

ProX™ 500

3D Production Printer



User Guide

Original Instructions

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Thank you for purchasing the 3D Systems ProX™ 500 SLS (Selective Laser Sintering) 3D Production Printer, auxiliary SLS equipment, and 3D Systems materials! Before you start printing parts with your process facility, please read this guide carefully to enjoy optimum process performance and longer equipment service life.

ABOUT THIS GUIDE

This guide describes how to operate and maintain your ProX 500 3D Printer, ProX Material Quality Control (MQC) System, and auxiliary equipment used for the SLS process. For part printing instructions, refer to the [Material Guide](#) for your specific material.

What's Inside?

This guide includes the sections summarized below:

Introduction to the ProX 500

This section describes basic components and concepts of your SLS system.

Safety Guidelines and Instructions

The Safety section tells you what you need to know to avoid injury or equipment damage. Read this section before you switch on power to any SLS equipment or handle any material.

Printing Parts with the ProX 500

This section gives you an outline of the entire part printing process.

ProX 500 System Operations

This section describes the printer and provides operating instructions for manual control of the machine.

MQC System Operations

This section details the operation of the MQC System including part breakout.

Maintenance Procedures

The maintenance section details preventive and common maintenance procedures which can be performed by the user. All other procedures are to be performed by Certified 3D Systems Field Engineers.

OTHER DOCUMENTS

Refer to the following manuals for additional information:

Material Guides

Each material used with the ProX 500 SLS system has its own manual which details the part printing and processing procedures specific to that material.

ProX 500 Facility Guide

Details the necessary requirements to install your ProX 500 SLS 3D Printer, ProX Material Quality Control (MQC) System, and auxiliary equipment.

2 INTRODUCTION TO THE PROX 500

The ProX™ 500, the new cutting-edge Selective Laser Sintering (SLS) production 3D printer from 3D Systems, takes SLS toughness, part quality and manufacturing economics to the next level. Designed for smooth integration with your manufacturing workflow, the ProX 500 produces parts for a variety of end-use and functional prototyping applications in aerospace, medical, industrial design and more. Use the ProX 500 and DuraForm® plastic materials to produce parts with superior mechanical properties, resolution, surface finish and edge definition compared to other processes.

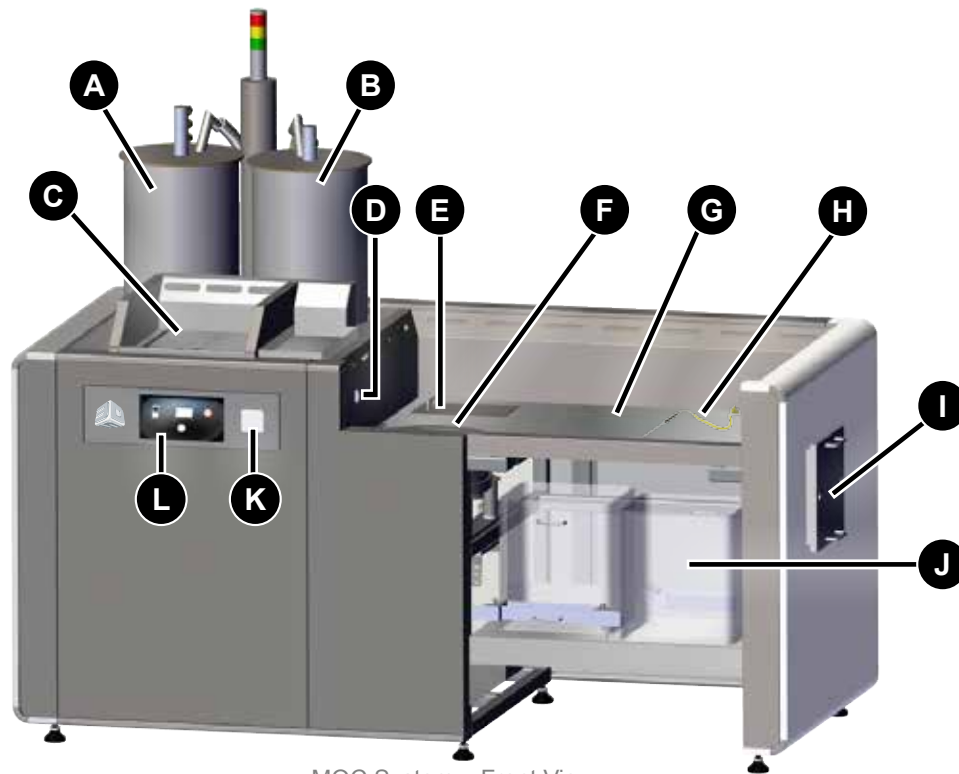
Ensure repeatable, consistent, tool-free manufacturing and produce durable functional parts faster with this mid-size production 3D printer. Additionally, the ProX 500 is equipped with mature production automation, mobile production control and material recycling functions, so it pays you back faster.



- A Stacklight:** Indicates the state of the system.
- B Print Chamber Area:** There are two doors in front of the Print Chamber—the outer locking door, and the inner print chamber door. The parts are printed inside the Print Chamber.
- C E-Stop:** The Emergency Stop button is a safety mechanism used to shut off the machine in an emergency situation in which it cannot be shut down in the usual manner.
- D User Interface (UI):** The user controls the system using a touchscreen located on the front panel.
- E LED Interface Lights and Controls:** There are three LED lights which give the user visual feedback regarding the system. The two buttons allow the user to control the chamber lights and enable the system. There are two standard USB ports beneath them.
- F User and Service Access Panels:** There are two types of panels on the sides and back of the machine—user access and service access. The user access panels are hinged doors. The service access panels are lift-off panels.

ProX MATERIAL QUALITY CONTROL (MQC) SYSTEM

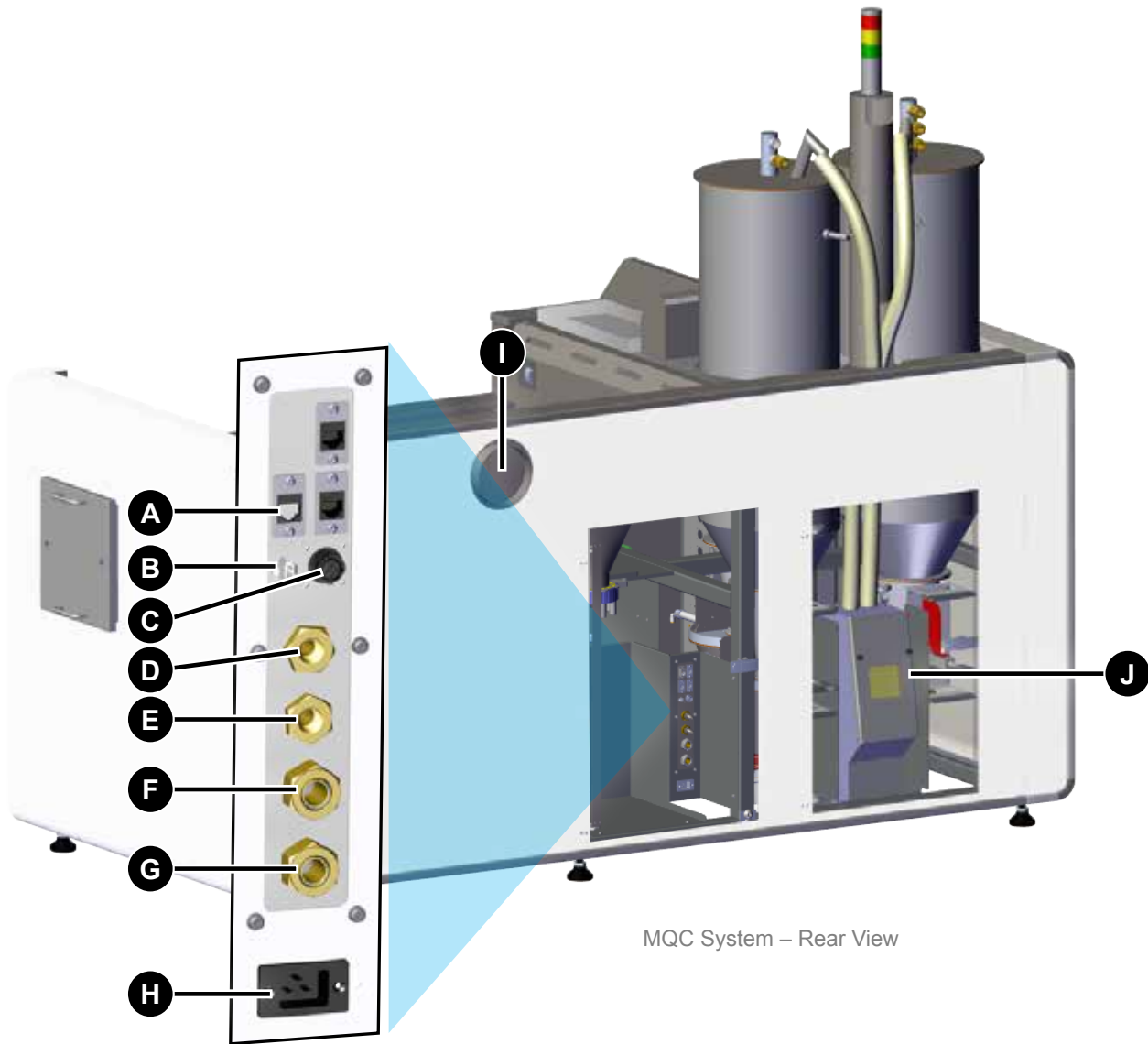
The MQC System is designed to be used as the material handling unit for the ProX 500 SLS line of printers. It is responsible for delivering material to the printer, storing and mixing fresh and used material, and breaking out the SLS parts from the print cake which is produced by the printer. One MQC System can handle material for up to two printers.



MQC System – Front View

- A Blended Material Bin:** Material which is a combination of used material and fresh material is stored for production use in this hopper. The system handles this automatically.
- B Recycled Material Bin:** Material which has gone through the system is stored here for production use. The used material is reclaimed through the sifter. [See letter 'F' below.](#)
- C Fresh Material Input:** Fresh material is loaded at this location. The user must scan the material tag on the container across the Reader ([See letter 'I' below](#)) to open the doors.
- D Breakout Controls:** This wheel switch allows the user to turn the sifter on and off.
- E Reject Chute:** Spent material (as determined by the user) is loaded into the reject chute.
- F Sifter:** The user removes the parts from the print cake in the breakout area and places the material for reuse into the sifter. After sifting, the material will be transported to the used material hopper.
- G Breakout Area:** The print cake is brought here using the [Part Transfer Cart Assembly](#).
- H Thermocouples:** Two temperature gauges for the print cake used to determine whether or not the print cake has cooled sufficiently to break out the parts.
- I Nitrogen Cooling Lid:** This lid is placed on top of a filled print cake extraction cylinder to control the cooldown of the print cake when using nitrogen for cooling.

- J Stowaway Area:** Underneath the breakout area, there is a shelf which can be used to store part extraction cylinders when they are not in use.
- K Tag Reader:** The tag reader is used to scan the tag on the lid of the material container. This ensures that the system keeps track of material quantity and fresh-to-new material ratios. The tag must be scanned to unlock the Fresh Material Input doors and add the material to the system.
- L MQC System Operator Controls:** User interface for operation of the MQC System.



MQC System – Rear View

- A** **RJ45 Ethernet Connectors (3x):** Network connections to service up to 2 printers and a laptop (for service personnel only).

B **3D Systems Nitrogen Generator Connection:** If you have purchased a Nitrogen Generator from 3D Systems, it is connected here.

C **Oxygen Monitor Connection:** A room oxygen monitor is connected here.

D **Compressed Air (CDA) Inlet:** Input for compressed air coming into the MQC System.

E **Nitrogen Inlet:** Input for nitrogen supply.

F **Material Output A:** Material transfer connection for Printer A.
- G** **Material Output B:** Material transfer connection for Printer B.

H **AC Inlet:** Power connection for MQC System.

I **Dust Collector Port:** Connection for the dust collector.

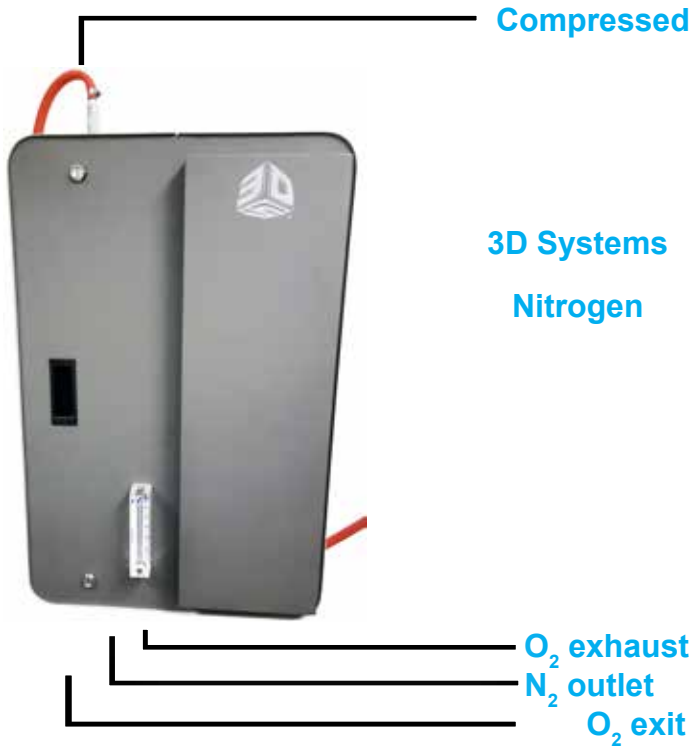
J **2-Stage Hepa/Sock Filter:** The material filter for the MQC System.

AUXILIARY SLS EQUIPMENT

There are several auxiliary components which can accompany the ProX 500 system. The Nitrogen Generator and Bead Blaster (optional) are shown below.

Nitrogen Generator

3D Systems manufactures a High-Performance Nitrogen Generator — Part Number 104011-02. The generator is ideal for SLS applications.



Bead Blaster (Optional)

If you plan to use DuraForm SLS material, 3D Systems recommends you install a pneumatic abrasive blast cabinet ("bead blaster") in the part finishing area separate from the ProX 500 SLS 3D Printer process station room.



ProX 500 SYSTEM COMPONENTS

ProX 500 User Interface

The User Interface, located on the front panel of the printer, consists of a touchscreen and the system status LED indicators. An E-Stop is located above the touchscreen.



A Emergency Stop: This switch, located above the touchscreen, immediately disables all hazardous machine functions or renders them safe. However, some surfaces may remain hot and care should be taken when handling them. After being pressed, it remains in the closed state until it is manually returned to the open state.

B User Interface: The user controls the system using a touchscreen located on the front panel.

C Buttons, Indicators, USB Ports:

Chamber Lights: This button turns the chamber lighting on or off

LED Indicators: The LED indicators under the touchscreen indicate the system's power and safety status. Each indicator operates as follows:

- **“Laser” Blue LED**

- **ON**, Solid
 - » Laser is enabled.
- **OFF**
 - » Laser is not enabled.
- **“Control” Green LED**
 - **ON**, Solid
 - » System is on and its controller has initialized.
 - » The system is in **RUN** mode.
 - **OFF**
 - » System is **OFF** or its controller is still initializing.
- **“System” Amber LED**
 - **ON**, Solid
 - » All E-stop buttons are reset, and system power is enabled.
 - **OFF**
 - » An E-stop button is pressed or system power is not enabled.

System Enable: This button re-enables the system following an emergency stop, which occurs after the emergency stop switch returns to the open state.

USB: A standard auxiliary USB port connected to the control PC is located under the LED Indicators.

Electrical Cabinet

Power Supply: This module distributes all the AC power that the system needs. Circuits for the various subsystems are located in this module.

Power Supply Drop



Main Power Disconnect: The main power disconnect, located on the left side of the system, enables you to turn on and off all power to the system. Do NOT position the equipment so that it is difficult to operate this device. There is a **computer reset button** on the left side of the machine, that the user may need to access in order to reboot the software if it should become inoperable.

Computer Reset Button



Computer: A computer which handles much of the functionality of the touchscreen and printer is located inside the electrical cabinet. It is part of a wider system of electronic components (Field-Programmable Gate Arrays, Digital Signal Processors, etc.) which control the hardware of the system.

ProX 500 Computer



ProX 500 Rear View

Part Transfer Cart Assembly

The print cake **Extraction Cylinder**, **Part Transfer Tray** and **Part Transfer Cart**, are used to remove the print cake from the ProX 500 print chamber and transport it to the MQC System. The system ships with the cylinder and tray. The transfer cart is optional.



Part Transfer Tray



Extraction Cylinder



Part Transfer Cart

ProX 500 Stack Lights

The stack lights let the user know from a distance what state the system is in. There is a stack light for both the main system and the MQC System.

ProX 500 SLS System Stack Light Conditions

Light Color	Solid	Flashing	Off
Red	E-Stop condition	System fault active	Normal
Yellow	System is in service mode	System warning active and/or message present on touchscreen	E-Stop condition or normal
Green	Print job active	System Active, not printing, manual operations possible	E-Stop condition or normal



MQC SYSTEM COMPONENTS

MQC System User Interface

The User Interface, located on the front panel of the MQC System, consists of a dial-operated menu screen that allows the user to access the functionality of the system. An E-Stop control is located to the right of the screen and the system power switch is located to the left. For detailed information on the interface screens, refer to the section, [“MQC System User Interface Settings” on page 48](#).



- A Power Switch:** This switch enables and disables power to the MQC System.
- B LED Display:** The display is operated using the Control Dial (see below). It gives the user access to all functionality of the machine.
- C Emergency Stop Button:** Depress the E-Stop button to cut off all power to the machine. This function is usually reserved for situations where the machine cannot be stopped normally.
- D Control Dial:** The user selects functions on the LED Display using this dial control.

