3DSYSTEMS®

ProX™ 800

3D Production Printer

ProX 800

User Guide

Original Instructions

CONTENTS

1 INTRODUCTION TO THE ProX™ 800 3D PRINTER

The ProX™ 800 Stereolithography (SLA) Production Printer ("ProX 800") is equipped with 3D Systems' newest print head technology that can manufacture real parts at up to 10 times the speed of other 3D printers, drawing on the widest choice of proven high-performance engineered materials that are qualified for the most demanding aerospace, medical device and industrial-use cases.

The ProX 800 is flexible and versatile, and can produce precision parts with accuracy that rivals CNC machining. Like all 3D Systems SLA printers, it is exceptionally productive and economical for high-volume additive manufacturing of plastic parts.

With the industry's widest array of SLA materials, the ProX 800 delivers a range of properties, from ABS-like toughness to polycarbonate-like clarity. You can even cast directly from printed patterns using QuickCast® technology.

2 WHAT'S INSIDE

This manual includes the following topics:

ADDITIONAL DOCUMENTATION

In the section *"Additional Documentation" on page 63*, you will find a listing and descriptions of the documents related to the ProX 800, including the *ProX 800 Facility Guide*, *ProX 800 Material Guides*, *ProX 800 Material Safety Data Sheets and Safety Data Sheets (MSDS/SDS)*, and *3D Manage Software Documentation*.

SAFETY

The Safety Section is listed first. Read and understand all information in this section before using your SLA system. Beginning with *"General Safety" on page 7*, topics include Laser Safety, Safety Labels and Interlocks, Chemical Safety, and Environmental Conditions.

ProX 800 SYSTEM COMPONENTS

The section *"ProX 800 System Components" on page 17* gives illustrations and descriptions of the components of the ProX 800, including the *ProX 800 Production Printer*, *Material Delivery Module (MDM)*, *Print Applicator*, *Printhead*, and *User Interface*.

SOFTWARE

The section *"Software Overview" on page 26* gives you detailed descriptions of the software that operates your ProX 800.

SYSTEM OPERATIONS

The section *"System Operations" on page 43* describes how to operate the ProX 800. The process of creating a print is covered in its entirety.

MAINTENANCE

The section *"Maintenance" on page 57* gives instructions for maintaining optimal functionality of your SLA system.

TROUBLESHOOTING AND CUSTOMER SERVICE

In the section *"Troubleshooting" on page 61* you can find a guide to fixing simple problems which may arise. For further support, refer to the sections *"Customer Support"* and *"Service" on page 66*.

GLOSSARY

The *"Glossary" on page 69* defines terms that relate to the ProX 800 and its operations.

3 ADDITIONAL DOCUMENTATION

The following documents provide additional information on the ProX 800 SLA system.

ProX 800 FACILITY GUIDE

The Facility Guide details the requirements necessary to install the ProX 800 3D Printer. Details include the necessary facility dimensions, electrical and pneumatic resources, and any equipment that may be needed for installation.

ProX 800 MATERIAL GUIDES

The Material Guides detail the use of materials that have been certified for use with the ProX 800. Each material has its own Material Guide. Information specific to each material is included in the guides.

ProX 800 MATERIAL SAFETY DATA SHEETS AND SAFETY DATA SHEETS (MSDS/SDS)

Each material has its own MSDS/SDS. The user must be familiar with all information contained in these documents before handling the materials. Every material shipment includes a paper copy of its MSDS/SDS.

Electronic versions of each MSDS/SDS are available on our website at http://www.3dsystems.com/support/materials/msds

3D MANAGE™ SOFTWARE DOCUMENTATION

3D Manage is the 3D Systems' software application used for preparing CAD models to be printed on an SLA printer. It is installed on a standalone computer which is provided by the customer.

4 GENERAL SAFETY

HAZARD MESSAGES

The following symbols are used throughout this manual. Some also appear on the printer itself.

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.

Wear gloves when handling uncured material.

Ultraviolet radiation inside. Exposure may cause eye damage. Do not operate without covers. Wear UV eye protection.

HOT SURFACE: Do not touch, may cause burn.

NOTE: Indicates an important point.

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 ProX 800 was designed with safety in mind; however, improper use and malfunctions can cause injury. To prevent unsafe operation, the ProX 800 automatically shuts down immediately if it detects an unsafe condition.

