **not** turn it off, unless you want to shut down the printer for more than a week. Keep the cover closed.

Shutting Down the Eden 3-D Printer

You only need to shut down the Eden 3-D printer if it will not be used for a week or more. To properly shut down, the printer needs to perform several processes. These are controlled by the shutdown wizard. Always use this wizard, instead of just closing the Eden printer interface.

To run the Eden shutdown wizard:

1. From the Options menu, select Shutdown or press F8.



Figure 7-15: First Shutdown Wizard dialog box

2. In the Shutdown Wizard dialog box, click **Next**.
3. In the next wizard screen, verify that the tray is empty and click **Next**.

The shutdown procedure begins, and the steps of this procedure are displayed in the dialog box that follows.



Figure 7-16:Shutdown dialog box, showing first step in the procedure

The Shutdown procedure may take up to 10 minutes while the following tasks are performed:

- a. The printing block returns to its starting point on all axes.
- b. The printing heads are heated.
- c. The printing heads are cleared of any remaining material.

After these tasks are completed, the final wizard dialog box appears, in which you choose whether or not to shutdown the computer in the Eden printer.

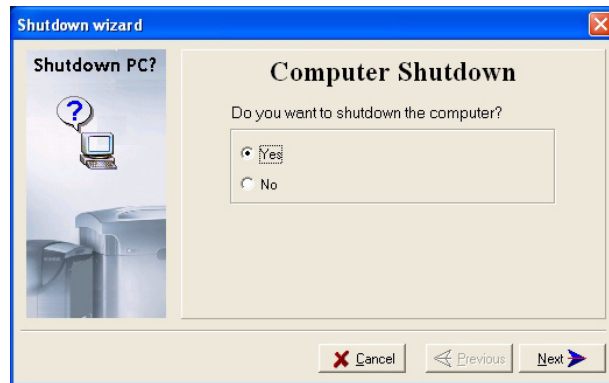


Figure 7-17:Shutdown Wizard dialog box, showing last step in the procedure

4. When completely shutting down the Eden printer and turning the power off, select **Yes** and click **Next**.
5. After the Eden computer shuts down, turn off the switch that controls the power outlet to which the Eden printer is connected.

Maintaining the Eden 3-D Printer

The performance of routine maintenance tasks is essential to getting satisfactory results from Eden 3-D printers. Perform the tasks at intervals shown below for optimum performance.

Routine Maintenance Schedule

Frequency	Task	For More Information
Daily	Clean the printing heads.	See “Cleaning the Printing Heads,” below.
Weekly	Perform the Pattern test.	See “Pattern Test” on page 7-17.
Weekly	Clean and inspect the wiper.	See “Cleaning and Replacing the Wiper” on page 7-18.
Weekly	Clean the build tray and the surrounding area inside the printer.	
Weekly	Restart the Eden printer computer.	
Monthly, and after replacing prints heads	Align the print heads.	See “Aligning the Printing Heads” on page 7-20.
Monthly	Inspect the exhaust system (duct, fan, connections).	
Every 2000 hours of printing or once a year	Preventive maintenance by authorized service engineer.	Contact your Objet support center.
At least once a year	Replace the activated charcoal filter.	Contact your Objet support center.

Cleaning the Printing Heads

Periodic inspection and cleaning of the orifice plates on the bottom of the print block ensures that the printing nozzles are not blocked. A wizard guides you through the procedure, and adjusts components of the Eden printer to enable you to perform it. This procedure takes about 20 minutes, and should be done at the beginning of the work day or before a big printing job.

To clean the printing heads:

1. Prepare—
 - isopropanol (IPA— isopropyl alcohol) or ethanol (ethyl alcohol)
 - disposable cleaning gloves
 - an Objet-supplied cleaning cloth or equivalent
 - a mirror
2. Start the *Clean Heads* wizard from the *Eden Options* menu (see figure 7-23 on page 7-18).

3. Follow the instructions on the wizard screens, and select the check boxes to confirm that:
 - you have checked that the tray is empty.
 - you have closed the cover.



Figure 7-18:Head cleaning procedure—step 3

4. Click Next.
5. When the following screen appears, open the cover.

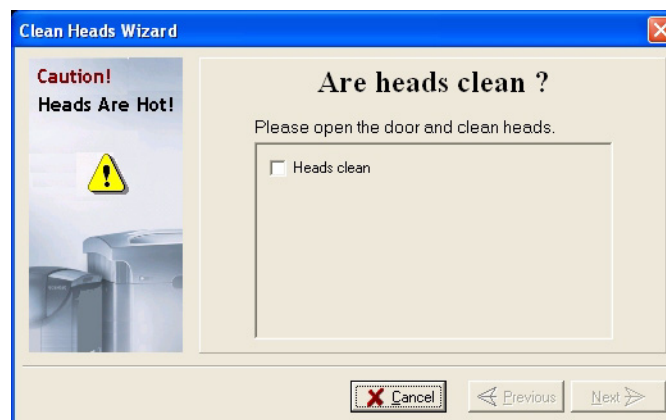


Figure 7-19:Head cleaning wizard—steps 5–10



WARNING: The print head orifice plates (bottom surface) may be hot. Do not touch them with your bare hands, and proceed with caution.

6. Place the mirror on the build tray.
7. Put on the gloves.
8. Soak the cleaning cloth with the cleaning fluid.
9. Clean the orifice plates, with a back-and-forth motion (see figure 7-20). Use the mirror to make sure that you have removed all of the debris.

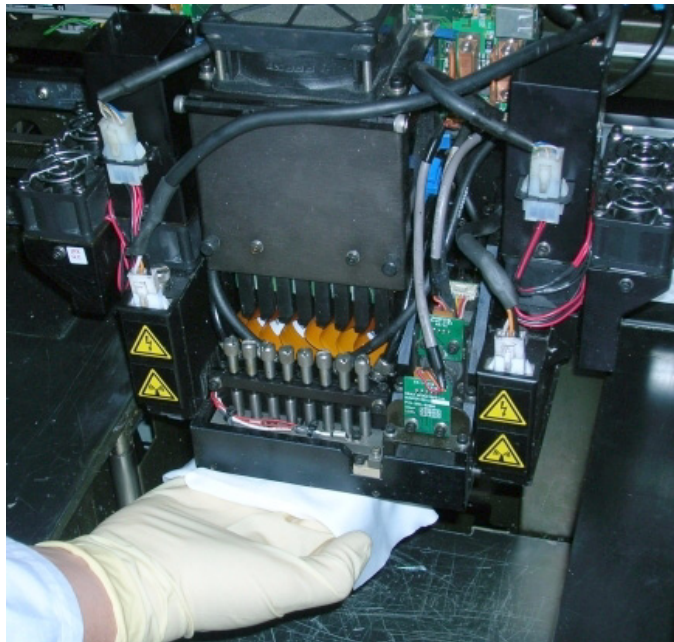


Figure 7-20:Cleaning the heads



It is recommended that you use this opportunity to also clean the roller and the UV-lamp lenses (to the left and right of the print heads).

10. When you have finished cleaning, select the confirmation check box in the wizard screen (see figure 7-19) and click **Next**.
11. Remove the cleaning materials from the printer and close the cover.
12. Select the confirmation check boxes in the wizard screen and click **Next**.

The heads are purged. When this is complete, the final wizard screen appears.



Figure 7-21:Head cleaning wizard—final screen

13. Click **Done** to close the wizard.

Pattern Test

The pattern test is the basic verification of the printer's ability to produce quality models, since it demonstrates the condition of the nozzles in the print heads. Make sure, therefore, that you perform this test weekly, and whenever you suspect a printing problem.

