

Important Notice

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Eden330/333 User Manual Part Number: DOC 00019 Rev. C

Using of the User Manual

This User Manual offers information and complete instructions for operation and maintenance of Eden330/333 system.

This manual assumes a basic knowledge of Windows XP® operating systems, including basic handling and proper working procedures.

This user manual has been designed to provide instructions for the operation of the Eden330/333 System as well as to serve as a reference that the user can return to whenever more information is required about a particular topic. Almost all the chapters of this book include hands-on examples to guide the user through real-world situations. In addition, the book provides detailed information for each of the features described with valuable guidelines, cautions and safety information. For inquiries and application support contact Avi_Cohen@2Objet.com

FCC Compliance Rules

In accordance with FCC rules, section 15.105 for a Class A device:

The Eden330/333 System has been tested and found to comply with the limits for a Class A device pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The Eden330/333 System generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the User Manual, may cause harmful interference to radio communication.

Operation of the Eden330/333 System in the residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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1. General Safety Rules

The safety cautions included in this chapter, and those to follow, are a matter of common sense. Please read all of the following chapters that apply to your particular work.

All service operations should be performed only by qualified service personnel who have been instructed about any precautions that must be taken.

1.1 In case the equipment is used in a manner not specified by Objet Geometries Ltd., the protection provided by the equipment may be impaired.

1.2.1 Be familiar with the locations and use of safety equipment such as fire extinguishers, emergency showers, emergency exits, eyewash fountains, first aid kits, fire blankets, main electrical switches, and water hoses.

1.2.2 Do not block the emergency equipment with boxes, trash, etc.

1.2.3 Keep your work area clean.

1.2.4 Use a dustpan to pick up broken glass; never use your hands.

1.2.5 Packages containing equipment and parts should not be dropped, bumped, or crushed. They must be handled with care.

1.2.6 The Eden330/333 System must be turned off and unplugged before it is serviced.

1.2.7 Every accident, no matter how minor, must be reported to the safety officer.

1.2.8 Do not use broken equipment. Inspect your equipment for holes or cracks before each use.

1.2.9 Inform co-workers of plans to carry out non-routine, hazardous work.

1.2.10 Please alert the safety officer, or any other appropriate authority, if you notice any unsafe conditions.

1.2.11 Machinery with moving parts must have an interlock, and a protective cover over the moving parts.

1.2.12 Do not open the hood while system working. Do not bypass the hood's interlock.

1.2.13 Do not stare at UV light. Use protecting eyeglasses while the UV light is on and main hood is open.

1.2.14 In case of direct contact of resin with skin or eyes, wash thoroughly with water.

1.3 Storage of Resins

The Eden330/333 System resins are composed of reactive monomers and oligomers. If improperly stored or handled, these compositions could undergo polymerization resulting in the evolution of heat. Improperly stored resins increase in viscosity, and eventually result in a gelled (polymerized) product in the storage container. Products should be stored in conformance with applicable fire department and insurance company regulations and other applicable laws, regulations, codes and guidelines.

1.3.1 Storage:

The Eden330/333 System resins are shipped in UV protective bottles. These bottles are acceptable as long as they are opaque to ultraviolet energy, and have not been contaminated with other chemicals prior to use in the Eden330/333 System.

To ensure product stability, the resins should not be allowed to come in contact with any metal. Plastic containers made from monomer-soluble materials such as polystyrene or polyvinyl chloride (PVC) also should not be used for storage.



Do not transfer the resin from Objet's cartridges into any other container

Container lids must be tightly sealed in order to protect the product from contamination and/or stray UV energy when resins are not in use. Accidental spillage of resin can be minimized if the container lid is sealed tightly.

Please note that the maximum quantity of flammable liquid stored in equipment is 18.90 liters (according to the UL1950 standard). This amount is for liquids with flash point at or above 60°C (140°F) contained in closed containers made of glass, metal or plastic.

1.3.2 Shelf Life:

The Eden330/333™ resins have a shelf life of as indicated onto the bottle in undamaged, unopened containers, starting from the date of manufacture as printed on the container. Therefore, inventory provisions should be made to insure that the resin purchased first is used first.

1.3.3 Light:

Resins should be shielded from sunlight or other sources which produce UV actinic radiation such as fluorescent or mercury vapor lights. Exposure to UV energy leads to an increase in product viscosity and eventually to product solidification.



Do not expose the resin to UV light

1.3.4 Temperature:

Containers of resin products should be kept indoors in a cool, dry area with adequate ventilation, and at temperatures preferably between 16°C (60°F) and 27°C (80°F). Always keep containers out of direct sunlight.



Always keep containers out of direct sunlight.

1.3.5 Polymerization:

Signs of premature polymerization in the container include bulging, leaking, the emission of heat, or an unusual odor emanating from the container. The precautions defined in the sections to follow should be taken if polymerization is suspected.

1.4 Transfer and Handling

1.4.1 Flammability:

Flammability is the ability of a material to burn. The degree of flammability hazard is often expressed as the flash point of a material or the temperature to which a material must be heated before a flame will ignite the vapors. Special precautions should be taken to prevent exposure of resins to heat, flames, sparks, or any source of ignition. If the containers are exposed to extreme heat, they may burst violently.

1.4.2 Health Hazards:

Any chemical may exert harmful effects if it enters the body in sufficient quantities. The hazard of a chemical is the likelihood that a chemical will produce damage under specified conditions, and is derived from two main considerations:

1.4.3 Toxicity:

Toxicity is the inherent ability of a chemical to produce a deleterious response in a biological system. All materials have some toxicity associated with them, which may be high or low. Toxicity can be measured in quantitative manners, which determine the nature of the toxic effect and the dose, which causes it.

1.4.4. Exposure:

Care should be taken to minimize exposure to uncured resin. The risk of health hazard can be greatly minimized by minimizing exposure.

1.4.5 Skin Irritation:

Brief contact with high concentrations or prolonged exposure to low concentrations of uncured acrylate or epoxy-containing materials may cause tissue inflammation, itching, redness, dry patchy scaling, and/or discharge. Skin irritation is generally confined to the area of direct contact. Prolonged exposure may cause burns. Because direct skin contact may not always cause immediate irritation, skin exposure can easily go unnoticed.

1.4.6 Skin Sensitization:

Sensitization dermatitis is the result of an allergic reaction to a given substance. In almost all cases, direct skin contact is necessary to cause sensitization. It is possible for individuals to become sensitized to a substance even after a trouble-free period of exposure.

Warning: Do not allow uncured resin to contact skin. Resin products may contain materials that are potential sanitizers. To avoid sensitization, do not allow uncured material to contact skin. Some epoxy resins are skin sanitizers, while others are not.

1.4.7 Inhalation:

Inhalation of resins has been regarded as less of a problem than skin or eye contact due to their low volatility, although volatility does vary by composition. Vapors may accumulate in areas without adequate ventilation, however, and some vapors do irritate the nose, throat and lungs. Therefore, all areas where resins are handled should be thoroughly ventilated. Ventilation capacity should be such as, to replace all air in the room 20 times in one hour.

1.4.8 Ingestion:

Resins may be toxic by ingestion. Therefore, these materials must not be present where food and drink are stored, prepared or consumed.

1.4.9 Handling of Cured Parts:

The cured plastic parts can be handled and stored with no special precautions. Typical applications include concept modeling, prototyping, and tool pattern generation.

1.4.10 Spill Control:

Small spills, loosely defined as two gallons or less, can be cleaned up using disposable towels, non-reusable rags, or absorbing materials such as sawdust, clay, diatomaceous earth, activated charcoal, etc.

All clean up materials should be placed in sealed, labeled containers. The spill area can then be cleaned with denatured or Isopropyl alcohol, followed by a thorough washing with soap and water.

1.5 First Aid

This section includes first aid procedures in the event of exposure to the Resins. Always refer to the resin container label for information specific to the product being handled.

1.5.1 Skin:

In general, there is no reason for direct contact of uncured resin with skin.



Wear protecting gloves with any material contact even with cured material (model and support material).

If resin or cured material comes in contact with the skin, immediately wash the contacted area thoroughly with soap and cool water, and then remove contaminated clothing. Particular attention should be paid to flushing the hair, ears, nose and other parts of the body that are not easily cleaned. The use of cool water is important to avoid opening the pores, which may allow more material to penetrate the skin. Do not use solvents to clean skin. If large areas of skin have been exposed, or if prolonged contact with resin results in blisters, a physician must be consulted. During first aid procedures, avoid the accidental transfer of resin from the hands to other areas of the body, especially to the eyes. Do not reapply barrier cream until the skin has been completely cleansed. Clothing should be professionally laundered. Do not launder contaminated clothing at home. Dispose of contaminated shoes, belts and other leather items because they can absorb resin and may re-expose the user at a later date.



If resin or cured material comes in contact with the skin, immediately wash thoroughly with soap and cool water.

1.5.2 Eyes:

Attention of Customer Support Engineers only is required to wear safety glasses to prevent accidental splashes into the eyes. If contact with eyes occurs, flush immediately with large amounts of water for 15 minutes and avoid sunlight, fluorescent light, or other ultraviolet light. Eye wash facilities should be provided with a first aid kit situated close to the resin.



Customer Support Engineers are required to wear safety glasses to prevent accidental splashes into the eyes

1.5.3 Contact Lenses:

Attention of Customer Support Engineers only that wearing of contact lenses is not recommended. However, if contact lenses are worn, verify that flushing the eye with water removes the lens from the eye immediately. Get medical attention.

If eye itching or burning occurs, remove contact lenses and do not refit new lenses to the eye until symptoms disappear. Also, clean and disinfect lenses with appropriate lens cleaner before refitting.

1.5.4 Ingestion:

If resin is swallowed, consult the container label for specific instructions. Get medical attention immediately.

1.5.5 Inhalation:

Vapors from resins as well as their combustion products can be very irritating to the respiratory system. Upon inhalation exposure to vapors or the products of combustion, immediately expose the affected individual to fresh air. If breathing has stopped, immediately begin artificial respiration or cardiopulmonary resuscitation.

Get medical attention immediately.

Oxygen should be administered by authorized personnel only. The patient should be kept warm but not hot. An unconscious person should never be given anything by mouth.

1.6 Disposal Procedure

Fully cured resins often present no special safety or health related disposal issues. Nonetheless, some areas may still regulate cured resins as hazardous industrial waste.

The disposal of fully cured resins, should comply with all applicable local, state, and federal environmental and safety regulations.

While removing the dirt container out from the Eden330/333™ 3D System it is essential to wear gloves. For direct contact with uncured formulation the Neoprene and Nitrile rubber gloves are recommended. For contact with cured materials (sometimes slightly uncured on the surface) common latex gloves are also acceptable.

Partially or uncured resin waste may be classified as hazardous in some areas, thereby requiring special packaging, transportation and disposal. The disposal of partially cured or uncured resins, should comply with all applicable local, state, and federal environmental and safety regulations. The packaging, transportation and disposal methods used must prevent any form of human contact with the waste, even if it is classified as non-hazardous or unregulated. This precludes the use of disposal methods that result in groundwater or surface water contamination. The disposal of cured, partially cured, or uncured resins, should comply with all applicable local, state, and federal environmental and safety regulations.

Clean up materials, soiled clothing, empty containers, etc., should be disposed of in accordance with the preceding guidelines and applicable laws and regulations. Whenever any of these contain uncured or partially cured resin, the disposal method must preclude any form of human contact, including any method, which could result in ground water or surface water contamination.

Discard contaminated shoes by isolating in a sealed container and disposing of as solid waste.

Empty plastic bottles should be punctured, drained thoroughly, and disposed as solid waste.

1.2. Introduction

The Eden330/333 prints three-dimensional models of designs made with most of the solid image design tools, such as Solid Works™, Pro-E™, Unigraphics™ and AutoCAD™, in STL format.

This User Manual has been designed to serve as an accompanying instructional text for use with the Eden330/333. It provides instructions for the operation of the Eden330/333 as well serving as a reference to which the user can turn whenever more information is required about a particular topic. Almost all the chapters of this manual include hands-on examples to guide the user through real-world situations. In addition, it provides detailed information for each of the features described, with valuable guidelines, cautions and safety information.

About This Manual

The manual is divided into two main sections:

1. Installation and operating instructions for the **Objet Host** software. This section incorporates explanations of all the screens and dialogs, up to the point where the **BUILD** command is actually sent.
2. Operation and maintenance of the Eden330/333 Printer. The System is operated via an Embedded program.

Model Material	Material used for building the model.
Support Material	Material used for support in model building.
STL	Type of input file to be used with the Objet software.
OTF (Objet Tray Format)	File comprising all information needed for a single job of model building.
EDEN330/333	Your Objet Eden330/333 System.
Host Workstation	The workstation on which the Objet Host software is installed.
Objet Studio	The Software Application which enables the user to prepare a printing job for printing (building)
Job Manager	The Software Application which enables management of the printing job.
Embedded Program	Real-time Software within the printing device that controls all operations of Eden330/333.
Embedded Screen	Graphic user interface of Embedded program.
Build Tray	The building surface upon which model/s are placed and defined for building.

2.3. Getting Started

Minimum Requirements for the Host Workstation

- **Processor:** Single Processor **Pentium® 4** speed 2.4GHz and up; 512KB Cache.
- **Operating System:** Microsoft® Windows XP.
- **Graphics Card:** ATI RADEON 9600 Supporting Open GL with **128MB** and up.
- **Memory:** 1 GB RAM and up.
- **Floppy Drive:** 3.5" 1.44MB Floppy Drive.
- **CD ROM Drive:** IDE CD ROM Drive.
- **Hard Drive:** 40GB & up.
- **Network Card:** Two network cards with cross cable LAN TCP/IP installed on one of them.

How to Install Objet Studio™ in the Host Workstation

1. Insert the **Objet Studio™** CD into the appropriate drive.
2. Right click the **Start** button and select **Windows Explorer**.
3. Scroll up to the CD drive and select **Setup**.
4. Follow the installations instructions. The software will prepare an Icon on your desktop named **Objet Studio™** for easy access.

About Objet Studio™ Software

Objet Studio™ is a Windows-based application with a familiar Windows interface.

The operating instructions include a variety of options and tasks, and involve the following steps:

1. Inserting one or more **objects** on the **Build Tray**.
2. Positioning the **object(s)** on the **tray**.
3. Setting the **object/tray** parameters.
4. Saving the above information as an OTF file (**Objet Tray Format**).
5. Sending the tray to **Build**.

2.13.1.1 Preparation of External File from CAD Workstation

The following is a list of the steps that should be taken in order to prepare the external file for use by the Eden330/333, and subsequently to prepare the selected model for printing. There are slight variations between the different solid image design programs in which external files are prepared. These instructions, however, apply to all programs.

To prepare an external file for use by the Eden330/333 system:

1. On the main menu bar select **File>Save As**. The **Save As** dialog box opens.
2. In the **Files of Type** window select the extension (*.STL)
3. Select **Options** and choose from the following:

Total Quality – default value of approximately 0.01.

Detail Quality – default value of approximately 14°.

The lower the value selected, the more accurate the saved file, although the saved file is correspondingly larger.

Resulting triangles should not be smaller than Z resolution of 0.02mm.

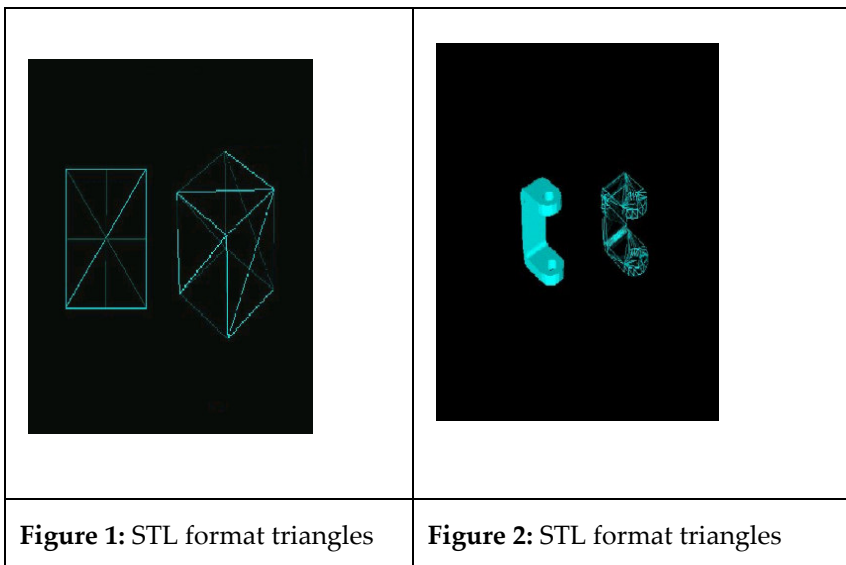
1. Select an option and press **OK**.
2. Click **Save**. A picture of the file model, showing its structure built in triangles, appears along with a window that provides information on:
 - Number of Triangles
 - File Size
 - File Format: Binary (preferable) or ASCII
 - *Save* – the address where the file will be saved
 - Yes/No
3. To save the file in STL format, select **Yes**.

2.23.1.2 What is an STL File?

The STL or stereolithography format is an ASCII or binary file used in manufacturing. It is a list of the triangular surfaces that describe a computer generated solid model. This is the standard input for most rapid prototyping machines.

The ASCII.STL file must start with the lower case keyword 'solid' and end with 'endsolid'. Between these keywords are listings of individual triangles that define the faces of the solid model. Each individual triangle description defines a single normal vector directed away from the solid's surface followed by the X-Y-Z components for all three of the vertices. These values are in Cartesian coordinates and are floating point values. The triangle values should all be positive and contained within the building volume. For this project the values are 0 to 14 inches in the X, 0 to 10 in the Y and 0 to 12 in the Z. This is the maximum volume that can be built but the models should be scaled or rotated to optimize construction time, strength and scrap removal. The normal vector is a unit vector of one length based at the origin. If the normals are not included then most software will generate them using the right-hand rule. If the normal information is not included then the three values should be set to 0.0.

The following diagrams illustrate the STL format:



3.4. About Objet Studio™

3.14.1.1 Selecting a Model File (Object)

Double click on your desktop shortcut to Objet Studio™. The opening screen appears displaying an empty build tray.