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

Follow these general safety guidelines when operating your ProX 800:

*   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 print is in process.
*   Do not use any material without first reviewing its Material Safety Data Sheet / Safety Data Sheet (MSDS/SDS).
*   Secure the power and communication cables to prevent tripping.
*   Do not open 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.
*   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 print 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.
*   To prevent potential skin irritation and sensitization due to contact with printing material, follow all guidelines in the section, *"Chemical Safety" on page 14*.
*   To prevent pinch and crush injuries to the hand, use caution when replacing the print pad inside the print chamber. The elevator will not move when the chamber door is open.

The ProX 800 uses a UV (ultraviolet) solid-state frequency tripled Nd:YVO4 laser which utilizes a 355 nm wavelength laser with a maximum power output of 3 watts (EN/IEC 60825-1:2007). The laser is located in the **Printhead** area of the ProX 800. For an overview of the printhead, refer to the section *"Printhead Overview" on page 23*.

The ProX 800 is a **Class I** laser product. Class I products are not considered harmful and require no special safety precautions under normal operating conditions. The laser beam is completely confined. The viewing windows in the Print Chamber block the UV laser radiation from exposure outside of the print area.

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 mirror-like surface.

RADIATION: During normal operation, and with all panels installed, the ProX 800 is classified as a Class I laser device. If any of the interlocks are defeated, the ProX 800 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 illustrated in the section, *"ProX 800 System Components" on page 17*. Master and Emergency power shut-off switches are described in the following paragraphs.

Master Power Shut-off

The ProX 800 has a master circuit breaker switch located on the electrical cabinet module on the right side of the machine. See the illustration in the section, *"ProX 800 Printer - Inside View" on page 18*.

Emergency Stop

All ProX 800 printers have Emergency Stop (E-Stop) buttons on the right-side panel and inside the print chamber. They are bright red with a yellow background. Pressing one cuts power to all moving axes, closes the laser shutter, and puts the laser in safe mode. To release the E-Stop, pull it out and turn it clockwise. The system cannot run while an E-Stop is depressed.

Main Power Disconnect

CAUTION: The Emergency Stop Button should be used when there is a fail situation in the system. Use the emergency stop button when the system needs to be stopped quickly.

Emergency Stop Button

USER INTERFACE LASER LED

The user interface, which is detailed in the section *"User Interface" on page 24*, contains a blue LED light that indicates whether or not the laser is enabled. If it is illuminated solid blue, the laser is enabled and can be used. When the laser is not enabled, the LED will be dimmed.
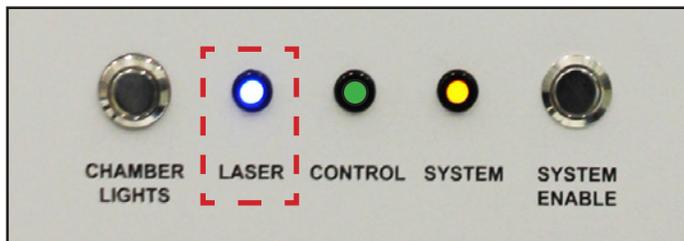
"Laser Enabled" Indicator on User Interface

Laser safety labels are located at system entry locations which are indicated below. An interlock is located close to each label.

LASER SAFETY WARNING LABELS

Laser safety warning labels for the ProX 800 are located at system locations which are indicated above.

SAFETY INTERLOCK SWITCHES

Safety interlock switches protect the user from possible UV Laser radiation exposure when certain doors or panels are opened. Safety Interlocks are located behind the safety warning labels.

Laser safety label on cover of printhead

CAUTION ⚠ **ATTENTION**
CLASS 4 INVISIBLE RAYONNEMENT
LASER RADIATION LASER INVISIBLE
WHEN OPEN AND DE CLASSE 4 EN
INTERLOCKS CAS D'OUVERTURE
DEFEATED ET DE NON-
AVOID EYE OR FONCTIONNEMENT
SKIN EXPOSURE DES VERROUILLAGES
TO DIRECT ÉVITER D'EXPOSER
OR SCATTERED LES YEUX OU LA
RADIATION PEAU AU RAYONNEMENT
DIRECT OU DIFFUSÉ

©Clarion Safety Systems, LLC   xxxxx   No. C4922-16

(Behind door)

(On left side)