To perform the pattern test:

1. Make sure that the build tray is empty.
2. In the Eden printer, tape an A-4 sheet of pink paper to the center of the build tray.
3. In the Eden computer interface, open the *Options* menu and select **Pattern Test**, or press F3.

The Eden printer prints a series of lines on the test paper.

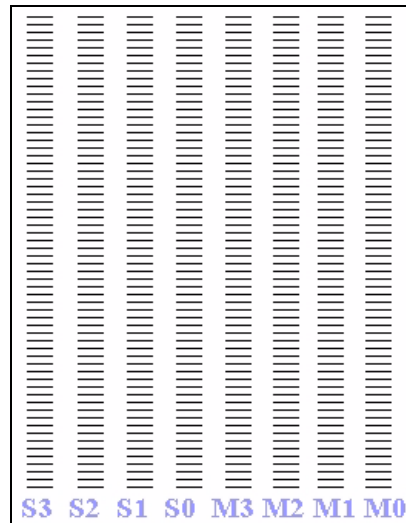


Figure 7-22: Sample Pattern Test

5. Carefully inspect the test paper to see if there are missing lines.

Too many missing lines, especially if they are in the same area, is an indication that the quality of printing when producing models will be poor. If this is the case, see "Improving Print Quality," below.

Note: Acceptable print quality is subjective, and depends on the type and scale (size) of the models produced. As a rule, however, more than 15 missing lines in one area of a column is considered unacceptable.

Improving Print Quality

If you suspect that print quality is poor, perform the pattern test (see Pattern Test, above). If the results are poor, use the following procedure to improve print quality.

If the results of the last pattern test are poor:

1. From the *Options* menu, select **Execute Purge Sequence**, or press F4.
2. In the confirmation dialog box, click **Yes**.

The print heads are purged of model and support material, and the wiper removes excess material from them.

3. Repeat the purge sequence.
4. Perform the pattern test.

If the results of the pattern test are still poor:

1. Manually clean the print heads (see “Cleaning the Printing Heads” on page 7-14).
2. Perform the purge sequence.
3. Perform the pattern test.

If the results of the pattern test are still poor:

1. Carefully clean the print heads again, making sure there is no residue left on them.
2. Perform the purge sequence.
3. Perform the pattern test.

If the results of the pattern test are still poor:

- Replace faulty print heads (see “Replacing Printing Heads” on page 7-25).

Cleaning and Replacing the Wiper

A rubber wiper blade removes excess material from the printing heads after the purge sequence. This is done automatically before each print job, and performed manually during maintenance tasks. You must periodically clean this wiper and check if it needs replacing.

To inspect and clean the wiper:

1. Prepare—
 - isopropanol (IPA— isopropyl alcohol) or ethanol (ethyl alcohol)
 - disposable cleaning gloves
 - an Objet-supplied cleaning cloth or equivalent
 - a spare wiper blade
2. Start the *Clean Wiper* wizard from the Eden *Options* menu.



Figure 7-23: Starting the *Clean Wiper* wizard

3. Close the Eden printer cover, and click Next in the wizard screen.

4. Follow the instructions on the wizard screens, and select the check boxes to confirm that:
 - you have checked that the tray is empty.
 - you have closed the cover.



Figure 7-24:Wiper Cleaning procedure—step 4

5. Click Next.
6. When the following screen appears, open the cover.

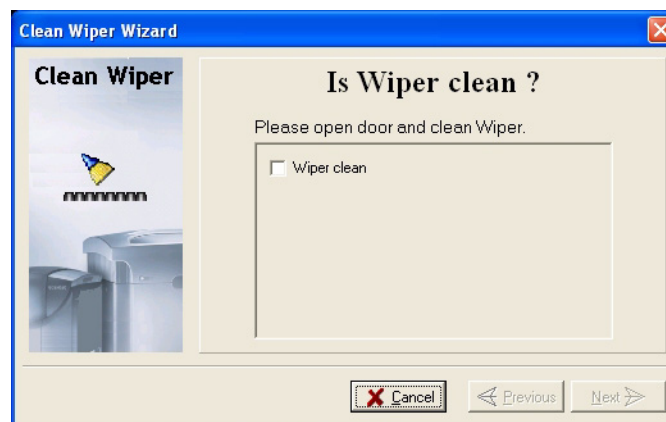


Figure 7-25:Wiper Cleaning procedure—steps 7–9

7. Put on the cleaning glove.
8. Inspect the wiper.
 - If it needs cleaning, soak the cloth with the cleaning fluid and use it to remove the debris.
 - If it needs replacing, grasp it and pull it up and out of its bracket. Then insert the new wiper blade, *making sure that it is straight and secured well on both sides.*
9. In the wizard screen, select the confirmation check box (see figure 7-25) and click Next.
10. Make sure that you have removed all materials from the printer, and close the cover.

11. Select the confirmation check boxes in the wizard screen and click Next.

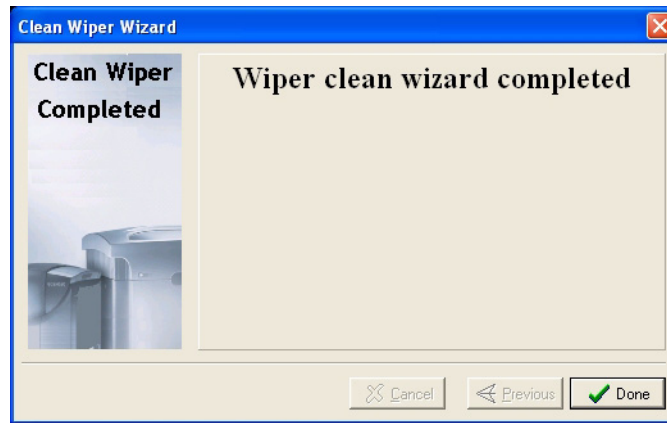


Figure 7-26:Wiper Cleaning procedure—final screen

12. Click Done to close the wizard.

Aligning the Printing Heads

You should check the alignment of the printing heads—

- once a month
- after replacing one or more heads
- if model quality is not acceptable even after cleaning the orifice plate on the bottom of the print block (see “Cleaning the Printing Heads” on page 7-14)

The head-alignment procedure takes about 20 minutes.

To check the alignment of the printing heads:

1. Prepare—
 - an A4-size transparency sheet
 - any type of sticky tape, to fasten the transparency sheet to the build tray
2. Start the Head Alignment wizard, either from the *Wizards* tab (on the right side of the Eden interface) or from the Eden *Options* menu (see figure 7-23 on page 7-18).
3. Click Next to begin, and close the cover.
4. In the wizard screen, select the check box to confirm that the cover is closed, and click Next.
5. Place the transparency on the build tray, next to its left and rear edges, as shown in the following figure.

