

iPro™ SLA® Center

Safety Manual

iPro™ 8000 SLA® Center

iPro™ 9000 SLA® Center

Redefining **High** Definition



225921-00 Revision A 17-Dec-08

Copyright © 2008-2009 by 3D Systems Corporation. All rights reserved. SLA and the 3D logo are registered trademarks of 3D Systems, Inc. and 3DPrint, 3DManage, Lightyear, ProCure, Viper, iPro and Zephyr are trademarks of 3D Systems, Inc.





iPro™ 8000/9000 SLA® Center Safety Manual

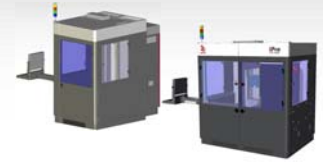


Thank you for purchasing the iPro™ 8000 SLA® Center. Before using this equipment, please read this guide carefully to enjoy optimum performance and longer service life.

Table of Contents

- [General Safety](#)
- [Laser Safety](#)
- [Chemical Safety](#)
- [Environmental Conditions](#)
- [Customer Support](#)
- [Service](#)
- [Maintenance](#)
- [Legal Notices](#)
- [Specifications](#)





General Safety

Hazard Messages

There are four safety hazard messages in this iPro 8000/9000 SLA Center User's Manual: Also see "[Safety Labels](#)" for descriptions of safety labels on your iPro 8000/9000 SLA Center.



Damage

Machine damage, part damage, and/or data loss can result if you ignore this type of hazard message.



Electric Shock

Injury or death from electric shock can result if you ignore this type of hazard message.



UV Radiation

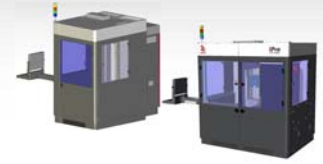
Eye injury or blindness can result if you ignore this type of hazard message.



Irritant

Bodily irritation or allergic reaction can result if you ignore this type of hazard message.

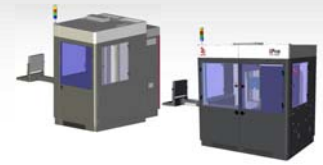
Always follow the safety procedures. Do not, in any way, risk injury by working dangerously. Safety is a part of work, and not an obstacle to it.



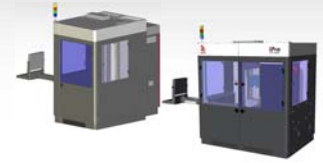
The iPro 8000/9000 SLA Center was designed with safety in mind; however, improper use and malfunctions can cause injury. To prevent unsafe operation, the iPro 8000/9000 SLA Center automatically shuts down immediately if it detects an unsafe condition.

Follow these general safety guidelines when operating your iPro 8000/9000 SLA Center:

- Read and follow system instructions.
- Follow all safety rules in this section and heed all cautions and warnings in this guide.
- Do not attempt to open the chamber door or windows while a part job is running.
- Do not use any material without first reviewing its [Material Safety Data Sheet \(MSDS\)](#).
- Dress power and communication cables at the back of the iPro 8000/9000 SLA Center to prevent tripping.
- Do not attempt to access, service, or adjust the internal components.
- Do not attempt to perform any maintenance procedures unless you have been specifically trained to do so.
- Operators are trained to operate the system and to perform all the necessary tasks to build a part.
- Certified service personnel 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 that they are authorized and certified to complete.
- Do not ignore warning signs that are posted during service operations.



- If you see an error message on the system's display, refer to [Troubleshooting](#) before resuming operation.
- To prevent potential skin irritation and sensitization due to contact with waste material, follow all guidelines in the iPro 8000/9000 SLA Center [Material Handling Safety](#) and [Material Disposal Safety](#).
- To prevent pinch and crush injuries to the hand, use caution when replacing the platform inside the build chamber. The platform carriage will not move when the chamber door is open.