ProX 800

Laser safety labels on ProX 800

⚠ DANGER

Laser radiation when open.
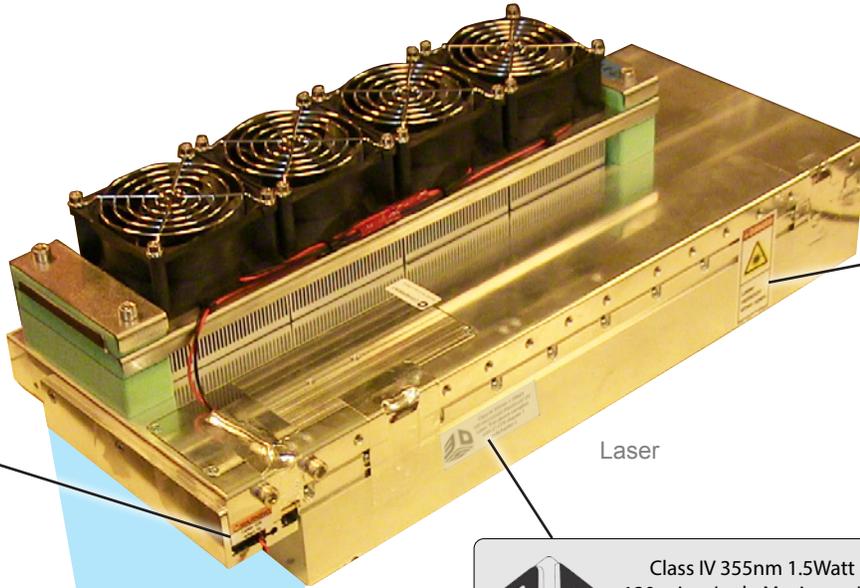
⚠ WARNING
Laser ON when lit.

Laser

Class IV 355nm 1.5Watt 120 microJoule Maximum UV Laser. This device complies with 21 CFR chapter 1 subchapter J.

CAUTION
CLASS 4 INVISIBLE LASER RADIATION WHEN OPEN
AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION
ATTENTION
RAYONNEMENT LASER INVISIBLE DE CLASSE 4 EN CAS D'OUVERTURE
EVITER D'EXPOSER LES YEUX OU LA PEAU AU RAYONNEMENT DIRECT OU DIFFUSE
©Clarion Safety Systems, LLC   clarionsafety.com   xxxxx   Reorder No. C4922-15

Printhead

ProX 800
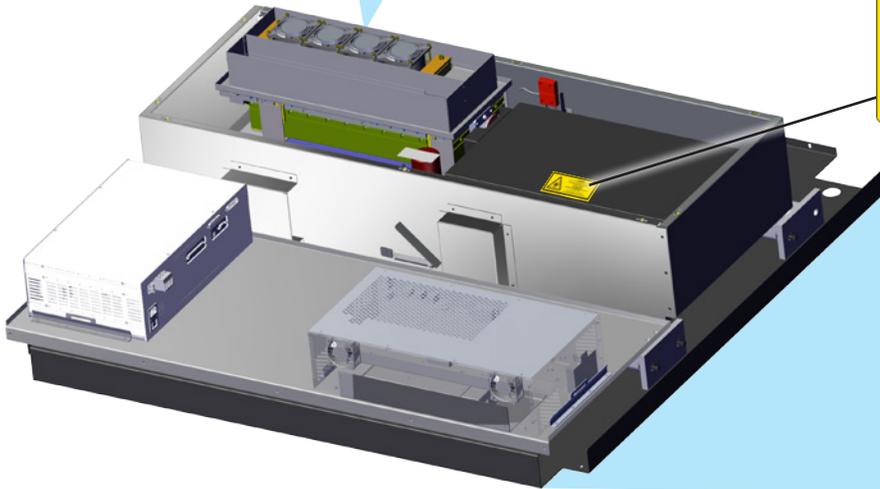
VOLTAGE, COMPLIANCE, AND ID LABELS

CLASS 1 LASER PRODUCT WHEN GUARDS ARE INSTALLED AND INTERLOCKS FUNCTIONING. CLASS 4 LASER INSIDE, MAX. POWER OUTPUT: 3W, WAVELENGTH: 355 nm (EN/IEC60825-1:2007)

PRODUIT LASER DE CLASSE 1 LORSQUE LES PROTECTIONS SONT INSTALLÉES ET QUE LES VERROUILLAGES FONCTIONNENT. LASER DE CLASSE 4 À L'INTÉRIEUR, PUISSANCE DE SORTIE MAX.: 3 W, LONGUEUR D'ONDE : 355 nm (EN/CEI60825-1:2007)

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Laser Label, Maximum Wattage