MQC System Stack Light Conditions

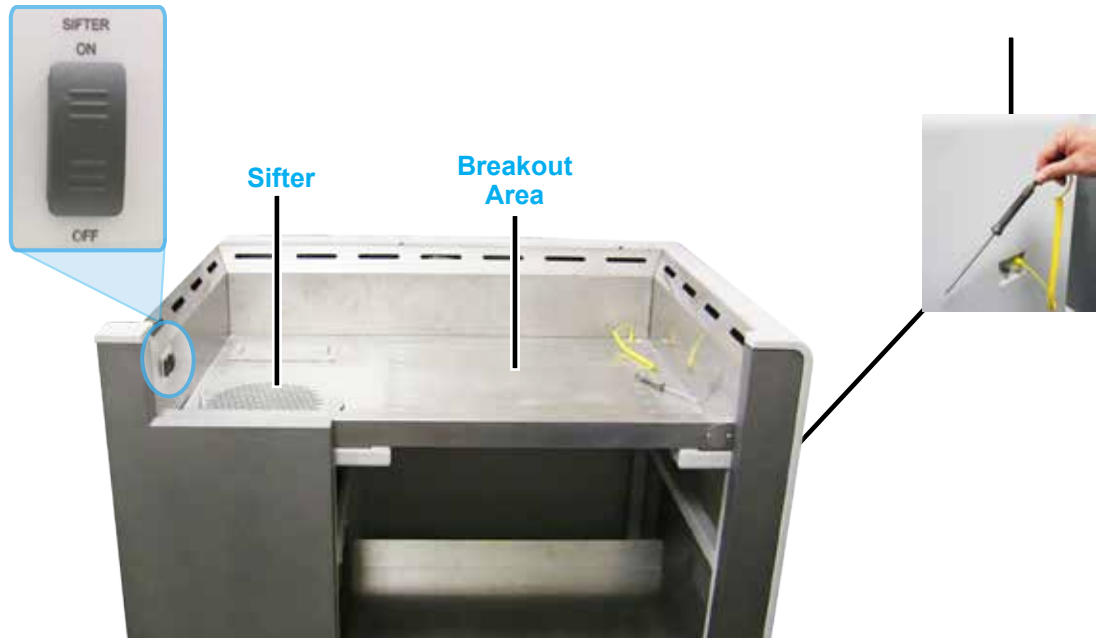
Light Color	Solid	Flashing	Off
Red	E-Stop condition	System fault active	Normal
Yellow	System is in service mode	System warning active and/or message present on user interface	E-Stop condition or normal
Green	System is active. Printer transports are enabled	System is active. Printer transports are disabled	E-Stop condition or normal



Sifter Switch

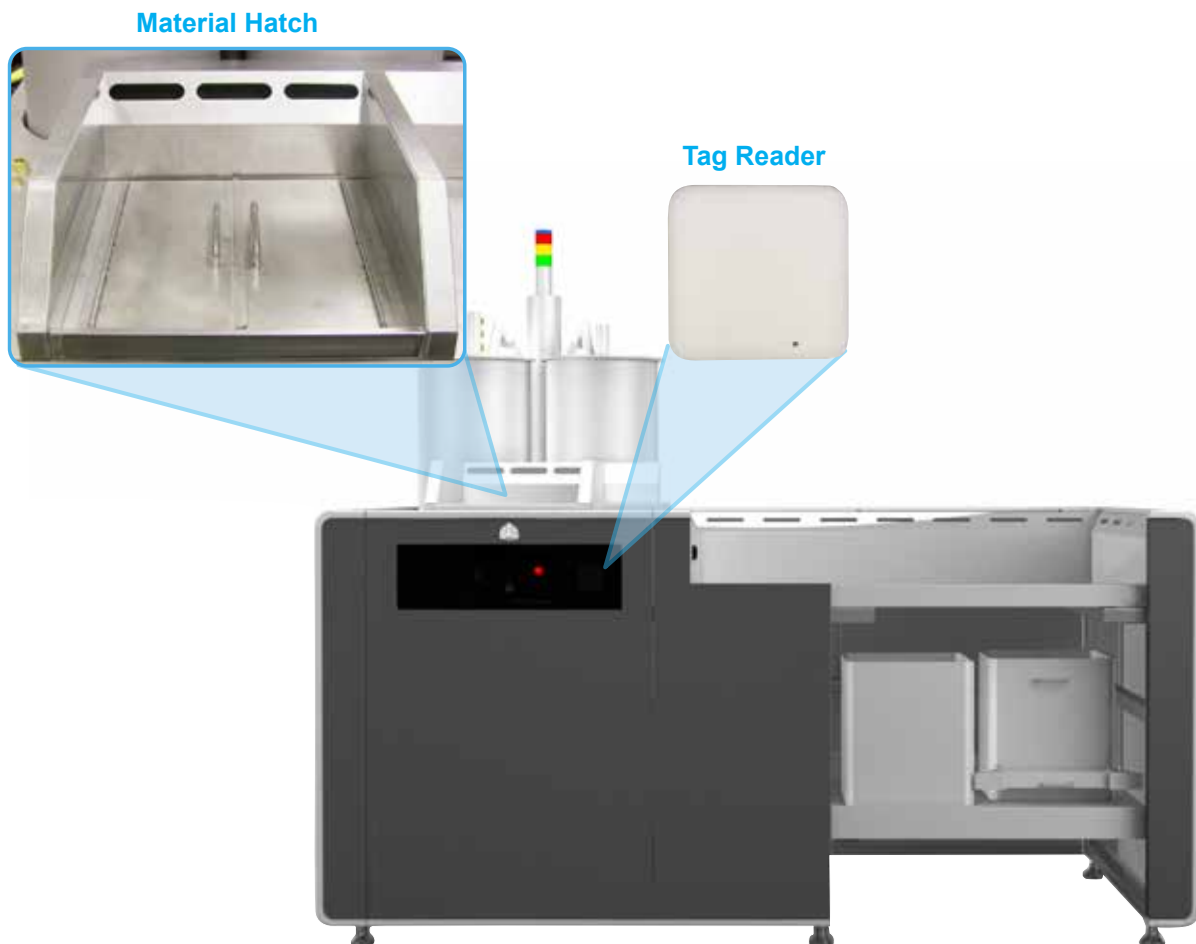
The Sifter Switch is located next to the sifter. The user moves the switch to the up position to enable vibration of the sifter during breakout. Move the switch to the bottom position to stop the sifter.

[NOTE: On ATEX version, sifter switch is located on the Operator panel.]



Fresh Material Input

The material input hatch takes fresh material from the user and feeds it to the MQC System. To unlock the hatch, the user must first swipe the tag of the material container across the tag reader.



GENERAL GUIDELINES

Before using your SLS equipment, your company should have a safety program in place. The safety program should:

- Point out hazardous equipment, materials, and procedures.
- Explain what to do in case of an emergency.
- Provide information about the hazards of the equipment and materials in the form of Safety Data Sheets (SDS). The Safety Data Sheets are provided with all materials supplied by 3D Systems.

All SLS equipment is designed with safety in mind. However, improper use, malfunctions, and excessive exposure could cause injury.

TRAINING AND INSTRUCTIONS

Follow these general safety guidelines when operating any SLS equipment:

- Do not operate any SLS equipment before receiving proper training.
- Read and follow all operating instructions.
- Follow all safety rules in this section and heed all hazard warnings in this guide.
- Do not try to perform any equipment maintenance procedures you were not trained to do.
 - **Operators** are trained to operate the system and perform all the necessary tasks to print a part.
 - **Certified service personnel** are those who have completed the 3D Systems service training package and are certified to perform service tasks. Certification may occur at various levels, and servicers should only perform tasks they are authorized and certified to complete.

MACHINE HANDLING

- Do not try to access, service, or adjust any components inside any SLS equipment enclosure.
- Do not try to open any panel or door while a machine is running.
- Do not access any area of the machine near the print chamber during printing.
- Use special caution when handling a heated print cake and when dealing with the heated, inert environment inside the SLS system's print chamber. Take note of all thermal hazard warning labels on the machines.
- Secure electrical cables and coolant hoses to prevent tripping.

MATERIAL HANDLING

- Do not use any material without first reviewing its Safety Data Sheet (SDS).
- To prevent injury and equipment damage, be sure to follow all handling guidelines detailed in the appropriate [Material Guide](#).

LASER

- **Do not** try to access, service, or adjust the laser system in any way.
- **Do not** enter any area displaying posted warning signs during open beam operations. Open beam operations refer to the laser, and they **only** occur during service procedures.

ALARMS AND WARNINGS

- If you see an error, alarm, or warning message on any SLS equipment display, note the state of that machine's stack light. Clear the alarm, error, or warning message before resuming operation.
- Displayed error, alarm, or warning messages can result from unsafe practices, such as opening an enclosure door or panel when equipment is powered up and running.

SAFETY SYMBOLS AND DEFINITIONS

The following safety labels are posted at various points on the machine to indicate potentially hazardous conditions:



HOT SURFACES HAZARD: There are surfaces and materials in the vicinity that may be hot and could cause severe burns.



LASER RADIATION HAZARD: Invisible laser radiation is accessible in the vicinity of this sign or behind the access panel. Direct and scattered radiation can cause severe burns and blindness. Access panels are for service only and should be opened only by certified service personnel.



ELECTRIC SHOCK HAZARD: High voltage electricity is accessible in the vicinity of this sign or behind the access panel. High voltage can cause severe burns or death. Access panels are for service only and should be opened only by certified service personnel or trained maintenance personnel.



CAUTION: Indicates something may happen that could cause loss of data, damage to equipment, or personal injury.



CRUSH HAZARD: Injury or death from crushing weight.



NOTCHED BELT ENTANGLEMENT: Injury or death from entanglement in notched pulley drive belt.

FIRST AID SECTION – WHAT TO DO



In the case of an accident while using any SLS equipment, seek medical attention immediately. Use the following guidelines for specific safety instances.

Burns

This equipment contains high temperatures and burning laser radiation which could cause 2nd degree burns. Do not attempt to remove any protective panels. There are no user serviceable parts inside.

If a burn occurs, seek first aid and immediate medical attention. Pushing the E-stop button will de-energize the equipment and diffuse the hazardous situation.

Reporting Laser Radiation Exposure

If the injury was determined to be the result of laser radiation overexposure, please send a report to:

Attention: Laser Safety Officer
3D Systems, Inc.
333 Three D Systems Circle
Rock Hill, South Carolina, 29730
USA

Include the following information in your report:

- Nature of the accident and circumstances surrounding it
- Where the accident occurred
- Model and serial number of the machine
- Number of people involved
- Any other pertinent information

Please send this information to 3D Systems within a day of the accident.

Electrocution

The SLS system contains equipment energized at 208 volts, 3-phase delta. Do not attempt to remove protective panels. There are no user serviceable parts inside.

If electrocution occurs, seek first aid and medical attention immediately. Pushing the E-stop button will de-energize the equipment and diffuse the hazardous situation.

Material Inhalation

The part cleaning process may create a choking or air restriction hazard. If someone has difficulty breathing or a “loss of breath” sensation, transport the person to a well-ventilated room or outside of the facility. If the condition persists, seek immediate medical attention.

SLS EQUIPMENT SAFETY FEATURES

A major design goal for all SLS equipment is to provide a safe operating environment. The frame and enclosure designs passively limit hazardous access while the electronics and software actively and automatically sense and react to unsafe conditions when they arise. For example, if the SLS system detects unsafe operating conditions, it will immediately stop operating and, in some cases, shut down completely.



CAUTION: If any SLS equipment safety features fail, your actions may be all that will prevent potentially hazardous operating conditions.

Safety Interlocks

Safety interlock devices on the SLS equipment help prevent accidental laser exposure, electrical shocks, crush injuries, burns, and fires. SLS equipment will not operate unless all safety interlocks are satisfied.



CAUTION: Never try to disable or override any safety interlock device on any SLS equipment. Operating equipment without all safety interlocks enabled can cause equipment damage, injury, or death. If you suspect a safety interlock device is not working properly, do not operate your SLS equipment. Rather, disconnect power from the equipment and contact 3D Systems Customer Support for assistance.

SLS System Response if an Interlock Fails

Safety interlock devices mounted on the SLS system sense the hazardous operating conditions below. The SLS system takes the actions listed when an interlock fails.

SAFETY INTERLOCKED CONDITION	IF THIS INTERLOCK FAILS...
<ul style="list-style-type: none"> • One or more internal print chamber panels are open^a • E-stop button pressed on user interface console • External oxygen monitor connected to SLS system detects too little oxygen in room 	<ul style="list-style-type: none"> • Print will not start • Warning message appears on SLS system display • Red Stacklight illuminates • Nitrogen generator (if in use) shuts down • Warning message appears on SLS system display • Red Stacklight illuminates • Laser, motors, and valves disabled • Nitrogen supply shuts off <p>E-Stop Only:</p> <ul style="list-style-type: none"> • CDA supply shut off • System power disabled

a. Internal panels are for service access only. Several interlocked panels are for customer maintenance: overflow cleanout, blackbody cleaning port, and the filter box located on back of machine.

Limited Access and Barrier Shielding

SLS equipment frame and enclosure designs limit access to the following:

- **Service areas**, such as cabinets and enclosures for electrical power and automation controls. This prevents accidental exposure to electrical shock hazards.
- **Material areas**, such as material feed hoppers, storage bins, and transport tubes. This prevents:
 - burn hazards by minimizing exposure to heated material
 - slip hazards by keeping material from dropping on the floor
 - fire hazards by minimizing airborne dust cloud formation and potential ignition. See SDS for complete material hazard details.
- **Laser beam optics and scanning areas**, including the fully-enclosed [Laser Enclosure](#)—where the laser beam originates—and the interior of the print chamber, into which the beam projects. The Laser Enclosure and print chamber are designed to minimize hazards such as burns, eye injury, and fire in the following ways:
 - The Laser Enclosure optics and laser beam duct (at the top of the print chamber, below the removable Laser Window) prevents the laser beam from being aimed outside the print chamber.
 - The fully enclosed print chamber blocks laser radiation from escaping to the outside.

- The material of the print chamber window also blocks laser radiation so you can safely observe the part bed during a print.

Other Active Safety Features

- The ProX MQC System, coupled with the [Dust Collector](#), removes airborne material during part breakout in accordance with standard industrial ventilation practices.
- An optional room oxygen monitor automatically initiates SLS system shutdown when it detects too little oxygen in the room.

ELECTRICAL SAFETY

To prevent electrical shock, SLS equipment will not operate unless all external panels are installed and all electrical safety interlock circuits are closed.



ELECTRICAL HAZARD: Hazardous voltage exists inside the enclosures of all SLS equipment. Injury or death from electrical shock can result if you remove external panels or try to defeat safety interlocks. Panels should only be removed, and interlocks should only be defeated, by trained and certified 3D Systems Customer Support personnel.



ELECTRICAL HAZARD: Verify your facility's electrical service ratings before connecting power to any SLS equipment. Power must only be connected by a certified electrician.



ELECTRICAL HAZARD: Do not open the panel behind disconnect switch! Live voltage present. This should only be opened by qualified personnel after power is disconnected from the facility's power circuit/breaker panel.

All SLS equipment was designed to minimize operator exposure to electrical hazards during normal operations. All exposed electrical circuits are inside limited-access cabinets. This is to separate the operator from service and maintenance areas.

When operating any SLS equipment, keep the following electrical safety points in mind:

- Only 3D Systems certified service personnel should operate SLS equipment with access panels or service doors open.
- Heed high voltage warning signs and labels.

ENVIRONMENTAL ISSUES

The SLS system emits no toxic substances when using materials approved by 3D Systems.

Emissions

Material heating – Analytical testing on 3D Systems materials indicates no detectable emissions outside acceptable limits from the SLS system. (See the materials' SDS.)

Nitrogen – The SLS system uses nitrogen, which is passively vented in the print chamber.



NOTE: Do not install a fan in the exhaust port. The exhaust port (see the section [“Cleaning the Exhaust Port” on page 62](#)) in the print chamber must not be blocked. The nitrogen-inert atmosphere in the SLS system print chamber is at higher pressure than the outside atmosphere. The chamber will vent without a fan. Installing a fan in the exhaust port will draw nitrogen-rich air out of the print chamber too fast, raising the oxygen concentration in the chamber. This can keep the SLS system from reaching inert status, or cause an in-process print to abort.

Material Disposal

Refer to the DuraForm ProX material SDS for disposal information. Follow any applicable local regulations.

LASER SAFETY

The SLS system contains a 100-watt continuous-wave CO₂ laser. The laser itself is designated Class IV. Very brief exposure to a direct—or specularly or diffusely reflected—laser beam can cause significant burns or eye damage. It can also be a fire hazard.




During normal operations of the SLS system, the laser beam path is wholly contained within the machine. This makes the entire machine a Class I Laser System. That means the SLS system does not produce damaging emissions under normal operations.

Laser Safety Classifications

Class I and Class IV are designations established by the U. S. Department of Health and Human Services, Public Health Service, Food and Drug Administration, Center for Devices and Radiological Health (CDRH), and by IEC 60825 (the International Electrotechnical Commission's *Radiation Safety of Laser Products, Equipment Classification Requirements, and User's Guide*). The Class I and Class IV laser designations also comply with DIN VDE 0837/02.86+A1/07.90. You can read more about laser safety and classifications in ANSI Z136.1-1993 (the American National Standards Institute standard for the safe use of lasers).