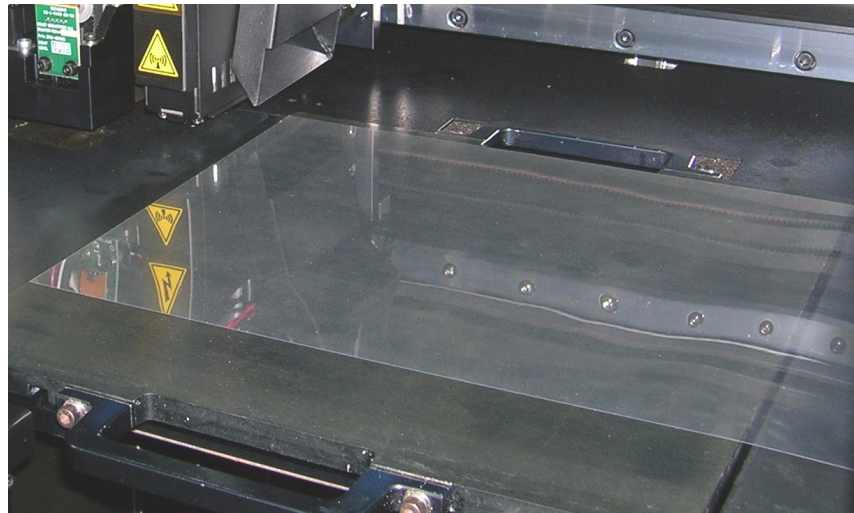


Figure 7-27: Positioning the transparency on the build tray

6. Make sure that the transparency sheet is lying flat, and tape it to the tray.
7. In the wizard screen, select the check box to confirm that the transparency sheet is placed on the build tray, and click Next.
The Eden printer prints the head alignment test on the transparency.
8. When the following screen appears, remove the transparency.

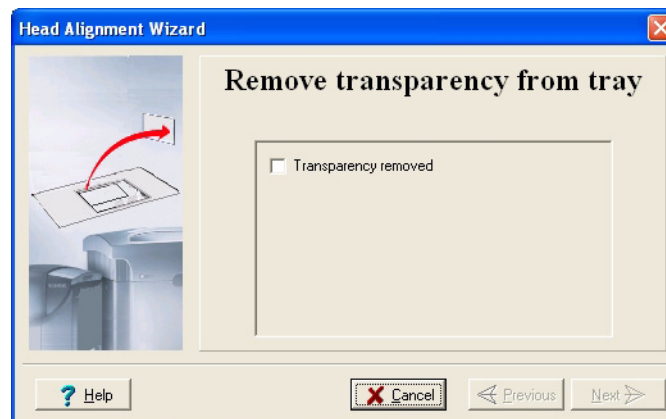


Figure 7-28: Head Alignment wizard—steps 8–10

The transparency sheet is printed with sets of vertical lines in seven columns, each column showing the results from a different print head.

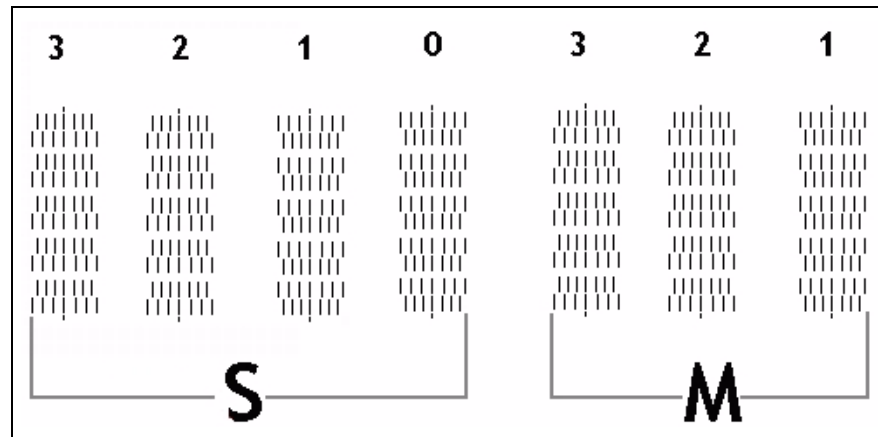


Figure 7-29:Part of a sample head-alignment test

- The three columns on the right were printed by the heads used for applying model material. From right to left, the columns represent heads M1, M2, M3, respectively. (There is no column for head M0 because its alignment is used as a reference for aligning all other heads.)
 - The four columns of lines on the left were printed by the heads used for applying support material when producing models. The columns represent heads S3, S2, S1 and S0, respectively.
9. For each column of lines, use a magnifying glass or loupe to inspect pairs of consecutive rows printed on the transparency to see where the vertical lines align.

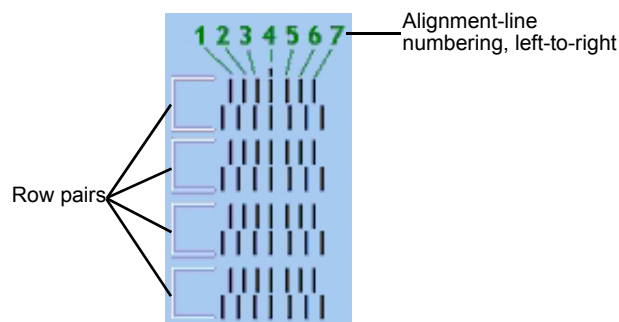


Figure 7-30:Comparing rows of alignment lines

Note: It does not matter which pair of lines you inspect, since they were all printed by the same head. Choose a pair of clearly printed lines for the inspection. (Since some nozzles may not print clearly, you may have to inspect several pairs of lines to properly inspect the alignment.)

Optimum head alignment is shown when the *fourth* lines in the upper and lower rows are aligned, as in figure 7-30. In the example shown, no change to the head alignment is necessary. If other lines in the set are aligned, you need to change the alignment of that head—in the next wizard screens.

10. In the wizard screen shown in figure 7-28, select the *Transparency removed* check box, and click **Next**.

11. In the next wizard screen, select the head(s) needing alignment, based on your inspection of the transparency, and click Next.



Figure 7-31: Head selection screen

Note: If you select M0—the head used for the head-alignment reference—you are choosing, in effect, to align all of the other heads.

The first in a series of alignment screens appears for the heads you selected.



Figure 7-32: Head alignment screen

12. In the head-alignment screen, select the number that indicates which lines align in the upper and lower rows of a pair on the transparency (counting from the left) for this print head.
- Note:** Because the alignment of the fourth lines is optimum, the number “4” is selected, by default, in the wizard screen. This does not change the head alignment. If you select other numbers, the wizard adjusts the head alignment, accordingly.
13. Click Next to display the next head alignment screen, and again select the number representing the most closely aligned vertical lines on the transparency for that print head.

When you have finished aligning all of the heads, the following screen is displayed.

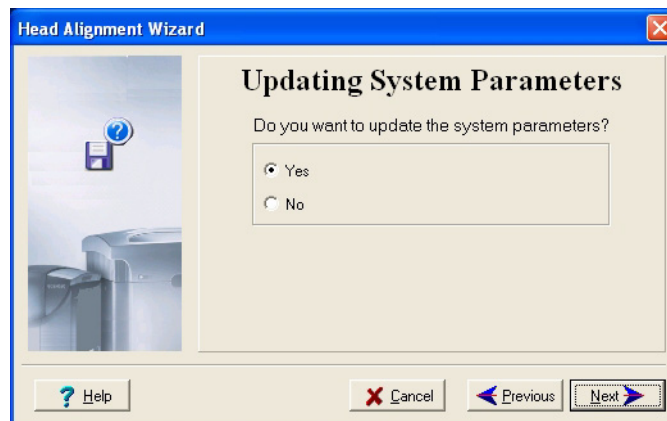


Figure 7-33: Updating System Parameters confirmation screen

14. To save the alignment changes, make sure that *Yes* is selected, and click **Next**.



Figure 7-34: Final head alignment screen

15. In the final wizard screen, choose to either repeat the head alignment procedure or close the wizard.
 - If the most closely aligned vertical lines for a print head were at either extreme—the first or seventh lines—choose *Yes* to run the head-alignment wizard again.

The transparency test will show if the heads are now properly aligned, and—if not—the wizard will allow you to “fine tune” the alignment.
 - If the vertical lines for the print heads were not aligned at either extreme, choose *No* to close the wizard.