TÜVRheinland

C   US

cTÜVus Label

CE

CE Mark Label
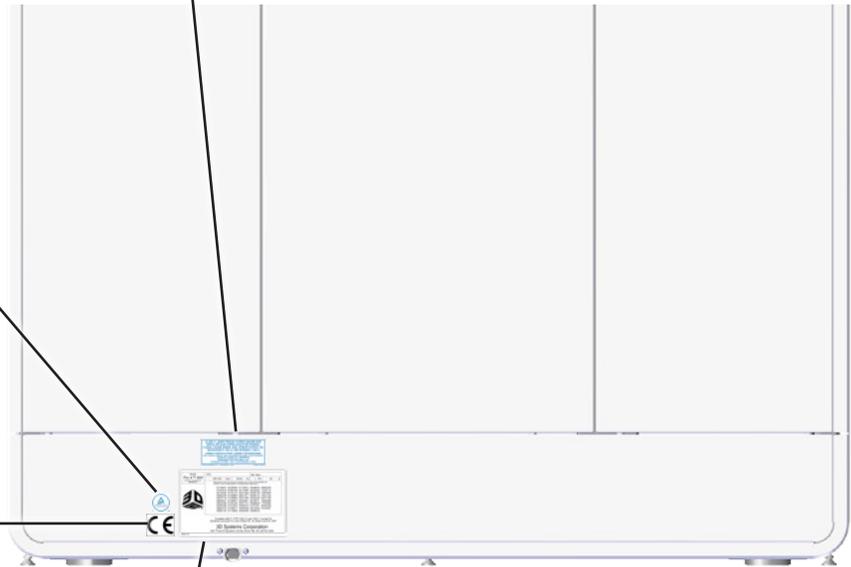
Rear of ProX 800

Model Pro X™ 800 STEREOLITHOGRAPHY APARATUS	S/N:			Mfr Date:		
	200-240	VAC	50/60	Hz	1 PH	30 A

This product or its use may be covered by one or more of the following U.S. Patents or other foreign patents or pending patent applications.

5779967	6029096	6179601	6558606	6996245
5785918	6048188	6215095	6622062	7339712
5814265	6103176	6241934	6646728	7585450
5840239	6126884	6261077	6649113	7621733
5855718	6129884	6261506	6660208	8237788
5902537	6132667	6325961	6678571	7690909
5902538	6153142	6347101	6699424	7785093
5945058	6157663	6399010	6797351	8040530
5965079	6159411	6406658	6813594	8105527
5999184	6172996	6426840	6989225	

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated June 24, 2007

3D Systems Corporation
333 Three D Systems Circle, Rock Hill, SC 29730 USA

286506-00

Product ID Label, Voltage

Model: *MDM ProX™ 800*

Material Delivery Module for
ProX™ 800

100-240VAC • 50-60Hz • 1PH • 6A

3D Systems Corporation
333 Three D Systems Circle, Rock Hill, SC 29730 USA

286510-00

Chamber controller panel
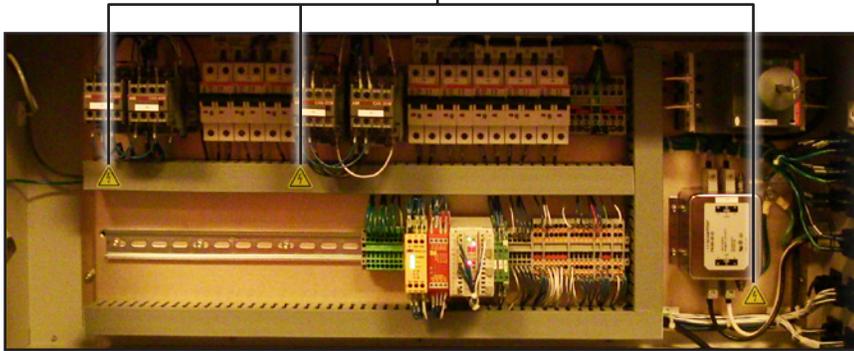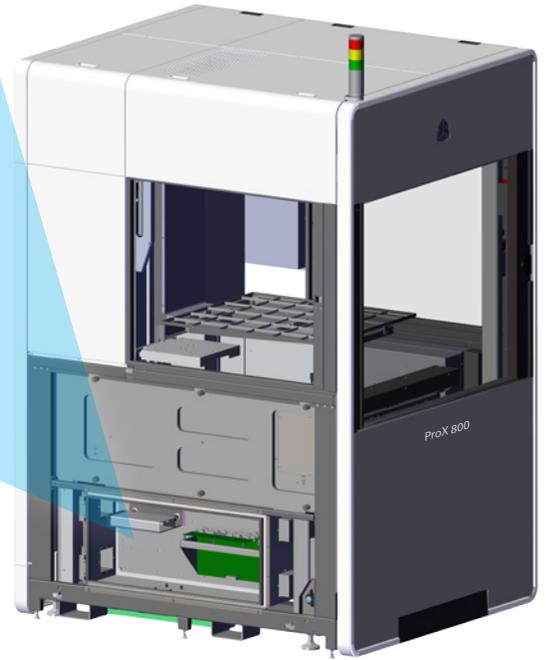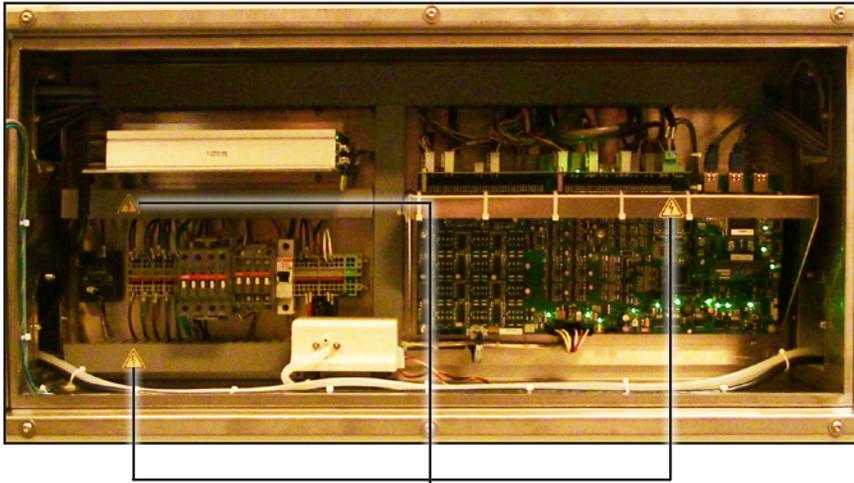
AC Electronics Panel