Laser Safety Labels on the SLS system

The SLS system has the two types of laser safety labels below. Laser safety label locations on the SLS system are shown in the figures that follow the table:

LASER SAFETY LABEL	WHAT IT MEANS
	<p>LASER RADIATION HAZARD</p> <p>Invisible laser radiation is accessible in the vicinity of this sign or behind the access panel. Direct and scattered radiation can cause severe burns and eye injury, or start a fire. Access panels are for service only and should only be opened by certified service personnel.</p>
	<p>DEFEATABLY INTERLOCKED PROTECTIVE HOUSING</p> <p>If you defeat the SLS system laser safety interlocks, then open this housing (panel or door), you can be exposed to hazardous direct and scattered Class 4 invisible laser radiation which can cause severe burns and eye injury, or start a fire.</p>
	<p>LASER CERTIFICATION/IDENTIFICATION</p> <p>Identifies laser system Class and shows CDRH Statement of Compliance.</p>

Laser Radiation Hazard Label Locations



Print Chamber Enclosure



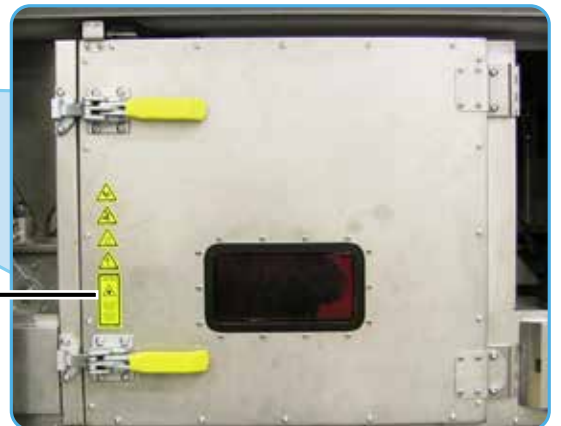
Interlocked Protective Housing Laser Label Locations



Laser Panels



Blackbody Sensor

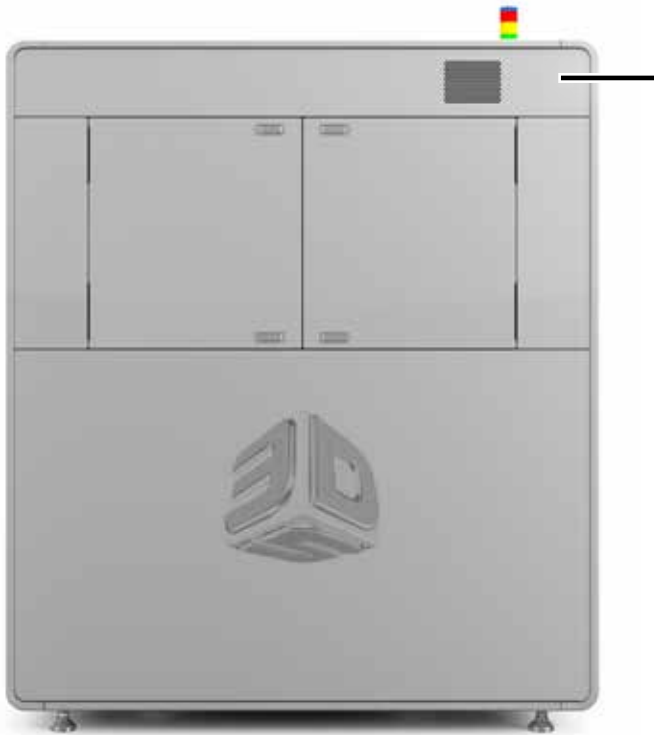


Print Chamber Door



Air Processing Module

Laser Certification (And Machine Identification) Label Location



MODEL: ProX 500		SERIAL NO:	
ELECTRICAL: 208VAC, 3-Phase, 50/60 Hz., 10KVA			MASS (KG): 1360
SHORT CIRCUIT INTERRUPTING CURRENT: 200KA		ELECTRICAL DIAGRAM NUMBER: 132508-00	
<p>This product or its use may be covered by one or more of the following U.S. patents or other worldwide patents or pending patent applications: 5,846,370; 5,990,268; 6,085,122; 6,151,345; 6,677,554; 6,694,207; 6,815,836; 6,930,278; 7,296,589; 7,357,629; 7,464,733; 7,521,852; 7,569,174; 7,790,096; 7,807,947; and 7,887,316.</p>			
CLASS 1 LASER PRODUCT			
STATEMENT OF CDH COMPLIANCE			
This product conforms to the applicable requirements of 21 CFR Subchapter J at the time of manufacture.			
STATEMENT OF FCC COMPLIANCE			
This product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.			
pn: 132540-00, Rev. A			
		 3D Printer MADE IN THE USA BY: 3D Systems, Inc. Rock Hill, SC U.S.A. Tel: +1.803.326.3900 www.3dsystems.com	
			

MATERIAL SAFETY

All materials certified by 3D Systems are safe during normal operation. However, you should be aware of the following issues:

- Any material, material-like substance, or airborne cloud of material has a remote chance of rapid combustion.
- Breathing some materials may cause certain people to experience respiratory irritation.
- Material safety hazards are minimized by good industrial housekeeping and ventilation practices.
- Spilled material can cause the floor to become very slippery.
- Material should be sifted in a well-ventilated room.

Refer to the SDS's and to 3D Systems material guides for information on specific materials.



CAUTION: Using materials that have not been certified for use in the SLS equipment may cause health or safety hazards and may damage the equipment and void the warranty.

Material Ignition Information

Powdered materials can be flammable and can be ignited by static electricity in a non-inert environment. Refer to each material's SDS for specific information.



CAUTION: The operator must use an approved vacuum cleaner to clean up excess material. 3D Systems recommends an ESD or explosion-proof model. Contact 3D Systems Customer Service for purchasing options.

Finding Material Safety Information

Use the Material Safety Information table to locate references and contacts for information on important material safety topics. Also check the SDS of the material used for the specific precautions to be observed.

Material Safety Information

TOPIC	REFERENCE / CONTACT	
Standard industrial ventilation practices	US: American Conference of Governmental Hygienists, Committee on Industrial Ventilation Europe: Maximale Arbeitsplatz Konzentration, January 1990	
Housecleaning and prevention of accumulation of explosive dust concentrations	US: NFPA 654: Standard for the Prevention of Dust Explosions in the Plastics Industry; National Fire Protection Association, Volume 5 of the National Fire Codes Europe: Maximale Arbeitsplatz Konzentration, January 1990	
Material exposure	US: Code of Federal Regulations, 29 CFR, section 1900.1000, available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 Europe: DIN EN 26184 Teil 1 /06.91	
Specific materials	Material Safety Data Sheets (MSDS) from 3D Systems, Inc.	
	US/Canada:	
	Europe:	
	Mfgr. Contact:	3D Systems Corporation 333 Three D Systems Circle Rock Hill, SC 29730 USA
	Information	Phone: 803.326.3900 or Toll-free: 800.739.3669
Emergency	1.800.262.8200 - Chemtrec	
		3D Systems GmbH Guerickeweg 9 D-64291 Darmstadt, Germany
		Phone: (+49) 6151 357-0
		1.703.741.5500 - Chemtrec (U.S.)

Material Handling Precautions

During normal operation of the SLS system using 3D Systems' materials, you are not required to wear a dust mask or special personal protection equipment unless specifically designated. Check the SDS of the material used for the specific precautions you should observe. Use the following table of precautions as a general guide:

Safe Material Handling Guidelines

CATEGORY	PRECAUTION
FIRE/HEAT	<ul style="list-style-type: none"> Never smoke or ignite anything around powdered materials. Maintain proper clearance from materials when using portable heating devices. Store flammable liquids away from materials. After removing a part from the print chamber, allow it to cool to room temperature in a well-ventilated area. Use anti-static mats in front of SLS equipment.
INHALATION	<ul style="list-style-type: none"> Avoid breathing powdered materials; when exposure to dust or fumes is likely, wear a NIOSH-approved respirator appropriate to the airborne concentration. Always provide adequate ventilation.
SHOP SAFETY	<ul style="list-style-type: none"> Train operators in SLS system procedures. Wear safety glasses. Use extreme care with all heated materials. Make sure that the room is well ventilated.
AVOIDING SPILLS	<ul style="list-style-type: none"> Keep containers closed when not in use. Have a fully-grounded internal non-ignition vacuum cleaner ready to use. Have any equipment specified in the SDS ready to use.
SDS	<ul style="list-style-type: none"> Give operators access to the SDS's that apply to materials they will be handling and ensure that they read them. If necessary, translate them. File SDS's in an easily accessible location for immediate reference. Strictly follow all the conditions in each SDS.

NITROGEN/OXYGEN SAFETY

The SLS system uses nitrogen to create an inert atmosphere in the print chamber. The nitrogen inhibits any potential rapid combustion of particulate matter during the SLS process.

The oxygen content of air is approximately 21 percent. Displacement of the normal atmosphere with an inert gas, such as nitrogen, can reduce the oxygen content in a room. In the remote chance that nitrogen leaks into the room during the sintering process, the situation can be hazardous.

Your site must have an oxygen alarm monitor installed in the room containing the SLS system. This monitor will alert you if the oxygen level drops below a designated point. It must be wired to trigger an immediate shutdown of the SLS system and nitrogen generator (if in use).



CAUTION: Exposure to an atmosphere containing 12 percent or less oxygen causes unconsciousness without any warning symptoms. This happens so quickly that you cannot help or protect yourself.

The table of [Oxygen Deprivation Effects and Symptoms](#) explains the potential effects and symptoms that can occur at different concentrations of oxygen in the atmosphere.

When you work in an environment that may become oxygen-deficient, make sure you comply with the following items:

- If, at any time, you feel you are experiencing symptoms of oxygen deprivation, leave the area immediately.
- You have received oxygen/nitrogen safety training.
- The room is well-ventilated; at least 4 air exchanges per hour.
- Self-contained breathing apparatus is available and easily accessible.
- The room oxygen alarm monitor is functioning and audible.
- Leave the SLS system room/area immediately when you hear the oxygen alarm.

Oxygen Deprivation Effects and Symptoms

OXYGEN CONTENT (% BY VOLUME)	EFFECTS AND SYMPTOMS AT ATMOSPHERIC PRESSURE ^a
15 – 19 %	Decreased ability to work strenuously. May impair your coordination or may induce early symptoms in persons with coronary, pulmonary, or circulatory problems.
12 – 14 %	Increases respiration during exertion. Pulse rate goes up. May experience impaired coordination, perception, and judgment.
10 – 12 %	Respiration continues to increase in rate and depth. Lips become blue. May lose consciousness at this point.
8 – 10 %	Mental failure. Fainting and unconsciousness. Face becomes ashen, lips become blue. Nausea and vomiting may occur.
6 – 8 %	100% fatal after 8 minutes of exposure. 50% fatal within 6 minutes. Recovery with treatment within 4 to 5 minutes.
4 – 6 %	Coma within 40 seconds; convulsions, respiration ceases, death occurs.

a. From Safety Bulletin SB-2 - 1983—"1983 by the Compressed Gas Association, Inc. 1235 Jefferson Davis Highway, Arlington, VA 22202

MECHANICAL MOTION, ELECTRICAL HAZARDS, AND HOT SURFACES

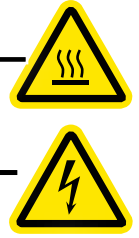
You should be aware of the following pinch, crush, rotating blade, heat, and electrical hazard locations on the SLS equipment:



Print Chamber Enclosure



Hopper Feed Module

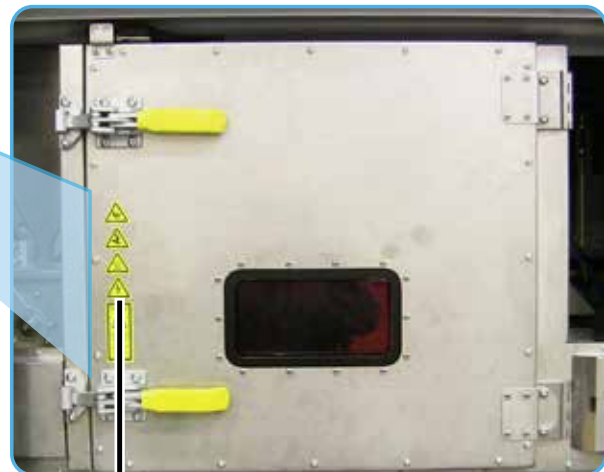


Disconnect Switch

Blackbody Sensor



Inner Print Chamber Door

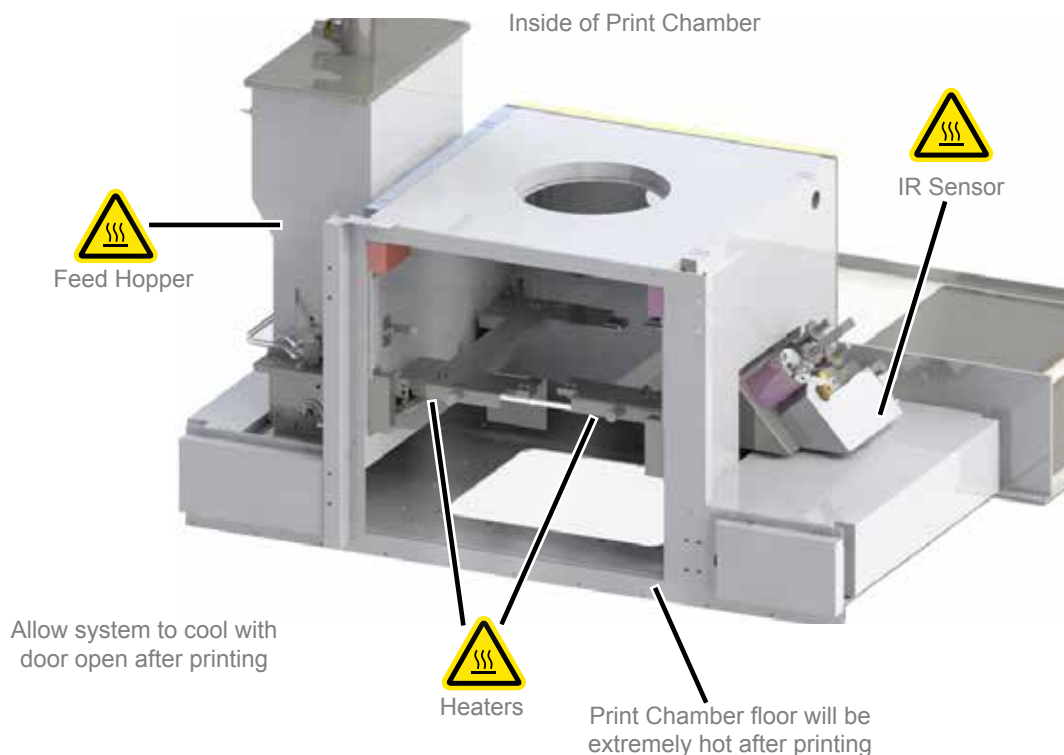




Hot Surfaces in the Print Chamber

The SLS print chamber contains heaters. During and after a print, the print chamber contains hot materials. Avoid burns by taking the following precautions:

- Allow the print chamber to cool after opening the print chamber door.
- Know which surfaces in the print chamber are likely to be hot after a print. These are indicated by warning labels. Avoid those surfaces when moving the heater assembly and removing parts from the print chamber. In particular, avoid the floor of the print chamber.
- Use appropriate gloves when removing the print cake from the print chamber, or let the print cake cool for several hours before you touch it.



This section gives an overview of the part printing process. For detailed information on operating the ProX 500 printer, see the section, [“ProX 500 System Operations” on page 37](#). For detailed information on operating the MQC System, see the section [“MQC System Operations” on page 43](#).

The software used to print parts on the ProX 500 printer consists of the **Build Setup** and **Sinter** applications. Build Setup is used to prepare models for printing. The models are then processed and transferred to the Sinter application which controls the printing of the parts.

Before printing, several components of the SLS equipment should be cleaned and the MQC System must have transferred material to the printer.

CLEANING AND CHECKING

Follow these procedures to clean the SLS equipment before you print parts. For detailed cleaning instructions, refer to the sections indicated.

1. Clean the print chamber (See the section, [“Cleaning the Print Chamber” on page 57](#))
2. Clean laser window (See the section, [“Cleaning the Laser Window” on page 59](#))
3. Check the overflow screen which is located at the lower-left side of the ProX 500 and clean, if necessary. (See the section, [“Cleaning and Replacing Filters” on page 63](#))
4. Check the two-stage filters which are located at the lower-left side of the printer and the back of the MQC System. Clean them if necessary. (See the section, [“Cleaning and Replacing Filters” on page 63](#))
5. Check the roller and clean any material or debris that may be adhered to it. (See the section, [“Cleaning the Roller Assembly” on page 59](#).)
6. Clean the print chamber window, if necessary, using a clean dry dust rag. (See the section, [“Cleaning the Print Chamber” on page 57](#).)
7. Check the heaters and chamber lights inside the print chamber and clean, if necessary. (See the section [“Cleaning the Print Chamber” on page 57](#))
8. Check that the coolant flow which is located on the lower-left side of the machine is at least 6 lpm. Also verify that the coolant temperature on the chiller is 20 °C.
9. Check to see if the heater assemblies are in the (down) print position. If not, lower the heater assembly into place.
10. Close and latch the print chamber door and outer front door. If the chamber door has been unlatched for a significant period of time, check the IR sensor core temperature before starting a print job. The temperature must be at 77 °C and stable. This can be checked in the Status settings of the Sinter Status window or Manual Operations Heater screen.
11. Check the laser window N₂ flow (see Material Guide for correct N₂ flow for your material).
12. Check the blackbody and clean, if necessary. (See the section, [“Cleaning the Black Body” on page 62](#))

MQC SYSTEM PREPARATION

The MQC System should be started and filled with material before proceeding. After it has been loaded with material, it will need to transfer the material to the printer. For detailed information on operating the MQC System.

1. Turn on the power to the dust collector and MQC System.
 - a. To turn the dust collector on, simply press the power switch.
 - b. If the MQC System has not been powered up, press the power switch on the front panel of the system.
2. Ensure that the system is in **“Stopped”** mode. If the status does not say “Stopped,”
 - Press the knob to navigate to the next screen
 - Select **“Operational mode”**
 - Select **“Stop cycle”**

Load Fresh Material from Material Container

3. From the Home screen, press the knob to go to the next screen and select **“Operational mode.”**
4. Select **“Load fresh material.”** The screen will prompt you to scan the tag of the material container on the tag reader.
5. The tag should be located on the cap of the material container. You can simply remove the cap and scan it across the tag reader.
6. When the system detects a valid tag, the doors above the interface will unlock.

7. Open the left door, then the right door all the way.
8. Pour the entire contents of the material bottle into the grate.
9. When finished loading the material, properly dispose of the cap and container.
10. Close the right door, then the left door. Ensure they are fully closed. The doors will then lock.



NOTE: Do not leave the station until the material has been added and the doors have been securely closed.



NOTE: If the system detects that less than 7.5kg (the weight of a full material container) has been added to the material input, you may receive a notification message on the screen telling you to retry if necessary or click to continue. You may use the same tag from the container three times before it becomes invalid. This is only until the full 7.5kg has been added from the container.

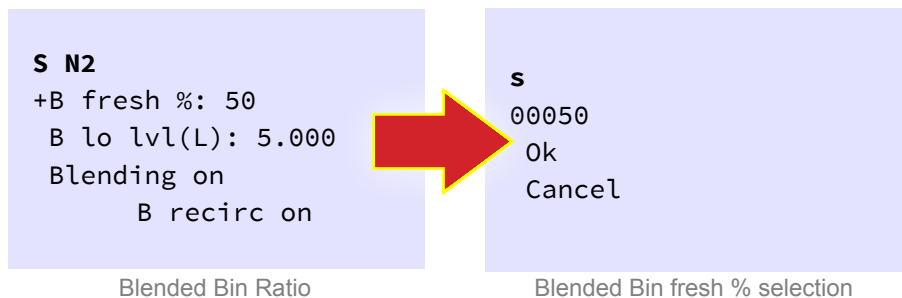
The MQC System must be in Full cycle mode for material to be sent from the blended bin to the ProX 500. Before selecting **Full** or **Local** cycle mode, the user should verify that the desired blend ratio is selected. (See Material Guide for recommended ratio.)