Replacing Printing Heads

You need to replace a printing head if one or more of the following symptoms occurs:

- The pattern test reveals that more than 15 nozzles are not functioning in one area of the head.
- Visual inspection reveals that the surface of the head is damaged — peeling or bubbles in the nozzle area.
- The Eden interface displays a warning or malfunction message relating to a printing head —
 - ☐ Head Heater temperature timeout
 - ☐ Head Heater thermistor open
 - ☐ Head Heater thermistor short
- Tests reveal that the material printed by a printing head is underweight (that is, not enough material is being outputted).

Note: Weight tests are performed only by an authorized service engineer.



Replacing print heads is expensive. Replace them only after consulting with Objet customer support to determine that head replacement is necessary.

A wizard guides you through the procedure of replacing a printing head, and adjusts components of the Eden printer to enable you to perform it. Only replace a printing head with the aid of the wizard. The procedure takes about 75 minutes, and consists of the following phases:

A. Identifying the head(s) needing replacement.

This is usually done by examining the results of the pattern test, after attempting all other means for improving print quality (see “Improving Print Quality” on page 7-17). Otherwise, evidence of physical damage to the head surface or a malfunction message indicates which head needs replacing.

B. Preparing the print block for head replacement.

This is done automatically when you run the *Quick Head Replacement* wizard.

C. Removing the defective head.

D. Immediately replacing the defective head with a new one.

E. Performing weight calibration.

The wizard prints a sample. After weighing it on a scale, you enter the weight in the wizard dialog box.

To replace a printing head:

1. Prepare—
 - replacement printing head(s)
 - isopropanol (IPA— isopropyl alcohol) or ethanol (ethyl alcohol)
 - disposable safety gloves (included in the head replacement kit)
 - an Objet-supplied cleaning cloth or equivalent
 - a flat-head screwdriver (5 mm)
 - the scale supplied by Objet for use in the weight test
- Note:** Make sure that you have these items before running the *Quick Head Replacement* wizard.
2. Start the *Quick Head Replacement* wizard from the *Eden Options* menu (see figure 7-23 on page 7-18).
3. In the opening wizard screen, click **Next** to begin.
The *Head Replacement Conditions* screen appears.
4. Read the conditions, select *I Agree* and click **Next**.
5. Select the head(s) needing replacement, and click **Next**.

Preparing the
print block

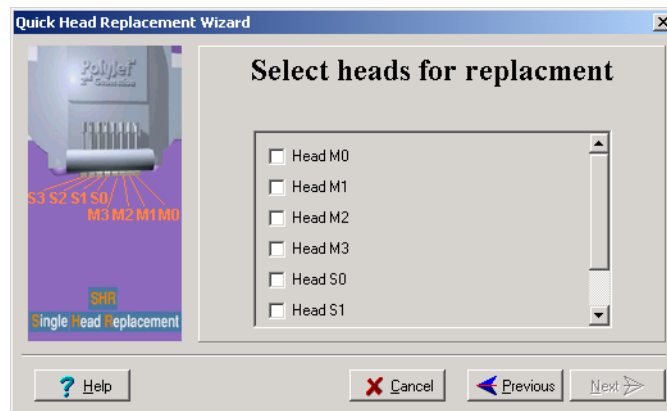


Figure 7-35:Head selection screen

The Eden printer heats and empties the heads. (This should take about 10 minutes.)

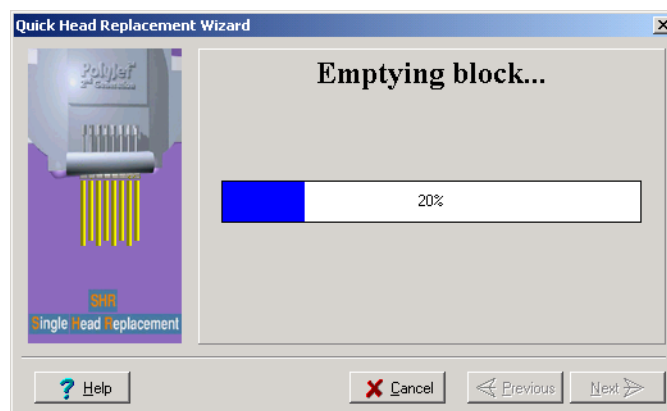


Figure 7-36:Emptying Block progress screen

6. When the print block is completely drained, click **Next**.

7. Take note of the warning screen that appears (see figure 7-37). To prevent damage to the print block, you must install the new head immediately after removing the defective one. Next if you are ready to continue.

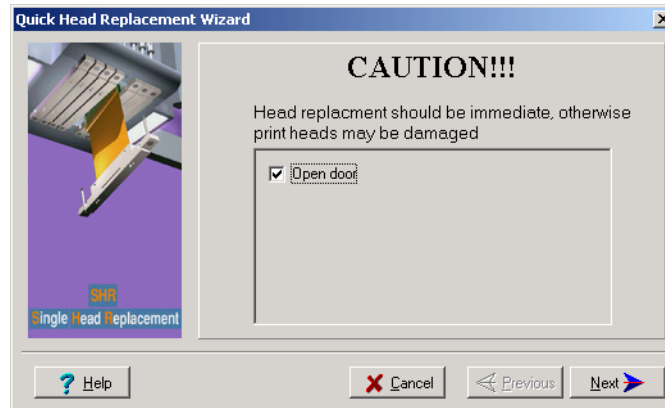


Figure 7-37:Head Replacement warning screen

8. Open the Single Head Replacement kit, and remove the safety gloves and the instructions.
9. Put on the safety gloves.
10. When the *Head(s) Replacement* wizard screen is displayed, open the Eden printer cover to remove the defective printing head.

Note: The Eden printer disconnects power to the heads for your safety.

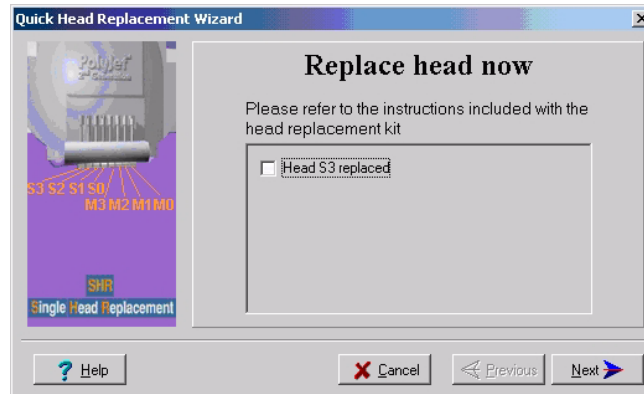


Figure 7-38:Replace the defective head when this screen appears

Removing the
Defective Head

11. On the print block, release the upper and lower screws that secure the printing head in the block. (If necessary, you may use a screwdriver to loosen the screws.)

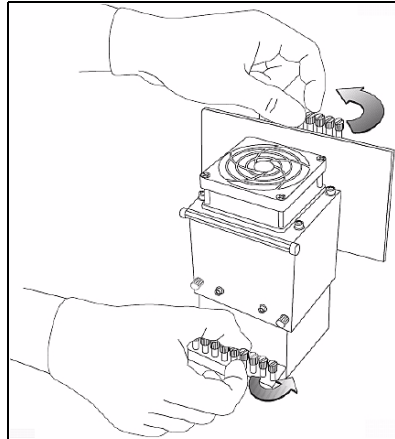


Figure 7-39: Releasing the locking screws

12. Press down on the upper and lower locking screws to release the printing head.

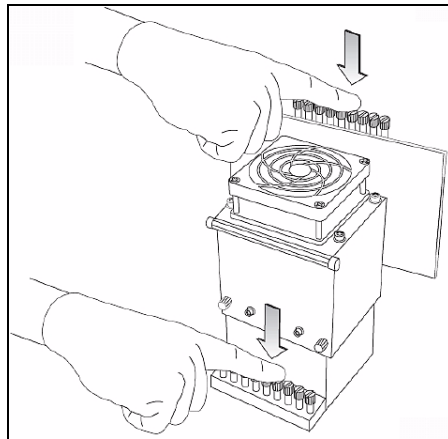


Figure 7-40: Releasing the printing head

13. Loosen the screws on the door of the compartment protecting the printing-head driver cards (A), then pull and lift up the door (B).