Laser Safety

The SLA Center is designated as a Class I Laser Device by the U.S. Center for Devices and Radiological Health (CDRH). Class I devices are not considered harmful and require no special safety precautions. Under normal operation conditions, the laser beam is completely confined. The viewing windows in the Process Module, block the UV laser radiation from exposure outside of the build area(s).



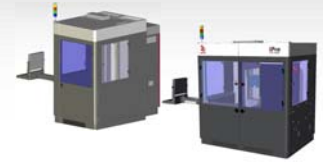
Radiation

Operating the equipment or performing procedures other than those specified within this guide may result in exposure to hazardous, invisible laser radiation.



Radiation

Never stare directly into a laser beam, nor into any beam reflection, whether diffused or from a mirrorlike surface.



Radiation

During normal operation, and with all panels installed, the iPro 8000/9000 SLA Center is classified as a Class I laser device. If any of the interlocks are defeated, the iPro 8000/9000 SLA Center becomes a Class IV device. Eye damage can occur by looking directly into the beam or by viewing any type of beam reflection.



Radiation

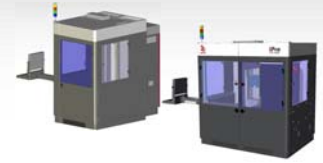
Interlocks are to be defeated only by trained personnel when needed during service procedures.

Control Switches

The locations of control switches are described in the [Operations](#). Master and Emergency power shut-off switches are located as described in the following paragraphs.

Master Power Shut-off

The iPro SLA Center has a master circuit breaker switch located on the electrical cabinet module.



Emergency Shut-off

All SLA Centers have an Emergency Shut-off button on the front panel of the Control Module/ Bay. The iPro 8000/9000 SLA Center has an additional Emergency Shut-off button inside the Process Chamber. They are bright red with a yellow background. Pressing either switch cuts off all electrical power to the system, including the laser. See “[Safety Labels](#)”.



Caution

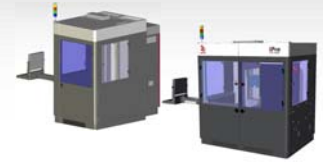
This method of power shut-off is not recommended and should be used only in an Emergency situation.

To restart the system after an emergency shut-off:

Rotate the Emergency OFF button clockwise to reset it, then press the **System Enable**.

Control Panel Laser LED

An LED light displays the current status of the laser power availability at the laser power supply.

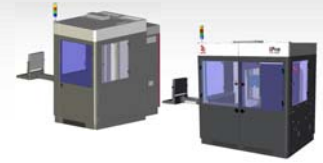


Safety Warning Labels

Laser safety warning labels for the iPro 8000/9000 SLA Centers are affixed inside the process module and RDM. On the iPro 8000/9000 SLA Center, labels are affixed on the frame behind the RDM door and near the aperture at the top of the process chamber. These labels conform to the requirements for Class IIIb and Class IV lasers. Refer to “[Safety Labels](#)” for their location.

Safety Interlock Switches

Safety interlock switches protect the user from possible UV laser radiation exposure when certain doors or panels are opened. See “[Safety Labels](#)” for their locations.