11. Remain in **Stop** mode

- a. From the **Home** screen, press the knob.
- b. Rotate the knob and then push the knob to select **Settings/Service**.
- c. Rotate the knob and select **Setup**.

12. To change the **Blended Bin (B) fresh %**, select and push the knob. You will see the following:

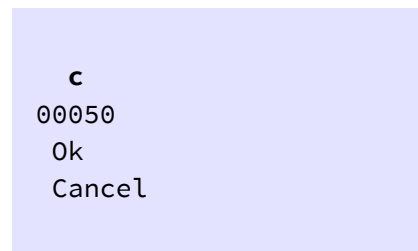
- a. “s” indicates that you may select the value located beneath.
- b. Turn the knob to move the selection to the next value.
- c. Push the knob to select the value. The screen will change as shown on the right.



Blended Bin Ratio

Blended Bin fresh % selection

- d. “c” indicates that the value is selected and can be changed.
- e. Turn the knob to change the value.
- f. Push the knob to return to **Selection** mode.
- g. Turn the knob to move to the next value or to **OK** or **Cancel**.



Select Percentage

Set the MQC System to Full Cycle Mode

The MQC System requires at total of 20 kg to blend material. If the Fresh ratio is set to 50%, then 10 kg of fresh material and 10 kg of recycled material is required for a blend cycle to start. It is recommended that the blended bin be empty and that the MQC System be set to **Local** cycle mode for blending before changing to **Full** cycle mode.

13. Enter “**Full Cycle**” mode:

- a. From the **Home** screen, press the knob and go to the next screen
- b. Choose “**Operational mode**”
- c. Choose “**Sel full cycle.**” The status will change to “**Full cycle**” and you will be returned to the Home screen.
- d. If adequate material is present, a blend cycle will be initiated.
- e. Material will be transferred to the printer at this point.
 - If the printer is requesting material and there is sufficient material in the blended bin, then material will be transferred to the printer.

ProX 500 START-UP SEQUENCE

If you're starting the printer from its powered-off state, you must first perform the following machine start-up sequence before you start a print:

- Start the chiller
- Verify the system's compressed air
- Verify the system's nitrogen supply
- Verify the system's material supply
- Put Sinter in Manual Operations (Man Ops) mode
- Move the part piston to its Home position
- Move the roller to its Home position
- Move the piston back to its Start position

Instructions for each step in this sequence are described next.



If you're starting the printer from its powered-off state, do not attempt to start a print before you perform the startup sequence. Also, never attempt to start a print if the dsp button is not shown in the taskbar. (Putting Sinter in Build mode then opening a build packet starts a build.) - see latest customer release notes for starting Sinter and system (dsp) initialization.

1. Start the Chiller.
 - a. Press the power (**I/O**) button on the chiller front panel.
 - b. Check that the chiller **COOLANT INLET** flow gauge at the SLS system gauge panel reads 6 lpm or more.
 - c. Check that the chiller temperature setpoint is 20C.
2. Verify the printer's compressed air supply.
 - a. Verify that facility compressed air is on and connected to the gauge panel **AIR INLET**.
 - b. The air pressure gauge label indicates the correct reading. This should be: 500 KPa (72psi).
3. Verify that the system has an adequate supply of nitrogen and that it is running.



NOTE: Skip Step (a) if you have a nitrogen dewar or bulk tank connected to your SLS system instead of a nitrogen generator.

- a. Open the compressed air supply valve at the bottom of the N₂ generator.
 - b. Make sure the **NITROGEN INLET** ball valve on printer's gauge panel is open. It needs to be turned at a 90° angle so that it is aligned with the direction that the nitrogen is flowing.
 - c. Verify that the regulated **N₂ PRESSURE** gauge on gauge panel reads 140 KPa (20psi).
4. Verify the material supply using either of the following two ways.
 - In SinterDiag, check the MQC window in the Man Ops screen. This displays the MQC System's status, including the amount of available powder.or...
 - Check the MQC status in the Sinter Status window which also displays the amount of available powder.

SETTING UP A BUILD PACKET

A **build packet (.bpf) file** is created using the **Build Setup** application. It contains the setup information necessary to process the print job. The Build Setup application contains extensive online help with further details pertaining to the operation of the software.

Build Setup can be launched and run on the computer connected to the ProX 500 or on a standalone computer. If you are using Build Setup with an offline (standalone) computer, you must export the .bpf file which creates a **.bpz file**, a compressed zip file that contains the .bpf file, sorted facet files and other associated files that are required. You must then copy it to the ProX 500 computer.

The .bpz file must be unzipped before starting the build. To do this, the user must launch Build Setup on the computer connected to the ProX 500 printer and open the .bpz file. This automatically unzips the files and places them in the appropriate directories.

To set up a build packet, you need to do the following:

- Run the Build Setup application
- Add STL files (“parts”) to your build
- Reposition parts in the build volume
- Set “build” and “part” parameters
- Save the build packet file.
- If Build Setup is run on a standalone computer, export the .bpf file to convert it to a .bpz file and copy it to the computer on the ProX 500 where you will unzip and print it.

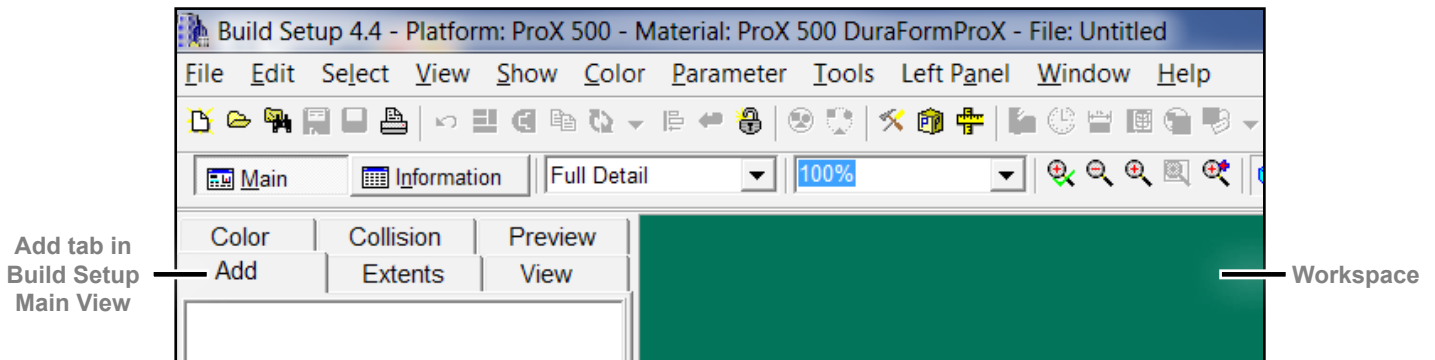
Each procedure is summarized below.

Run Build Setup

1. Choose **Start > Programs > SLS System > Build Setup**.
2. Build Setup starts with its **Main** window displayed showing an empty virtual build volume, known as the **Workspace**.

Add STL Files to the Build Packet

The ProX 500 can build parts from computer-aided design (CAD) data saved in the STL file format. You add parts to your build by selecting the **Add** tab on the left side of the window. Then use the file browser to locate an appropriate STL file, and drag and drop the file onto the representation of the build area on the right.



Reposition Parts in the Workspace (Build Volume)

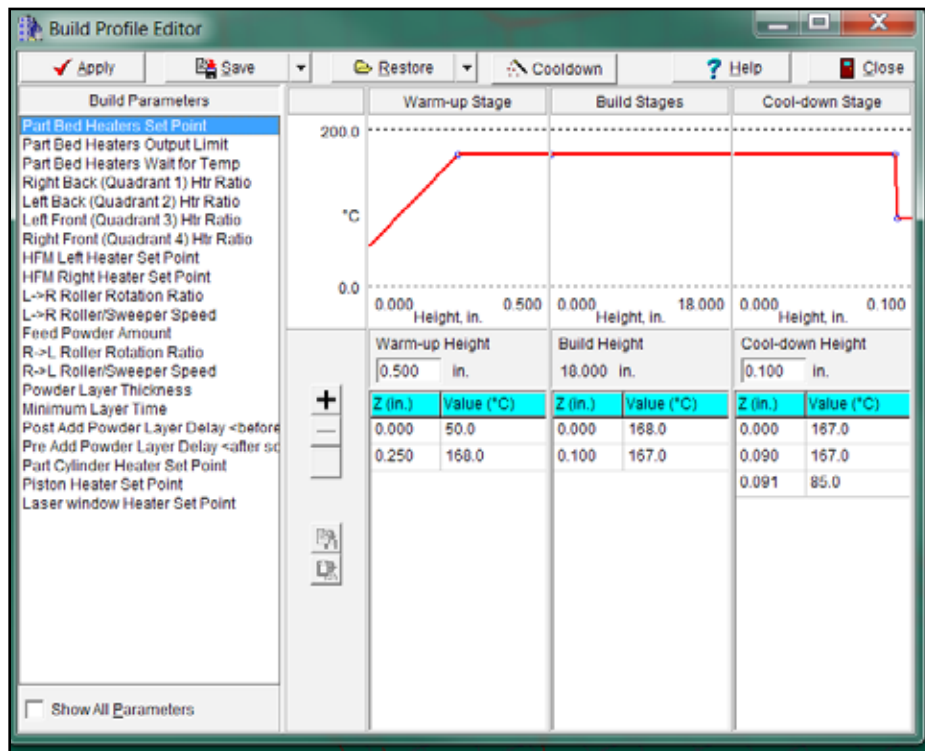
Build Setup gives you many ways to move parts around in the Workspace. For example, you can:

- Drag parts
- Position parts numerically
- Snap parts on a 3D grid
- Rotate and align parts to each other on a plane

You can even have Build Setup place your parts automatically. In time, you'll learn optimal placement and orientation strategies for the types of parts you build most often. (See Material Guide for more specific information about optimal placement and orientation.)

Set Parameter Values in the Build Packet

"Parameters" are settings in a build packet that you can change. Parameter settings apply to parts or the entire build. You set parameters in Build Setup's **Part Profile Editor** and **Build Profile Editor** dialog boxes. Parameters control most aspects of how a part is built. You set scale and offset values in Scale & Offset editor. Scale compensates for material shrinkage. Offsets compensates for width of laser beam.



Build Profile Editor in Build Setup

As with part placement, see Material Guide for more information about specifics for build, part and scale values. 3D Systems supplies sample build packets which can be used for reference when getting started.

Save and Verify Build Packet

When all parts are arranged and parameters are set, the last step is to save and verify the build packet. This step ensures that the build will work. It also creates a sorted facet file (.sff) the printer uses to scan parts.



NOTE: You cannot run a build packet until it is verified.

To save and verify a build packet, select **File > Save & Verify**. After verification, the build packet is saved in your **..dtm\build** folder with a **.bpf** extension.



NOTE: If you are using Build Setup with an offline (standalone) computer, you must export the .bpf file which creates a .bpz file, a compressed zip file. You must then copy this file to the ProX 500 computer. The .bpz file must be

RUN SINTER APPLICATION

1. Start the Sinter application: from the Windows task bar; choose **Start > Programs > SLS System > Sinter**, then...
 - The Sinter application window opens.
 - The RealMonitor utility starts, appearing as a **RealMonitor** button in the Windows taskbar. Sinter icons will remain grayed-out until the DSP is initialized. (Sinter uses DSP to control SLS system heaters and motion, and to communicate with the laser scanning system.)
2. When you see the DSP button in the taskbar, the Sinter application is ready to start a print. However, you must prepare the chamber before printing the parts.

Preparing the Print Chamber

The following steps are a suggested guideline for preparing the system to print parts.

1. Check to see if the MQC is in Fully Cycle mode and that there is enough powder in the blended bin for the print. Refer to the section, [“Set the MQC System to Full Cycle Mode” on page 32.](#)
2. Close and latch the inner print chamber door and close the outer door. All interlocks must be engaged to move the piston or roller.
3. If the piston is not homed, go to **Sinter > ManOps > Piston Control** and select **Home Piston**.
4. If the roller has not been homed, press the **Roller** button on the toolbar, then press the **Home Limit** button in the dialog box to home the roller.
5. Press the **Inert** button on the toolbar and select the **Enable** toggle option to activate the inerting process.
6. Press the **Add Powder** button on the toolbar to create level print bed:
 - While the machine is inerting, begin leveling powder. Set the **Layer Thickness** to 0.0. Specify the number of cycles, normally 2 at a minimum, in the **Layer Cycle Count** field press the **Add Layer** button to begin leveling.
7. Once the powder has been leveled, and if the next build has not yet been set-up, open Build Setup, complete the Build Setup, and close the function. Refer to the section, [“Run Build Setup” on page 34](#) for detailed instructions.

Running the Build

After the preceding steps have been completed, the printer is ready to print parts.

1. Verify that the IR Core temperature value is 77 °C. If necessary, run an IR Calibration. Refer to the section, [“Calibrating the IR Sensor” on page 42](#)
2. Press the **Exit** button on the toolbar to exit Manual Ops and return to the main Sinter screen.
3. Select **Build > Start Build**, select the build packet name, and select **Start**.
4. Once the O₂ level of 5.5% has been reached, the roller should begin adding powder layers.

BREAKING OUT PARTS

Once the print job has finished, the part cake will need to be cooled and transported to the MQC System for breakout.

To cool down the print cake and remove the print cake from the print chamber, refer to the section, [“Removing the Print Cake from the Print Chamber” on page 44.](#)

For instructions on breaking out the parts from the print cake at the MQC System, refer to the section, [“Breaking Out Parts” on page 47.](#)

For post-processing parts, refer to the **Material Guide** for your specific material.

5 PROX 500 SYSTEM OPERATIONS

Many of the basic operations and components of the ProX 500 have been covered in the previous sections of this manual. These will be referenced under the appropriate headings below. Remaining details will be described here.

ProX 500 START-UP SEQUENCE

To start up the ProX 500 printer to prepare for a print job, follow the steps described in the section, [“ProX 500 Start-Up Sequence” on page 33.](#)

BUILD SETUP AND SINTER APPLICATIONS

To print parts with your printer, you must prepare the models in **Build Setup** and run them in the **Sinter** application. Follow the procedures listed in the section, [“Printing Parts with the ProX 500” on page 31.](#)

Messages in the Sinter Application

When Sinter is running various types of messages appear in the Message List window (described below). Alarm and warning messages also appear in pop-up windows you must acknowledge.

Message Types in Sinter

TYPE	COLOR	DEFINITION
Message	Black	Informational only or tells of a minor error. These generally occur when you enter different data than the system expects or when a dependency is not met.
Advisory	Yellow	Something occurred that can turn into an alarm condition if not corrected in a specified time.
Warning	Yellow	Something serious may occur that you should attempt to correct; does not terminate the print.
Alarm	Red	Indicates something occurred that will halt the current operation and return the SLS system to a safe state.

About the Message List Window

The Sinter application displays messages in a **Message List** window. New messages appear at the top of the window; old messages scroll down as new ones appear. Messages are color coded to indicate their type. You can select a message and then right-click to acknowledge it; after you do so, it turns black, whatever its initial color was. See **Responding to Messages** in Sinter Help for more information on acknowledging messages.

Message	Type	Ackn...	TimeStamp
The roller needs to be homed.	Message	N/A	03/21/2014 17:22:51
The part piston needs to be homed.	Message	N/A	03/21/2014 17:22:51
The roller needs to be homed.	Message	N/A	03/21/2014 17:16:17
The roller needs to be homed.	Message	N/A	03/21/2014 17:14:48
The part piston needs to be homed.	Message	N/A	03/21/2014 17:14:48
The roller needs to be homed.	Message	N/A	03/21/2014 17:13:47
The part piston needs to be homed.	Message	N/A	03/21/2014 17:13:47
The roller needs to be homed.	Message	N/A	03/21/2014 17:08:50

Restarting a Terminated Build

If you terminate a build before completion, you may be able to restart it. This depends on the material in use and the temperature at which you were running the build.



NOTE: When you restart a build, it resumes building at the layer it was on when the build was terminated. Therefore, if the part piston was moved after you terminated the build, some parts in the build might be ruined.

Keep the following in mind:

- After restarting the build, you may need to increase the laser power for the first few layers to make sure the layers bond properly.
- Make sure the powder is feeding properly

Viewing a Build In Progress

During a build, the **Build Viewer** window displays the slice that the system is currently scanning. Click on a part to display its name at the bottom of the main window.



NOTE: If you close the Build Viewer window when a build is not running, you exit Build mode. You cannot close this window while a build is running, but you can minimize it.

Viewing Options on the Toolbar

While the system is in **Build** mode, the **Build** toolbar appears at the top of the main window as shown:



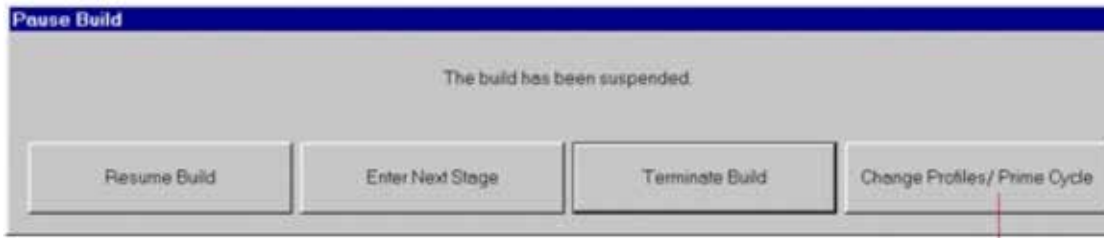
Click the **Grid** button to turn the display of grid marks on or off. Click the zoom buttons to expand or contract the scale of the **Build Viewer** window.

Options on the Viewer Menu

While the system is in Build mode, you can set the following options for the Build Viewer. These options appear on the Viewer menu in the main window:

VIEW OPTION	DESCRIPTION
Set grid size	This option displays a dialog box that lets you control the size of the grid drawn on the Build Viewer window.
Grid marks	This option is the same as the Grid button on the toolbar.
Clear after every slice	When this option is checked, the system erases the display before drawing a new slice. Otherwise, the system draws new slices on top of old ones.
Dark background	You can toggle this option on or off by selecting it. When checked, the system displays a dark background in the Build Viewer window.

Pausing a Build



When the Pause Build button is active, click on it to stop the build and display options.



Resume the build as soon as possible after you pause it.