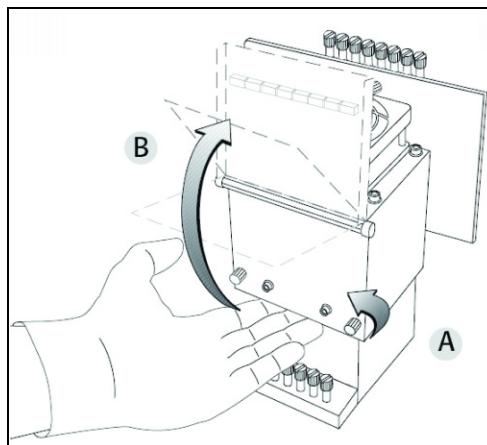


Figure 7-41: Opening the printing head compartment

14. Pull the printing-head driver card out of its socket so that the head is free (A), and remove it from the bottom of the print block (B).

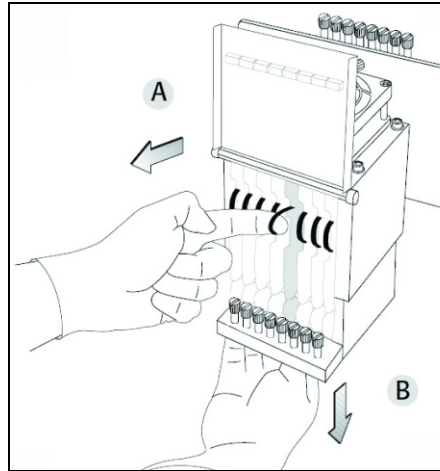


Figure 7-42: Releasing the printing-head driver card to remove the head

15. Make sure that along with the head, you remove the two rubber O-ring seals.

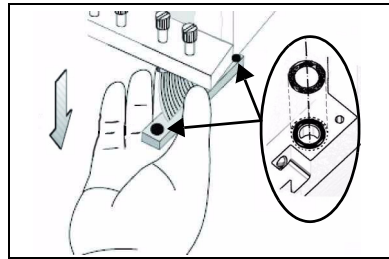


Figure 7-43: O-ring seals on the head housing



Important: If the seals are not removed with the head, they are probably stuck to the print block housing. If so, remove them.

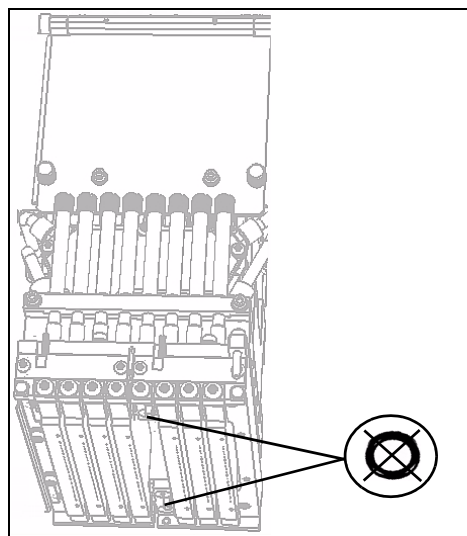


Figure 7-44: Making sure the O-rings are not stuck to the print block

Installing the
New Head

16. Inspect the replacement head, and make sure that the O-ring seals are in place (see figure 7-43).
17. Gently insert the replacement head into the vacant slot in the print block, and push the printing-head driver card into its socket.

Note: Make sure to insert the head with driver card facing its socket, in the rear of the print block.

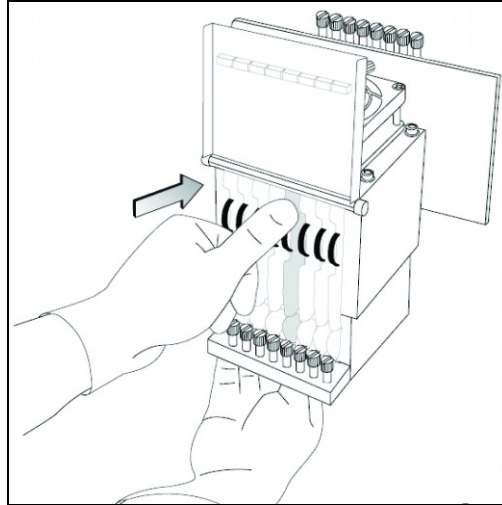


Figure 7-45: Inserting the printing-head driver card into its socket

18. Push the head up until you hear it click into place, in both front and rear holders.

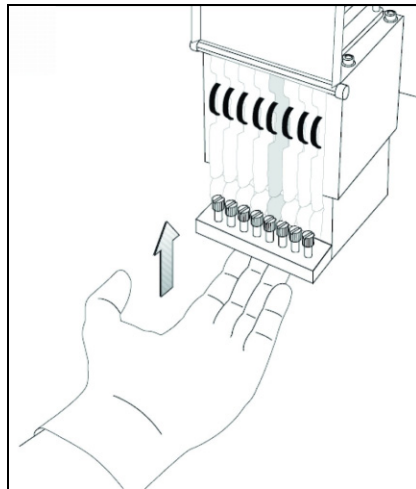


Figure 7-46: Clicking the head into place in the print block

19. Lower the door of the printing head compartment, and tighten the screws to lock it in place.
 20. Tighten the upper and lower screws that secure the printing head in the printing block (see figure 7-39 on page 7-28).
- Note:** Hand-tighten these screws. Do *not* use a screwdriver.
21. In the *Replace Head Now* screen (see figure 7-38 on page 7-27), select the check box to confirm that the head has been replaced, and click **Next**.

22. With your fingers, make sure that the new head is level and even with the other heads.

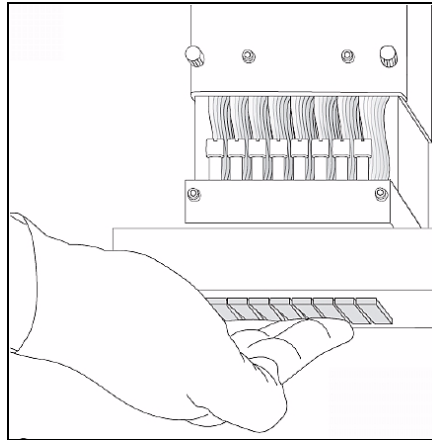


Figure 7-47: Checking the level of the new head

23. In the *Installation check* wizard screen, select the check box to confirm that the new head is level and even with the other heads, and click **Next**.