Main Power Disconnect Switch

⚠ WARNING

LINE VOLTAGE PRESENT WITH MACHINE POWER OFF.
Risk of electric shock or burn.
Turn off and lock out facility power before servicing.

⚠ AVERTISSEMENT

PRÉSENCE DE TENSION SECTORIELLE LORSQUE LA MACHINE EST À L'ARRÊT.
Risque de choc électrique ou de brûlure.
Couper et verrouiller l'alimentation électrique de l'installation avant toute intervention.

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⑦ CHEMICAL SAFETY

❌ **IRRITANT! Always wear chemical-resistant gloves, goggles, and protective clothing when handling material. Avoid skin contact. Avoid breathing material fumes.**

- Always wear approved goggles, nitrile gloves and protective clothing when working near materials or with partially cured parts.

- Wearing contact lenses when working with materials is not recommended.

- Always wear chemical-resistant gloves whenever handling materials or partially cured parts. Recommended gloves are 100% Nitrile. Latex gloves are not chemical-resistant and are not recommended.

- Always work in a well ventilated area when using materials. Avoid breathing vapors.

- Always wash skin thoroughly with mild soap and COLD water after working with materials. DO NOT USE HOT WATER OR SOLVENTS to wash hands, as it will result in quick absorption through the skin.

- Use extreme care when handling solvents used to remove excess material from uncured parts. These solvents (e.g., denatured alcohol, isopropyl alcohol) are very flammable.

- Keep all materials away from heat, sparks and flame. Material containers may rupture when exposed to extreme heat.

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

MATERIAL CHARACTERISTICS

The photopolymers used in stereolithography may be hazardous if handled improperly. Repeated skin contact with materials may cause sensitization. Consult the manufacturer's Material Safety Data Sheet / Safety Data Sheet (MSDS/SDS) for information on specific materials. For further information on this and related topics, consult the 3D Systems – Materials website at http://www.3dsystems.com/support/materials/msds

MATERIAL STORAGE

Prior to actual use of the material, read the Material Safety Data Sheet / Safety Data Sheet (MSDS/SDS) for the material(s) that you have selected; follow the instructions and guidelines that those documents provide.

Print materials should be stored in the opaque, non-reactive containers in which they were provided, according to the guidelines given in the MSDS/SDS included with the print material and all applicable regulations (local, state, and federal).

Protect print material from sunlight and ambient room light. Print material may be stored in material carts with the lid securely fastened. Material for the ProX 800 is composed of reactive monomers and oligomers. If improperly stored or handled, these compositions may undergo polymerization resulting in the emission of heat.

Improperly stored resins may increase in viscosity, and eventually result in a gelled, polymerized product in the storage container. Materials should be stored in conformance with applicable laws and regulations. 3D Systems is not responsible for losses incurred as the result of improper storage of print material. See subjects of **Light** and **Temperature** below.

Light

Photocurable materials should be shielded from sunlight or other sources of actinic radiation such as fluorescent or mercury vapor lights. Exposure to UV radiation leads to an increase in product viscosity and eventually to product polymerization, rendering the material unusable for part printing.