CLICK THIS PAUSE BUILD BUTTON...	TO DO THIS...
Resume Build	Continue the build.
Enter Next Stage	Move from Warmup stage to Build stage, or Build stage to Cooldown.
Terminate Build	Stop the build. If you terminate a build when the system is in the Build stage, and you do not want to restart the build from the termination point, remove any parts from the print bed and review the build packet in Build Setup. Make any changes that can improve the build.
Change Profiles/Prime Cycle	Modify a profile, add/delete parts, or run a prime cycle.

Modifying a Build in Progress

Make changes during a build with the **Build Modify** dialog box.

To display it, click the **Change Parameter** button; if the build is paused, click the **Change Profiles/Prime Cycle** button in the **Pause Build** dialog box.

Modifying Part and Build Profiles

Click the **Modify Build Profile** or **Modify Part Profile** button to display a profile editor dialog box from the Build Setup application. Modify parameters as described in the Build Setup Help.



NOTE: You can find definitions of the parameters in the Build Setup Help.

In most respects these dialog boxes work just as they do in the Build Setup software, with the following differences:

- Settings for Z levels below the current are yellow and cannot be changed.
- The current Z level is displayed as a green vertical line in the parameter chart.
- In the Build Profile Editor, a new button appears. Use this button to make a profile change at the current Z level. Click the button and a new row appears in the current build stage. Click in the **Value** column and enter a value, then click **Apply**. When the system applies the value, it updates the row to the current Z level.
- If you make changes near the current Z, the system may not be able to apply them. If you do not get the message **The parameter change has been applied** after clicking **Apply**, try again at a higher Z. (There is no message when the attempt fails.)

Adding and Deleting Parts and Other Changes

Click the **Add/Delete Parts** button in the Build Modify dialog to launch the Build Setup application. From here you can modify most aspects of your build packet during the build.

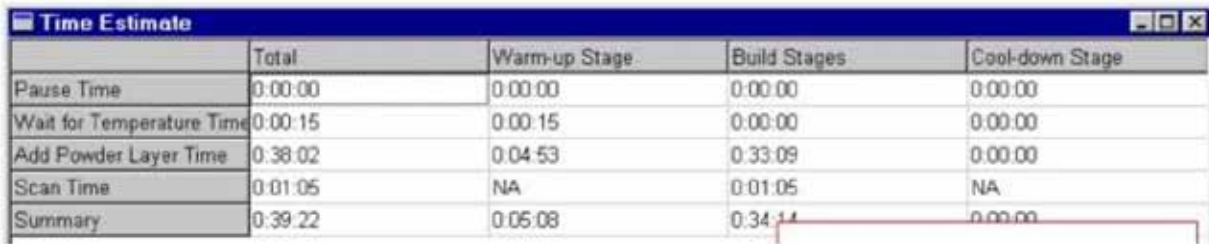
The application works just as described in the Build Setup Help, except that it also displays a plane marking the current Z level. Changes you make below the plane, such as adding or moving parts, will not affect the current build, although they will be saved and will affect future runs of this build packet. Parts are initially displayed in Box view.

Running a Prime Cycle

The Prime Cycle can only be run if the user has paused the build. Click the **Prime Cycle** button in the **Build Modify** dialog to spread powder across the print bed without moving the part piston, which can compensate for a short feed.

When a Build Ends

At the end of a build, the Sinter application displays a summary of the actual build times such as the example below:



	Total	Warm-up Stage	Build Stages	Cool-down Stage
Pause Time	0:00:00	0:00:00	0:00:00	0:00:00
Wait for Temperature Time	0:00:15	0:00:15	0:00:00	0:00:00
Add Powder Layer Time	0:38:02	0:04:53	0:33:09	0:00:00
Scan Time	0:01:05	NA	0:01:05	NA
Summary	0:39:22	0:05:08	0:34:14	0:00:00

MANUAL OPERATIONS

The **Manual Operations (Man Ops)** section of the Sinter application provides access to several components of the printer which need to be controlled manually while operating the system.

Homing the Part Piston and Roller

It may be necessary to “home” (reset the reference limit position) the piston and the roller. This needs to be done before a print job is begun and may need to be performed during maintenance procedures.

Before you can do either, these dependencies must be met:

- SLS system start-up is complete and Sinter is running. Refer to the section, [“ProX 500 Start-Up Sequence” on page 33](#).
- The **Add Powder Layer** window is closed.

To Home the Part Piston

Before you can move the part piston to any position other than the home limit, the piston must be successfully homed. All the buttons except for **Home Limit** are dimmed for a piston that needs to be homed.

1. To home the piston, click the **Home Limit** button in the **Piston Control** window.
2. After the piston is homed, click the **Start Position** button

To Home the Roller

- To home the roller, click the **Home Limit** button in the **Roller Control** window.

Adding and Leveling Powder

Just before you run your print, use the **Add Powder** dialog box in **Man Ops** mode to add and level powder in the print chamber.

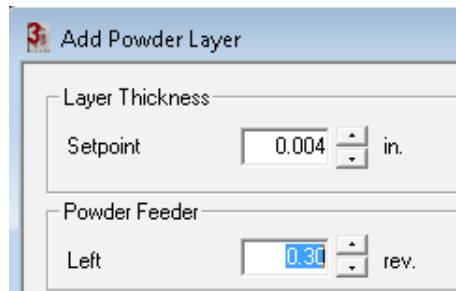
Adding powder creates a smooth powder bed on the floor of the print chamber.

To Add and Level Powder

Use the **Add Powder** button to manually add a layer of powder to the print bed. Before you can add a powder layer, all these dependencies must be met:

- The roller must be stopped at the left limit.
- The piston must be homed and if empty, moved to the **Start** position.
- The **Roller Control** and **Piston Control** dialog boxes must not be open.

When you click **Add Powder**, the **Add Powder Layer** dialog box appears:



The screenshot shows a dialog box titled "Add Powder Layer". It has two main sections. The first section is "Layer Thickness" and contains a "Setpoint" field with a numeric input of "0.004" and a unit dropdown set to "in.". The second section is "Powder Feeder" and contains a "Left" field with a numeric input of "0.30" and a unit dropdown set to "rev.". Both numeric inputs have up and down arrow buttons next to them.

To Use the Add Powder Layer Dialog Box

Change the settings for each parameter in the Add Powder Layer dialog box to the settings you want, then click the Add Layer button.



NOTE: Click the **Stop** button if you need to stop the roller while it is adding a layer. If you do this, you must move the roller back to a limit before continuing. Click the **Move To Limit** button to move the roller back to a limit.



NOTE: Under some circumstances, the system may not correctly update the **Move to Limit**, **Stop**, or **Add Layer** buttons; they may remain dim when they should be enabled. If a button you need to use is dim when it should be enabled, close and reopen the Add Powder Layer dialog box to enable the button.

The following parameters are available to set in the Add Powder Layer dialog:



NOTE: You cannot close the Add Powder Layer dialog box while the printer is adding layers.

Add Powder Layer Parameters

PARAMETER	RANGE	DEFAULT	DEFINITION
Powder Feed amount	0 to 10 rev.	0.2 rev.	The number of revolutions the powder dispenser makes when dispensing powder on top of the roller. (The powder dispenser is at the bottom of the feed hopper.) Typical setting is 0.2 rev.
Layer Thickness	0.1 mm (0mm available for Add Powder Layer)	0.1 mm	The distance that the part piston lowers each layer.
Layer Cycle Count	1 and 32,000	1	The number of consecutive powder layers to be added.
Roller: Rotation Ratio	0 to 15	11	The ratio of the roller's counter-rotation angular velocity to its (linear traverse) speed. The larger the ratio, the faster the counter-rotations.
Roller Traverse Speed	76 and 305 mm per second (3 and 12 inches per second)	203	Specifies the speed at which you want the roller to travel.

Calibrating the IR Sensor

The printer will recalibrate the IR sensor dynamically during a build. This calibration is a quick process which occurs multiple times during a print to compensate for sensor drift and changing environmental conditions within the machine.



NOTE: You must perform an initial offline IR calibration to enable automatic, real-time recalibration during the print. If recalibration requires too great an adjustment, a message pops up advising you to perform offline calibration again when the print completes.



NOTE: Once you perform a manual IR calibration, the settings are saved in the system. A manual IR calibration does not need to be performed before each print.

If you want the printer to do real-time IR sensor recalibration during the print, perform a manual IR calibration before you start the print as described below.



NOTE: You can opt to have the printer simply verify IR sensor readings rather than recalibrate. Click the Verification Only checkbox in the IR Cal window to choose this option.

To Perform Manual IR Calibration

1. Put the system in **Manual Operations** mode.
2. Click the **IR Cal** button.
3. The **Manual IR Sensor Calibration** dialog box appears.
4. Click the **Start** button on the dialog box. The calibration will last approximately 10 minutes.



NOTE: During the calibration, an **Abort** button appears; click it if you need to stop the calibration process for any reason.



NOTE: If the part bed or the blackbody is above 60 °C, the software waits until they cool to actually start the offline calibration.



NOTE: If the IR sensor core temperature is below 77 °C, the offline IR Calibration will wait until 77 °C has been reached, and then an additional 5 minutes for the core to stabilize.

6 MQC SYSTEM OPERATIONS

Follow the instructions in this section to use MQC System safely. The instructions tell you how to load fresh material, blend material, and breakout parts from the print cake.

Refer to the section, [“ProX Material Quality Control \(MQC\) System” on page 8](#) for diagrams and an overview of the MQC System.

Refer to the section, [“MQC System User Interface” on page 16](#) for an overview of the user interface.

HOW THE MQC SYSTEM WORKS

The MQC System regulates the material usage for the ProX 500. It stores and mixes fresh, blended, and recycled powder and can supply material for one or two ProX 500 printers. Each printer sends a separate refill request to the MQC System when its feed hopper is low.

Receiving and Storing Material

Used print material, fresh material, and blended material are received and stored in three separate bins on the MQC System:

Used bin – receives and stores used material that has been removed from a print cake. It is reclaimed through the sifter. To feed recycled material into the system, the Sifter Switch must be turned on during breakout.

Fresh bin – receives and stores fresh material input by the user. The fresh material is loaded from the material containers. The container’s tag (on top of the lid) must be scanned by the reader on the interface of the MQC System before it can be fed into the system. For instructions on loading fresh material, refer to the section, [“Load Material from Material Container” on page 31](#).

Blending and Sending Material

The MQC System automatically initiates a blend cycle when it has at least 20 kg of material. At a 50% fresh ratio, it requires 10 kg in the fresh bin and 10 kg in the used bin. The level settings available for fresh powder on the MQC System is material-specific. The information is transferred to the MQC System from the material container’s tag.

A blend cycle typically takes about 20 minutes.



During the blend cycle the user should not perform any activities with the MQC System except breaking out a print cake—but NOT using the sifter.



NOTE: A load cell under the bin and a material sensor at the top of the bin read the material weight and level. Do not place objects on top of the bin. This will give an incorrect reading of the material weight.

BASIC OPERATIONS

Turning on the MQC System:

3D Systems designed the MQC System to remain with the power on at all times. You seldom need to power-up the machine. If you ever find the power off, this subsection describes how to turn on the system.

1. Make sure the facility power to the system is turned on.
2. Turn on the dust collector by pressing the power switch.
3. On the user interface, flip the power switch to the ON position.




Power Switch

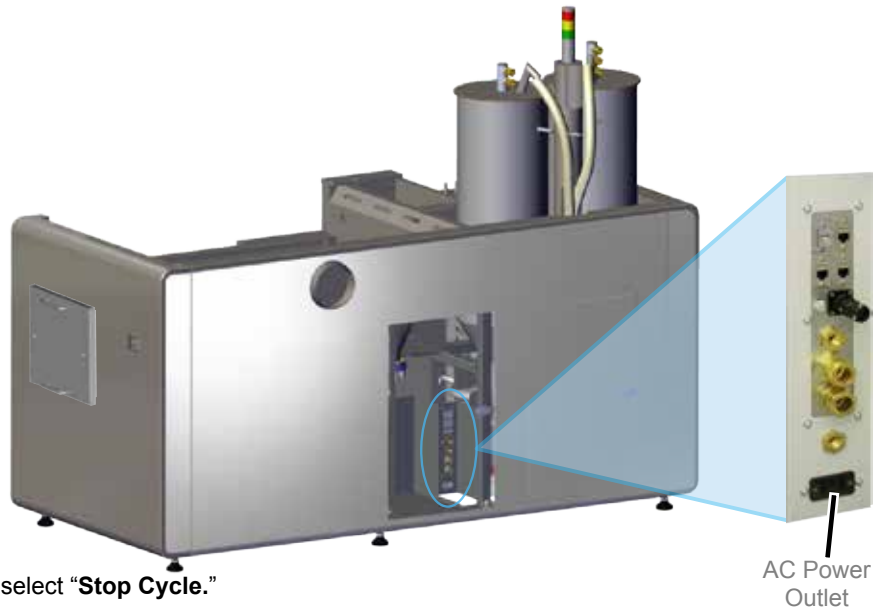
Shutting Down the MQC System Completely

3D Systems designed the MQC System to remain with the power on at all times. You seldom need to power-down the system, unless:

- You are shutting down the entire system.
- The system requires service.
- The system loses facility power and does not regain it immediately.
- The system will be idle over an extended period of time.

To turn the system off,

1. Check the MQC System user interface screen to see what mode it is in.
2. If the cycle is stopped, skip the next step.
3. If the cycle is in **Full** or **Local** mode, navigate to the **Operation Mode** menu, and select “**Stop Cycle.**”
4. Navigate to the **Setup/Service** menu and then the **Setup** submenu. Select “**System Shutdown.**”
5. At the operator panel, turn the power switch off.
6. Go to the back side of the MQC System and open the reject powder door.
7. Pull out the power plug from the AC inlet.  **WARNING (for ATEX): Use socket cap when unplugged.**



Cleaning the MQC System Before Breakout

Follow these procedures to clean the system before you print parts with your ProX 500 printer.

1. Debris and loose powder from the MQC System can be cleaned using a non-ignition vacuum cleaner.
2. A clean, dry cloth can be used to wipe off excess material from any area of the machine where it is present.

Verifying Material Quantity

The approximate amount of powder required for a print job can be found on the information page in Build Setup.

To verify that there is sufficient material for the print job, you can use either of the two following methods:

1. In **Build Setup**, check the **MQC window** in the **Man Ops** screen. This displays the MQC System’s status, including the amount of available powder.
or...
2. Check the **MQC status** in the **Sinter Status** window which also displays the amount of available powder.

REMOVING THE PRINT CAKE FROM THE PRINT CHAMBER

The print cake can be removed from the print chamber either before or after it has finished cooling.



CAUTION: Do not begin breakout of the parts from the print cake until the cooldown stage is complete. The temperature must be no higher than 85 °C. The print cake can remain extremely hot for hours after a build. To prevent burns, allow sufficient time for cool down (up to 24 hours without the nitrogen lid) before removing parts from the print cake. The temperature of the print cake can be tested using the thermocouples in the breakout area of the MQC system.

Where to Cool Down the Print Cake

If you cool down the print cake inside the print chamber, wait until the print cake reaches its final cooldown temperature of no more than 85 °C. If you choose to let the print cake cool down outside the print chamber, you can take it to the MQC System and either let it cool down normally or use the nitrogen cooling lid on the side of the MQC System.

To use the nitrogen cooling lid, do the following:

- Immediately after placing the hot print cake in the breakout area of the MQC System, place the nitrogen cooling lid onto the print cake cylinder. Then...
 - use the cooling lid to do a controlled cooldown for a programmed amount of time (the default is 3 hours), or until a programmed temperature is reached.

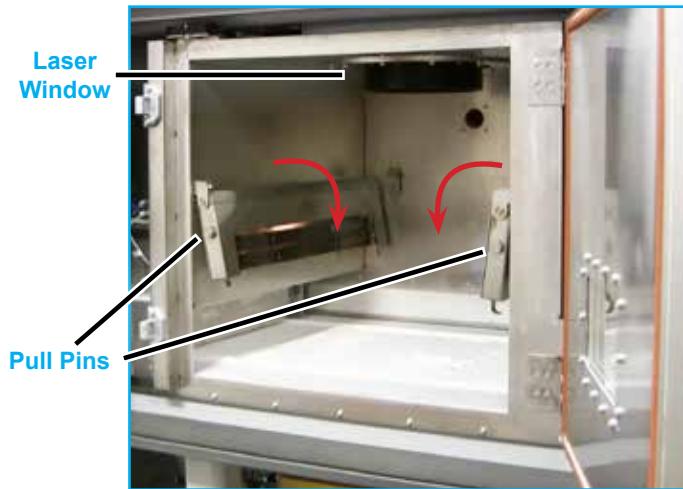
- let the print cake cool down without the nitrogen flow.

Unloading the Print Cake After a Print

After a print and before part breakout, you must remove the print cake from the print chamber and transport it to the MQC System.

To remove the print cake:

1. Turn off the chamber lights.
1. Open the outer door of the print chamber.
2. Unlatch and open the inner print chamber door.
3. Raise heaters.
4. Remove the Laser Window by turning it counterclockwise ¼-turn and pulling it out of the top of the chamber. Put it in a safe, clean location and clean it before reinstalling it into the print chamber. See the section, [“Cleaning the Laser Window” on page 59](#).
5. Press the red Laser Window Baffle Plug into the top of the chamber (see illustration).



Lowering heaters in print chamber



Insert Laser Window Baffle Plug

6. With the handle facing towards you, fully insert the print cake cylinder into the print chamber, placing it over the print bed.

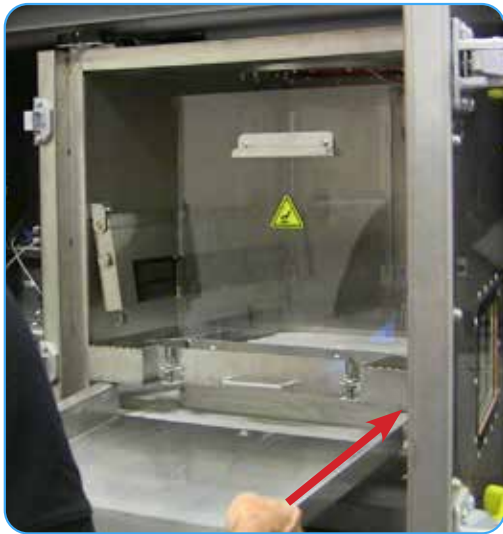


Full insert print cake cylinder into chamber

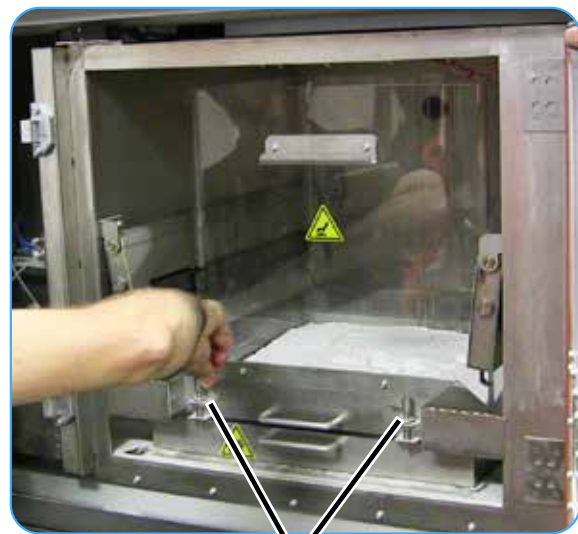


Make sure the outer tabs of the cylinder catch on the rim of the print chamber door.