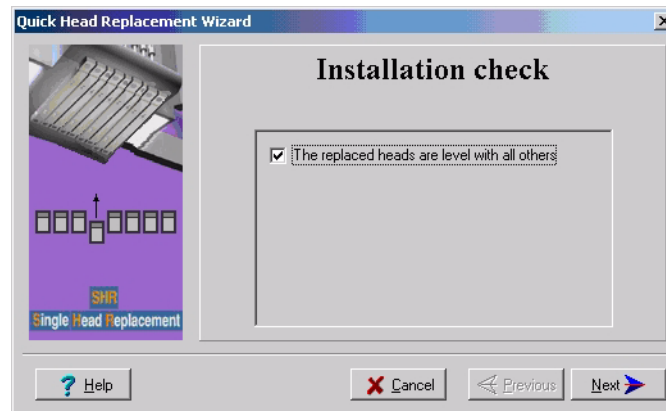


Figure 7-48: Installation check screen

24. In the next wizard screen, select the check box to confirm that you have removed all tools and objects from the Eden printer.

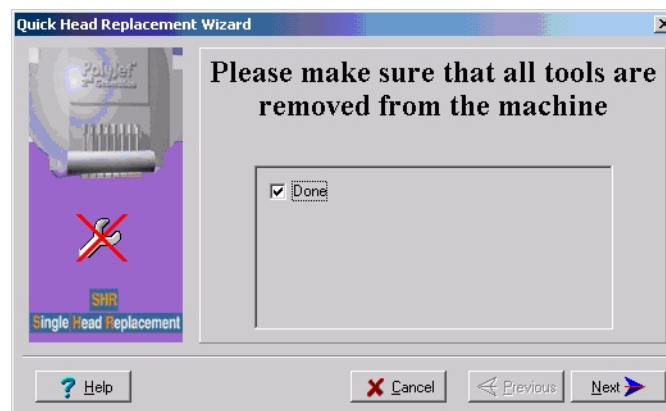


Figure 7-49: Cleared-tray confirmation screen

If the installation was successful, the wizard continues by performing a vacuum leakage test.

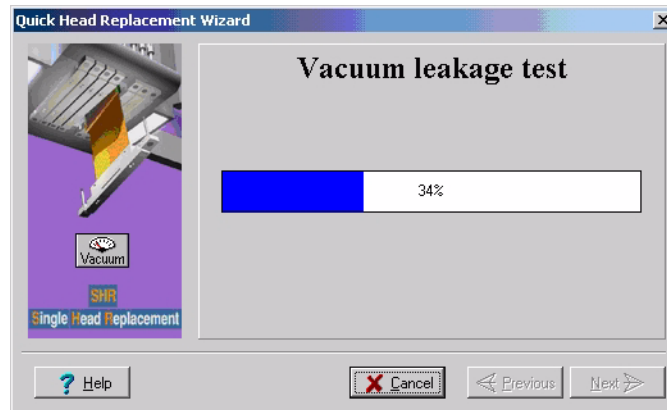


Figure 7-50: Vacuum Leakage Test progress screen

If the vacuum leakage test is successful, the wizard continues by filling the heads, then heating and purging them. Continue with "Weight Calibration" on page 7-34.

If a vacuum leakage is detected, or if other problems occur, see "Installation Problems," below.

- Installation Problems
- If the Eden software does not sense the replaced head, the following warning screen appears.



Figure 7-51: Incorrect-installation screen, showing which head(s) to re-insert

If this happens:

- a. Open the printing head compartment (see figure 7-41 on page 7-28).
- b. Re-insert the printing-head driver card into its socket (see figure 7-45 on page 7-30).
- c. In the wizard screen, select the check box to confirm that you have re-inserted the card, and click **Next**.

- If the replacement head was not factory calibrated, the following warning screen appears.



Figure 7-52: "No factory data" warning screen

If this happens:

- a. Remove the head and replace it with another one (starting with step 11 on page 7-28).
 - b. In the wizard screen, select the check box to confirm that you have installed another printing head, and click Next.
 - c. Contact Objet customer support about the uncalibrated head.
- If the vacuum test is not successful, the replacement head was not sealed properly during installation, and the following warning screen appears.

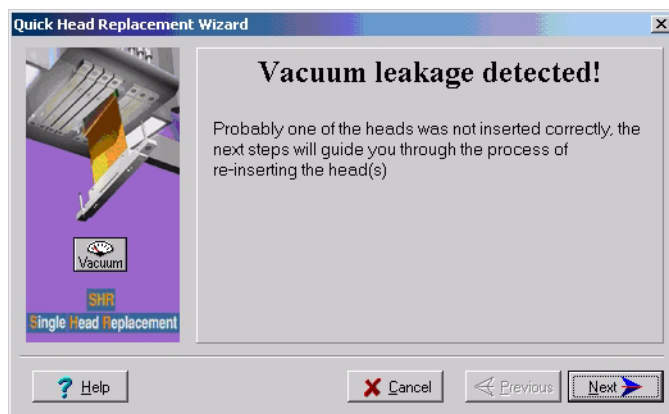


Figure 7-53: Vacuum Leakage warning screen

If this happens:

- a. Click Next.
- b. Follow the instructions on the wizard screens to re-install the head.

Weight Calibration After the successful installation of a print head, the wizard begins the first of two weight tests, in which each head prints a sample. This phase takes about 25 minutes.



Figure 7-54: High-quality-printing weight test progress screen

25. Carefully remove the samples for each head, keeping track of the head that printed them.

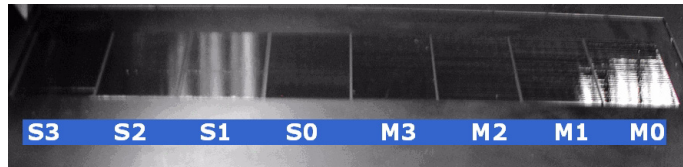


Figure 7-55: Samples printed on the Eden build tray

26. Using the scale, weigh each sample and enter the weight (in grams) for the corresponding head in the wizard screen. Then click Next.

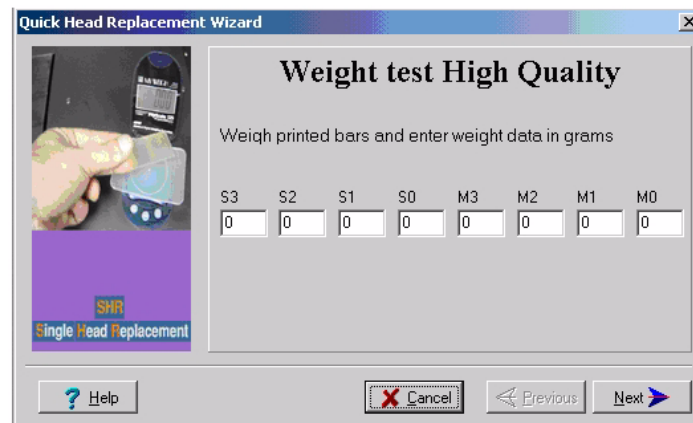


Figure 7-56: Weight Test data entry screen

After the high-quality-printing weight test, the weight test begins for high-speed printing.

27. Repeat steps 25 and 26 for the high-speed-printing weight test, then click Next.

The Eden printer calibrates itself based on the weight data you entered, and the final wizard screen appears.

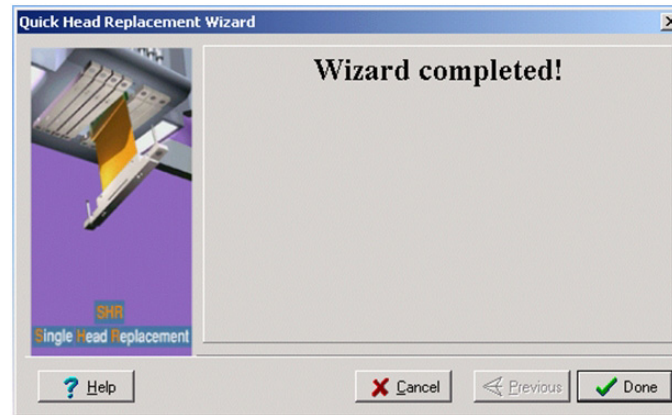


Figure 7-57: Final Head Replacement screen



After replacing printing heads, check the head alignment (see “Aligning the Printing Heads” on page 7-20).