Temperature

Containers of print material should be kept indoors at temperatures between 16 °C (60 °F) and 27 °C (80 °F). Temperatures above 27 °C (80 °F) may accelerate the depletion of the stabilizers contained in the product. Once the stabilizers are exhausted, the product may undergo polymerization, rendering it unusable for part printing.

Containers

Print materials for the ProX 800 are shipped in polypropylene containers. Polyethylene containers or liners are acceptable for storage also, as long as they are opaque to ultraviolet light, and not used to hold solvent containing materials. Plastic containers made from organic solvent soluble materials such as polystyrene or polyvinylchloride (PVC) should not be used for material storage.

Print materials containing acrylates should not be allowed to come into contact with iron and copper, or alloys containing copper to insure product stability. Container lids should be tightly sealed in order to protect the product from contamination and/or stray light when not in use. Also, a tightly sealed container is less likely to cause spillage if accidentally dropped during handling. You should consult the applicable literature for proper storage, use and handling of photocurable materials.

Shelf Life

VisiJet SL & Accura materials are certified for use for at least 12 months from their date of manufacture. Most materials are certified for 18 months from their manufacture dates. The recertification dates are marked on the material cartridge labels. In general, resins are usable for several months after their recertification dates provided that the materials have been properly stored, handled and not exposed to excess heat. However, use of very old or material past its recertification date may shorten your In-Service material life. It is advisable to check the viscosity of any material past its recertification date prior to use.

In-Service Life

In-service life of the print materials is defined as the useful life of the material after having been poured into the ProX 800 MDM. The in-service life of the ProX 800 material greatly varies depending on material type, usage and environmental conditions. The more volume printed, the more the material is refreshed with newer material. This blends older material with newer material and extends the in-service life of the materials. If the material is exposed to temperatures outside of the normal operating limits, is exposed to UV light, is exposed to particulates or vapors in the air such as dust or fumes, or if contaminates are introduced such as partially cured platforms being placed back into the MDM, this will shorten the material in-service life. The type of patterns and prints performed also affect the in-service life of the material. With all this taken into consideration, we would expect the in-service life of the material to be at least two years but can be much longer with proper care and maintenance. The material retains its usefulness until a buildup of viscosity or a change in reactivity prevents further processing in the ProX 800.

Contamination

Care should be taken when cleaning windows, panels, and other parts of the ProX 800. Cleaning products which contain ammonia should not be used because they can cause contamination of the material. Instead, use a small amount of isopropyl alcohol on a paper towel to clean up spills. Accidental contamination of resins may change the material's performance characteristics to such an extent that acceptable parts can no longer be reliably created.

Polymerization

Signs of polymerization of stored material include container bulging, leaking, and the emission of heat, or an unusual odor from the container. If you notice this, do not use the material and dispose of it properly.

 Never mix different materials.

MATERIAL DISPOSAL

Because stereolithography materials are regulated, they are subject to special disposal requirements by your local, federal, or other regulatory agencies. Follow applicable disposal guidelines. Contact a local waste management company for recommendations on disposal requirements that affect your facility.

Do not leave uncured or liquid materials in an area where persons who are not knowledgeable about their handling or use may have access to them. If your area requires regulated waste disposal, consult with and retain a waste management company to periodically pick up regulated waste. Your local waste management company may recommend that you set up a drum, or other approved container, to dispose of liquid print material and of any materials (such as paper towels or gloves) that may have come into contact with the uncured liquid print material.

After part printing in the SLA system, the parts are not yet fully cured, and must be post-cured using the ProCure UV Chamber. After an adequate period of UV light exposure in the ProCure chamber, the parts should be fully solidified and then may be handled without the precaution of gloves.

 NOTE: Inspect your parts after curing in the ProCure UV chamber to ensure they are fully solidified. Part surface tackiness, visible or discernible areas of liquid resin indicate the part is not fully cured.

MATERIAL SPILL CONTAINMENT

Your company has the responsibility to define what constitutes a major spill. Personnel who are involved in cleaning up major spills of material 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 material, which can cause eye, skin, and respiratory irritation, as well as possible skin allergies and respiratory reactions.

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 material spill. The spilled material 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. Dry-clean contaminated clothing. Discard contaminated shoes and leather products. Avoid exposure to sunlight until skin and clothing have been cleaned of material. Refer to the MSDS/SDS 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 material exposure. If professional medical attention is necessary, take the Material Safety Data Sheet / Safety Data Sheet (MSDS/SDS) for the exact material involved to the attending physician.

Skin Contact

Wear 100% nitrile gloves and lab coats to avoid skin contact. Should material come in contact with skin, wash thoroughly with soap and cold water and immediately remove contaminated clothing and shoes. If skin is irritated, seek 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 material 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 material.