7. Close and latch the inner print chamber door.
8. Close the outer print chamber door.
9. In Build Setup, open the **Piston Control** and press the **Start Piston** button to raise the print cake into the cylinder.
10. Once the piston has finished raising the print cake, open the outer and inner print chamber doors.
11. Slide the Print Cake Tray underneath the cylinder, as shown, and latch the tray with the pull pins on the cylinder.

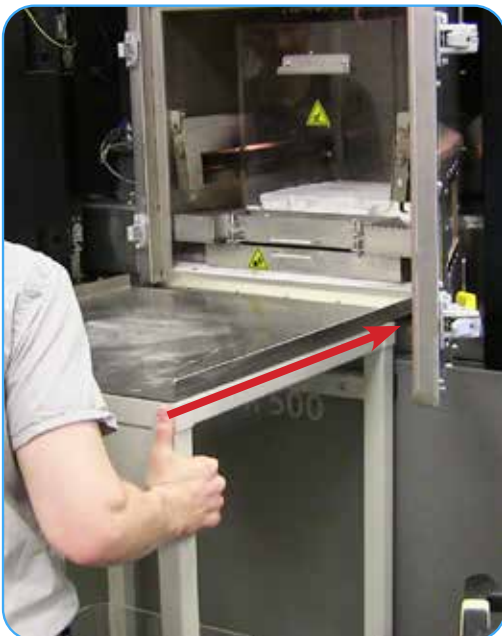


Slide print cake tray underneath cylinder

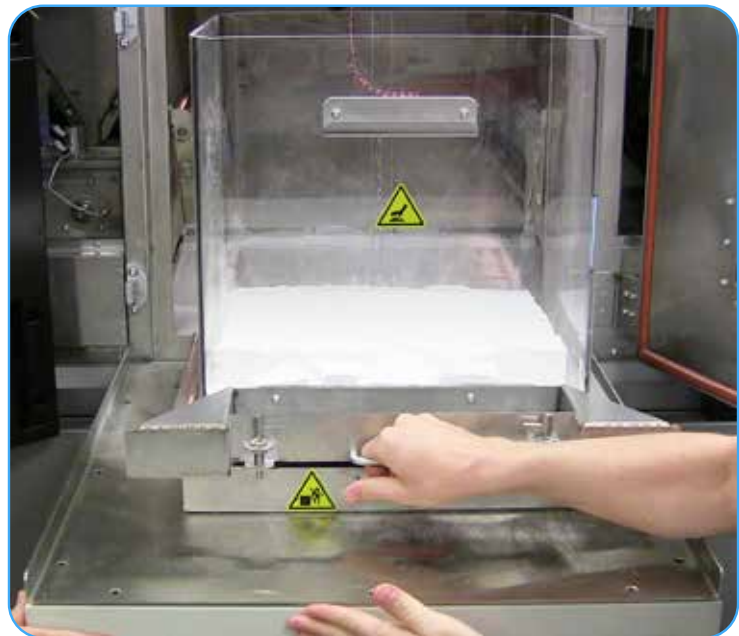


Latch cylinder to tray

12. If the print cake is light enough, it can be moved manually to the MQC System. Otherwise, use the Part Transfer Cart.
13. Move and align the cart to the print chamber.
14. Slide the cylinder and tray out of the chamber and onto the cart.



Align cart with print chamber



Slide tray and cylinder onto cart

15. Move the transfer cart to the MQC System.

BREAKING OUT PARTS

When a print completes, you need to remove the sintered parts from the print cake and clean them. Removing parts from the print cake is called “breakout.” This section describes the procedures you follow when you break out parts.



NOTE: You can find material-specific information about breaking out and cleaning parts in your Material Guide.

Before breakout, you must:

- Cool down the print cake then remove the part transfer cylinder from the print chamber—or vice-versa.
- Roll the part transfer cart to the MQC System and unload the print cylinder onto the breakout area.
- Remove the print cylinder.
- Remove the surrounding powder from the outline of the parts with a spatula and brush. Ensure the sifter is running, then brush unsintered print cake powder into the sifter.
- When you can easily grasp a part, carefully lift it. Gently brush off the parts and place them on the breakout area of the MQC System.

Part Finishing After Breakout



NOTE: Consult your Material Guide for full details on part finishing.

After breakout, remove and dispose of any remaining print cake material from holes and crevices.

Your SLS system ships with a basic set of rough and fine part cleaning tools. You may find it useful to supplement these with other fine tools, picks, and brushes, such as those used for dental and jewelry work.

3D Systems recommends you also purchase a glass bead blaster (pneumatic blast cabinet). A bead blaster makes fine cleaning much easier and faster. See your **Facility Guide** for recommended third party suppliers.

MQC SYSTEM USER INTERFACE SETTINGS

Display Legend

The following information is applicable to all LED Display menu items:

LEGEND

- > **Submenu** - press button to enter.
 - + **Command** - press button to start action or edit value.
 - (or no symbol) - Output or unavailable command, does not respond to the button.
 - > **BACK** - Press button to return to the previous menu.
- Rotate the button down to switch between items.
- Hold the button down to return to the **Main Control** screen.

MQC System Main Control Screen

The **Main Control** screen allows the user to:

- Navigate to the **Operational Mode** screen. See [“Operational Mode Screen” on page 48](#).
- **Load fresh powder** into the system (To do this, the user must first scan the material tag on the lid of the material container across the reader on the front panel of the MQC System. This will unlock the doors above the panel so that the material can be introduced into the system.)
- Trigger the **nitrogen cooling system** to cool the print cake using the nitrogen cooling lid (located on the side of the MQC System).
- Select the destination of sifted powder (used bin or drum)..
- Navigate to the **System Setup and Service** screen. (Only the **Setup** screen is available to general users. The **Service** screen is only for use by 3D Systems Certified Technicians)

Main Control

- > Operational mode
- + Load fresh powder
- + Start/stop cool cycle
- + Used pwr --> drum/bin

The **Activate Svc mode** and **Deactivate Svc mode** options are only available to service personnel.

Operational Mode Screen

From the **Main Control Screen**, use the dial to highlight the menu item, **Operational mode** and press the dial to select.

This menu allows the user to choose the mode of material handling for the MQC System.

- **Full Cycle** will allow the MQC System and printer to control all material handling in fully-automatic mode.
- **Local Cycle** is the same as Full Cycle, except that all printer powder requests are ignored by the MQC.
- Choose **Stop Cycle** to turn material handling off.

Operational mode

- + Run Full cycle
- + Run Local Cycle
- + Stop Cycle

System Setup/Service Screen

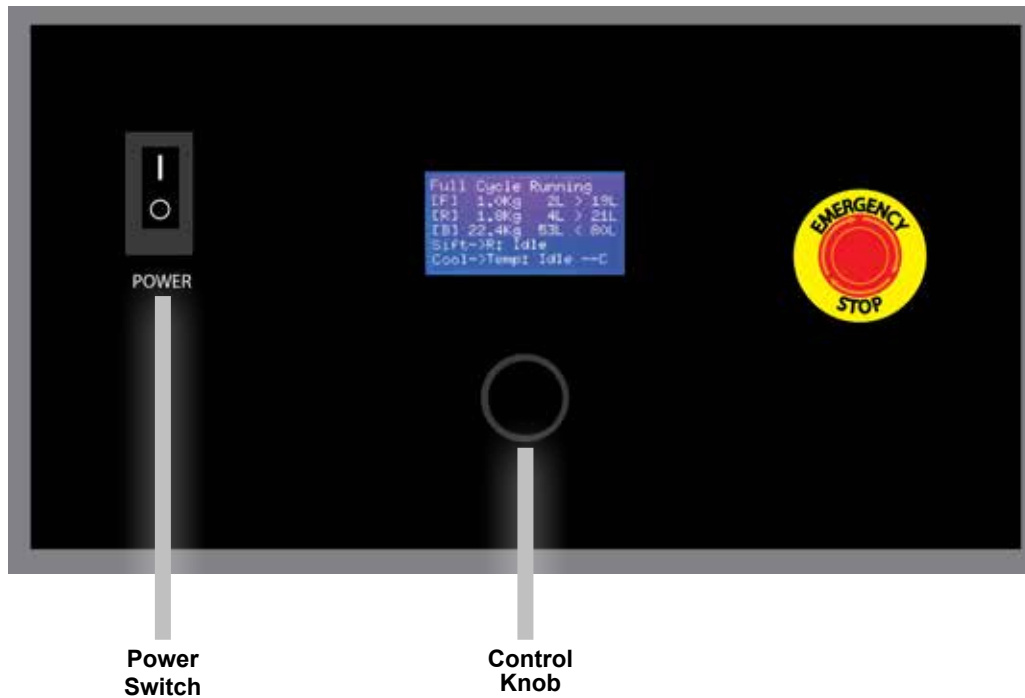
From the **Main Control Screen**, use the dial to highlight the menu item **Setup/service**, and press the dial to select. The **Service** option is for Certified Personnel only and not available to the user.

From this screen, you can:

- Navigate to the **Diagnostics** screen. See [“Diagnostics Screen” on page 54](#).
- Navigate to the **Setup** screen. See [“Setup Screen” on page 54](#).
- Navigate to the **Service** screen. This is available to certified personnel only.
- View the **Version information** for the software installed on the MQC System.

System setup/service

- > Diagnostics
- > Setup
- > Service
- + Version info



MQC SYSTEM USER INTERFACE SETTINGS

Display Legend

The following information is applicable to all LED Display menu items:

LEGEND

- > Submenu - rotate knob to highlight and select submenu, press knob to enter.
- + Command - press button to start action or edit value.
- (or no symbol) - Output or unavailable command, does not respond to the knob.
- > BACK - Rotate knob to highlight and select, press knob to return to previous menu.

Rotate the knob to switch between items.

Press and hold the knob down to return to **Main Staus** screen.

MQC System Main Status Screen

The **Main Control** screen allows the user to:

- Displays the current operational mode and other status information.
- Shows amount of powder in MQC bins (Kg and Liters) and the amount of powder required to begin a powder blend.
 - F - Fresh powder bin
 - R - Recycled powder bin
 - B - Blended powder bin
- Sifter status
- Cooling lid status

In opposite screen:

- There are 2 liters in fresh bin
- There are 4 liters in the recycled bin
- There are 53 liters in blended powder bin
- The MQC will not start another blend cycle unless:
 - The fresh bin level is greater than 19 liters
 - The recycled bin level is greater than 21 liters
 - The blended bin level is less than 80 liters
- The sifter is idle and but if in use the output would be directed to Reclaimed bin
- The cooling lid is idle but if in use N2 flow duration would be controlled by temperature probe

```
Full Cycle Running
[F] 1.0Kg 2L > 19L
[R] 1.8Kg 4L > 21L
[B] 22.4Kg 53L < 80L
Sift->R: Idle
Cool->Temp: Idle --c
```

The amount of powder required in the Fresh and Reclaimed bins to start a blend will vary based on the current refresh percentage.

First line display may change based on MQC current status:

- F B -> B indicates Full Cycle mode and Blended Bin recirculation
- Other possible status messages:
 - R -> R Reclaimed bin recirculation
 - B -> PA Blended bin transporting to Printer A
 - B -> PB Blended bin transporting to Printer B

```
B->B
[F] 1.0Kg 2L > 19L
[R] 1.8Kg 4L > 21L
[B] 11.5Kg 27L < 80L
Sift->R: Idle]
Cool->Temp: Idle --C
```

```
B->PA
[F] 1.0Kg 2L > 19L
[R] 11.0Kg 26L > 21L
[B] 3.1Kg 7L < 80L
Sift->R: Idle
Cool->Temp: Idle --C
```

To toggle from Status screen to Main Control screen, quickly press and release control knob.

MQC Main Control Screen

- The **Main Control Screen** allows the user to:
- Navigate to the **Operational Mode** screen.
- **Load Fresh Powder** into the system (To do this the user must first scan the material RFID tag on the lid of the material container across the RFID reader on the front panel of the MQC system. This will unlock the fresh bin access doors. The RFID tag material type must match the material type currently in MQC)
- **Start Cool Cycle** - Start the N2 flow to the Cooling lid (duration controlled either by temperature or time)
- **Change Sifter Mode** – allows user to select destination of the output from the sifter (reclaimed bin or external barrel or drum)
- **Setup/Service/Diag** – Navigate to submenu. (only the Setup screen is available to general users. Service and Diag screens are only for use by 3D Systems Certified Technicians)
- **Activate Service** – Service RFID tag required
- **Clear Weight Error** - usage by operator for a clear bin weight tag to clear a bin weight error

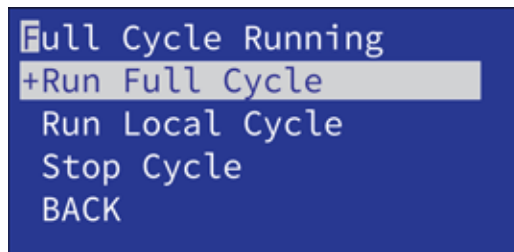
```
Full Cycle Running
>Operational Mode
Load Fresh Powder
Start Cool Cycle
Change Sifter Mode
Setup/Service/Diag
```

```
Full Cycle Running
Start Cool Cycle
Change Sifter Mode
>Setup/Service/Diag
Activate Service
Clear Weight Error
```

Operational Mode Screen

On the Main Control Screen, rotate the button to highlight Operational Mode.

Quickly press and release knob to display the following screen:



Full Cycle allows the MQC System to operate in a fully automatic mode.

- The MQC will send powder to requesting printer(s) if blended powder is available.
- The MQC will blend powder if adequate powder is available in the fresh and reclaimed bins.
- The MQC will periodically recirculate the powder in the fresh and blended bins.

Local Cycle will allow the MQC System to operate the same way as Full Cycle mode except that all printer requests for powder are ignored by the MQC.

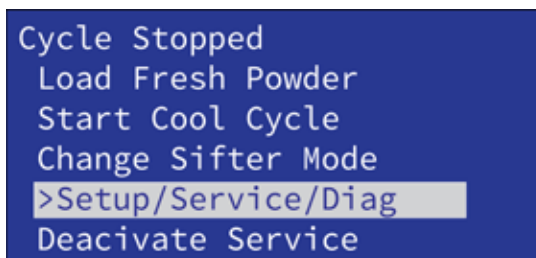
Stop Cycle prevents the MQC from blending powder, recirculating powder in Fresh and Reclaimed bins or responding to printer requests for powder.

User should select **Stop Cycle** to:

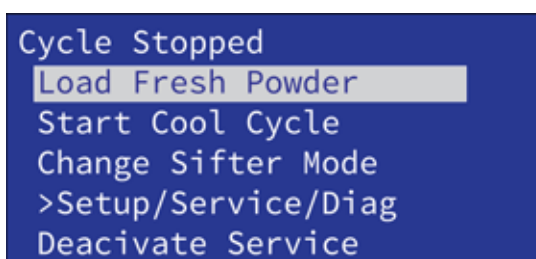
- Load Fresh Powder
- Enter Setup submenu to:
 - Change replenish percentage for blending
 - Change sifter timeout

To Load Fresh Powder

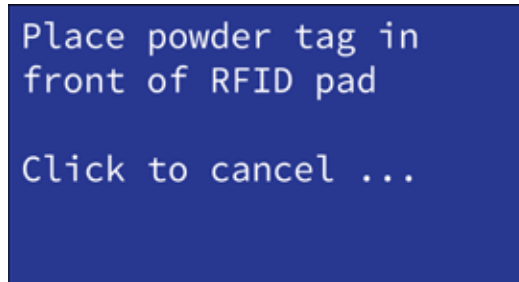
1. After **Stop Cycle** is selected, quickly press and release knob to display the following screen.



2. Rotate knob to select **Load Fresh Powder**.



3. Quickly press and release knob to display the following screen:



4. Remove lid from powder container. Place the lid against the RFID pad and hold there until you hear the doors to the fresh powder bin unlock.

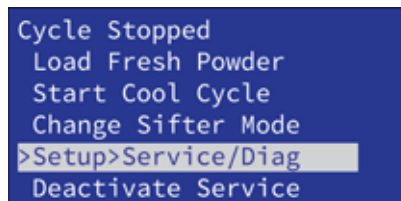
5. Turn on MQC air handler. Open Fresh Bin doors and empty the powder container into Fresh bin, then close doors. You should hear doors relock.

[NOTE: If loading multiple powder containers, you must close and lock the Fresh Bin doors between each container.]

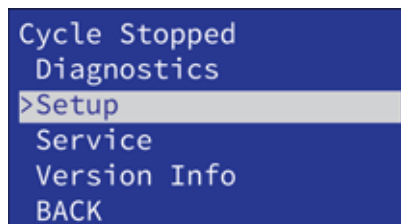
6. When finished with loading powder into the Fresh Bin, return MQC to Full Cycle mode to blend powder or continue in Stop mode if you wish to change Replenish percentage or make any other changes to the setup parameters.

To change Replenish percentage:

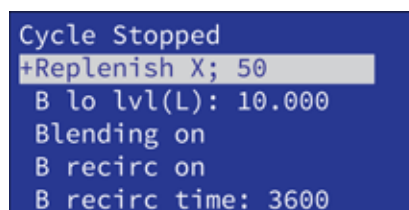
1. Quickly press and release knob to display the following screen:



2. Rotate control knob to select **Service/Service/Diag** and quickly press and release knob.



3. Rotate control knob to select **Setup** and quickly press and release knob to display the following screen:



4. Select **Replenish%**.

```
Cycle Stopped
+Replenish X: 50
B lo lvl(L): 10.000
Blending on
B recirc on
B recirc time: 3600
```

5. Twist knob to position selection cursor.

```
|
S
00050
Ok
Cancel
```

```
      S
00050
Ok
Cancel
```

6. Push knob to change cursor from **Select** to **Change** mode and rotate to change value.

```
|
      C
00050
Ok
Cancel
```

7. Push knob again to go back to **Select** mode.

```
|
      S
00040
XOk
Cancel
```

8. Continue to rotate until the selection is adjacent to the OK and push knob again (this will save your changes).

```
|
00040
XOk
Cancel
```

Diagnostics Screen

From the **System setup/service** screen, use the dial to highlight the menu item **Diagnostics**, and press the dial to select.