Replacing the UV Lamps

The UV lamp used for curing models have a long, but limited, working life. The Objet service engineer tests their effectiveness during regular maintenance checks, and replaces them, if necessary. If, for any reason, you need to replace a UV lamp, follow these instructions.

1. Make sure the Eden printer is in *offline* mode.



Figure 7-58: Offline mode (red)

The button at the bottom of the Eden computer interface should be red. If not, click it to switch the printer to *offline* mode.



WARNING: Before continuing, make sure that the safety interlock in the printer cover is not defeated.

2. Open the cover of the Eden printer.

3. Disconnect the power connection to the UV lamp by pulling it up.

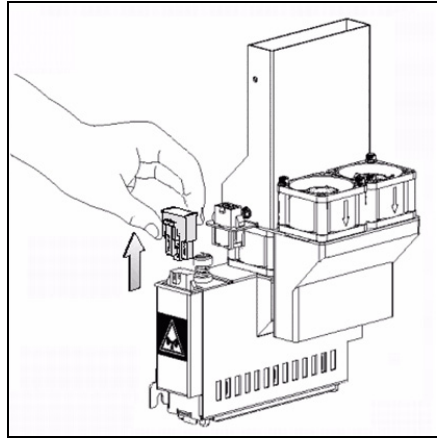


Figure 7-59: Disconnecting power to the UV lamp

Note: Do *not* disconnect the power connection to the cooling fans.

4. Loosen the screw securing the UV lamp cover (A), and pull the cover up (B), then out (C).

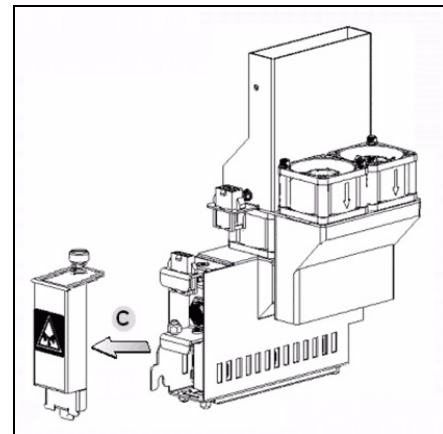
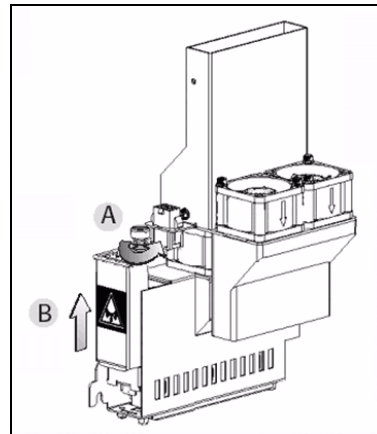


Figure 7-60: Removing the UV lamp cover

5. Pull the lamp reflector out of the print block.

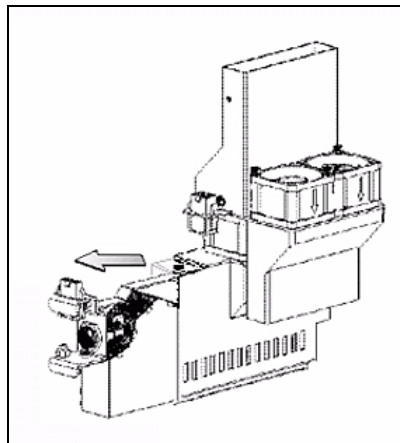


Figure 7-61: Removing the UV lamp reflector

6. On the inside of the lamp reflector, a black strip covers part of the reflector. Remove this strip by sliding it off.

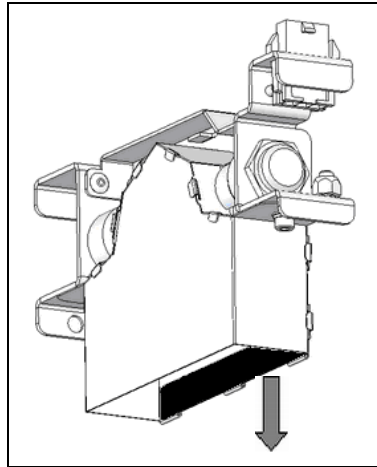


Figure 7-62: Removing the black strip from the old reflector

7. Discard the old reflector and lamp, but save the black strip so you can install it in the new reflector.
8. Fasten the black strip to the inside of the new UV lamp reflector, *on the same side as it was in the old reflector*.

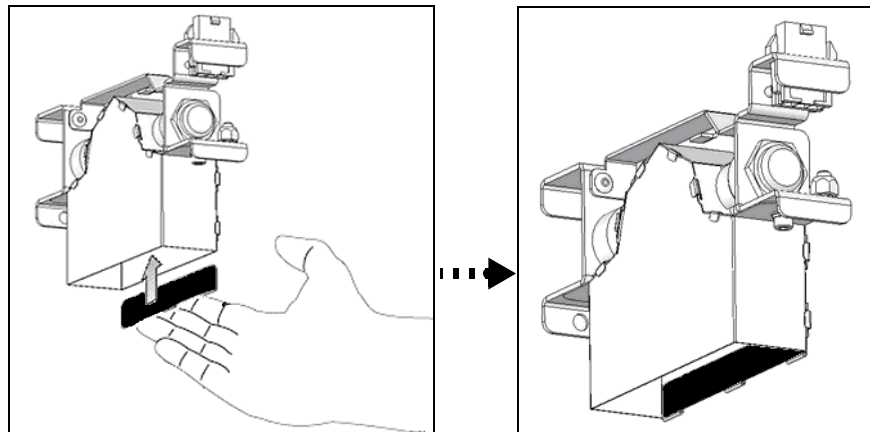


Figure 7-63: Fastening the black strip to the right UV lamp reflector



Important: The black strip must always be on the side of the reflector opposite the print block.

9. Insert the new UV lamp/reflector into the housing next to the print block.

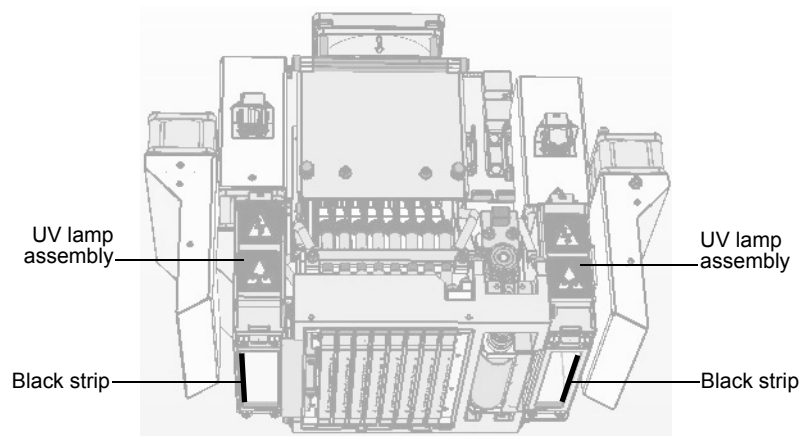


Figure 7-64: Printing block and UV lamp assembly, showing correct placement of black strip

10. Replace the lamp cover by inserting it into the slot on the bottom of the housing, and tighten the securing screw on top.