Contact Lenses

If material 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 material.

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.

8 ENVIRONMENTAL CONDITIONS

TEMPERATURE

To allow optimum systems operation and optimum part quality, the temperature of the ProX 800 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 ProX 800 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 ProX 800 print chamber depends partly on the 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 materials. The system can operate at higher non-condensing humidity levels but may adversely affect part quality. Review your ProX 800 material information, MSDS/SDS, product datasheet, and product labeling, for specific information on recommended humidity levels. The ProX 800 can operate correctly up to an altitude of 1000m above mean sea level.

SOUND PRESSURE

Overall sound pressure level for this equipment will not exceed 70 dBA.

ProX 800 SYSTEM COMPONENTS

The ProX 800 SLA System is comprised of many subcomponents which all work together to produce the highest quality printed parts on the market. Below is an overview of these components.

ProX 800 PRODUCTION PRINTER

This section will introduce you to the locations and component descriptions of the ProX 800 printer. There are two views: an outside view and an inside view.

ProX 800 Printer - Outside View

A **Light Stack:** The light stack consists of three lights: red, yellow and green. The lights reflect what state the machine is in at any given time. Refer to the section *"Light Stack" on page 25* for light stack meanings.

B **Printhead:** The printhead is located at the top of the machine, beneath the frame panel. Refer to the section, *"Printhead Overview" on page 23* for further information.

C **Emergency Stop (E-Stop):** This switch is located on the side panel above the touch screen. The E-Stop immediately disables all motion controls and the laser, rendering them safe. After being pressed, it remains in the closed state until it is manually returned to the open state by pulling the red knob and turning it clockwise. An E-Stop is also located inside the print chamber.

D **User Interface (UI):** This is the control touchscreen which allows the user to interface with the printer. The **Print3D Pro** software installed on the touchscreen enables the user to view and adjust the print parameters used to print a part as well as control the various hardware components of the printer.

E **System Status Lights:** System Status Lights indicate critical information regarding the system. See the section, *"LED Indicators" on page 24* for descriptions of each indicator.

F **Door Handle Location:** To open the door, pull it by the handle-like grips at the edge of the door panel. The door cannot be opened anytime the system is enabled. The system can be disabled by clicking **Unlock Doors** on the UI or by pressing an E-Stop button.

ProX 800 Printer - Inside View

H — Two Chamber lights inside print chamber

K — Both inner and outer electrical panels are removed
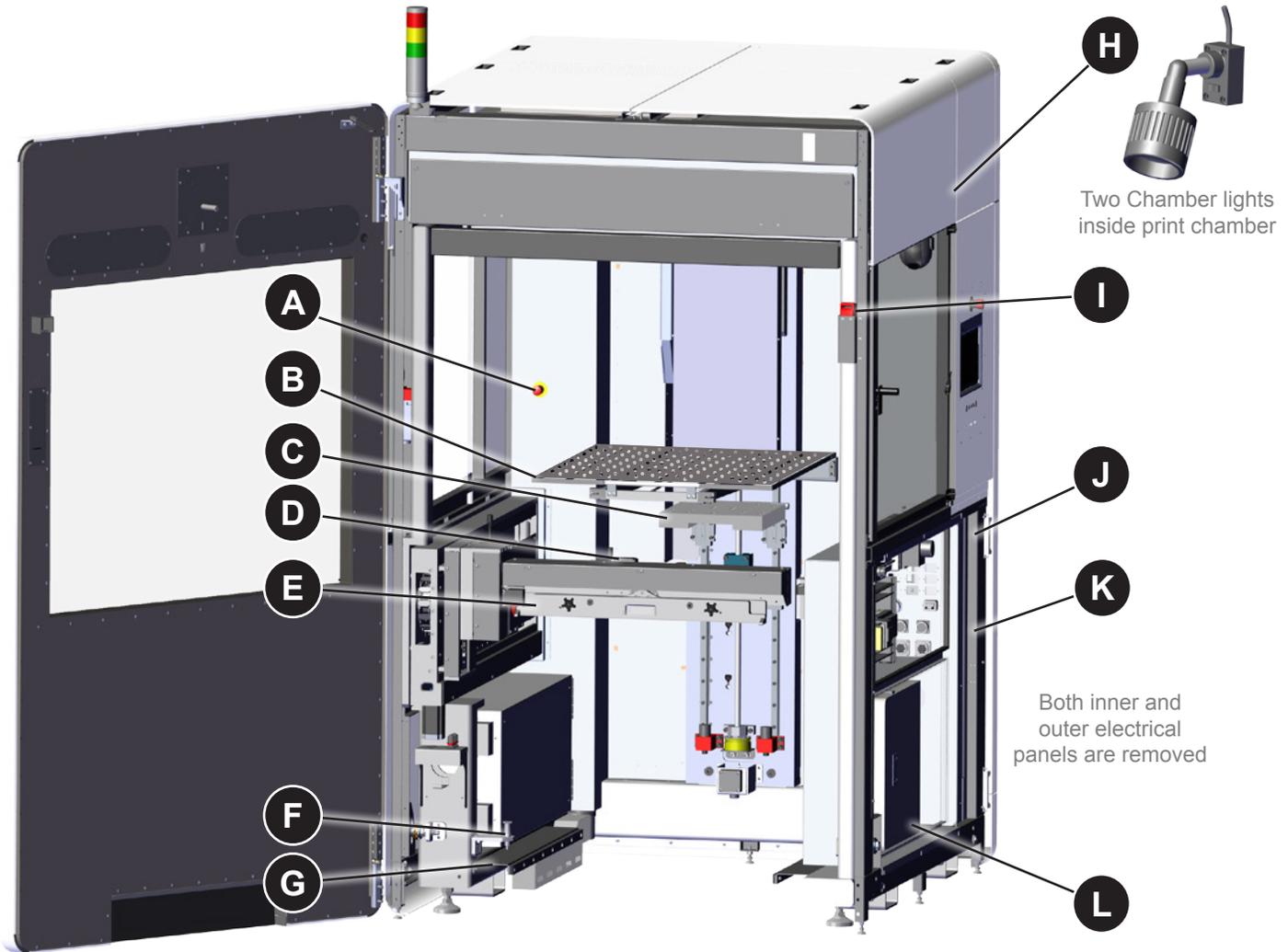
A   **E-Stop:** The E-Stop immediately disables all motion controls and the laser, rendering them safe. After being pressed, it remains in the closed state until it is manually returned to the open state by pulling the red knob and turning it clockwise.