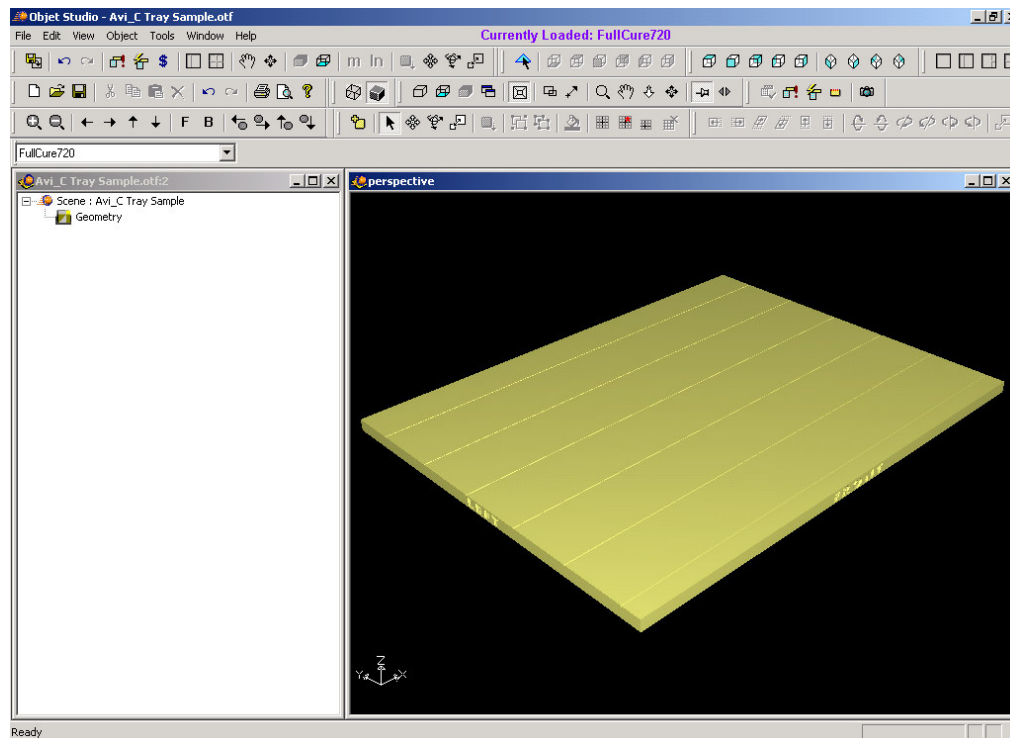


Figure 3: Opening screen

To select a model file for positioning on the tray, do one of the following:

- ⊙ Place the cursor on the tray and click on the right mouse button
- ⊙ From the Main Menu Bar select **Object>Insert**
- ⊙ Press the **Insert Model** icon button.

The **Insert** dialog box appears

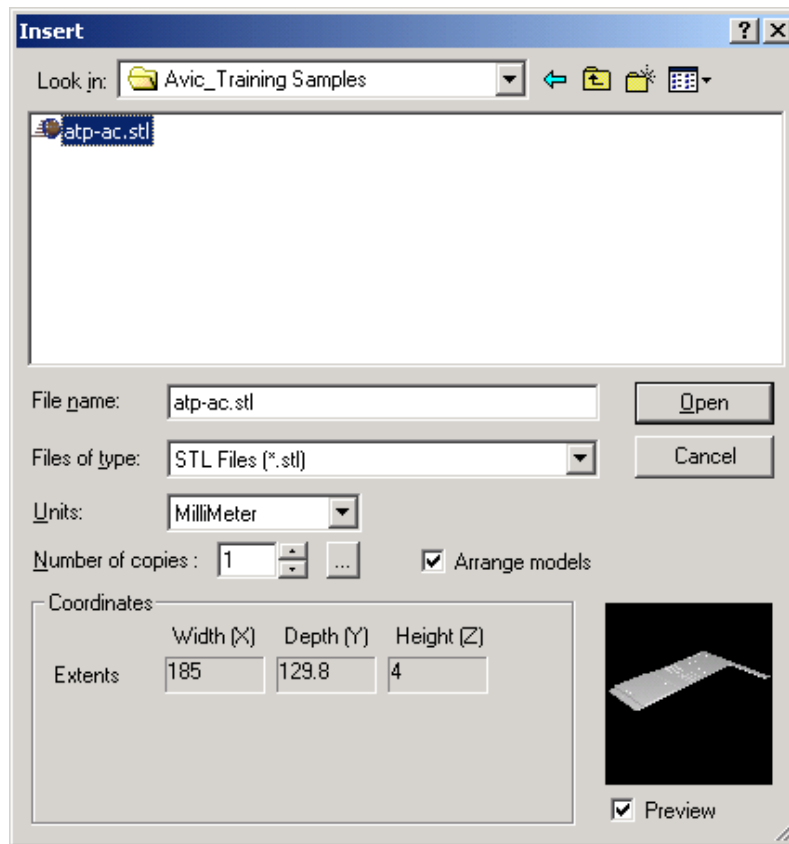


Figure 4: Insert Dialog box

- To select the file** Use the browser to navigate to the library in which the file for printing has been saved. Choose file or files by clicking on them with mouse (multiple selection is allowed using SHIFT and Ctrl keys, as usual).
- To preview the file** Click in the Preview check box at the bottom right of the screen. The Model appears in the Preview window.

Units	Open the drop down list next to Units and select the appropriate units of measurement for the model (millimeters or inches). Determine the unit type by examining the values in the Extents fields. Values of less than or circa 10 may mean that the measurement unit is inches. Larger values may mean that the unit is millimeters. The size of the Build tray is 330/333 mm(x) 330/333 mm(y) 200mm(z)
To Insert	To insert selected objects, press Open. Models appear on the tray.
Number of copies	Insert the number of copies from the selected model to be placed onto the tray.
Quick Automatic Placement	If Quick Automatic Placement is active, all models would be automatically positioned on tray.

3.24.1.2 Placing More Than One Model on the Tray

To place more objects on the tray, revert to *Object>Insert*. Select an additional file/files and proceed as detailed above.

To place more than one copy of the model / duplicate a model on the tray:

- Click on the current model to select it
- Click on the right mouse button and select **Copy** to place the model in the clipboard.
- Click on **Paste** to copy a single model on to the tray, *or*
- Click again on the right mouse button and select **Paste Special** The **Paste Special** dialog box appears.

4.1.3 Paste Special

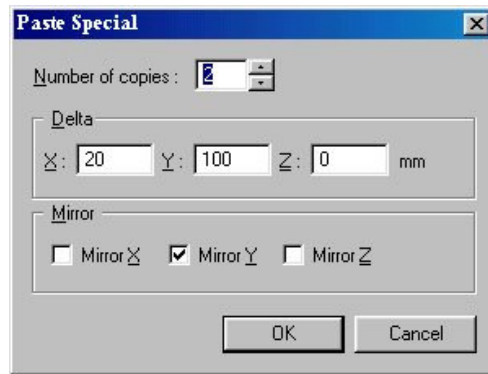


Figure 5: Paste Special dialog box

The Paste Special dialog box contains the information required to insert additional copies of the object. Enter information as detailed below:

Number of copies: Type in a number, or use the arrows provided.

Delta: Distance between copies along X, Y and Z axes.

Mirror: Allows the option of placing a copy of the model as a mirror image on the tray.

For example: the settings from Figure 5 result in a Tray placement as shown below:

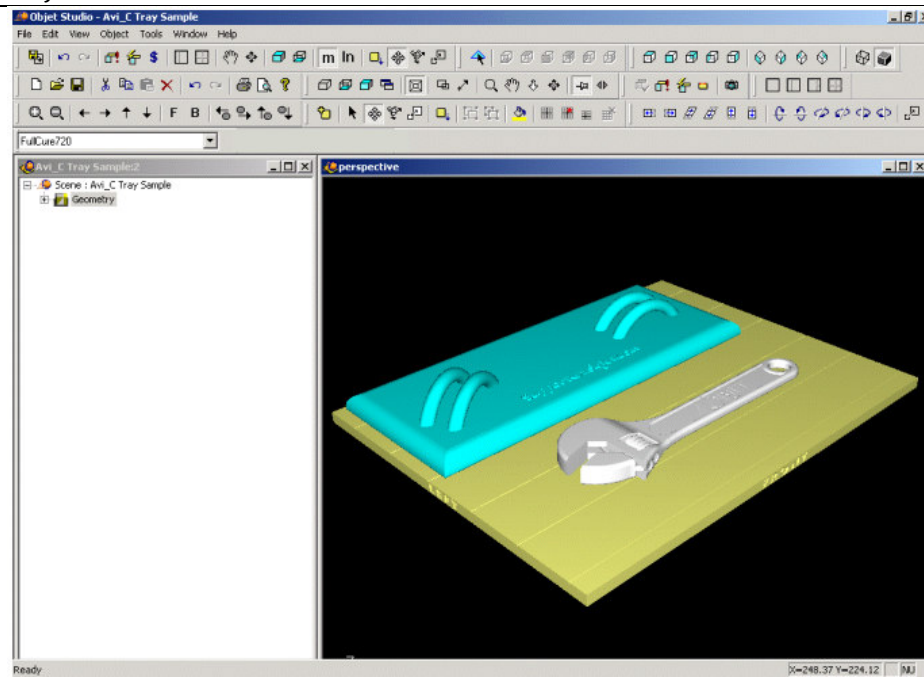


Figure 6: Build Tray after Paste Special

3.34.1.4 Selecting an Object(s) on the Tray

Selecting an Object(s) on the Tray

To perform a task involving the positioning or moving of an object on the tray, you need first to select the object.

To select an object, place the cursor on the object and right click with the mouse button.

Note: The object changes color when selected.

To select more than one object from the tray:

- Place the cursor on the first selected object and right click with your mouse.
- Place the cursor on the next object to be selected and holding the Shift or Ctrl key, right click the mouse. Both selected objects now change color.
- Repeat step 2 for all the objects to be selected.

3.44.1.5 Considerations for Placing/Positioning a Model

Although the decision as to where and how to orient, place and position a model on the tray needs to take into account a variety of factors, there are actually no hard and fast rules. Each case should be considered individually. The guidelines provided below are helpful when making the decision.

4.1.6 The X-Y-Z Rule

A primary consideration when positioning a model is its outer dimensions. The Eden330/333 prints (scans) along the X-axis and so printing time along this axis relative to total printing time does not take long. This being the case, it is recommended to place the object's longest dimension along the X-axis

The ink-jet head width is 65mm. This means that any model with a width of less than 65mm is printed in one scan. This being the case, it is recommended to place the Intermediate dimension along the Y-axis.

The high resolution printing (1270 DPI) on the Z-axis and the fact that each printing layer is equal to 20 microns mean that it is time-consuming to print a tall object. This being the case, it is recommended to place the smallest dimension along the Z-axis.

In summary, always try to position an object on the tray with:

- The longest dimension along the X-axis
- The intermediate dimension along the Y-axis
- The smallest dimension along the Z-axis

4.1.7 The Hollow-up Rule

When printing models with drills, holes, hollow or unfilled surfaces it is important to locate them face up so that unfilled surfaces are not filled with Support material.

4.1.8 The Fine Surface Rule

When printing models with fine details on the outer surface (e.g. the keypad side of a phone set) we recommend positioning the side with the fine detail face up. This

means that the upper (detailed) surface is printed without Support material, giving a fine-smooth finish.

4.1.9 Z-From Left To Right Rule

The Eden330/333 prints (scans) along the X-axis, moving from the axis origin to the right. It is therefore efficient for a model that is partly high and partly low to position the highest part of the model close to the X-axis origin, so that the heads do not have to move all along the tray to print the slices of the taller part, once printing of the lower parts has been completed.

4.1.10 Avoid Support Rule

For an object like a pipe or tube, it may be better to print it standing up (no support material inside the pipe) rather than in the lying down position even though the latter method is faster. This is so that the hollow inside of the tube or pipe is not filled with support material (as in 3.5.2 above).

3.54.1.11 Tray Architecture

The architecture of the tray is laid out on the left hand side of the tray screen, in a manner similar to that of MS Explorer.

- Double click on Geometry and the objects appear one below the other listed as Placed Elements.
- Click on an object (Placed Element) and the image on the screen changes color indicating that it has been selected.
- Click on more than one Placed Element in the list while holding the Shift key, and the object images on the screen change color simultaneously as they do when clicking directly on the object images
- Right click on an object (Placed Element) and the Popup menu appears.

3.54.1.12 The Objet Studio™ Toolbars

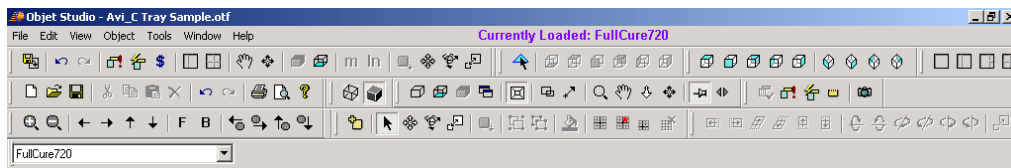


Figure 7: The Objet Studio™ Toolbars

Figure 7 shows all the Objet Studio™ Toolbars. It is not necessary to display them all on the screen at the same time.

To access the toolbars from the main menu bar:

- Select View>Toolbars to display the checklist in Figure 8.
- Click the checkbox to select the required toolbar.
Press OK to confirm the selection.

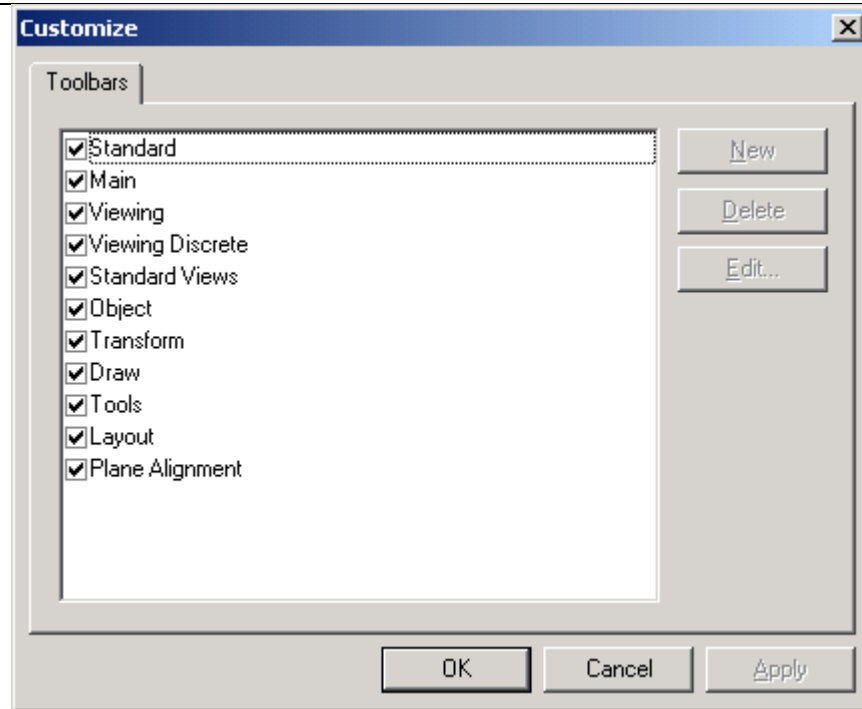






Figure 8: Toolbar selection checklist


Some of the buttons that appear on the *Objet Studio*™ toolbars are familiar from standard Windows programs and do not require explanation. The remaining buttons are designed to provide maximum flexibility in viewing and positioning models on the build tray. Place the cursor on an Icon and the Icon name appears.

3.54.1.13 Inserting and Moving a Model

The following Icon buttons facilitate the tasks involved in inserting an object onto the build tray and moving the object and/or the tray around in the View Window.


Table 1: Inserting and moving icon buttons

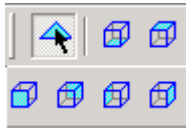
ICONS	TASK
 <p>Select</p> <p>Translate</p> <p>Rotate</p> <p>Scale</p>	<ul style="list-style-type: none"> To select a model, click on the Select button, then on the model. The color of the selected model changes to light blue. A model can be manipulated only after it has been selected. Click the Translate button to move the model around in the view screen. Click the Rotate button to turn the model around on either of the X Y Z axes. Select the Scale button to change the size of the model. Click and hold the left mouse button and move the cursor over the object, to decrease or increase the size of the model.
 <p>Lay on</p>	<ul style="list-style-type: none"> The Lay on button positions the model so that it is sitting on the build tray. This action insures that the model is not floating above or beneath the surface of the tray.
 <p>Group and Ungroup</p>	<ul style="list-style-type: none"> The Group and Ungroup buttons are operative only when more than one model has been selected. Grouping two or more models enables their manipulation as a group, as opposed to individually.
 <p>On/Off Grid</p> <p>Snap to Grid</p>	<ul style="list-style-type: none"> Moving from left to right: Select the On/Off Grid button to toggle the grid in the view screen. The Snap to Grid button causes any movement of the selected model to result in its being positioned according to the grid. The model snaps to grid on completion of any movement. Select the Grid Origin button to move the Grid Origin Point to the desired position in the viewing screen.

ICONS	TASK
Grid Origin Reset Grid	<ul style="list-style-type: none"> Select the Reset Grid Origin button to restore the Grid Origin Point to the default position.
 Wire Frame Shaded	<ul style="list-style-type: none"> The Wire Frame and Shaded buttons enable toggling between an outline view of the model and a solid object view.

3.74.1.14 Positioning the Model(s)



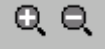

Table 2: Positioning icon buttons






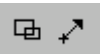
ICONS	TASK
 Dynamic Checking Tray Validation Automatic Placement	<p>From left to right:</p> <ul style="list-style-type: none"> Select the Dynamic Checking button to prevent invalid placement of the model. Click again to cancel. Select the Tray Validation button to validate the Tray. If the placement of the models or Models themselves are invalid for any reason, problematic models will appear colored, as defined in the constraints settings Select the Automatic Placement button for automatic and valid placement on the tray by the software. Selecting this Icon button is equivalent to clicking the checkbox in the Section dialog box in order to view the section.


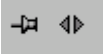


Enable Clipping	
 <p>Select Plane</p> <p>Align Bottom/ Top</p> <p>Align Left/Right</p> <p>Align Front/Back</p>	<ul style="list-style-type: none"> Choose the Select Plane option to mark a surface onto the model located on the tray. One may attach this surface to the tray (align bottom) or place the opposite surface of the selected plane (align top) or orient in other directions accordingly.

3.74.1.15 Viewing and Movement Options

Table 3: Viewing & Movement Icon buttons

ICONS	TASK
 <p>Camera View</p>	Select the <i>Camera View</i> button to view the object on the build tray from the viewpoint of a virtual camera lens. The position of the camera may also be established and subsequently pointed to view the model.
 <p>Windows View</p>	The Windows View buttons enable selection of up to four simultaneous windows, each showing the object(s) in different projections.
 <p>Zoom In</p> <p>Zoom Out</p>	Select the Zoom In and Zoom Out buttons to view the model and build tray from a closer or more distant perspective.
 <p>Pan Buttons</p>	<ul style="list-style-type: none"> Use this set of Pan buttons to facilitate moving the build tray and contents from side to side or up and down for easy positioning in the view window.

ICONS	TASK
 Backward & Forward	<ul style="list-style-type: none"> The Advance Forward and Backward buttons facilitate movement of the build tray and its contents so that the tray appears to move towards or away from the viewer.
 Millimeter or Inch Units	<ul style="list-style-type: none"> Select the Millimeter icon for converting an inch-inserted model into millimeter units. Select the Inch icon for converting an millimeter-inserted model into inch units
 Rotate	<ul style="list-style-type: none"> Use this set of Rotate buttons to rotate the selected model in the direction indicated by the arrow.
 Zoom	<ul style="list-style-type: none"> These icons permit zooming in on the object or tray.
 Perspective Parallel	<ul style="list-style-type: none"> Use the Perspective/Parallel button to create a slight change in perspective for viewing the build tray and its contents.
 Zoom by Rectangle Zoom by Line	<ul style="list-style-type: none"> The Zoom by Rectangle and Zoom by Line buttons provide additional options for zooming in on the selected object on the build tray.