From this screen, you can navigate to the following diagnostic screens:

- **Material tracking.** This allows you to view details regarding the material that is in the system. See [“Material Tracking Screen” on page 54.](#)
- **Fresh-bin diagnostics.** This allows you to view status details of the components that comprise the handling of fresh material in the system. See [“Fresh-Bin Diag Screen” on page 55.](#)
- **Used-bin diagnostics.** This allows you to view status details of the components that comprise the handling of used material in the system. See [“Used-Bin Diag Screen” on page 55.](#)
- **Blend-bin diagnostics.** This allows you to view status details of the components that comprise the handling of blended material in the system. See [“Blend-Bin Diag Screen” on page 62.](#)
- **Sifter diagnostics.** From here you can view the status of components related to the sifting system. See [“Sifter Diag Screen” on page 56.](#)
- **Generic I/O diagnostics.** Details related to the stack lights, E-Stop, relays, nitrogen, and temperature can be viewed here. See [“Generic I/O Diag Screen” on page 56.](#)

Diagnostics

- > Material tracking
- > Fresh-bin diag
- > Used-bin diag
- > Blend-bin diag
- > Sifter diag
- > Generic I/O diag

Setup Screen

From the **System setup/service** screen, use the dial to highlight the menu item **Setup**, and press the dial to select. This screen is only operational when the system is in **Stop** mode.



NOTE: all times are in seconds except the nitrogen cooldown time, which is in minutes.

This menu provides the following commands:

- Choose the percentage of **fresh powder** in the **blended bin**.
- Choose the **lower level limit** of the **blended bin** in liters.
- Turn the **blending function** on or off.
- Turn the **blended bin recirculation** function on or off.
- Set the **period** for the **blended bin recirculation** (in seconds).
- Turn the **used bin recirculation** function on or off.
- Set the **period** for the **used bin recirculation** (in seconds).
- Set the **length of time for the sifter** to automatically turn off.
- Toggle the **nitrogen** setting between **temperature** and **time**.
- Set the **time that the nitrogen will be used** to cool off the print cake.
- Set the **temperature** of the print cake at which the nitrogen will stop being dispensed.
- Reset the data for the material.
- Shutdown the system.

Setup

- + B fresh %
- + B lo lvl (L)
- + Blending on/off
- + B recirc on/off
- + B recirc per
- + U recirc on/off
- + U recirc per

- + Sift timeout
- + Cool by temp/time
- + Cool time (min)
- + Cool temp
- + Reset material data
- + System Shutdown

Material Tracking Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Material tracking**, and press the dial to select. For further diagnostics options refer to the section, [“Diagnostics Screen” on page 54.](#)

This screen displays the following status information:

- **Material Number:** The number associated with the material.
- **Name:** The name of the material.
- **Material Density:** The density of the material.
- **Minimum Fresh Blend Percentage:** The minimum percentage of fresh material that is available for blending.
- **Maximum Fresh Blend Percentage:** The maximum percentage of fresh material that is available for blending.
- **Max Recirculation Period:** The maximum time (in seconds) that recirculation will take place.

Material Tracking

- Matl #
- Name
- Matl density
- Min Fr Bl. %
- Max Fr Bl. %
- MaxRecircPeriod

Fresh-Bin Diag Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Fresh-bin diag**, and press the dial to select. For further diagnostics options refer to the section, [“Diagnostics Screen” on page 54](#).

This screen displays the following status information:

- **Left door closed/open:** This indicates whether the left door for inputting fresh material is open or closed.
- **Right door closed/open:** This indicates whether the right door for inputting fresh material is open or closed.
- **Doors unlocked/locked:** Indicates whether or not the doors for inputting fresh material are locked or unlocked.
- **Powder Level full/not full:** Indicates if the fresh material bin is full or not.
- **Gate valve open/closed:** Indicates if the gate valve for the fresh material bin is opened or closed.
- **Transport level full/not full:** Indicates whether or not the transporter for the fresh material is full or not.
- **Fluidizing air on/off:** Indicates whether or not the air responsible for fluidizing the material in the transporter is on or off.
- **Transporter air on/off:** Indicates whether or not the air responsible for transporting the material out of the transporter is on or off.

Fresh-bin diag

L door closed/open
R door closed/open
Doors unlocked/locked
Pwdr level full/not full
Gate valve open/closed
Tport level full/not full
Fluid air on/off
Tport air on/off
Weight
Pressure

Used-Bin Diag Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Used-bin diag**, and press the dial to select. For further diagnostics options refer to the section, [“Diagnostics Screen” on page 54](#).

This screen displays the following status information:

- **Powder Level full/not full:** Indicates if the used material bin is full or not.
- **Gate valve open/closed:** Indicates if the gate valve for the used material bin is opened or closed.
- **Transport level full/not full:** Indicates whether or not the transporter for the used material is full or not.
- **Fluidizing air on/off:** Indicates whether or not the air responsible for fluidizing the material in the transporter is on or off.
- **Transporter air on/off:** Indicates whether or not the air responsible for transporting the material out of the transporter is on or off.
- **Weight:** Gives the weight of the material in the used bin.

Used-bin diag

Pwdr level full/not full
Gate valve open/closed
Tport level full/not full
Fluid air on/off
Tport air on/off
Pinch U->U closed/open
Pinch U->B closed/open
Weight
Pressure

Blend-Bin Diag Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Blend-bin diag**, and press the dial to select. For further diagnostics options refer to the section, [“Diagnostics Screen” on page 54](#).

This screen displays the following status information:

- **Powder Level full/not full:** Indicates if the blended material bin is full or not.
- **Gate valve open/closed:** Indicates if the gate valve for the blended material bin is opened or closed.
- **Transport level full/not full:** Indicates whether or not the transporter for the blended material is full or not.
- **Fluidizing air on/off:** Indicates whether or not the air responsible for fluidizing the material in the transporter is on or off.
- **Transporter air on/off:** Indicates whether or not the air responsible for transporting the material out of the transporter is on or off.
- **Weight:** Gives the weight of the material in the blended bin.
- **Pressure:** Gives the air pressure from the transporter.

Blend-bin diag

Pwdr level full/not full
Gate valve open/closed
Tport level full/not full
Fluid air on/off
Tport air on/off
Pinch B->B closed/open
Pinch B->PA closed/open
Pinch B->PB closed/open
Weight
Pressure

Sifter Diag Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Sifter diag**, and press the dial to select. For further diagnostics options refer to the section, "[Diagnostics Screen](#)" on page 54.

This screen displays the following status information:

- **Gate valve open/closed:** Indicates if the gate valve for the sifter is opened or closed.
- **Transport level full/not full:** Indicates whether or not the transporter for the sifter is full or not.
- **Fluidizing air on/off:** Indicates whether or not the air responsible for fluidizing the material in the sifter transporter is on or off.
- **Transporter air on/off:** Indicates whether or not the air responsible for transporting the material out of the sifter transporter is on or off.
- **Pinch valve sifter to used bin closed/open:** Indicates whether or not the sifter's used bin is open or closed.
- **Pinch valve sifter to drum closed/open:** Indicates whether or not the sifter's used drum is open or closed.
- **Cycle start active/inactive:** Indicates whether or not the sifter's cycle start is active or inactive.
- **Cycle stop active/inactive:** Indicates whether or not the sifter's cycle stop is active or inactive.
- **Shaker on/off:** Indicates whether or not the sifter's shaker is on or off.
- **Pressure:** Gives the air pressure from the transporter.

Sifter diag

Gate valve open/closed
Tport level full/not full
Fluid air on/off
Tport air on/off
Pinch S->U bin closed/open
Pinch S->Drum closed/open
Cycle start active/inactive
Cycle stop active/inactive
Shaker on/off
Pressure

Generic I/O Diag Screen

From the **Diagnostics** screen, use the dial to highlight the menu item **Generic I/O diag**, and press the dial to select. For further diagnostics options refer to the section, "[Diagnostics Screen](#)" on page 54.

This screen displays the following status information:

- **E-Stop active/inactive:** Indicates whether or not the E-Stop for the machine has been activated.
- **24V Relay on/off:** Indicates the on/off status of the 24 volt relay.
- **Red light on/off:** Indicates the status of the red stack light.
- **Amber light on/off:** Indicates the status of the amber stack light.
- **Green light on/off:** Indicates the status of the green stack light.
- **Logo backlight on/off:** Indicates the status of the logo backlight.
- **Nitrogen supply valve open/closed:** If the valve for the nitrogen supply is open, nitrogen can be fed to the system.
- **Nitrogen blanket (cooling lid) valve open/closed:** If the valve for the nitrogen supply to the cooling lid is open, the cooling lid can be used.
- **Part Cake 1 (thermocouple) temperature:** Gives the temperature of the first thermocouple used to measure the temperature in the part cake.
- **Part Cake 2 (thermocouple) temperature:** Gives the temperature of the second thermocouple used to measure the temperature in the part cake.
- **Digital Output temperature:** Gives the temperature of the digital output on the controller board of the MQC System.

Generic I/O diag

Estop active/inactive
24V Relay on/off
Red light on/off
Amber light on/off
Green light on/off
Logo backlight on/off
N2 supply v. open/closed
N2 blanket v. open/closed
PC1 temp.
PC2 temp.
DO temp.
PS temp.

7 MAINTENANCE PROCEDURES

This section covers the following topics:

- [“Replacing Light Bulbs in the Process Chamber” on page 57](#)
- [“Cleaning the Print Chamber” on page 57](#)
- [“Cleaning the Roller Assembly” on page 9](#)
- [“Cleaning the Laser Window” on page 59](#)
- [“Replacing the Laser Window” on page 62](#)
- [“Cleaning the IR Sensor” on page 62](#)
- [“Cleaning the Black Body” on page 62](#)
- [“Cleaning the Exhaust Port” on page 62](#)
- [“Cleaning and Replacing Filters” on page 63](#)
- [“Chiller Maintenance” on page 66](#)

MAINTENANCE PROCEDURE PRECAUTIONS

Observe the following precautions during user maintenance procedures:

- Do not perform any procedures without thoroughly reading and understanding the safety information in the section, [“Safety Guidelines and Instructions” on page 18](#).
- Provide adequate ventilation during any maintenance procedure that might cause material to become airborne.
- Use an ignition-proof vacuum only, do not use compressed air.
- Spilled material can cause the floor to become very slippery; clean up spills promptly.
- Some cleaning solvents are flammable and can cause skin and/or respiratory irritation. For each solvent, refer to its Safety Data Sheet (SDS) for more details.
- Do not perform any procedures that are not covered in this section or that you are not fully trained and qualified to perform.

MAINTENANCE KIT

With each ProX 500, 3D Systems provides a maintenance kit for routine maintenance procedures. Many of the tools you need for these procedures can be found in this kit.

PRINT CHAMBER MAINTENANCE

Replacing Light Bulbs in the Process Chamber

There are two light bulbs located on the heater assembly of the print chamber. If one or both of them burns out, contact 3D Systems Field Service.

Cleaning the Print Chamber

Before any new print job, clean the print chamber. To print parts with a different material than you used in the previous job, thoroughly clean all parts of the print chamber to prevent mixing or contaminating materials. If a material becomes contaminated by another material or any foreign substance, discard it. Contaminated material can adversely affect part quality.



NOTE: The following procedure contains the steps for a **thorough** cleaning of the print chamber. If you are not changing materials, you can omit the steps marked by the * (**asterisk**) **symbol**, to perform a moderate cleaning.



NOTE: Perform a moderate cleaning after every print job. Perform a thorough cleaning whenever you change materials in the SLS system.

Tools and Supplies Needed

- Scoop for material
- Non-ignition vacuum
- Tack cloth or dust rag
- Container for discarded material

- Lab-grade acetone and lab-grade ethanol
- 2.5 mm allen wrench
- Soft brush

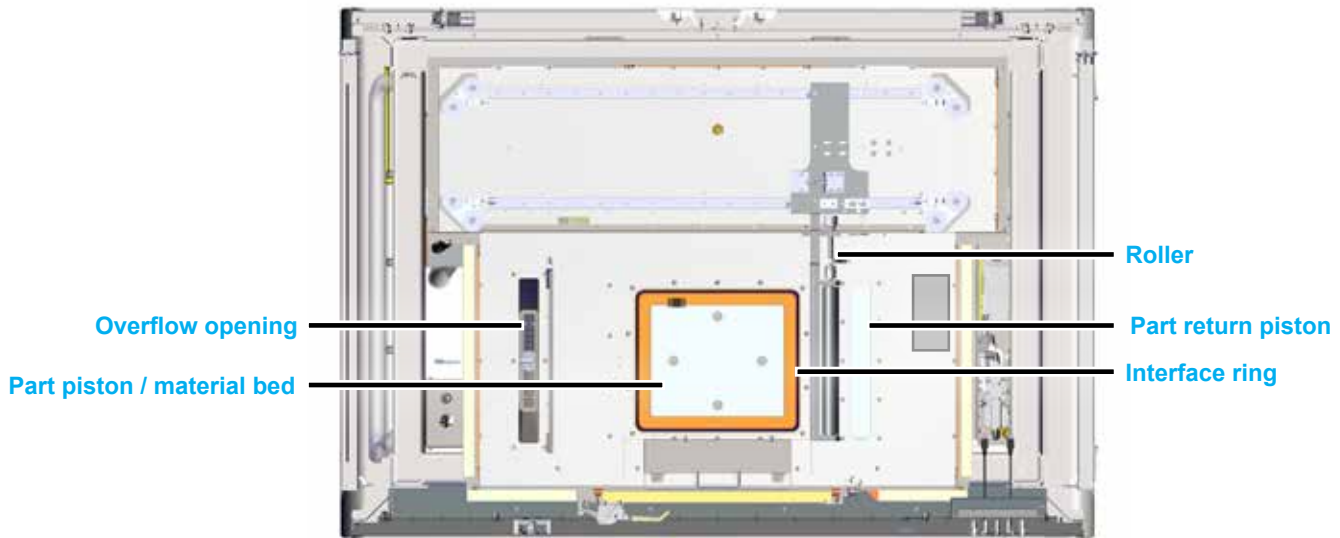


CAUTION: Before beginning any of the procedures in this section, make sure that the printer has cooled down adequately to prevent burn hazards.

The following figure illustrates the bottom surface of the print chamber, as if you were looking straight down from the ceiling of the print chamber.



NOTE: Refer to the appropriate Material Guide for special cleaning instructions for specific materials.



Overhead Section-View of Print Chamber

To Clean the Print Chamber

1. Close outer print chamber door. Close and latch the inner print chamber door.
2. Put the **Sinter** application in **Manual Operations** mode.
3. If necessary, exit **Print** mode. Then select the **Man Ops** button to access the manual operations screen.
4. Using the **Roller** screen, move the roller to the center position.
5. Open the outer print chamber door. Unlatch and open the inner print chamber door.
6. * Vacuum and brush the material from the seal around the inside of the print chamber door. Use a non-ignition vacuum cleaner.
7. * Clean the door with the tack cloth and vacuum the door and the window. If necessary, clean the window with ethanol or glass cleaner.



NOTE: Use only soft cloths or paper towels and non-abrasive cleaners on the inside of the print chamber window to avoid damaging the coating that prevents the laser beam from escaping during the print process.

8. There are pull pins on the front of the heaters which will release them.
9. Vacuum and wipe off the entire roller assembly.
10. Clean the roller. See the section, **“Cleaning the Roller Assembly” on page 59.**
11. * Wipe the print chamber walls with a tack cloth.
12. Clean under the roller. To see the overflow on left, the powder chute must be lifted manually.
 - a. Close the inner and outer print chamber doors.
 - b. The roller should be in the center. If not, press the green **System On** button to engage the roller contactor.
 - c. Use the **Roller** button to move the roller.
 - d. Unlatch and open the print chamber doors.
 - e. Brush material in the area that had been covered by the roller into the overflow, then clean the area with a non-ignition

vacuum cleaner and tack cloth.

13. Clean the belt seals.
14. Clean or replace the print chamber filters. See the section, [“Cleaning and Replacing Filters” on page 63.](#)
15. Clean the part piston and around the part piston seals.
16. Vacuum the entire print chamber, the seals, and the door. Wipe them with a tack cloth. For a moderate cleaning, you can simply brush off or vacuum the surface of the part cylinder interface ring to clean out the counter-bores and outer crevice.
17. Return the heater assemblies to their print position.
18. Clean the laser window. See the section, [“Cleaning the Laser Window” on page 59.](#)

Cleaning the Roller Assembly

This section describes how to clean the roller assembly. Perform these procedures in conjunction with a thorough cleaning of the print chamber, described previously.

Tools and Supplies

- Tack cloths
- Lab-grade ethanol
- Bottled air

1. Close and latch the print chamber door.
2. Move the roller toward the center of the print chamber.
3. Unlatch and open the print chamber door.
4. Clean around the roller assembly. Use a brush and a non-ignition vacuum cleaner.
5. * Clean the roller using ethanol. Wipe dry with a tack cloth.

Cleaning the Laser Window

The laser beam passes through the laser window into the print chamber. It is very important that all impurities are kept off the laser window. Impurities can be burned onto the laser window, decreasing the laser power available at the print bed.

Cleaning the laser window is a delicate procedure. The laser window can be damaged and may need to be replaced if serious damage occurs. Handle the laser window very carefully and follow the cleaning procedure exactly.

Tools and Supplies

- Lens tissue
- Lab-grade acetone
- Applicator bottle for acetone
- Dawn liquid soap
- 2.5 mm Allen wrench
- Cotton gloves (optional)
- Paper towels

Removing the laser window and inserting the baffle plug as described in the section.

1. After removing the laser window, bring it to a clean area and set it down on a clean cloth as shown. When not in use or being cleaned, cover it with lens tissue and secure the tissue over of the lens using the tissue box.
2. The laser window is enclosed in the baffle assembly. Remove the top cover of the assembly using a



Laser window on clean cloth



Cover when not in use

2.5mm allen wrench. Be sure to loosen the screws in a cross-pattern so that the tension is relieved evenly.

3. Set the screws and the lid to the side.
4. Cover the lens with a lens tissue and turn the assembly over so that the lens comes out.