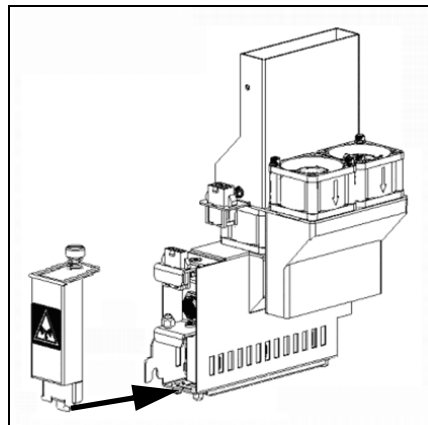


Figure 7-65: Replacing the lamp cover

11. Reconnect the power connection to the UV lamp.

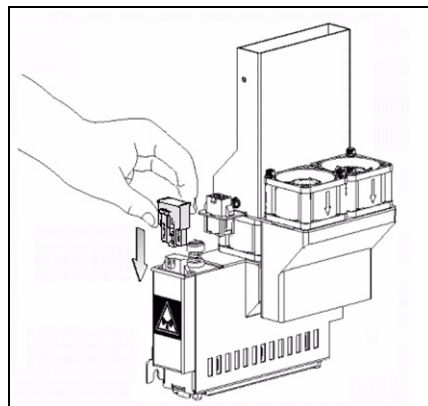


Figure 7-66: Connecting power to the UV lamp

Replacing the Waste Container

The waste container contains partially cured polymeric material produced during normal operation and maintenance of the Eden printer. For safety and environmental reasons, this material is kept in a special leak-proof, disposable container.

The container has a capacity of about eight kilograms of waste material—usually enough for several months of printer use. The Eden software displays a warning message when the container weighs 7.3 kilograms, and stops the printer when it weighs 7.8 kilograms. Above 7.3 kilograms, the software does not allow you to start a print job until you replace the waste container. You can monitor the weight of the waste container in the Maintenance screen of the Eden interface.

To monitor the waste weight (and other indicators) in the Eden printer:

- In the main Eden interface screen, click the display toggle to view the Eden printer indicators.



Figure 7-67: Eden printer interface, showing waste weight (red background indicates operator alert)

The waste container consists of a sealed bag inside a cardboard box. You typically dispose of the entire waste container—including the box. Therefore, you must assemble a new box and insert a new waste bag before you can install it in the printer.



Replacement boxes, waste bags, and sealing caps are supplied in the Eden start-up and preventive-maintenance kits.

To prepare a new waste container:

1. Assemble the cardboard box, making sure to punch out the perforated sections.
2. Fold a new waste bag—so it fits in the box—and insert the bag's screw-connector into the hole in the top of the box.

Note: Do not close the box until you connect the waste drain tube from the printer (see below).

To replace the waste container:

1. Locate the waste compartment under the Eden printer (see figure 7-1 on page 7-2).
2. Remove the two screw-knobs securing the waste compartment panel, and remove the panel.

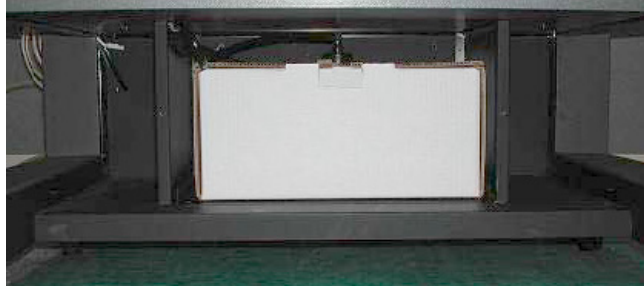


Figure 7-68:Waste container under the printer

3. Carefully slide out the waste container, removing it from the printer.



Figure 7-69:Waste container removed from the printer

4. Place the new waste container next to the full container.
5. Unscrew the cap securing the waste drain tube and connect it to the new container.
6. Close the full container with a sealing cap.
7. Close the new waste-container box.
8. Position the waste container under the Eden printer, on the load cells.
Note: Make sure that the waste drain tube is not crimped and that it is not pinched by the container.
9. Close the waste compartment.



Dispose of the full waste container in accordance with environmental and safety requirements.

Handling Printed Models

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Cooling Models After Printing

After printing models, you should allow them to cool as much as possible before handling them. If additional models do not have to be produced on the Eden printer, it is best to let the printed models cool in the printer, with the cover closed, as long as possible.

If the Eden printer must be used to produce additional models as soon as possible:

1. Let the printed models cool on the build tray for at least 10 minutes.
2. Very carefully, remove the models from the tray with a scraper or spatula (supplied in the tool kit), taking care not to pry or bend the model.



WARNING: Wear protective gloves when handling printed models before they are washed.

3. Place the models on a flat surface, and cover them with a cardboard box or paper hood.

This allows the models to cool slowly and evenly.

4. Let the models cool for several hours.

Removing the Support Material

After printed models have cooled, the support material must be removed. This can be done by different methods, depending on the size of the model, how delicate it is, the amount and location of the support material, and other factors. Use the following methods as a guide, and adapt them (or a combination of them) for finishing the models you are handling.

Removing Excess Support Material by Hand

While wearing protective gloves, break away excess support material on the outside of the model. For delicate models, use a toothpick, pin or small brush after dipping the model in water.

Removing Support Material with Water Pressure

For most models, the most efficient way to remove support material is by using a high-pressure water jet. One suitable system is the Objet WaterJet cleaning unit, shown in figure 8-1 on page 8-3.

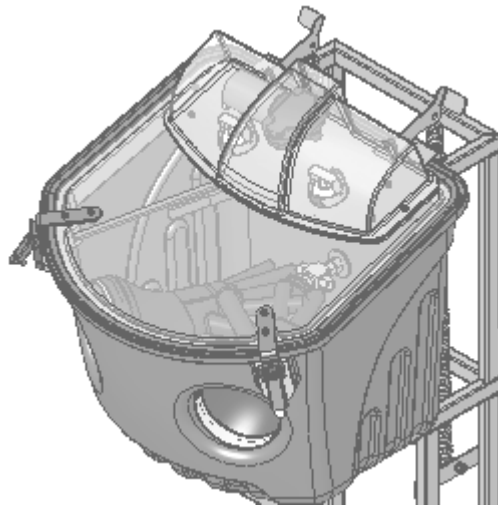


Figure 8-1: Objet WaterJet Cleaning Unit

To clean a model using this device, you place it in the chamber, and you manipulate it and the jet using the built-in, waterproof sleeves. A pump turns ordinary tap water into a high-pressure jet, and a wiper keeps the window clear.



Use caution when cleaning delicate models with high-pressure water systems.

Removing Support Material with Caustic Soda

Soak models in a 2-percent solution of caustic soda (sodium hydroxide) to remove support material from difficult-to-reach areas and to give the model a smooth, clean finish. The amount of time you soak the model in the solution depends on how delicate it is and how much support material needs to be removed, but it is typically between half-an-hour and several hours. In any case, you should remove as much support material as possible before the caustic soda treatment, and rinse the model thoroughly (with a water jet) afterwards.



WARNING: Caustic soda may cause chemical burns, scarring and blindness. Mixing it with water generates heat that could ignite other materials. Take adequate safety precautions; always use nitrile gloves when handling caustic soda and models soaked in it.

Storing Models

Models are cured as they are printed, making them safe and stable for a long time. However, proper storage conditions and protection from ultra-violet radiation are necessary to prevent deforming.

- Keep printed models at room temperature and in a low-humidity environment.
- Do not expose models to sunlight and other possible sources of ultra-violet radiation.

Printer Elements

The following diagram shows a schematic view of the elements that make up the Eden260 3-D printer.