ICONS	TASK
 <p>Zoom Dynamic</p> <p>Pan Dynamic</p> <p>Walk Dynamic</p> <p>Study Dynamic</p>	<ul style="list-style-type: none"> Select a button, then holding the left mouse button down, use the mouse to move the build tray with its contents. The following is a description of the options from left to right: The Zoom Dynamic button enables continuous zooming in on the model without the step-like progression of the <i>Zoom</i> button. The Pan Dynamic button enables continuous movement of the model and build tray without the step-like progression of the <i>Pan</i> buttons. The movement occurs according to the direction of movement of the pointer. The Walk Dynamic button works in a similar fashion to the <i>Pan Dynamic</i> button, except that the movement is in the opposite direction to the movement of the pointer. The Study Dynamic button enables rotation of the entire study (build tray and model together). If used in conjunction with the <i>Spin Mode</i> button (see below), the study will rotate continuously in the view screen.
 <p>Sticky Mode</p> <p>Spin Mode</p>	<p>From left to right:</p> <ul style="list-style-type: none"> Select the Sticky Mode button to maintain a selected button in a continuously selected state. Select the Spin Mode button to cause the build tray and its contents to spin continuously. When used in conjunction with one of the rotate options, the build tray will spin in the way that has been selected by the rotate option.
 <p>Build</p>	<ul style="list-style-type: none"> Select the Build button once all objects are properly placed. This is the final command prior to saving the tray information as an OTF.
 <p>Estimate Consumption</p>	<ul style="list-style-type: none"> Select the Estimate Consumption button for calculating the printing time per tray, and the material consumption per tray/model. <p>This icon is equal to 'Tools', 'Estimate Consumption' from the main pull-down-menu.</p>

3.84.1.16 Main Menu-Bar Options

Most of the options accessed via the Icon buttons listed above can also be accessed from the main menu at the top of the screen.

To open a main menu bar option, click on it and a drop-down menu appears. Many of the options are standard Windows commands

Following is a list of Main Menu commands.

3.84.1.17 File Menu

From the Main Menu Bar select *File*>

New	To open a new empty tray.
Open	To open a saved file, OTF (or STL for viewing mode only).
Close	To close an open file (Standard Windows command).
Save	To save a file (Standard Windows command).
Save As	To save a file as an OTF with a file name in a designated library.
Build	The final command prior to slicing (see Build Icon on this page). Following this command, if an OTF has not yet been created, the Save As OTF dialog appears.

File>Page Setup	To set page parameters for printing a picture of the model. The Page Setup dialog box appears; it is similar to the standard Windows Page Setup.
---------------------------	---

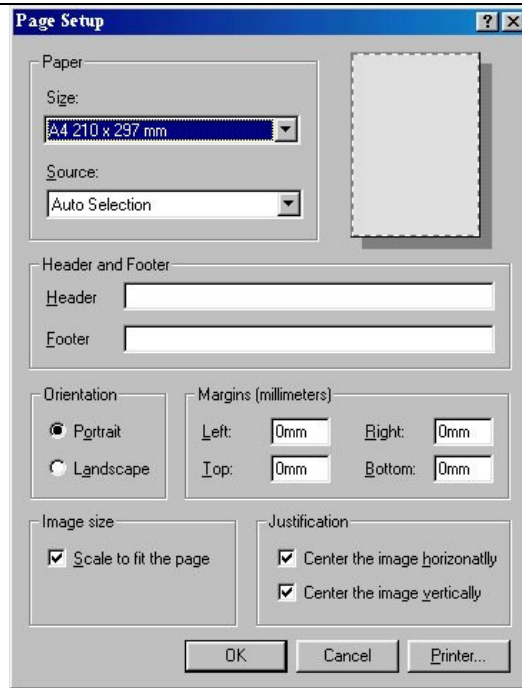


Figure 9: Page setup dialog box

Type in the required page setup parameters then click the System button.

Note: The following commands do not refer to your Objet Eden330/333 but to a regular printer!

- File>Print Preview provides you with a preview (Standard Windows Command).
- File>Print Sends the picture to the regular printer.

3.44.1.18 Edit Menu

From the Main Menu Bar select *Edit>*

Undo/Redo

To undo/redo last operation.

Cut, Copy, Paste

Standard Windows commands.

Paste Special

See page 8.

Delete

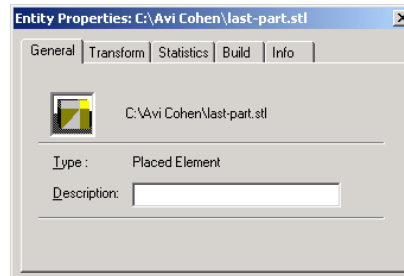
To delete an object from the tray.

Edit>Properties

The Properties dialog box opens with five tabs.

General Tab

You can insert a description in the Description field.

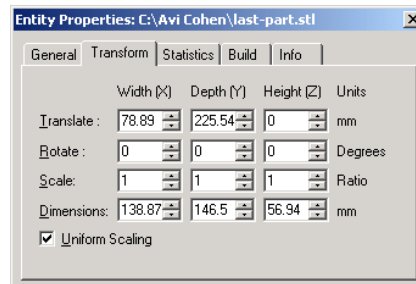
**Transform Tab**

Uniform Scaling: Click in the Checkbox for Uniform scaling in all 3 axes.

Rotate: round any axis X,Y, or Z. The Rotate value is relative to the starting position. This means that if a correction is made you type in the actual new value and not the increment.

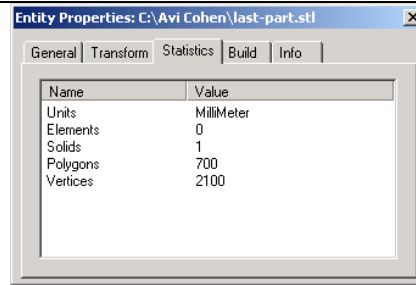
Scale: Relative to the 3 axes

Dimensions: The actual dimensions of the model.



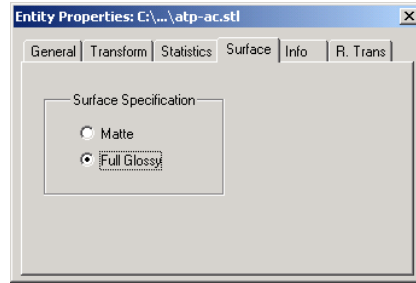
Statistics Tab

Displays File name and location together with general statistics.



Build Tab

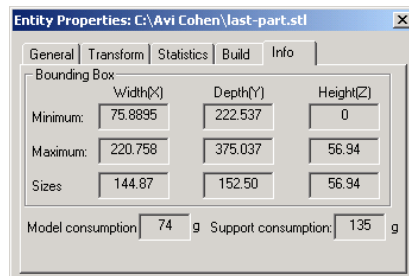
Displays the select build option. 'Matte' for building with support layer around the part, 'Sateen Surface' for automatic selection of support enclosure and 'Full Glossy' for no support around parts (this option is restricted for special geometries as shown hereafter).



Info Tab

This tab contains size information concerning the bounding box.

Note: The Model and Support Consumption would be presenting the estimated consumption after the user would request this calculation, from: 'Tools' – 'Estimate Consumption' menu.



3.44.1.19 Selection of Build Parameters

Note: The Build parameter defaults have been carefully selected and the values on the Objet Studio screen are suitable for most model building (printing). Please call Objet Customer Support if you wish to alter the defaults.

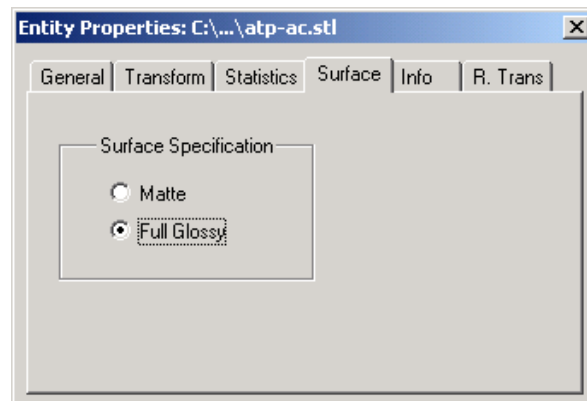


Figure 10: Surface Selection Screen

3.84.1.20 Build on Pedestal

Pedestal:

The pedestal structure is selected automatically based on material selection.

A “Pedestal” is a build of a complex support structure of predefined height in order for a model to be built upon it. This option allows the user to attain easy removal of the printed part from the tray.

This option is selected by the Objet Studio for Eden330/333 users.

3.84.1.21 Build Types

Matte Surface Builds a complete support structure shell around the entire model.

Full Glossy Builds no support shell around the model. This option is for experienced users only, because it is geometry dependent and is not acceptable for every model printed.

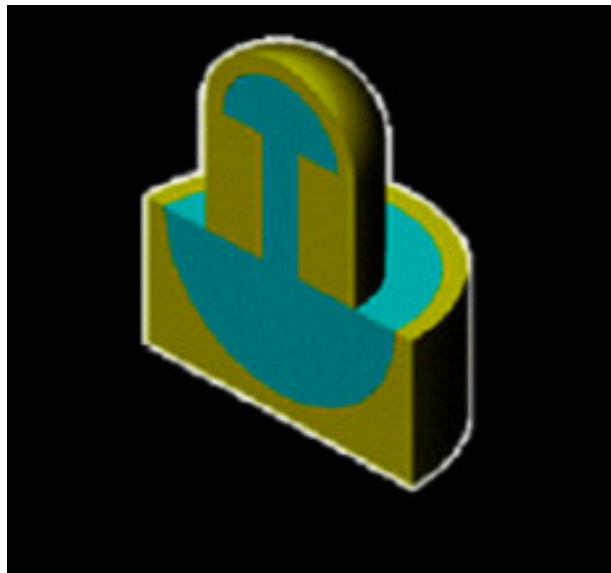


Figure 11: Matte Surface

3.84.1.22 View Menu

From the Main Menu Bar select View>

Points	Displays the model with the triangle coordinates (points) only.
Wire Frame	Displays an outline view of the object.
Shaded	Displays a solid object view.
Display Bounding Box	Displays the Bounding Box instead of Model geometry.
Toolbars	Opens the "Customize" dialog.
Status bar	Displays the status bar at the bottom of the screen.
Layout	Opens a checklist from which 1,2,3 or 4 views may be selected. (See Windows View buttons in the Icon table on page 15.)

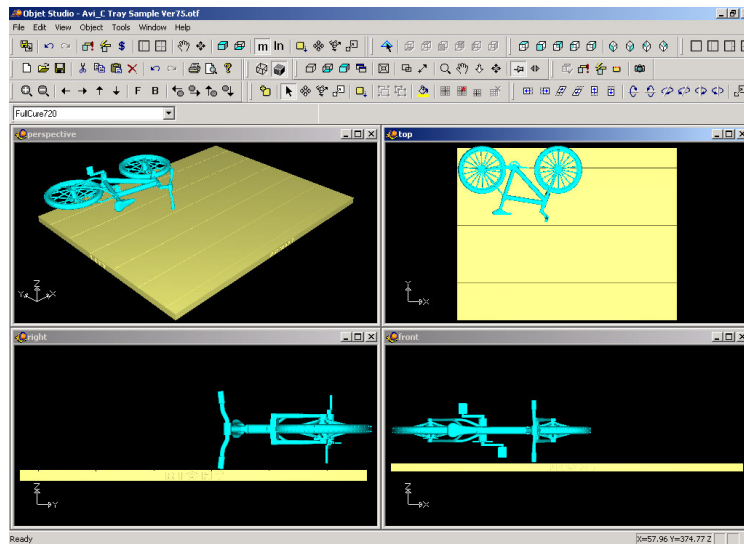


Figure 12: Views From Layout

3.84.1.23 Object Menu

From the Main Menu Bar select *Object*>

Insert	Opens the Insert dialog box (see page 7).
Translate	These options enable the user to manipulate the object(s) on the tray. The tasks they perform are equivalent to those performed by the Icon buttons described on page 12.
Rotate	
Scale	<p>Click on an object to select it. The color changes to light blue.</p> <p>Click on the selected option and move the cursor over the selected object.</p> <p>Move the cursor with the mouse button pressed. The equivalent Icon appears over the object and the task is performed as detailed on page 11.</p>
Lay on	To position the object so that it is placed directly on the build tray – to ensure that it is not floating above or beneath the surface of the tray. (See Lay on button page 13.)
Flip	<p>Opens a dropdown list showing the three axes X, Y, Z.</p> <p>Choose an axis and click on a selected object. The object flips over on the axis you selected.</p>
Fill Color	Click to open Windows color pallet. This allows the selection of a color for the object(s) on the screen.
Group	These options are operative only when more than one model has been selected. Grouping two or more models enables their manipulation as a group.
Ungroup	

Split Option

The Split option, located at the 'Objet' pull-down-menu enables the user to perform simple cut to parts for tray fitting.

Using the Split options, one may cut the part at a fixed distance (default maximum tray envelope). Note that all cut parts would be saved in a new directory carrying the STL file name.

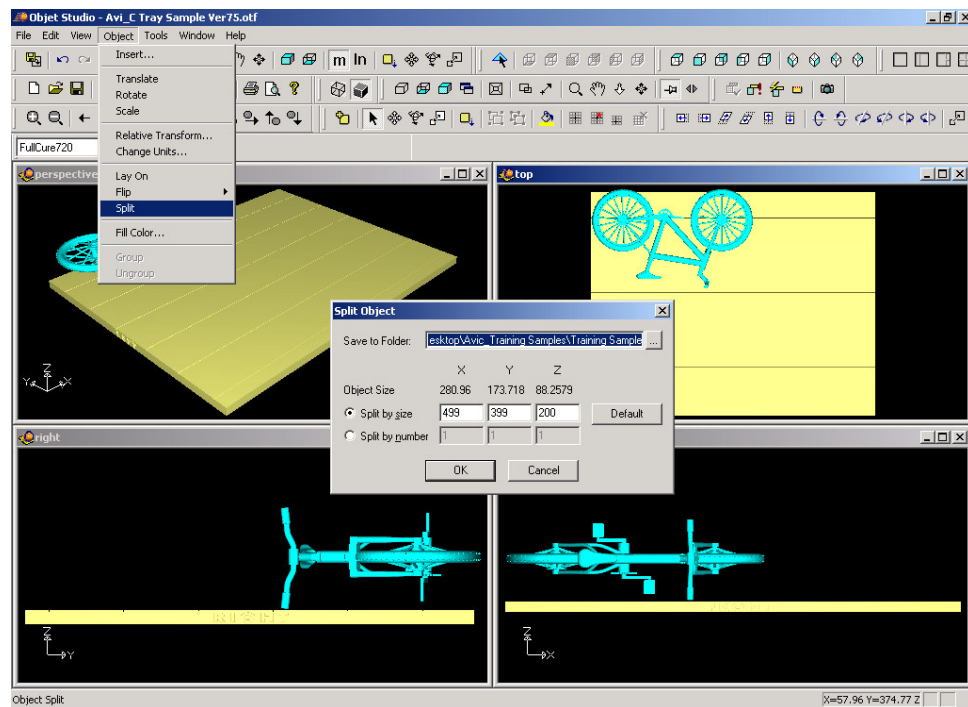


Figure 13: Split Screen

3.84.1.24 Tools Menu

From the Main Menu Bar select *Tools*>

Grid	Displays the Grid on the screen.
Snap to Grid	<p>The selected object is positioned in line with the Grid.</p> <p>After any movement of the object, it will automatically line up with the Grid (Snap to Grid)</p> <p>See Icon table on page 13.</p> <p>The Placement Validation opens showing a color code for the constraints parameters:</p>
Constraints settings	<ul style="list-style-type: none">⊙ Outside Tray⊙ Collision⊙ STL Problems <p>To select Dynamic Check, click the Dynamic check box. A check (validation) may be specifically performed to see if the object is outside the tray, or colliding with another object on the tray.</p> <p>This may be done by clicking a checkmark in the relevant box.</p>

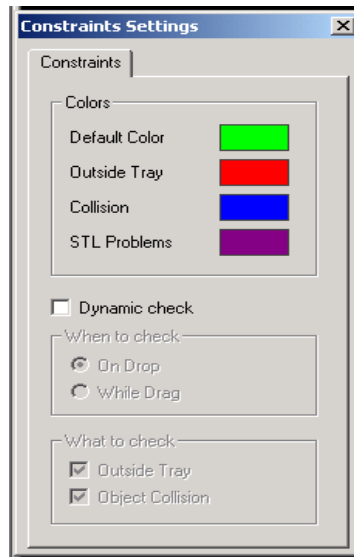


Figure 14: Constraints Settings dialog

Click on any of the colored boxes to open the color pallet. The color that appears may be changed in order to alert the user of the problems with objects on the Tray.

**Tray
validation**

Validates objects on the tray for printing (Building) in line with the constraints settings (see above). For example, if the object is outside the tray it will appear in red.

**Automatic
Placement**

Automatically places the objects on the tray in the optimal position.

Section Displays a cross section of the objects on the tray.

This allows examination of the internal structure of the object to plan the necessary support.

Click in the checkbox to activate (enable clipping).

The sliding bars enable the user to select the best position for the section.

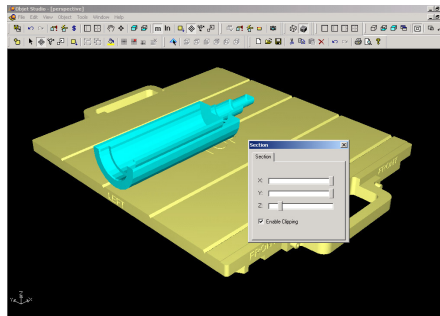


Figure 15: Section

Options

The Options dialog opens with five tabs.

Grid

The Grid tab enables you to adjust the Grid parameters as displayed.

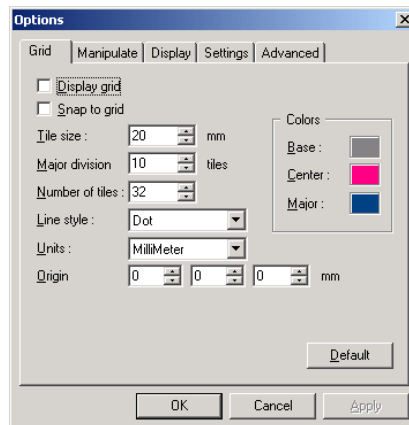


Figure 16: Grid settings

Manipulate

Set defaults
for working
with
Transform
Toolbar.

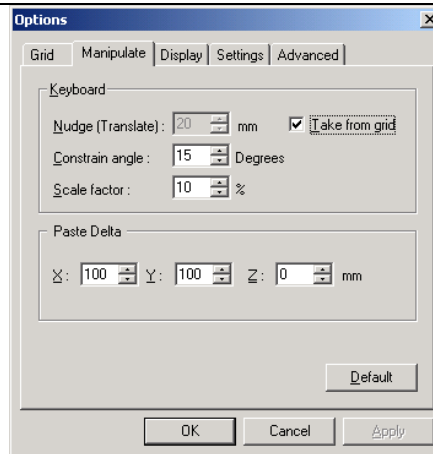


Figure 17: Manipulate settings

Display

The Options
dialog
enables to
set the
default
display.