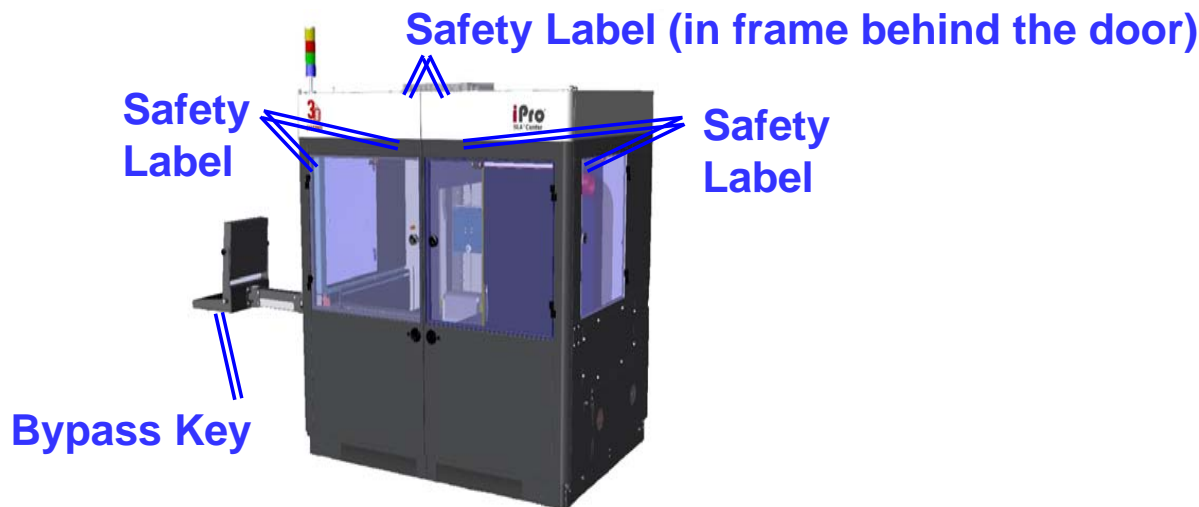


Safety Labels & Interlocks

Safety labels are attached at the places shown.

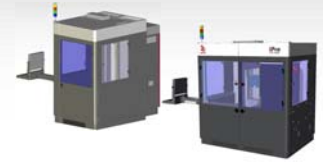


An **interlock** is located close to each label.



The machine **bypass key**. **Note: when this key is in bypass mode, the safety interlock switches are not active.**





Chemical Safety



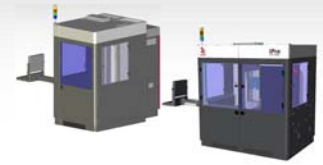
Irritant!

Always wear chemical-resistant gloves, goggles, and protective clothing when handling resin. Avoid skin contact. Avoid breathing resin fumes.

- Always wear approved goggles, nitrile gloves and protective clothing when working near resins or with partially cured parts. Epoxy resin is less viscous and splashes more easily than acrylate resin.
- Wearing contact lenses when working with resins is not recommended.
- Always wear chemical-resistant gloves whenever handling resins or partially cured parts. Recommended gloves are 100% Nitrile. Do NOT wear latex gloves.
- Always work in a well ventilated area when using resins. Avoid breathing vapors.
- Always wash skin thoroughly with abrasive soap and COLD water after working with resins. DO NOT USE HOT WATER OR SOLVENTS to wash hands, as it will result in absorption through the skin.
- Use extreme care when handling solvents used to remove excess resin from uncured parts. These solvents (e.g., denatured alcohol, isopropyl alcohol) are very flammable.
- Keep all resins away from heat, sparks and flame. Resin containers may rupture when exposed to extreme heat.



Use National Fire Protection Association Class B extinguishers such as carbon dioxide, dry chemical, or foam.



Resin Characteristics

The photopolymers used in stereolithography may be hazardous if handled improperly. Repeated skin contact with resins may cause sensitization. Consult the manufacturer's [Material Safety Data Sheet \(MSDS\)](#) for information on specific resins. For further information on this and related topics, consult the [3D Systems – Materials](#) website.

Resin Storage

Resin should be stored in opaque, non-reactive containers, according to the guidelines given in the MSDS included with the resin. Protect resin from sunlight and ambient room light. Resin may be stored in RDMs with the lid securely fastened. Pouring resin back into the original containers is acceptable, but be sure to leave several inches of air above the resin in the sealed container. This will leave room for expansion and also inhibits spontaneous polymerization for some resins. Always label resin by type and usage history.