Remove lid and set to the side

Set the lens aside on the work table. This will be the side of the O-ring that will need to be cleaned the most. However, both sides



Cover with lens tissue



Turn the assembly over



Remove lens and set on work table

will be cleaned in this procedure.

5. Remove the O-ring and wipe it clean.
6. Replace the O-ring into the laser window baffle assembly.

Side of lens
that needs to
be cleaned



Remove and clean O-Ring



O-Ring

Replace into baffle assembly

7. Transport the lens to an area where it can be cleaned with mild soap (Dawn liquid soap is recommended) and warm water. Have lens clothes ready. This is a pre-cleaning that needs to be performed to get the stickier material off before a final cleaning with acetone.
8. First, clean hands and run warm water over the lens.
9. Apply a moderate amount of soap to the lens and spread it across the surface by hand.
10. Rinse the lens in the warm water. Repeat these steps until the lens is thoroughly cleaned.
11. Dry the lens using the lens cloth.
12. Return the lens to the work table to clean with acetone.
13. Set the lens down on a clean tissue in a clean area of the work table. It does not matter which side is facing up.
14. Using the applicator filled with acetone, apply a moderate amount of acetone to the surface of the lens.
15. Set a tissue on top of the lens to soak up the excess acetone.
16. After the tissue has soaked up some of the acetone, pull it off gently to avoid streaking. Discard the tissue.

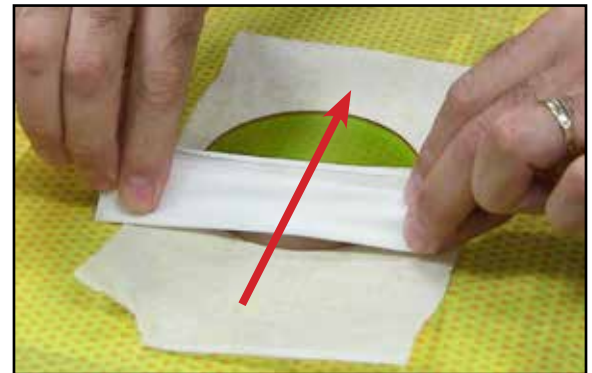


Apply acetone to lens

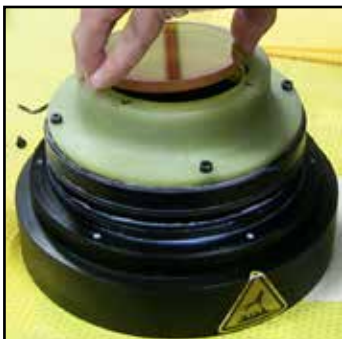


Soak up excess acetone with lens tissue

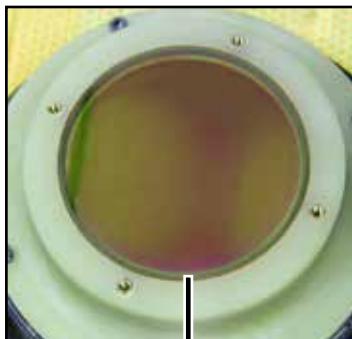
17. Apply a small amount of acetone to the lens again.
18. Fold up a lens tissue lengthwise to wipe the acetone off with.
19. Gently pull the tissue across the lens.
20. Fold the same tissue once again and gently wipe once more. This should completely remove the acetone from this side of the lens.
21. Repeat the process for the other side of the lens.
22. Gently press the lens back into the laser window baffle housing. Ensure that the O-Ring is visible and that the lens is fully seated and flush with the housing.
23. Place the housing ring on top of the assembly.
24. Fasten the ring using the screws that were set aside earlier using a 2.5mm allen wrench. Use the long end of the allen wrench to prevent over-tightening. Tighten in a cross-wise fashion to even out the tension.
25. Cover the lens using a lens tissue and weigh down with the tissue box.



Gently wipe lens dry



Replace lens



Ensure O-Ring is visible and lens is flush with housing



Replace top ring and fasten with 2.5mm allen wrench



Cover when not in use

Replacing the Laser Window

Once the laser window and print chamber have been cleaned, you must reinstall the laser window.

1. Remove the red laser window baffle plug.
2. Insert the laser window into the recess at the top of the print chamber with the warning label facing slightly to the left. This will be so that when you tighten it, the label will be facing forwards.
3. Rotate the laser clockwise $\frac{1}{4}$ -turn to tighten it into the print chamber.



Rotate laser window so label faces forward

Cleaning the IR Sensor

1. Place a small amount of ethanol on an SLS IR sensor cleaning swab (part #4100-01431).
2. Use the wet swab to clean the head of the IR sensor by gently touching the IR sensor head with the tip of the wet swab and rotating the swab.
3. Use a dry swab to dry the IR sensor head by gently touching the IR sensor head with the tip of the dry swab and rotating the swab.

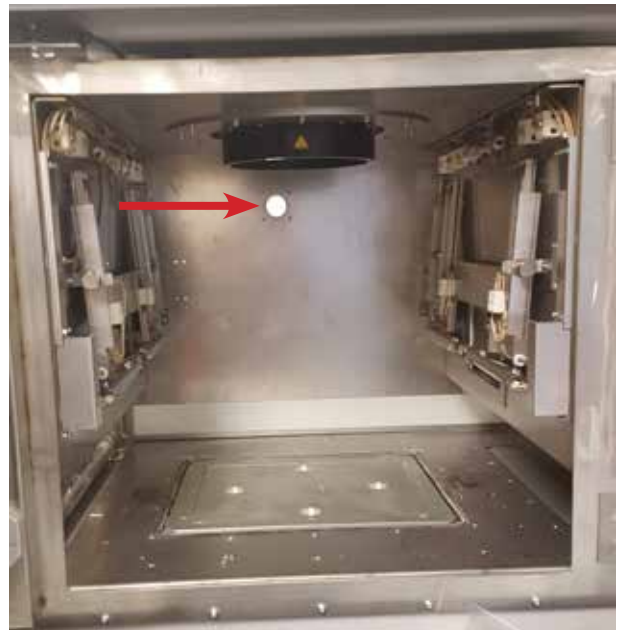
Cleaning the Black Body

A clean black body will have a dark matte finish. It is important to inspect the black body at least 3 times a week or after 40 hours of print time and clean, if needed. Powder deposit on a black body surface can permanently change the surface if the powder sinters on the surface of the black body.

1. Gently vacuum the black body without touching its surface.
2. Place a small amount of ethanol on an SLS IR sensor cleaning swab (part #4100-01431).
3. Gently rub the swab in a back-and-forth motion to clean the black body.
4. Use a dry swab to dry the black body. Repeat until clean.

Cleaning the Exhaust Port

To clean the exhaust port inside the print chamber, use a non-ignition vacuum cleaner to remove any debris that has accumulated.



Print chamber showing exhaust port

CLEANING AND REPLACING FILTERS

There are several filters on the ProX 500 and MQC System that need to be cleaned or replaced periodically. It is suggested that each of them be checked weekly and replaced as necessary:

ProX 500 Filters

- Air Processing Module Filter
- 2-Stage Powder Filter (“Sock” Filter and Hepa Filter)
- Electrical Enclosure Filter

MQC System Filters

- 2-Stage Powder Filter (“Sock” Filter and Hepa Filter)

1. Open the top back doors of the printer.
2. Unscrew the filter cover.
3. Remove the filters and clean them using a vacuum cleaner or cloth; or, replace them with new filters.
4. Replace the filter cover.
5. Close the printer doors.

Wire Conduit Trays

Cleaning interval on conduit wire trays on MQC system framing should be part of maintenance to clean dust accumulation.

- Cleaning should be done before powder reaches 3mm in depth or at least once a month.



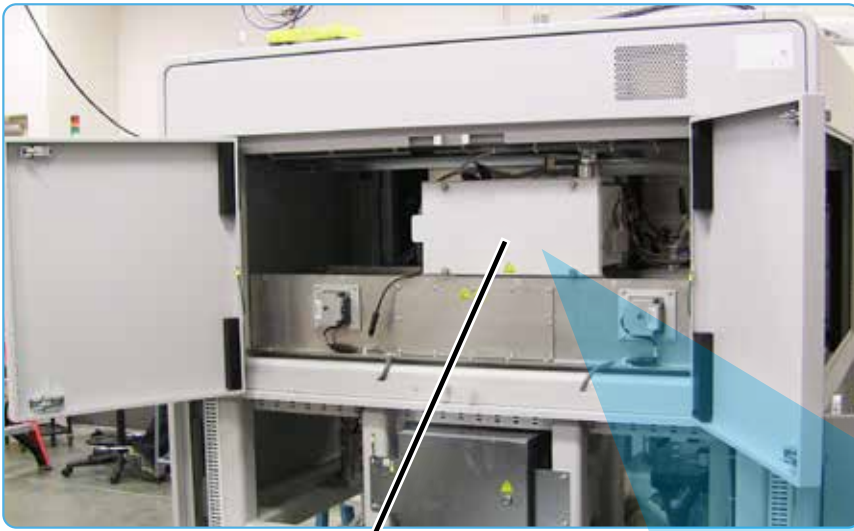
Exhaust Processing Module Filters

Tools and Supplies

- Tack cloth
- New filters
- Non-Ignition vacuum cleaner

The exhaust processing module filters gas moving through the print chamber. You access these filters from the back of the printer by loosening the thumb screws and removing the panel.

To clean or replace the filters:



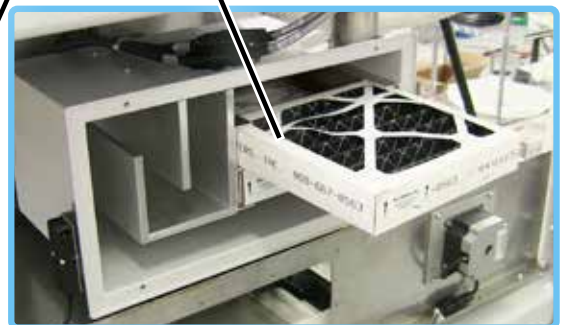
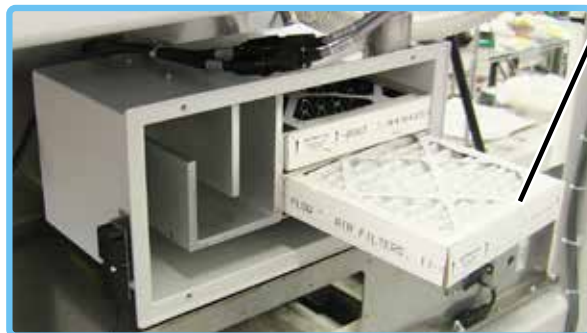
Air Processing Module

1. Open the top back doors of the printer.
2. Unscrew the filter cover.
3. Remove the filters and clean them using a vacuum cleaner or cloth; or, replace them with new filters.
4. Replace the filter cover.
5. Close the printer doors.



Particulate Filter

Active Charcoal Filter



Electrical Enclosure Filter

Tools and Supplies

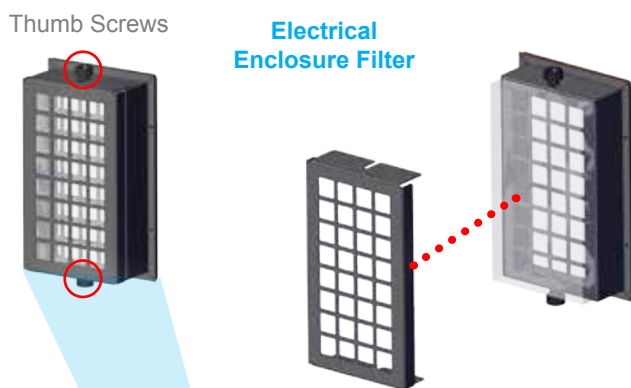
- Tack cloth
- New filters
- Non-Ignition vacuum cleaner

Replacing Electrical Enclosure Filter

Air moving through the electrical cabinet is filtered from both sides of the cabinet. You access these filters by loosening the thumb screws and removing the covers.

To replace the filter:

1. Open the lower door (left or right) of the printer.
2. Unscrew the filter cover.
3. Remove and replace the filters.
4. Replace the filter cover.
5. Close the printer door.



Electrical Enclosure Filters
(located on both sides of the enclosure) **2-Stage Hepa Filter**
(Also located at rear of MQC System)

2-Stage Powder Filter ("Sock" Filter and Hepa Filter)

Tools and Supplies

- Tack cloth
- Non-Ignition vacuum cleaner
- New filters

Cleaning or Replacing the 2-Stage Powder Filter

The powder filter filters powder and air moving through the system. There is one located at the rear of the MQC System (see ["MQC System - Rear View" on page 10](#)) and one on the left side of the printer. You access the filter by loosening the thumb screws and removing the cover.

To Clean or Replace the Sock Filter:

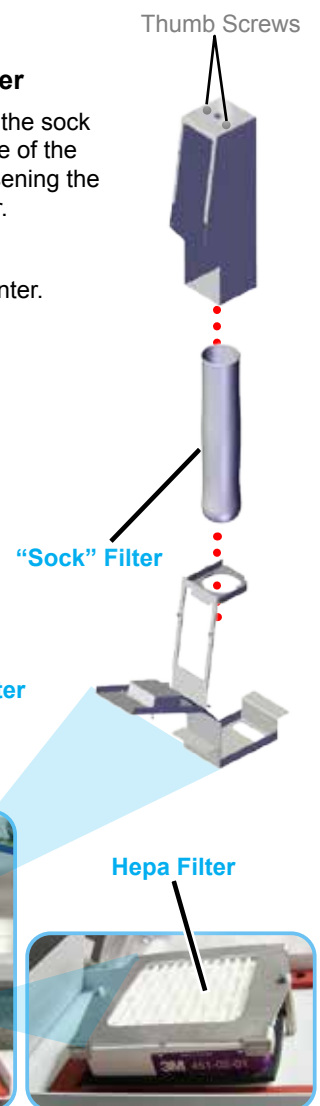
1. Open the left-lower door of the printer or rear door of the MQC System.
2. Unscrew the filter cover.
3. Loosen the top thumb screws to unclamp the sock filter.
4. Remove the sock filter.
5. Turn inside-out, shake off loose powder, and vacuum.
6. If necessary, replace the filter.
7. Replace the filter cover.
8. Close the printer door.

Cleaning or Replacing Hepa Filter

This filter complements the filtering of the sock filter. Access this filter from the left side of the printer or rear of MQC System by loosening the thumb screws and removing the cover.

To replace the filter:

1. Open the left-lower door of the printer.
2. Unscrew the filter cover.
3. Remove and replace the filters.
4. Replace the filter cover.
5. Close the printer door.



Thumb Screws

2-Stage Hepa Filter

Hepa Filter

Chiller Maintenance

Routine inspection and, if necessary, maintenance for the HRS024 SMC chiller is recommended to be completed on a weekly basis. This will include replacing the chiller air filter, replacing the chiller fluids, replacing the chiller fluid filter and inspection of all coolant lines. For detailed instructions on the chiller, refer to the **Operation and Installation Manual:** http://www.idealvac.com/files/manuals/Chiller_Neslab_ThermoFlex-900-2500_Manual.pdf


Replacement Parts

Part Number	Description
132564-00	Pentek CW-F Polypropylene Wound Filter (Scott Equipment #155186-43)
9208-30021	Water Distilled 1 Gal. McM 3190K901
110362-00	Opti-Shield PN "400113" http://optishield.net/ (1 quart)
132788-00	Chiller External Filter Kit
132789-00	Air Filter Element Kit, TF2500
132790-00	Air Filter Kit W/Frame (TF2500)
132791-00	Air Filter Kit W/Frame (TF5000)
132792-00	Pump Assembly, W/Motor, T1
132793-00	Filter Kit, 250 Micron
132794-00	Filter Housing, Canister w/O-ring
132795-00	Canister O-ring

Fluid Filter Bag

The reservoir has a fluid bag filter designed to prevent the introduction of particulates into the system. Units are shipped with a bag filter in place.

Note: The fluid bag filter can be removed with the unit operating.

	Before using any fluid or performing maintenance where contact with the fluid is likely to refer to the manufacturer's MSDS for handling precautions.
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Reservoir Sight Tube

Clean the sight tube by gently pulling up on the plastic funnel housing to remove it and then gently pulling out the black sight ball topper from the tube. Use a long soft-bristle 1/4" brush. Use caution not to scratch the glass. For easier replacement, wet the stopper first and then use a twisting motion to install it in the sight tube.

Fluid Diffuser

If the fins of the air-condenser become clogged with dust or debris, heat radiation performance reduces. This results in the reduction of

cooling performance, and may stop the operation because the safety device is triggered.

Shut off the power supply of the product when performing cleaning, maintenance or inspection to avoid electric shock, injury or burn, etc.

Use a long bristled brush or air gun to clean the condenser to prevent the fins from being deformed or damaged.

To replace the filter, remove the filter panel and replace with "SMC Filter Element AF/AW30 (Scott Equipment #AF30P-060S)" (p/n 132576-00).

Refer to the OEM documentation for detailed instructions.

Reservoir Cleaning

EC Declaration of Conformity



La Déclaration de CE de Conformité

We, 3D SYSTEMS, INC. herewith declare that the following described machine in our delivered version complies with the basic safety and health requirements of the EC Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006, based on its design and type, as brought into circulation by us. In case of alteration of the machine, not agreed upon by us, the declaration will lose its validity.

Nous, 3D SYSTEMES, INC. ci-joint déclarer que le suivre a décrit la machine dans notre version livrée se conforme à la sûreté fondamentaux et aux conditions de santé des Directive de CET 2006/42/EC du Parlement européen et du Conseil 17 Mai 2006, a basé au dessous sa conception et son type, comme amené dans la circulation par nous. En cas du changement de la machine, pas consenti sur par nous, la déclaration perdra sa validité.

Description of the machine:
La description de la machine:

Selective Laser Sintering Apparatus

Machine type:
Usiner le type:

ProX 500 SLS 3D Printer

Serial Number:
Numéro de série

Year of Manufacture
Année de Fabrication

Applicable EC Directives:
Les Directives applicables de CE:

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast), EMC Directive (2004/108EC)

Applicable Harmonized EC Standards:
Les Normes de CET Harmonisé applicables:

EN/IEC61010-1, 3rd Edition; EN/IEC 60825-1:2007, EN 61000-6-2:2005; EN 61000-6-4:2007

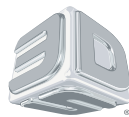
Manufactured in USA for
Fabriqué dans l'USA pour
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Director, Manufacturing
Le directeur, les fabricant

Date



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