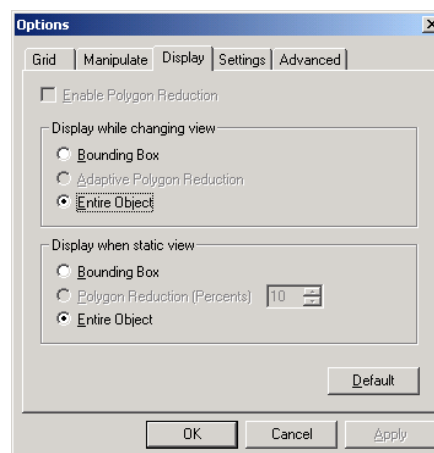


Figure 18: Display

Settings

The Options dialog enables to set the default values for the 'Automatic Placement' (Select: Placement; Orientation; automatic placement).

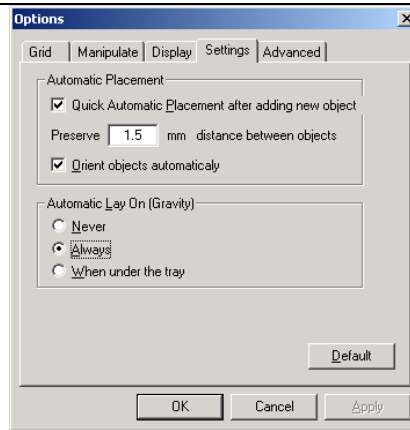


Figure 19: Settings

Advanced

The Options dialog enables to set improved values for Open GL video card. For further information regarding this option, please contact Objet Technical Support.

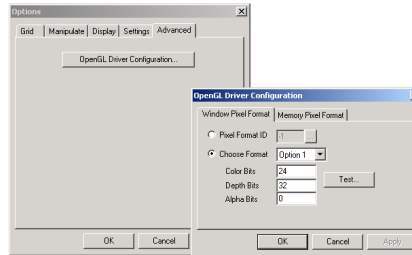


Figure 20: Advanced

3.134.1.25 Saving Tray and commencement of Build

Now all the models are properly placed and ready for Building.

From the main menu select *File>Build Tray*.

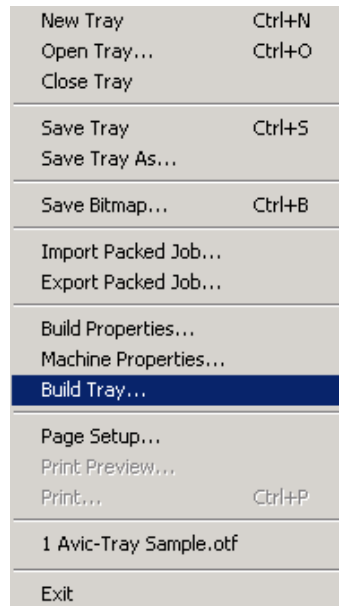


Figure 21: Selecting the **Build** command

Note that when selecting the Build option, the current tray will be saved (overwritten) automatically. If the tray is a new tray, i.e., has not yet been saved under an .OTF file name, the user will be prompted to save the current tray via the Save As dialog box, as shown in the figure below.

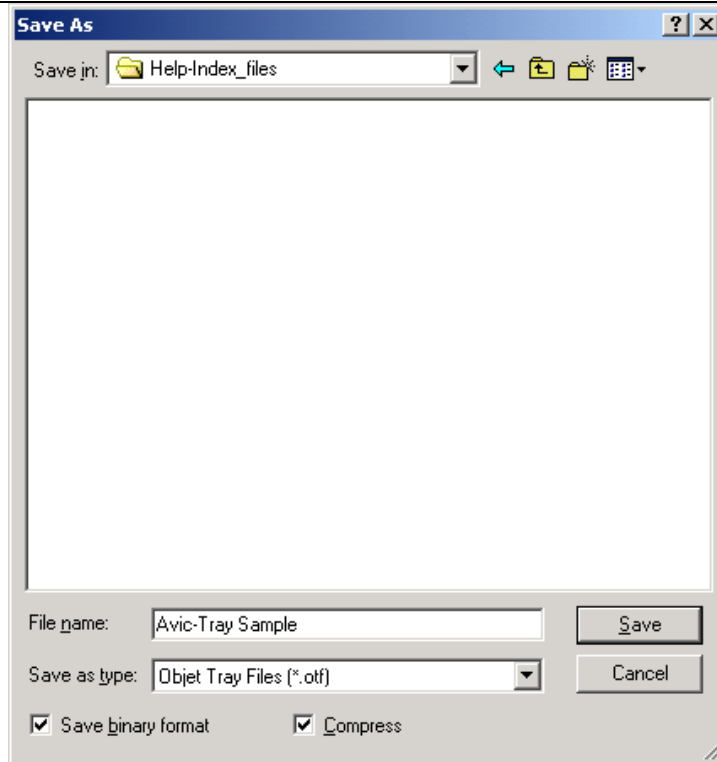


Figure 22: Save As OTF dialog box

Select a location for the file in the **Save in** field.

- Type in a file name.
- Make sure that Save As type shows Objet Tray Files (*.otf).
- Press **Save**.

Once the Build command has been selected (and the job saved), Objet Studio sends the job to the Job Manager, and the Objet Studio application closes itself.

3.134.1.26 Working With Resin Replacement

An enhanced features of the Objet Studio is a recognize tool for current loaded resin type. Each resin type (i.e. FullCure 720, Vero, or Tango) has its own unique characteristics and therefore special printing modes.

Once launching the Objet Studio, a clear message will advise what resin type is currently loaded (refer to the figure below: 'Currently Loaded: FullCure720'). This on-screen display, enables the user to immediately be advised as per loaded resin in the Eden system.

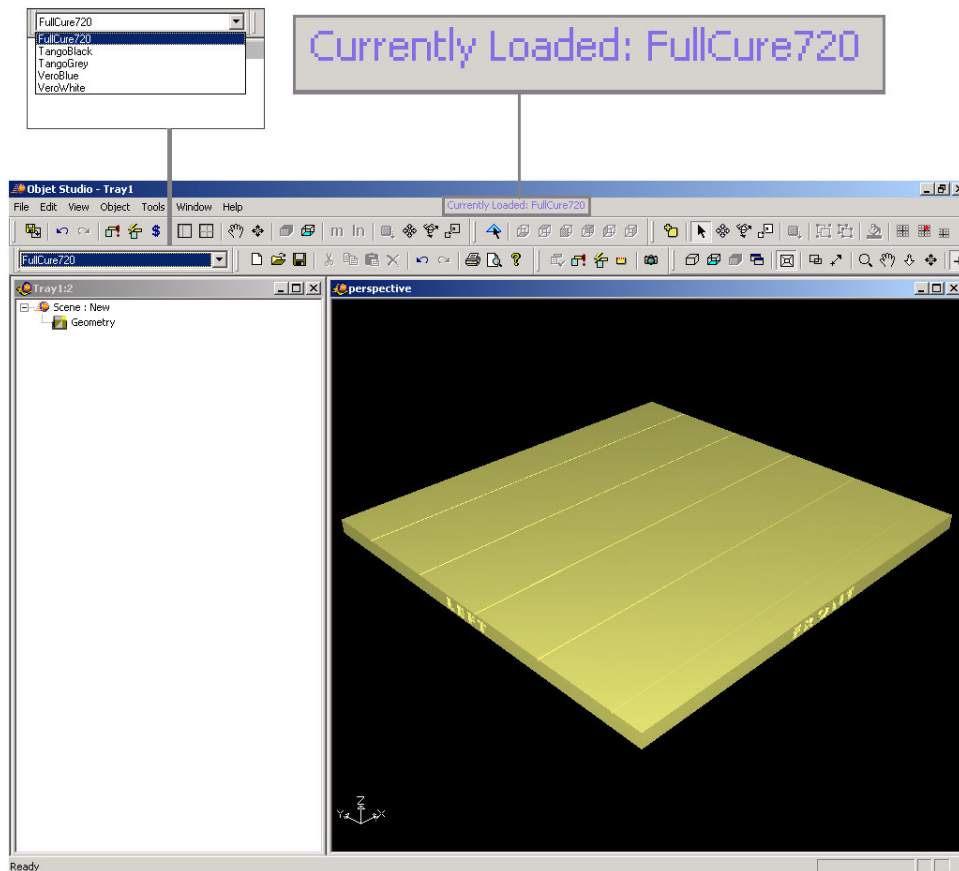


Figure 23: Working with resin replacement

In addition to the displayed current resin type, the user should select the material type, once a tray preparation is required. Thus, while preparing a tray for TangoBlack resin, the user should select from the main toolbar the selected tray, and then insert the STL parts and prepare the tray.

Please note that although the system is loaded with one type of resin, the user can prepare trays for different types of resin, and save its corresponding OTF file. Then after loading the required resin with Resin Replacement Wizard in the Eden Software, he may open the saved trays and print them.

Note that the tray size may be shown different for some selected resin types, due to each resin's unique characteristics. Hence, a Tango resin may show and require a smaller tray size as shown in figure 24 below.

The Objet Studio application will generate an alert message while trying to printing a tray (for certain resin type) different than loaded in the machine.

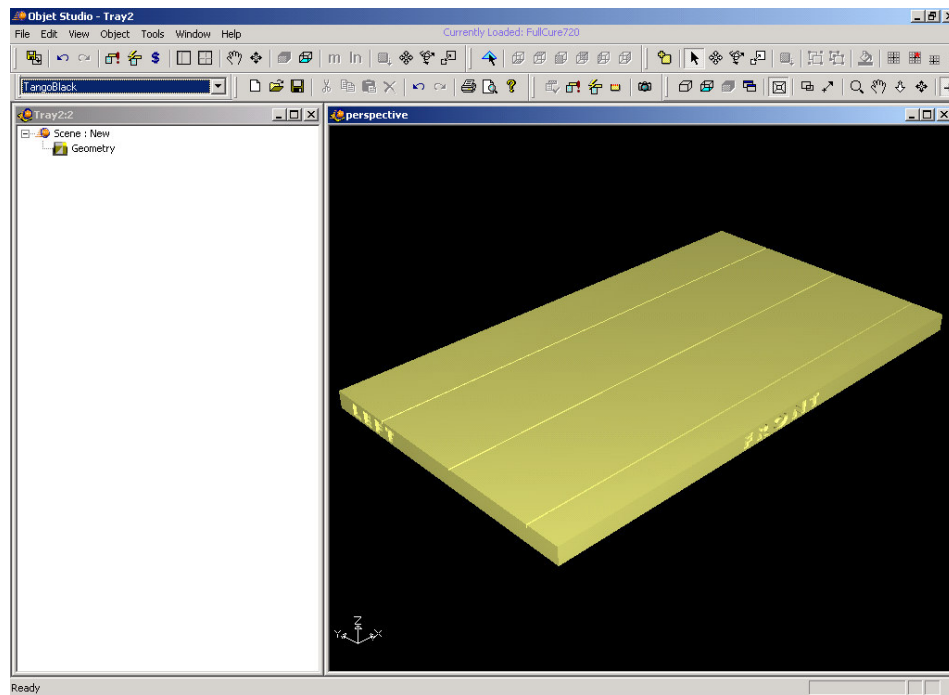


Figure 24: Preparing the TangoBlack Tray

5. About Job Manager

When Job Manager receives a new job the Job Manager Screen appears and begins pre-processing automatically. The Embedded screen will show the 'Run' icon as active

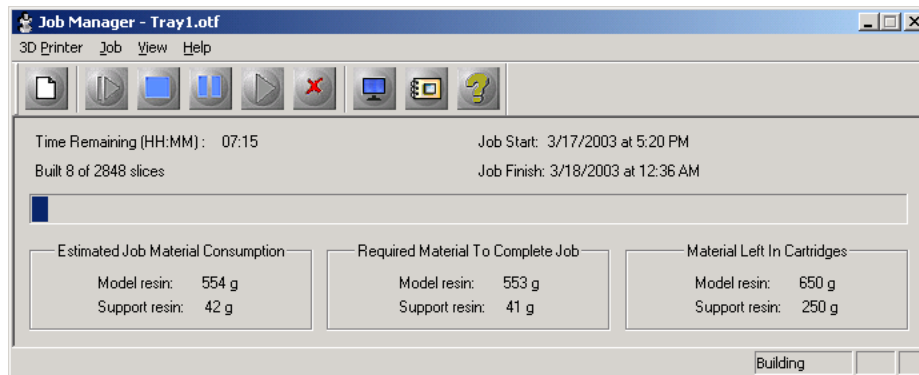


Figure 25: Job Manager Screen

- Select the 'Job Info' icon (or select from the pull-down menu) to review the Tray Properties, such as build parameters, material consumption and estimated printed time, per model or per tray.

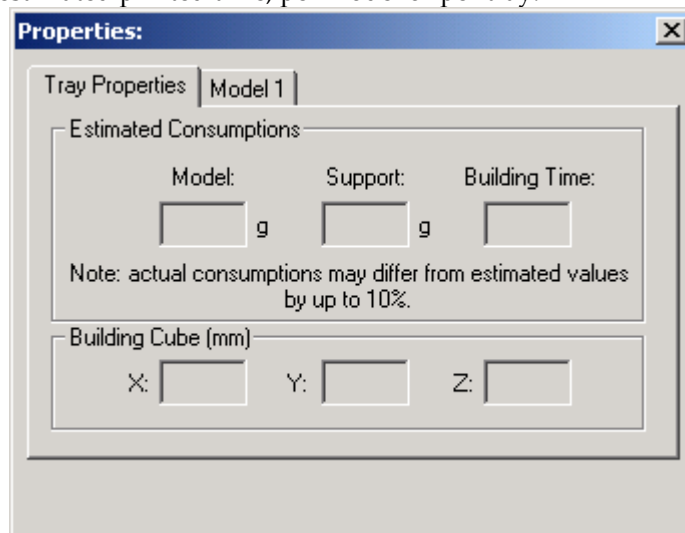


Figure 26: Properties Screen

- The View menu includes the 'ToolBar' option (active if checked), the 'Status Bar' option (to present messages on Job Manager status line), the 'Refresh Status' (to update the on screen values), the 'Show Outgoing Slices' (to show each slice being sent for building), and the 'Show 3D Progress' (to show actual building in 3D view).

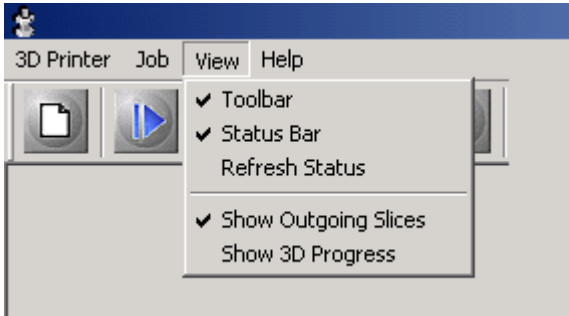


Figure 27: View Screen

- The Job menu includes all features also in the icons line. 'Restart Job' for printing from a certain slice, Pause, Stop, Resume, Delete Job, Preview Slices, Review Job, and Job Info.

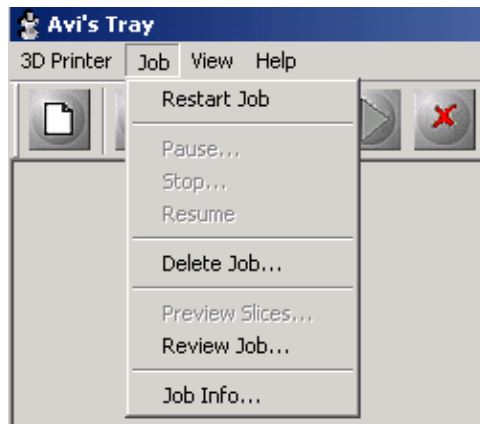


Figure 28: Jobs Screen

4.45.1.1 Report Options

Select the '3D Printer/Preferences...' from the Job Manager main menu to set your desired report options.

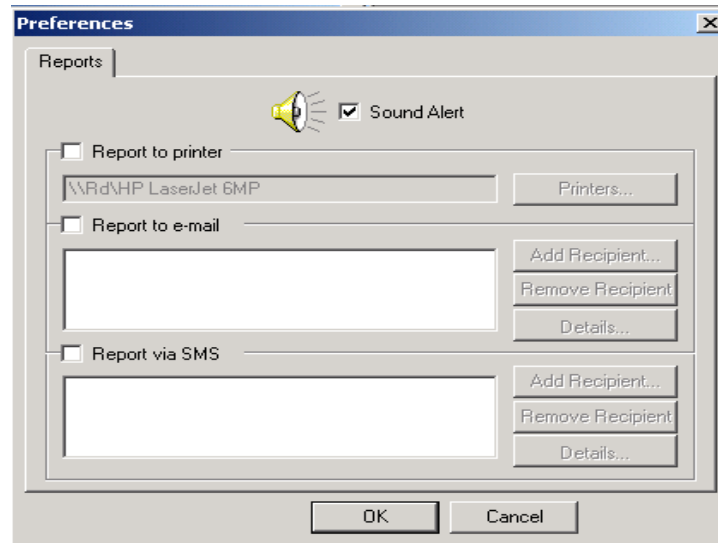


Figure 29: Preferences Dialog

- Sound Alert – The application will generate a sound alert for any message appears on the Job Manager screen.
- Report to System – Select this option to print a hardcopy of successful job results.
- Report to Email – Job Manager will send email messages regarding any event as chosen for each recipient in the list. This option requires E-mail messaging software that supports Windows MAPI to be installed on your Host Workstation (Outlook, Netscape Messenger etc.).

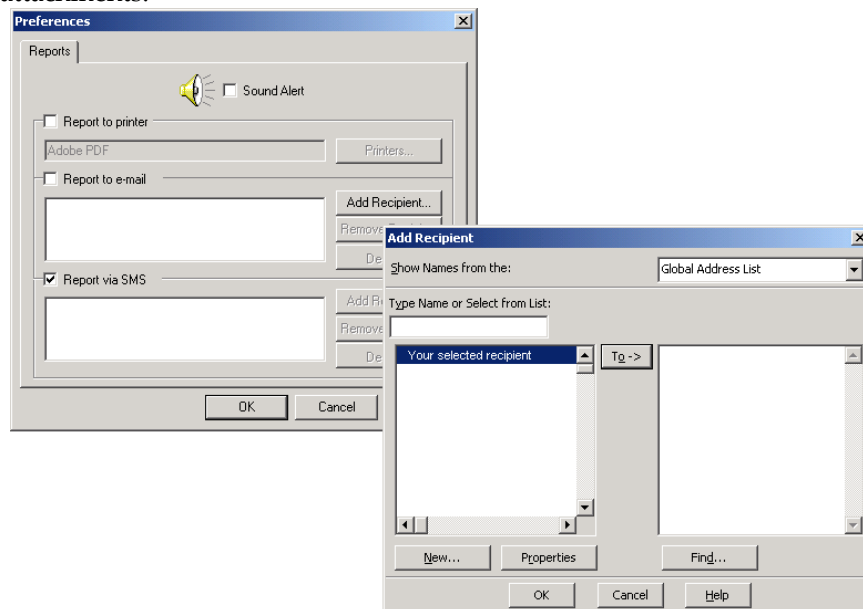
5.1.1.1 Report Via SMS:

Job Manager will send brief messages regarding any event as chosen for each recipient in the list. This option requires E-mail messaging software, which supports Windows MAPI to be installed on your Host Workstation and some mechanism for retransmission of messages to cell-phones.