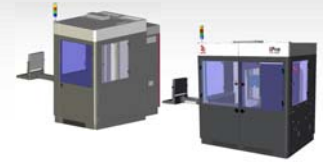
Never mix different resins.

Resin Disposal

Do not dump used resin down any drains. Follow disposal rules established by company, local, state, and federal authorities.

Resin Spill Containment

Your company has the responsibility to define what constitutes a major spill. Personnel who are involved in cleaning up major spills of resin should wear NIOSH/MSHA approved respirators designed for use with organic chemical vapors. In addition, each person should wear protective goggles, rubber boots, and 100% nitrile gloves to minimize exposure to resin, which can cause eye, skin, and respiratory irritation, as well as possible skin allergies and respiratory reactions.



Caution!

Resin is combustible. Care should be taken during resin containment and cleanup operations.

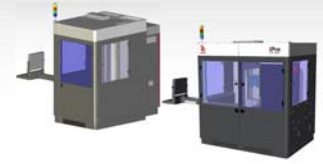
A supply of dikes and control booms should be stocked so they are available to contain the affected area in the event of a major resin spill. The spilled resin should then be absorbed on inert absorbent material and placed into drums for transfer to an approved waste disposal site. After cleaning up the spill, individuals should wash thoroughly with soap and cold water. All clothing should be washed before reuse. Avoid exposure to sunlight until skin and clothing have been cleaned of resin. Refer to the MSDS before using any chemicals. Repeated or prolonged skin contact may cause sensitization. Vapor may be harmful.

First Aid and Protective Equipment

The following paragraphs provide general first aid procedures and recommendations for protective equipment to minimize the risks from resin exposure. If professional medical attention is necessary, take the [Material Safety Data Sheet \(MSDS\)](#) for the exact resin involved to the attending physician.

Skin Contact

Wear 100% nitrile gloves and lab coats to avoid skin contact. Should resin come in contact with skin, wash thoroughly with soap and **cold** water and immediately remove contaminated clothing and shoes. If skin is irritated, get medical attention. Dry-clean contaminated clothing. Discard contaminated shoes and leather products.



Eye Contact

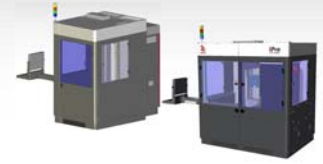
Safety goggles should be worn to prevent accidental splashes into the eyes. If resin comes in contact with the eye, flush immediately with large amounts of water for 15 minutes, avoid sunlight, fluorescent light, and other ultraviolet light, and obtain immediate medical attention. Eye wash facilities and a first aid kit should be readily available and close to the resin.

Contact Lenses

If resin splashes into the eye when contact lenses are worn, flush the eye with water immediately. Verify that flushing has removed the contact lens from the eye. Protect eyes from light and obtain immediate medical attention. Discard contact lenses that come into contact with liquid resin.

Fume Inhalation

Remove the person to fresh air. Give artificial respiration or cardiopulmonary resuscitation (CPR) if required. If breathing is difficult, give oxygen. Obtain immediate medical attention.



Environmental Conditions

Temperature

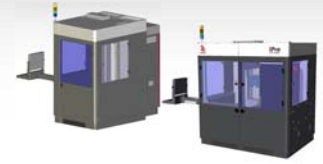
To allow optimum systems operation and optimum part quality, the temperature of the iPro 8000/9000 SLA System's room or other location should remain stable. The working range is 23°C +/- 3°C (73°F +/- 5°F). Any temperature fluctuation greater than 3°C may adversely affect parts built on the system.

The air conditioning system should maintain a temperature change of less than 1°C per hour. The stereolithography room should have a minimum cooling capacity of 1.4 kW. We recommend an HVAC system that changes the air two to five times per hour. To avoid adversely affecting part quality, do not expose the iPro 8000/9000 SLA system to direct air flow from the air conditioning system.

Beyond the temperature range that is optimum for part quality, the system is capable of operating safely without creating a hazard between 5°C and 40°C.