Note: The 'Report Via SMS' feature can be activated with Microsoft™ Outlook 2000™ (which support Windows MAPI) and does not operates with Microsoft™ Outlook Express™

Configuration settings for SMS Report: In order to configure the SMS report, select the 'Report via SMS' checkbox. Then by clicking on the 'Add Receipt' icon – the Microsoft™ Outlook2000™ will pop-up. Add the selected email address of you mobile phone messaging system for retransmission of messages to cell-phones.

Please note that in order to get SMS messages to you cellular phone, your mobile phone company **MUST** support the transmission of email to SMS. The Job Manager will deliver therefore only the 'Subject Line' with no attachments.



4.55.1.2 Configuration Options

For use by Technical Support personnel only.

4.65.1.3 Building

Having set all the necessary parameters you are now ready to send the Build command. To do so:

- Press the Build Tray button on the toolbar of the Main Objet Studio screen. Application sends a job to Job Manager and closes.
- Make sure that you have completed the Start Procedure for the Eden330/333 Printer.
- Press Run on the Embedded computer.

4.75.1.4 How to Resume a Printing process

The Printing process may be interrupted for a number of reasons.

For example, if interruption was initiated by machine (power off, technical problem etc.), Job Manager will stop sending slices and generate the following message:



Figure 31: On Screen Message

In order to continue/resume printing from the same slice, follow these steps:

- Verify that the machine and Embedded computer are both ON.
 - Ensure that the network between the Embedded and Host is active.
 - Home all machine axes (including Z axis) and perform a pattern test (you may run the printing wizard which includes and required activities, such as, purges, wipes etc.).
 - Now, when the machine is ready for printing, select the 'Resume' icon on the Job Manager screen.
-
- The application will prompt the user to enter the 'Continue from Slice' number, showing proposed next slice.
 - At this point the user has to select the appropriate slice number. This can be done by observing the last slice printed (in the Embedded screen).
 - If the wrong slice number was selected, the Embedded application will generate a warning message, advising the proper (last) slice number.

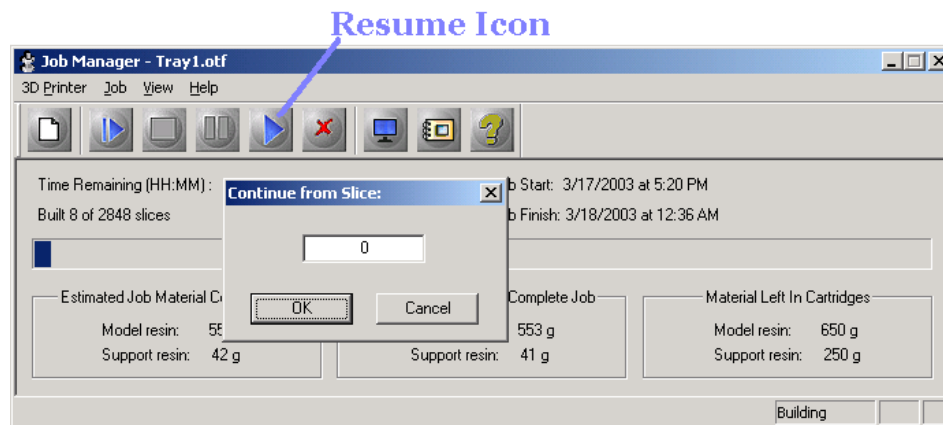


Figure 32: Resume Option

6. Operation and Maintenance

- ⦿ Read all of the following chapters that apply to your particular work.
- ⦿ Do not open the hood while the system is working. Do not bypass the hood's interlock.
- ⦿ Do not stare at the UV light. Use protective eye glasses while the UV is ON.
- ⦿ Do not touch the **Model** and/or **Support** material with bare hands. Wear gloves during cleaning of the **Model** and/or **Support** material from the machine. If you make skin contact with **Model** and/or **Support** material, wash the area as soon as possible with water and mild detergent.

1.1 Installation and Training Rules

An authorized Customer Support representative from Objet Geometries Ltd. will perform the following tasks:

- ⦿ Unpack, install, assemble and completely check the Eden330/333 system before approving it for operation.
- ⦿ Train the selected personnel to operate the system. Only trained personnel are qualified to operate the system.
- ⦿ Only an authorized Customer Support representative from **Objet** will be responsible for the system service and maintenance.
- ⦿ The user must follow all safety rules and regulations as described above.

6.1.1 Working with the Eden330/333 System

Procedure for Starting on the Eden330/333

1. Check that there is sufficient material in the cartridges (see Loading and Replacing Material Cartridges).
2. Check that there is no printed model on the tray.
3. Perform the Daily Maintenance procedure.
4. Start the EDEN330.EXE program at the Embedded Workstation.



Figure 1: Application Main Screen

6.1.2 Procedure for Shutting Down the Machine

1. Click the *Option* pull-down-menu, and select the *Shut Down* option.
2. Press [Next] when ready, or [Cancel] to abort operation.
3. The system will empty existing material in printing heads, and perform wiping. Please note that this sequence will take about 5 minutes.
4. Turn off the EDEN330/333.EXE program.
5. Switch off the machine.



Figure 2: The Shutdown Wizard

6.1.3 Procedure for Performing Pattern Test

As a periodic procedure, it may be necessary to perform a pattern test, and to examine the nozzles status. In order to perform a pattern test, follow the next steps.

Enter the main menu, and select the *Pattern Test* option from user 'Options' pull-down-menu.

Pattern test would be printed onto working table, as shown in the figure below.

Confirm the Pattern Test message, and place a paper for the printed pattern test.



Figure 3: Pattern Test Screen

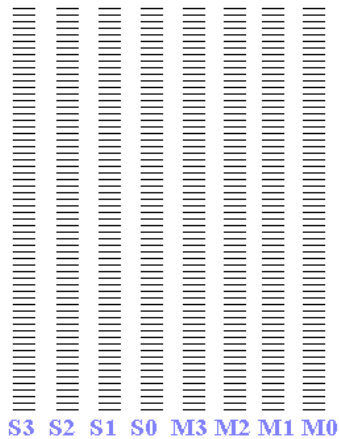


Figure 4: Pattern Test Mapping

6.1.4 Preparing the Machine for a Prolonged Pause

It is sometimes necessary to leave the machine for several hours or possibly days (weekend). The following describes the procedure to be followed when preparing the machine for such a prolonged pause. This is not closing down the machine as detailed above.

1. Ensure that the Objet Studio™ program in the Host computer is idle (not in printing mode).
2. Click the Options pull-down-menu, and select the Shut Down option.
3. The system will empty existing material in printing heads, reduce heads heating, and perform wiping. Please note that this sequence will take about 5 minutes.
5. Do NOT turn off the machine or the EDEN software.

6.1.5 Procedure for Restarting the Machine after a Pause

1. Check that there is sufficient material in the cartridges (see Loading and Replacing Material Cartridges).
2. Click the Options pull-down-menu, and select the Pattern Test option.
3. The system will prompt the user to continue with this sequence, or abort the selected option. Press [OK] to continue.
4. Once the Pattern Test sequence has been completed, and presented satisfying nozzles status - One may proceed with printing from the Host computer.

6.1.6 Procedure for cleaning or replacing the Wiper Blade

The wiper blade installed in the Eden330/333 requires an easy cleaning by the user, as part of the routine maintenance procedure. This wiper blade can be also easily replaced if required.

For cleaning or replacing the wiper blade, click the *Options* pull-down-menu, and select the *Clean Wiper* option.

The system will raise the wiper blade and prompt the user to replace or clean the wiper blade.



Figure 5: Wiper Cleaning Screen



Figure 6: Wiper Blade Removal

6.1.7 Loading and Replacing Material Cartridges

The Objet Eden330/333 operates with one cartridge of Model material and one cartridge of Support material for printing models. The net weight of each cartridge is 2.0 kilograms (4.4 lbs.) . When facing the Eden330/333, the cartridges are located in two pullout drawers in the cabinet at the lower left front of the machine.

The cartridges may be replaced either while the machine is operating or idle. If replacement takes place during operation, the process should be done as quickly as possible to ensure the continuous validity of the print process.

Do not allow the replacement of a cartridge to exceed 30 seconds when the machine is operational.

To replace and load these cartridges:

1. Open the left cabinet door and pull open the cartridge drawer containing the cartridge to be replaced.
2. Take care to load Model material into the Model drawer and Support material into the Support drawer (resin containers are keyed in order to prevent misplacement).

Grasp the handle of the cartridge firmly and pull straight out. Do not twist or turn the cartridge to remove.

When the MMS (PolyLog material management System) determine that the cartridge is empty – it will prompt a message on screen. The Objet Studio™ program in the Host computer will also generate on screen message 100 grams (or 15 minutes) before the cartridge is empty

Grasp a new cartridge (or the partially used cartridge) firmly by the cartridge handle, and pull it out.

6. Insert the new cartridge directly into the drawer. Some resistance will be felt as the needle pierces the rubber stopper at the front of the bottle.
7. Press the cartridge securely into the drawer.

To check that the bottle is entirely in place with the needle well inside the stopper, press the cartridge firmly and refer to the Eden330/333 application to see the detected existing resin quantity.

Close the left cabinet door.



Figure 7: Open the left door



Figure 8: Pulling cartridge out

6.1.8 Replacing the External Waste Container

The waste container contains partially cured polymeric material generated during printing heads maintenance, and should be considered according to the safety requirements as described in the User Manual.

The waste container has been designed for a long period of time, and might keep up to 3 months of non-stop working. The user is requested therefore to observe for a full container, and replace it accordingly, during the daily maintenance. Note that the application includes the current external weight container weight, and will alert the user once the weight reaches 7Kg (maximum external weight capacity is 8Kg).

To replace and load the waste container, follow the next steps:

1. Gently, pull out the external waste container located at the machine lower cabinet. Treat its content as polymeric material. Be aware of the pipe entering the container.
2. Lift up the container or shake it in order to feel if the container is full.
3. You may empty out the external waste container even if it has not reached maximum level – Note to treat its content as polymeric material.
4. While done, insert a new container by driving it back underneath the cabinet, ensuring it is placed correctly onto the load cells.



Figure 8: The Waste Container Display

6.1.9 Daily & Bi-Weekly Maintenance

The Eden330/333 has been designed to provide trouble-free operation. The system does however require minimal routine maintenance.

Warning: Operation and maintenance of the Eden330/333 is to be carried out by trained personnel only.

Cleaning Procedures

Perform the following cleaning procedures every day, at the end of the last shift.

- Check if the external waste container is full and replace if required.
- Check if the material bottles have enough for the next shift. Prepare additional resin bottles to be available if required. Please note - As the Eden330/333 is equipped with PolyLog system, there is no need to replace the bottles – unless required by the Job Manager.
- Clean the top table of the system with a cloth soaked in water. If liquid material has spilled. (Model/Support) clean with a cloth soaked with Propanol. For any material leakage – Please contact immediately Objet technical support.

Other Routine Procedures – Every other week

- **General Maintenance** - While the machine is ON – perform the following heads cleaning:
 - Verify that there is no model on the tray.
 - Select the 'Move to Head Maintenance Position' command from Eden330/333 main menu.
 - Place a mirror onto the tray and carefully clean the heads with a cloth soaked with Propanol. Note to clean well the orifice plate, in between heads, and underneath the roller bath.
 - Using the mirror, inspect also for any cured dirt, and remove it gently by scratching it out using a fingernail. Do not use sharp tools, such as knife blade etc. Note that the heads may be hot, and required precaution.

- Clean the wiper blade with a cloth soaked with Propanol. Replace if needed
- **Wiper Blade Cleaning** -Clean the wiper blade with a cloth soaked with Propanol. Replace if needed.
- **Pattern Test** - Perform a Pattern Test and review the nozzles status with respect to the last printed result. In the case of missing nozzles, clean the heads with a cloth soaked with Propanol and perform additional manual purges.
- **Computer Reset** - Perform a computer reset for the Embedded computer once a week.

6.1.10 UPS and emergency power recommendations

Introduction:

A wide variety of natural electrical system failures can cause short-term power outages. A power outage of very short time can cause problems to computer systems (most often causes your PC to boot and lose some data) or operating machines, such as the Eden system. An Uninterruptible Power Supply is a device that sits between a power supply (e.g. a wall outlet) and a device (e.g. a Host computer or Eden machine) to prevent undesired features of the power source (outages, sags, surges, etc.) from adversely affecting the performance of the machine. The UPS industry is made up of many manufacturers, and there is a lack of standard terms or specific UPS recommendation. There are basically three different types of devices, all of which are occasionally presented as UPSs:

- Standby power supply (SPS): In this type of supply, power is usually derived directly from the power line, until power fails. After power failure, a battery-powered inverter turns on to continue supplying power. Batteries are charged, as necessary, when line power is available. This type of supply is sometimes called an "offline" UPS.
- Hybrid or Ferro resonant UPS systems: When normal operating line power is present, the supply conditions power using a transformer. This transformer maintains a constant output voltage even with a varying input voltage and provides good protection against line noise. The transformer also maintains output on its secondary briefly when a total outage occurs. When main power is lost, power inverter then goes on.
- "True" UPS systems: This type of system continuously operates from an inverter. In this kind of system there is no switchover time, and these supplies generally provide the best isolation from power line problems. This UPS type is the one recommended for Eden machines.

In order to choose the right emergency power source and to size it properly, one should note for the power requirements of the Eden machine operated. One warning for UPS users: Keep in mind that devices are not designed to let you keep working for a long period of time; they are intended to give you with at least **10 minutes** to shut your system down in the normal manner.

Specifications:

Please note that the power requirements for Eden machines are as described hereafter. While selecting a UPS unit, please refer to the relevant Eden machine below:

Eden 330/333: 100-120V~ 50-60Hz 13.5A 1.6KW

Eden 330/333: 220-240V~ 50-60Hz 8.0A 1.6KW

Please note that Eden330/333 is operated over a wide range (100V- 240V~). The information provided above is for UPS selection only, subject to power rating at each country.

The above are machine power consumption. UPS selection should be set accordingly (usually 20% higher rate).

Automatic and Controlled Machine Shutdown

While selecting a UPS device, please note that you MUST choose a solution having a USB alert output for Graceful System Shutdown. For clarifying specifications, do not select a UPS device with Serial Com (RS-232 Protocol) signal output.

Important Note: A UPS device, featured by a USB alert output for Graceful System Shutdown can be also used for Host computer backup.

Once a UPS was installed on-site, one can set options for its operation using Power Options in Control Panel (Windows 2000 and Windows XP). The UPS settings available depend on the specific UPS hardware installed on-site. The settings may include options such as:

- The serial port where the UPS device is connected (This option should be by USB).
- The conditions that trigger the UPS device to send a signal, such as a utility power failure, low battery power, and remote shutdown by the UPS device.
- The time intervals for maintaining battery power, recharging the battery, and sending warning messages after power failure.

For activating the USB alert output for Graceful System Shutdown, use the Eden **C:\Eden330\ServiceTools\UPS_Support** (available on Eden Version 3.2 and up).

Technical Notes: (1) Before changing these settings, see the documentation that came with your UPS. (2) You must be logged on as an administrator or a member of the Administrators group in order to complete the UPS settings. If your computer is connected to a network, network policy settings may also prevent you from completing this procedure.

6.3 Procedure for Single Head Replacement

1.3.1 General

1. The objective of this procedure is to guide users through the Single Head Replacement procedure.
2. Follow the safety instructions before performing the Single Head Replacement

1.3.2 Why and when to replace a single head?

1. Single Head Replacement should be carried out in any one of the following cases:
 - 1.1 A large number of nozzles or all nozzles on a single head are not functioning or “missing”. Only heads missing more than 15 nozzles should be considered for replacement
 - 1.2 Printing head is damaged (orifice plate is peeling or has bubbles). *
 - 1.3 Printing head is jetting a very low weight. **
2. The following are general guidelines as to when to avoid head replacement.
 - 2.1 Do not remove single heads if the printing block is full of resin. The printing block must be empty before head replacement.
 - 2.2 Do not remove or attempt to replace heads during printing, as head replacement requires performance of ‘Weight Test’.

* Note: Head replacement in this case should be done only if the damaged orifice plate affects missing nozzles or printing quality.

** For optimizing a single head’s weight, or adjusting other heads to same level as the defective head, please refer to ‘*Optimizing Heads*’ procedure.

17.1 Required Tools

1. Gloves (pair).
2. Flat-end screwdriver (5mm).
3. *FlipScale* or other weight measurement tool (with minimum accuracy of 0.05 gr).
4. Wiping cloth and Propanol spray.

17.2 Step-by-step Procedure for Single Head Replacement**Review:**

1. Single Head Replacement (SHR) is based on 4 major steps, as follows:
 - 1.1 **Identify the head to be replaced:** This should be done primarily by performing a Pattern Test which will determine if any of the heads needs to be replaced, according to the number and location of missing nozzles on this head. Please note that missing nozzles spread out over the head may draw a different conclusion, as opposed to all missing nozzles being in one area. In addition, missing nozzles may still be revived if head wiping is not adequate or wiper blade is defective. Always perform purges, manual head cleaning and wiping before determining final status of missing nozzles.
 - 1.2 **Preparing the printing block for head replacement:** This step is done automatically by the Eden application during the Wizard process. The application will empty the heads, and prompt the user to replace required head.
 - 1.3 **Replace malfunctioning heads:** Remove malfunctioning head, tag it and record relevant information with regards to this head [(1) Total printing time (2) Head location in block (3) Head S.N. (4) Block S.N. (5) known weight (6) malfunction description]. Insert new head.
 - 1.4 **Automated Calibration:** The wizard will perform an automatic 'Weight Test'. The user will be required to measure the weight of printed cube for replaced head, and enter the result into the wizard screen.