Humidity and Altitude

The optimum humidity in the iPro 8000/9000 SLA Center build chamber depends partly on the SL material selection, although humidity should always be non-condensing and should not vary outside the range of 20-50% for optimum part quality with most resins. The system can operate at higher non-condensing humidity levels but may adversely affect part quality. Review your iPro SLA Center material information, MSDS/SDS, product datasheet, and product labeling, for specific information on recommended humidity levels. The iPro 8000/9000 SLA Center can operate correctly up to an altitude of 1000m above mean sea level.



Customer Support


If you receive an unrecoverable error message, or if you need to contact us for another problem, you may contact our Customer Support Hotline. Before you call Customer Support with a problem or question, please make sure that you have the following information:

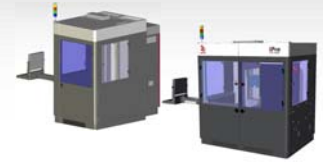
- The serial number of the iPro 8000/9000 SLA Center (located on the rear panel)
- A brief description of the problem, including the exact error message
- When the problem occurred; for example, when you submitted a job, during the beginning or the end of a build, or after power off recovery

Customer Support Hotline

Please contact your Customer Support Hotline at one of the following numbers:

- In North America, call 1-800-793-3669
- In Asia and the Pacific Rim, call +852 2923 5077
- In Germany, call +49-6151-357 357
- In the United Kingdom, call +44 1442 282665
- In France, call (+33) 01 60 87 88 77
- In Italy, call +49 (0) 6151 357 357
- In Switzerland, call +41-26-439 95 90
- In Japan, call (+81) 3 5451 1690

 **Want to know more?**
Click here for more info!



Service

General

SLA Center service procedures must be performed only by a 3D Systems-certified service technician unless this guide explicitly states otherwise.

If your SLA Center needs service, contact 3D Systems Technical Support at the following numbers:

- In the United States or Canada, call 800-793-3669
- In Europe, call +49-6151-357357

You can also contact your local 3D Systems representative. For material safety data sheets and other technical support information, go to this 3D Systems' Web site address:

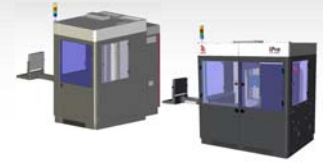
<http://www.3dsystems.com/techsupport/index.asp>

Laser

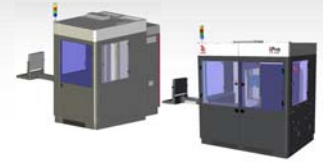


UV Radiation

SLA Center laser service procedures must be performed only by 3D Systems certified service technicians. Attempts by non-certified personnel to perform laser service procedures can result in serious eye damage. All SLA Center users must observe the guidelines and warnings in "[Laser Safety](#)".



The SLA Center conforms to applicable requirements of 21 CFR Subchapter J at the date of manufacture. It is designated a Class I Laser Device by the Center for Devices and Radiological Health (CDRH). In normal operation, the laser beam is completely confined and the viewing windows in the Process Module block the UV laser radiation. However, if the laser cover, doors, or windows, are removed for any reason, the unit becomes a dangerous Class IV laser device. Direct or reflected laser power from a Class IV laser device can cause eye damage. See [Laser Safety](#) for more information.



Maintenance



Damage

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

iPro 8000/9000 SLA Center Cleaning and Decontamination

Clean the iPro 8000/9000's inner and outer surfaces and windows periodically as described in the following paragraphs.

iPro 8000/9000 SLA Center Surfaces

Clean the iPro 8000/9000 SLA Center's outer surfaces as needed following the following guidelines.

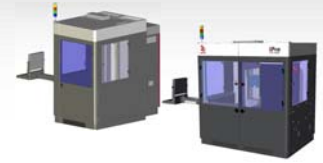
Dust Removal

Remove dust from the outer surfaces of the iPro 8000/9000 SLA Center by wiping with a clean, dry, lint-free cloth.