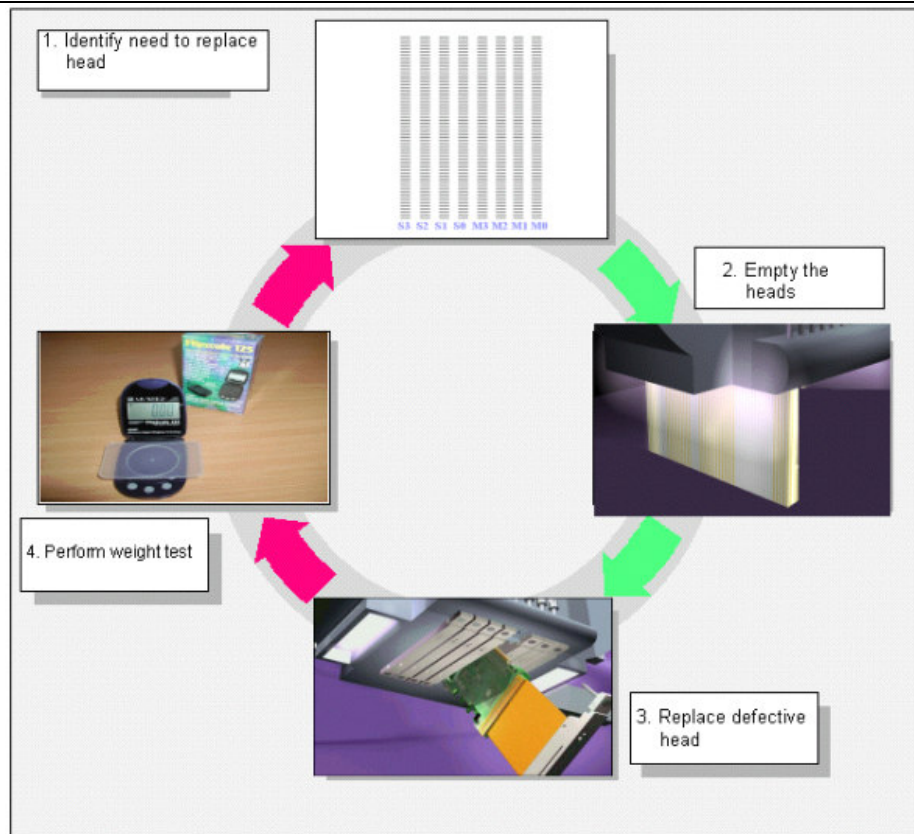


Figure 9: Illustration of 4-steps for SHR

2. Step 1: Identify the head to be replaced:

- 2.1 This should be done primarily by performing a Test Pattern, which will determine if head needs to be replaced, according to number and location of missing nozzles on this head. Please note that missing nozzles spread out over the head may draw a different conclusion, as opposed to all missing nozzles being in one area

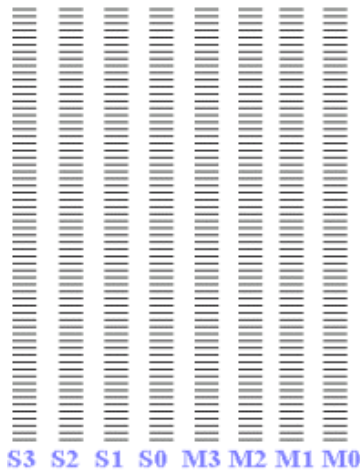
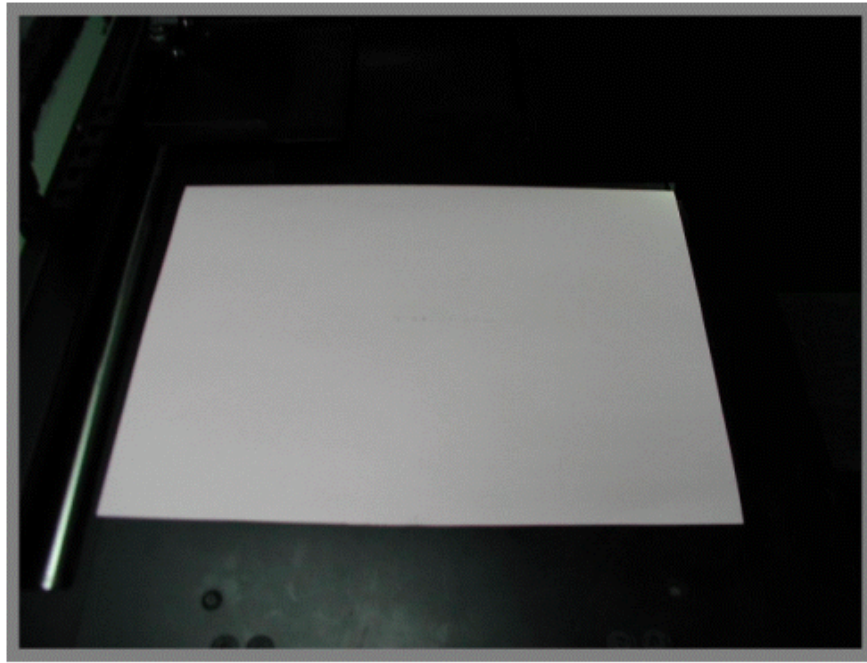


Figure 10: Performing 'Test Pattern'

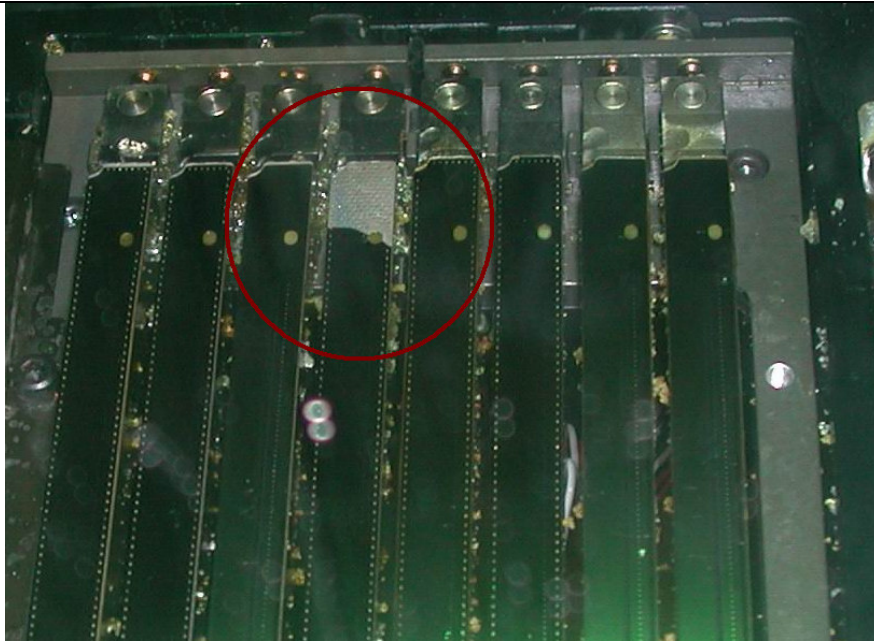


Figure 11: Example of peeling orifice plate.

* Note that when an orifice plate peels at either end this might not necessarily affect nozzles status, and therefore Single Head Replacement should be reconsidered.

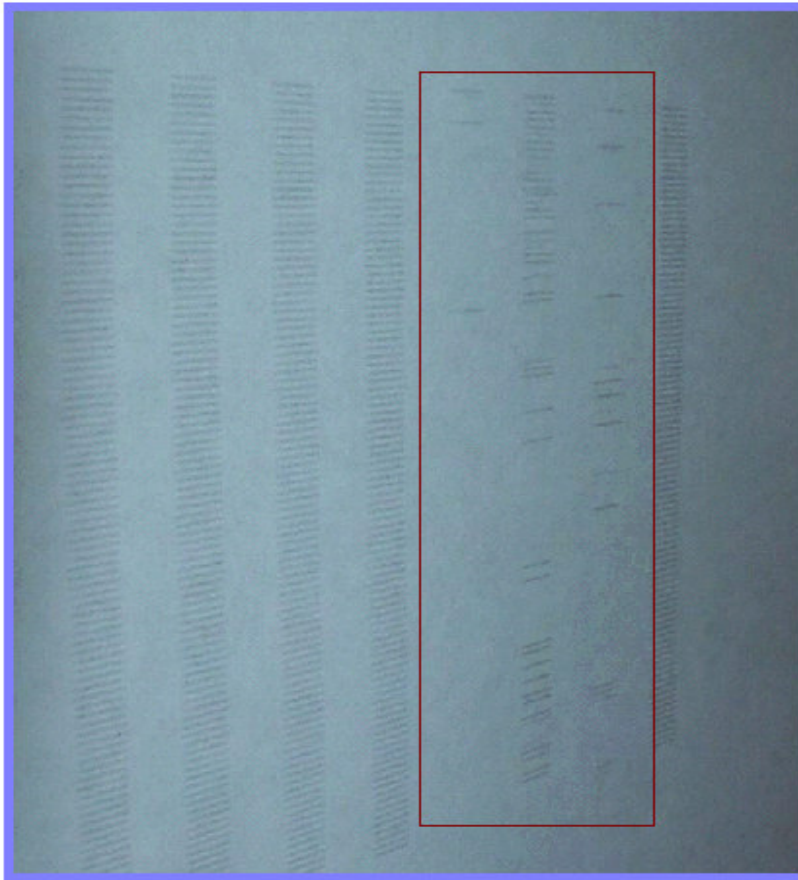


Figure 12: Example of a severe case of missing nozzles

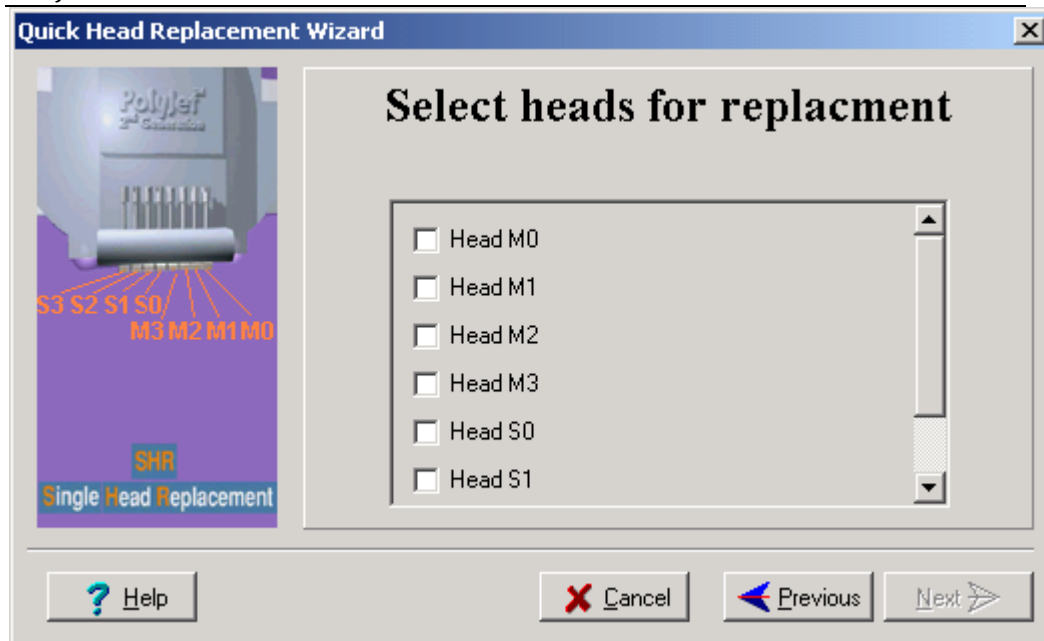
3. Starting the Head Replacement:

- 3.1 This step will be carried out automatically and will take few minutes.
The Wizard will empty the heads before Single Head Replacement wipe the heads when done.
- 3.2 Please note that head replacement does not require washing the heads with washing detergent. Nevertheless, as uncured resin would be exposed in the material entry holes located in the block, please perform the single head replacement as quickly as possible, after removing the head.



Screen 13: Welcome to Head Replacement Wizard

Click **'Next'** to start the Head Replacement Wizard, or **'Cancel'** to abort.



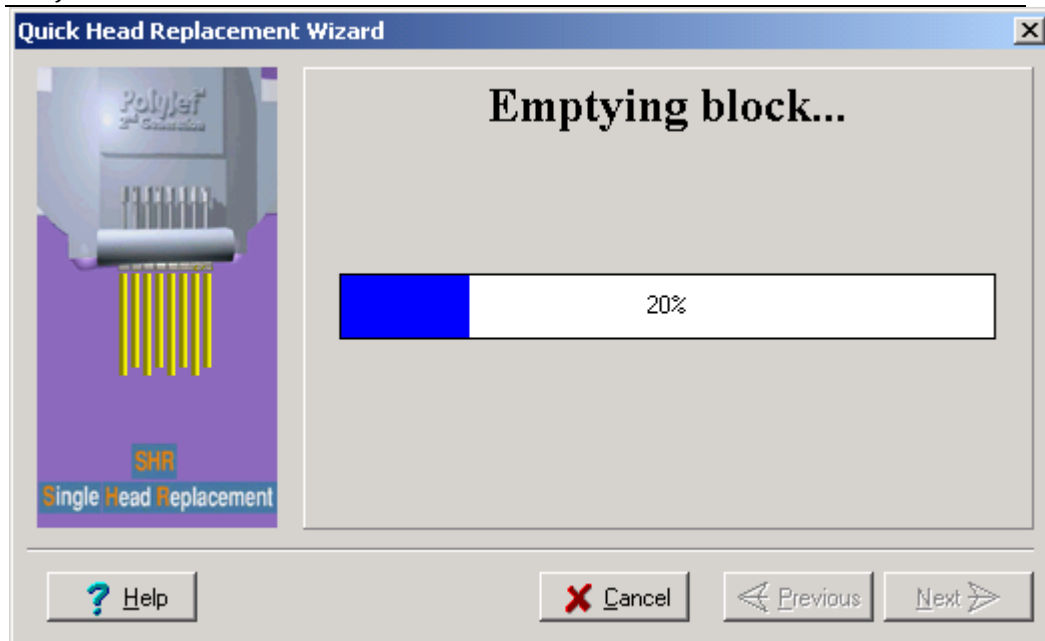
Screen 14: Select the head(s) to be replaced

Select the head you are about to replace. You may have multiple selections of a few heads at the same time.

Please note the head order, as shown in the picture (Head S3 is first left; Head M0 is far right).

When done:

Click '**Next**' to continue the Head Replacement Wizard, or '**Cancel**' to abort.



Screen 15: Emptying block process

At this stage, the printing block would automatically be positioned over the wiper location, and the head will drain.

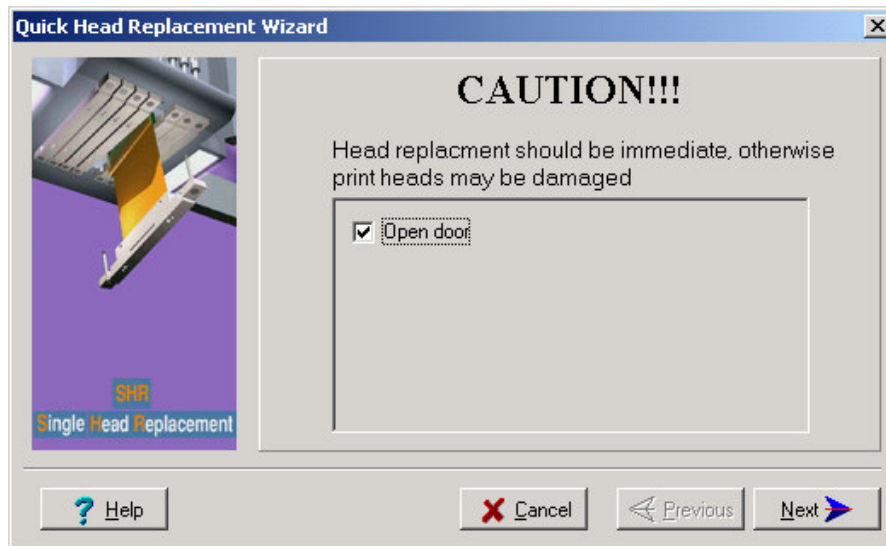
Please note that this step may take few minutes, as it requires heating of the heads prior to the draining process.

When done:

Click '**Next**' to continue the Head Replacement Wizard, or '**Cancel**' to abort.

4. Head Replacement:

- 4.1 This step will guide the user through actual head replacement, after the head's draining has been completed.



Screen 16: Replacing the head

At this stage, the user is prompted to replace the head(s) selected.

For information of how to remove an insert a new head, follow the next steps.

When done:

Click '**Next**' to continue the Head Replacement Wizard, or '**Cancel**' to abort.

5. Replacing a Head – Removing Malfunctioned Head:

- 5.1 Please note that prior the head replacement; the wizard will turn OFF part of the machine 'Power'.
- 5.2 Follow the next steps, as described below:



Figure 17: Open the new SHR box, and carefully read the enclosed safety instructions

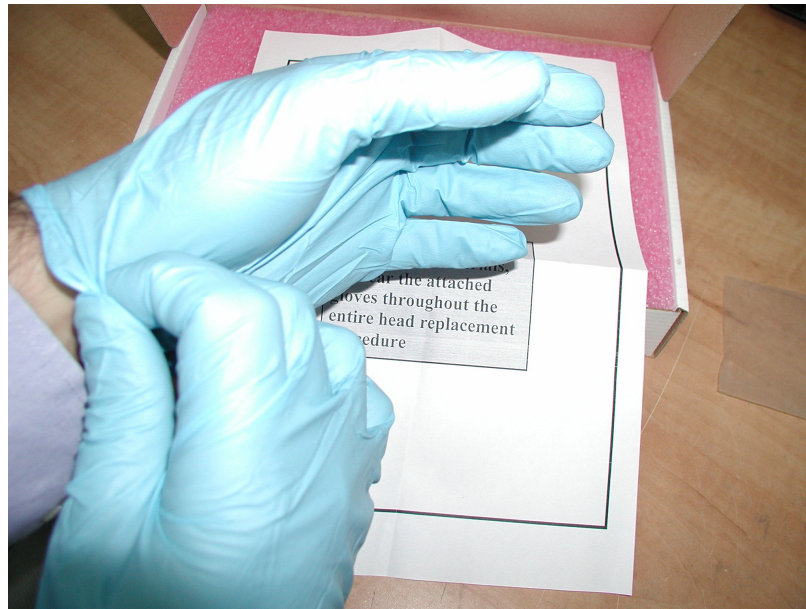


Figure 18: Wear the safety gloves prior to the SHR procedure

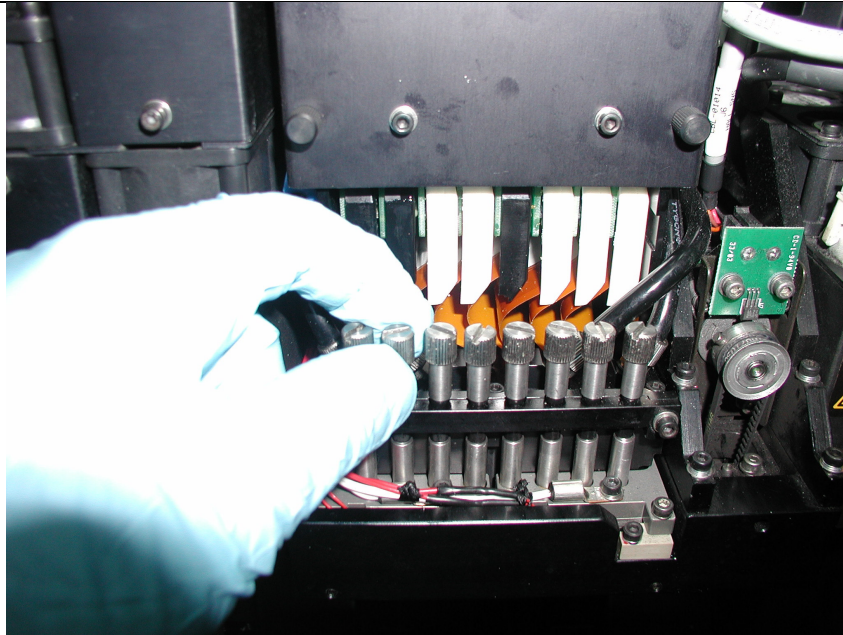


Figure 19: Release lower locking screw (Head S2 in this example)*

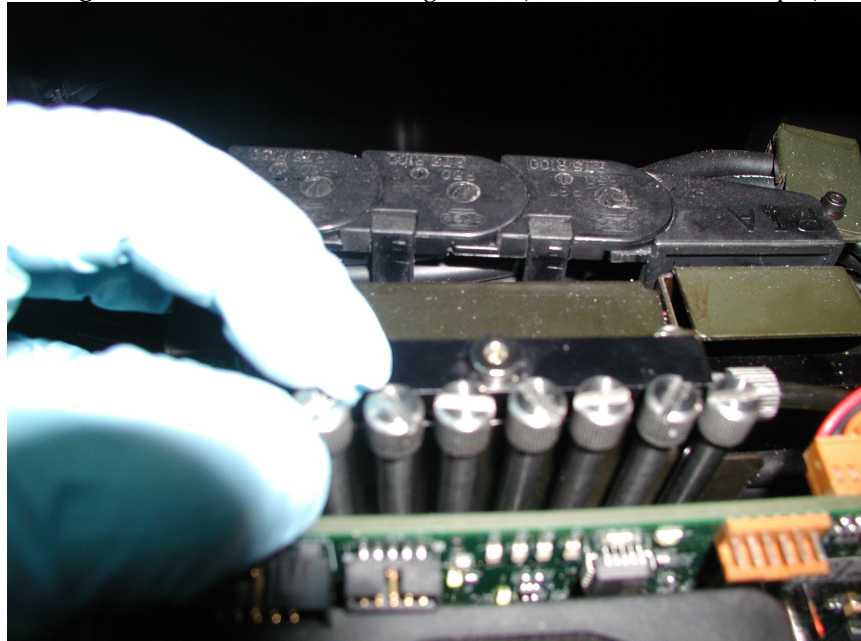


Figure 20: Release Upper locking screw (Head S2 in this example)

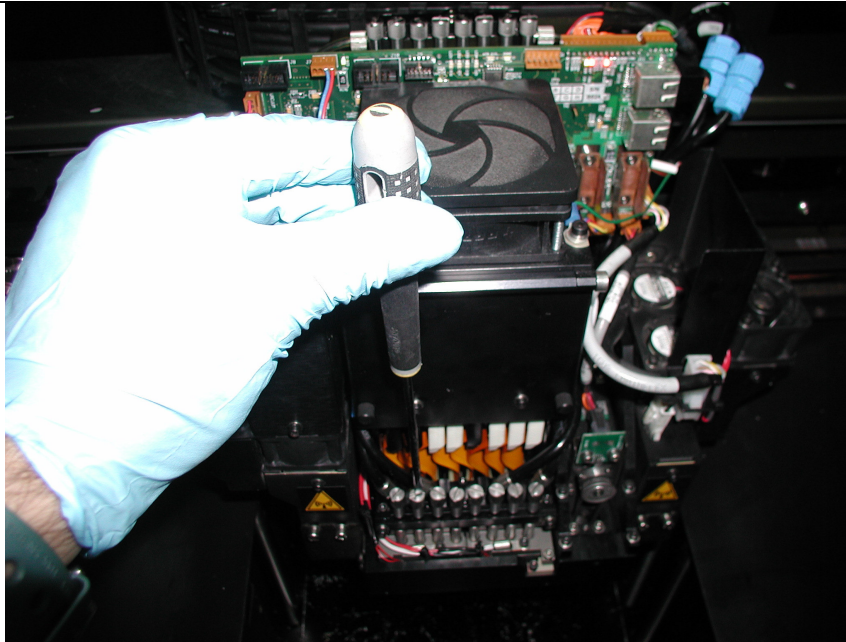


Figure 21: Use a Flat-End screwdriver if necessary

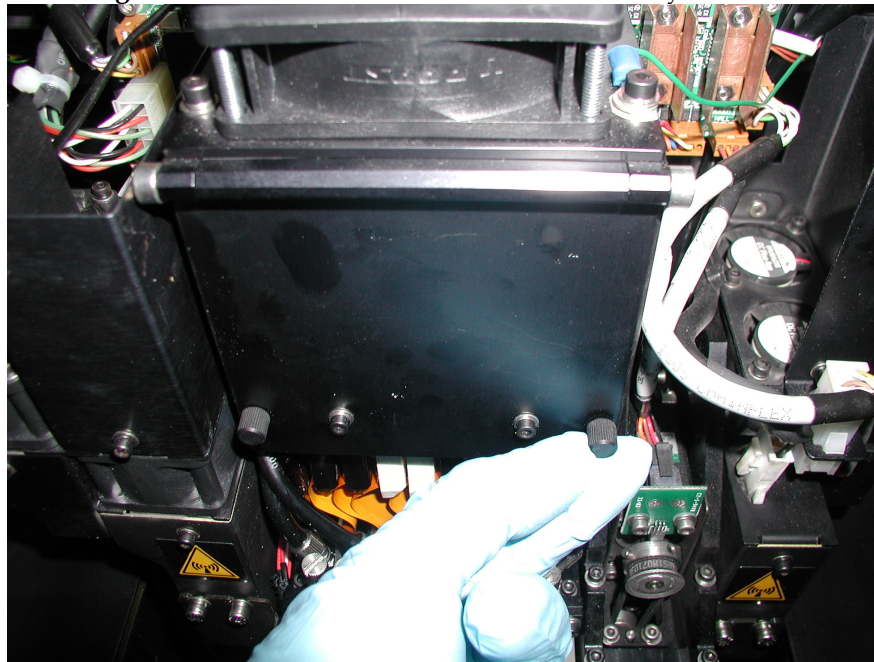


Figure 22: Open the 'Heads Driver' compartment by releasing the door screws

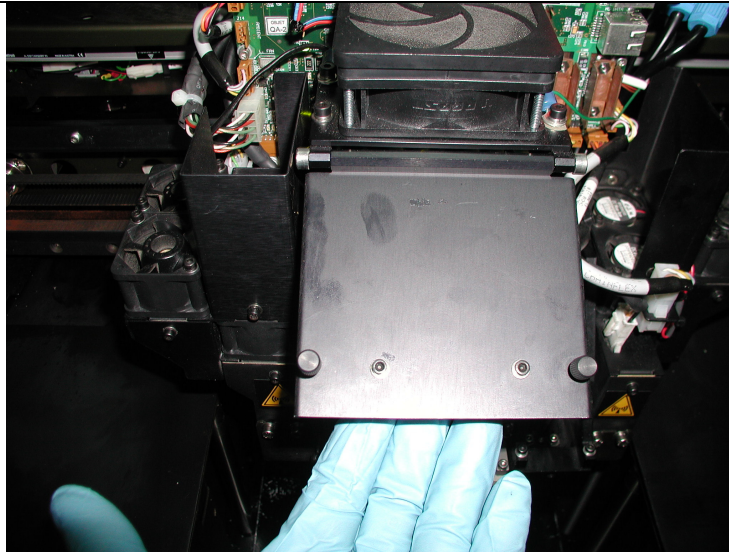


Figure 23: Lift the 'Heads Driver' compartment door to vertical position



Figure 24: Press the lower head's screw

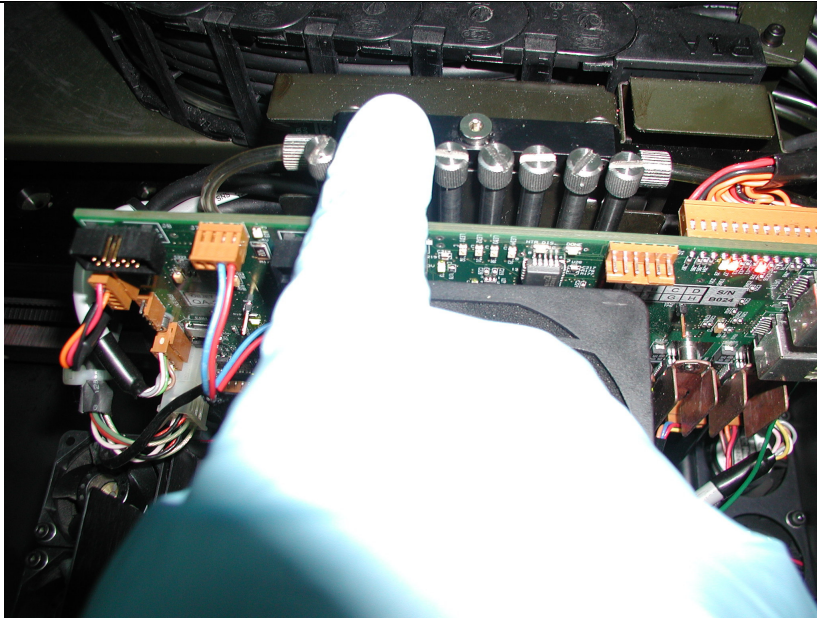


Figure 25: Press the upper head's screw

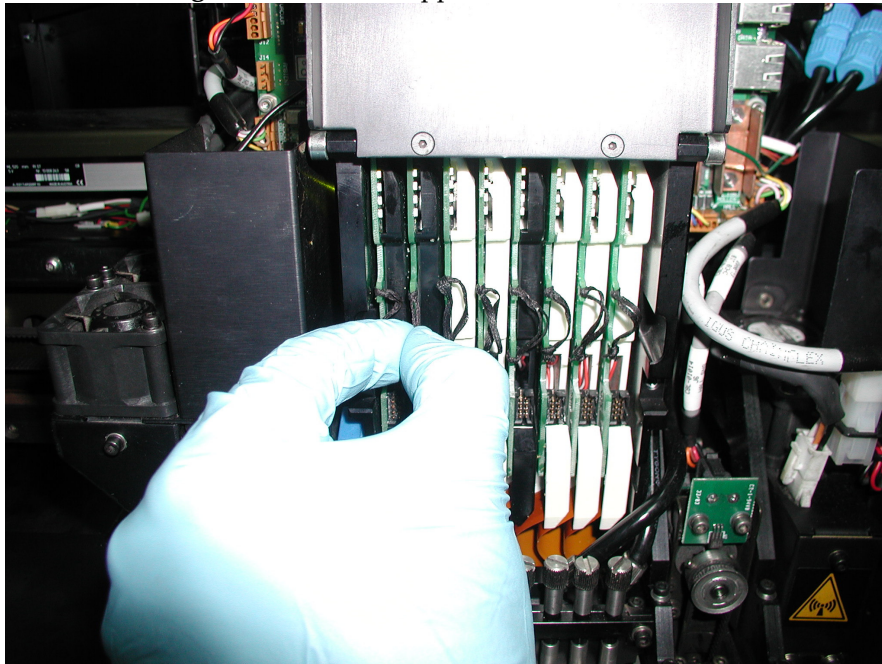


Figure 26: Pull out the head's driver card (about 5mm) until it is released from its connector

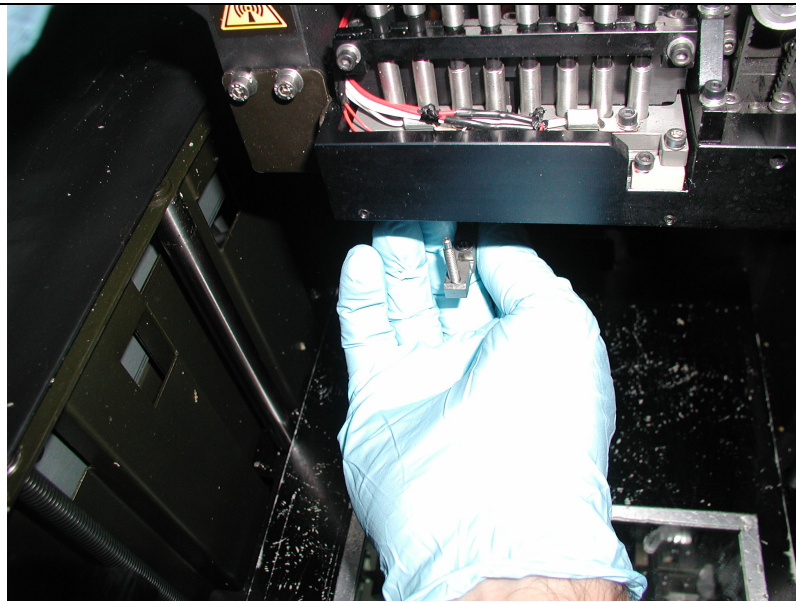


Figure 27: The head would already be almost falling out. Hold your hand underneath it and gently withdraw it from the printing block



Figure 28: Pull the entire head out. Make sure the head card is slides easily down and out.

6. Step 4: Replacing a Head – Installing New Head:

6.1 Remove the new head from its packing, and record the head S.N.



Figure 29: Gently, remove the head from its packing.

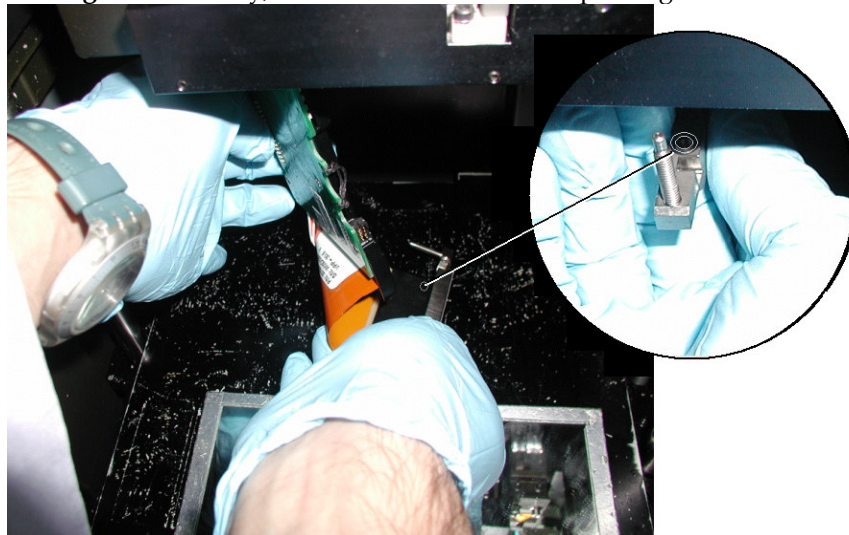


Figure 30: Insert the new head into position. Note the 'Front' and 'Back' markings on head driver's cover (connector on head driver should be on the back of the head). Also, ensure that the rubber O-ring exists at both ends of the head, as shown above.

Please also note if the O-ring is missing from the removed head. In this case, the O-ring may still be in the head's entry holes and must be removed prior to head replacement



Figure 31: Insert the head driver into its slot by pressing it gently as shown above.

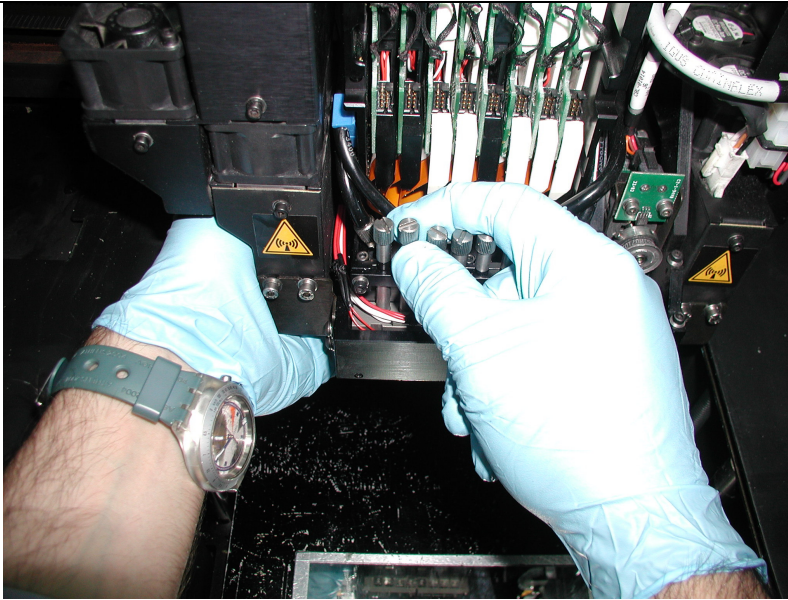


Figure 32: Lock and tighten the lower and upper screws by hand

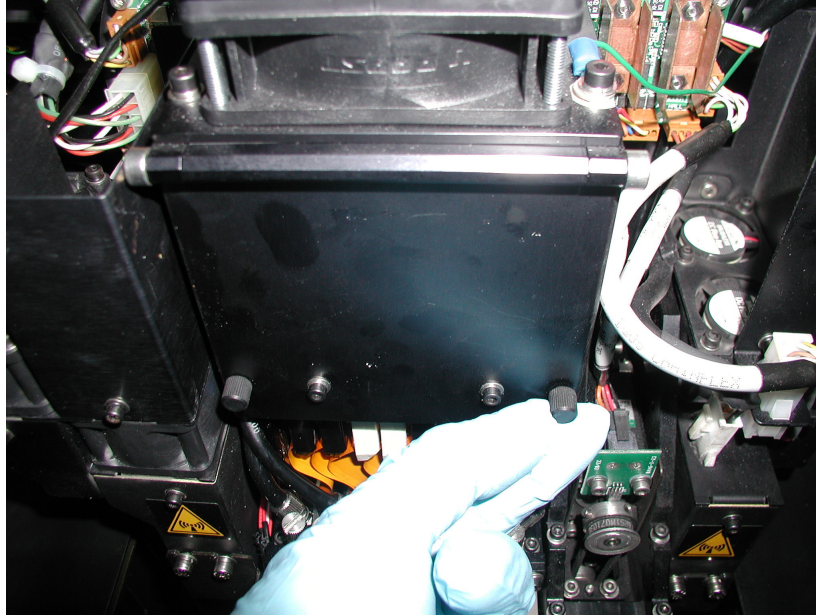
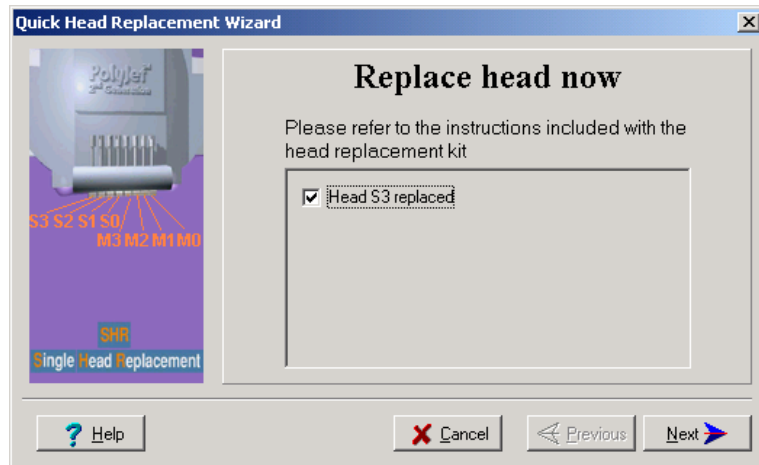


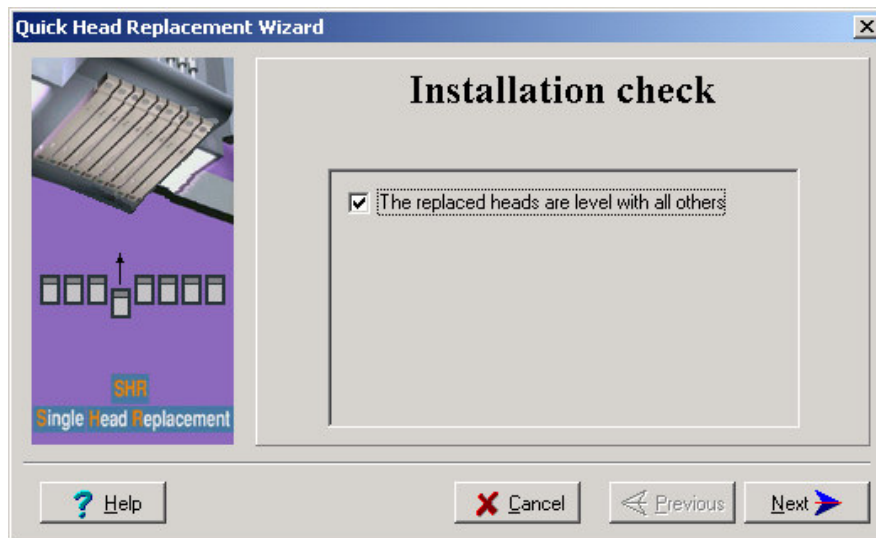
Figure 33: Lock and tighten the head driver compartment as shown above and remove all tools from tray.