Damage

Do not remove any outer panels when cleaning the iPro 8000/9000 SLA Center. Panels must be removed only by a qualified 3D Systems Customer Support Representative.

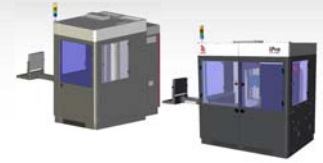


Preventive Maintenance

Your iPro 8000/9000 SLA Center must have preventive maintenance (PM) performed by a qualified 3D Systems Customer Support Representative. Contact 3D Systems after one year of build time.

Gel Filtering

Resin life is adversely affected by partially-polymerized material in the RDM, both in debris, such as broken supports and crash remains, and in gel. In order to maintain the longest possible resin life, the user should remove as much debris as possible, either continuously or periodically. Gel should be kept apart from neighboring gel, to avoid viscosity increase. Gel continually forms, both in the bulk of the RDM, and around debris that has settled to the bottom of the RDM. Gel may cluster into larger masses, may gradually increase in molecular weight because of chain growth, and may or may not settle to the bottom of the RDM, depending on the specific resin and the state of the gel. Debris removal prevents some gel formation, although not all gel is related to larger debris. Gel can be very difficult to actually remove, as it isn't easily separated from viscous resin, is slippery, and can clog filters and sieves.



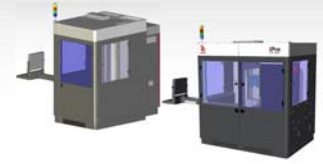
Damage

Do not leave debris in the machine and do not allow debris to bypass the debris-catching device.

Gel must be kept apart from its neighboring gel, which requires continuous resin movement in the RDM. When installed in the RDM, the resin should circulate when not building. When offline the material does not circulate, nor does it need to. Circulation while online allows the resin to take up oxygen from the RDM surface, improving resin life by keeping the RDM temperature uniform.

Debris Filtering

Debris is removed periodically, as a maintenance-like action. At least once per month, use the debris removal tray. This removal process may be repeated more than once each month, if the user desires. This process involves a tray that has two filters. As the tray is lifted, the fluid goes through the filter and the debris are removed.



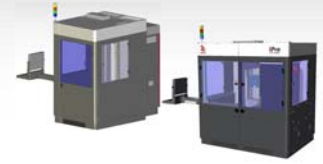
Legal Notices

Copyright and Corporate Identity

Copyright 3D Systems, Inc. All rights reserved. Subject to change without notice. This document is copyrighted and is the property of 3D Systems, Inc. The licensed user, in the name of whom this document is registered (the “Licensed User”) does not have the right to copy, reproduce, or translate this document in any way or to any media without the prior written consent of 3D Systems, Inc. No copies of the document may be sold or given to any person or other entity.

Improvements

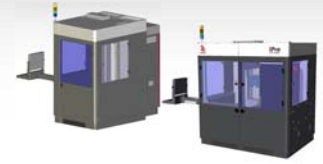
3D Systems may (but shall not be obligated to) make improvements to this document from time to time. However, the Licensed User acknowledges that at any time after the expiration of the date of issuance, 3D Systems may institute a periodic charge or fee payable by the Licensed User in return for ongoing receipt of improvements. It is the responsibility of the Licensed User to provide 3D Systems with current information as to its name and address. The Licensed User also undertakes to notify 3D Systems promptly in the event that it considers any of the data contained in this document to be incomplete or erroneous in any respect, in connection with Licensed User's particular use or generally.



FCC Notice

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case, the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by 3D Systems could void your authority to operate equipment.



Specifications

Technical Data

For a complete **iPro™ SLA® Center** datasheet that includes *FEATURES, APPLICATIONS, BENEFITS, and TECHNICAL DATA*, refer to:

[SLA datasheets](#)