Screen 34: Confirm the head replacement

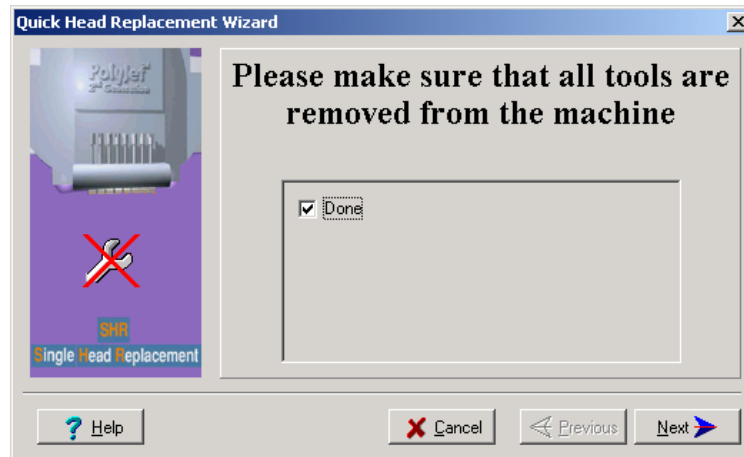
7. **After Head Replacement - Confirm:**

This stage guides the user after head replacement, in order to ensure that the new head was inserted correctly.

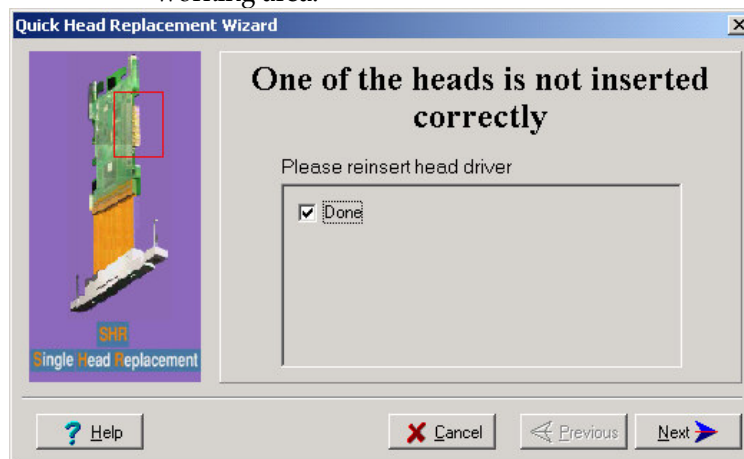


Screen 35: Ensure the replaced head is level with all other heads.

This should be done by passing your fingers under the heads to confirm that all are at the same level.



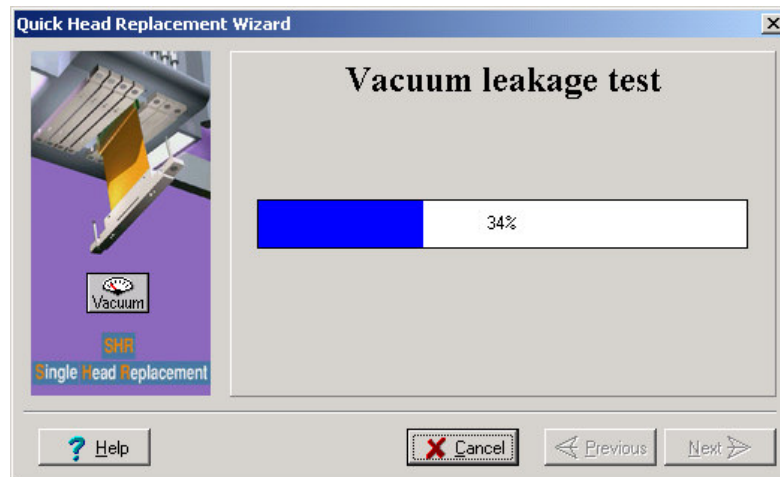
Screen 36: Confirm that all tools and damaged heads have been removed from the tray and machine working area.



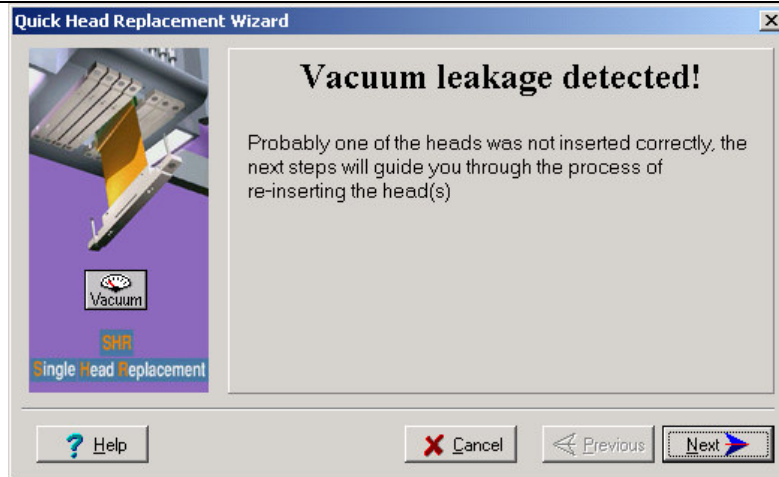
Screen 37: If the newly inserted head is not recognized by the software, the user will be requested to reinsert the head's driver card.



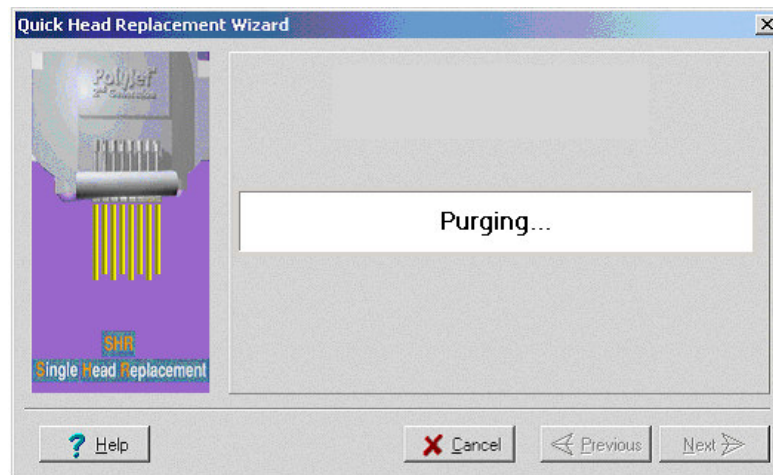
Screen 38: If the head does not contain the factory data, the user will be requested to insert a new version of the head.



Screen 39: At this stage, the system will perform an automated vacuum test to ensure there is no vacuum leakage as a result of head replacement.



Screen 40: An automated test has detected that the vacuum is dropping due to incorrect head installation. The wizard will guide the user how to remove and reinsert the head. This may take some time, as the system will empty the heads once again.

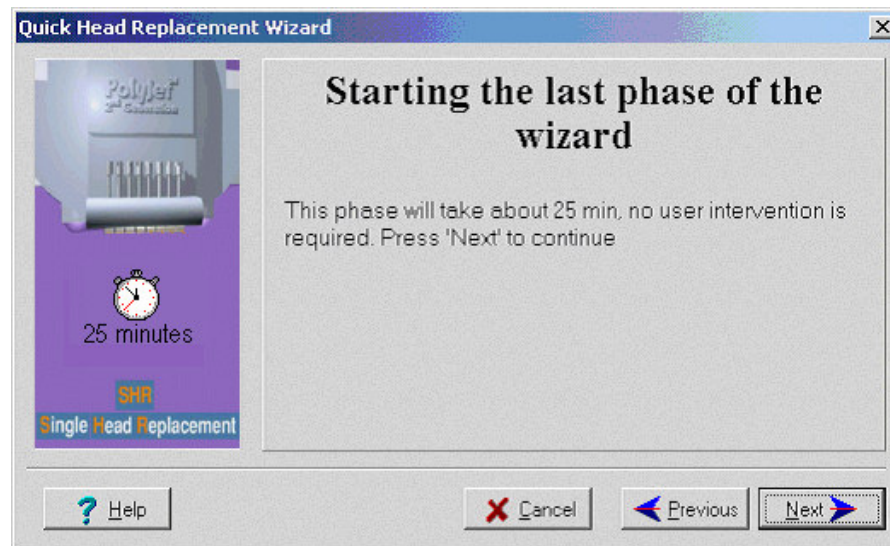


Screen 41: At this stage, the system will perform an automated purge. This may take few minutes, as the system needs to heat and fill the heads.

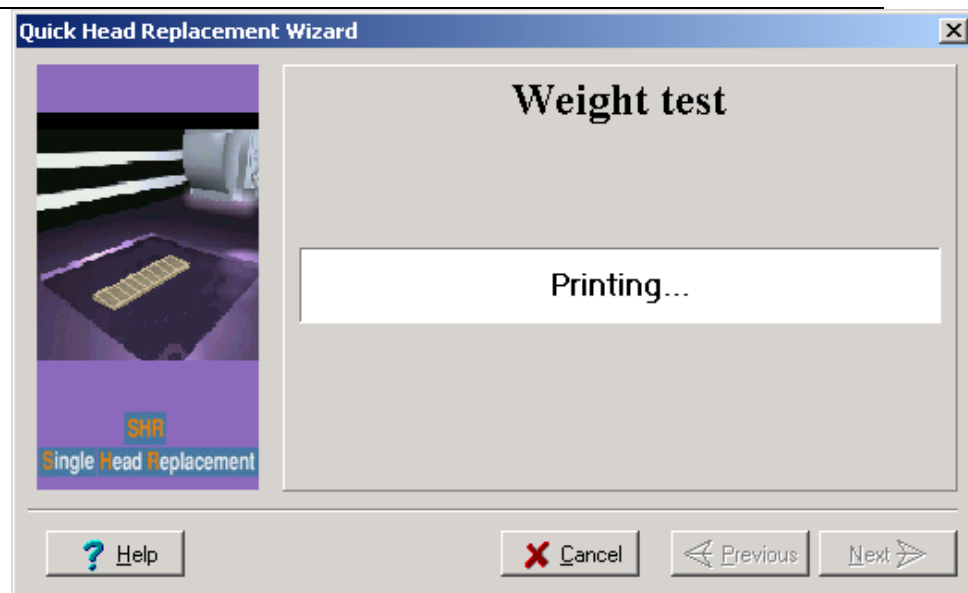
8. After Head Replacement – Automated Weight Test:

When head replacement has been completed, the application will perform an automated weight test in order to detect and set the head's weight properties.

What is a 'Weight Test'? A weight test is an automated test mode, whereby the system prints a set of 8 rectangles (one from every head), lasting about 25 minutes. Examination of these rectangles (from each head) will assist in determining the heads' exact jetting properties. Once weight test printing has been completed – the user will be required to weigh the rectangle printed by the newly replaced head and enter its weight measurement into the Wizard.



Screen 42: The automated weight test printing will last about 25 minutes.



Screen 43: Printing the weight test

When weight test printing has been completed, the user will find a number of rectangles on the tray, as detailed below.

Please pay special attention to the order of the rectangles (S3 being the furthest left; M0 being the furthest right).

You may use an ink marker on the tray to mark the order of the rectangles, as shown below.

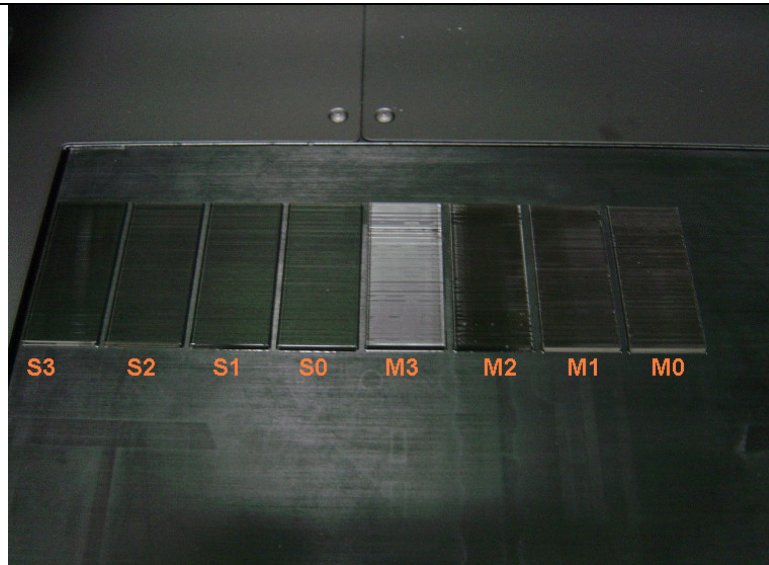


Figure 44: The 'Weight Test' Order

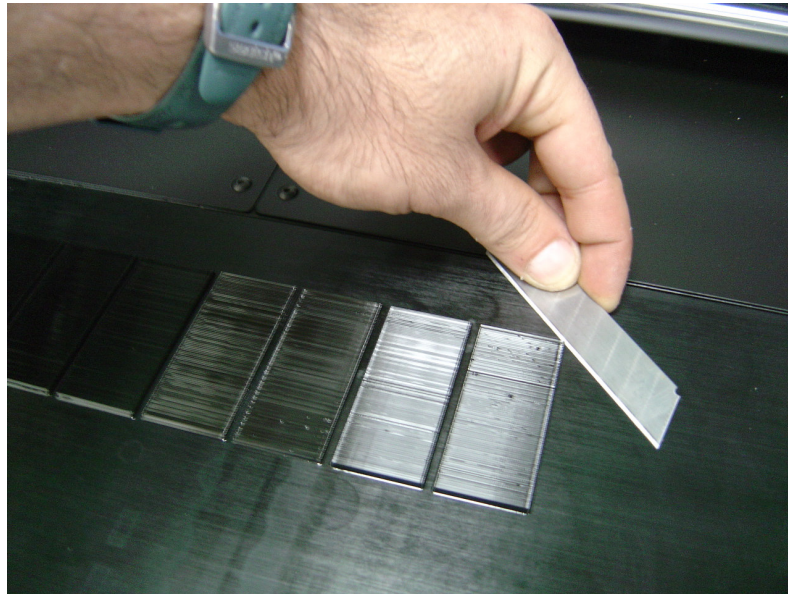


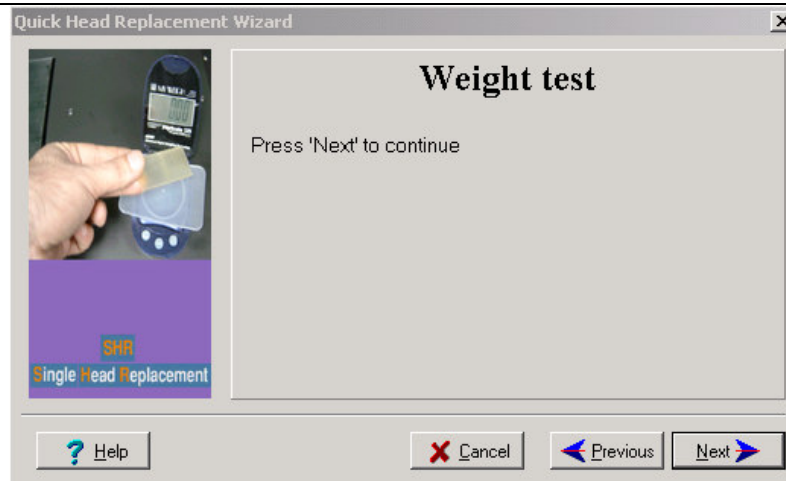
Figure 45: Removing the 'Weight Test' rectangles



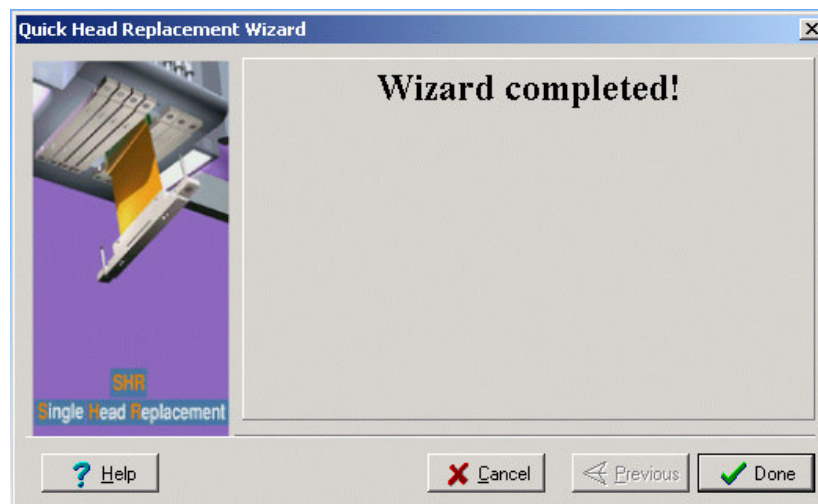
Figure 46: Measuring the weight of each rectangle

Important Note: Measure rectangles of all heads, including the replaced head(s) and insert results into the wizard screen.

Tip: Required **Model** weight should be approximately **3.65 grams** (per rectangle); Required **Support** weight should be approximately **3.55 grams** (per rectangle).



Screen 47: Entering the weight test data



Screen 48: SHR has been successfully completed