B   **Print Pad:** The print pad is a removable platform on which parts are printed. The Elevator (See letter "C") raises and lowers the print pad. For instructions on installing and removing the print pad, refer to the section *"Print Pad Installation" on page 49*.

C   **Elevator:** The elevator is responsible for raising and lowering the print pad. This controls the Z-Axis component of the printing process and can be manually controlled through the touchscreen. Refer to the section *"Elevator/Leveler Settings Screen" on page 33* for instructions on manually operating the elevator through the touchscreen.

D   **Omron Sensor:** This sensor indicates the material level in the MDM.

E   **Print Applicator**: The print applicator system has a Zephyr™ applicator with four axes of motion. The y-axis moves the applicator from the front to the rear. Other motion systems are utilized to ensure the exact amount of material is deposited, resulting in the high part accuracy produced on this system. The applicator system's liquid level sensor maps the material surface by measuring the distance to the material surface along the length of the print area. The sensor calibrates the position of the applicator so that it moves perfectly parallel to the material surface, enabling the print to be accurate and precise. The applicator system uses the motion axes that are connected to the applicator, enabling the system to self-calibrate and permitting a customized

Omron Sensor

setting of the applicator gap, or distance from the applicator's bottom to the material surface, for different materials. For instructions on removing and replacing the applicator, refer to the section *"Print Applicator Installation and Removal" on page 43*.

F **MDM Docking Pull Pin:** The pull pin is used to fasten the MDM into place in the print chamber. See the instructions for installing and replacing the MDM in the section *"Material Delivery Module (MDM) Installation" on page 44*.

G **MDM Guide Rail:** There are two guide rails on opposite sides of the print chamber which are used for directing the MDM into and out of the print chamber. Refer the section *"Material Delivery Module (MDM) Installation" on page 44*.

H **Chamber Lights:** There are two chamber lights inside the print chamber. These can be turned on or off from the "Chamber Lights" button on the UI as well as the switch on the light itself. For more information, see the section *"User Interface" on page 24*.

I **Safety Interlock:** Safety interlocks are used to ensure that doors and panels are not improperly opened during printing and other printer operations. Safety interlocks must be satisfied for many printer operations.

J **Electrical Cabinet:** The electrical cabinet houses the system computer and the main power disconnect switch, as well as other controller hardware for the printer.

K **Inner Electrical Panel:** This is located behind the outer panel of the printer. It contains the following items:

> **Main Power Disconnect:** The disconnect enables you to turn on or off all power to the system. For safety reasons, the machine should be positioned to allow easy access to this switch.

> **PC Reset Button:** The reset button resets the system's controller.
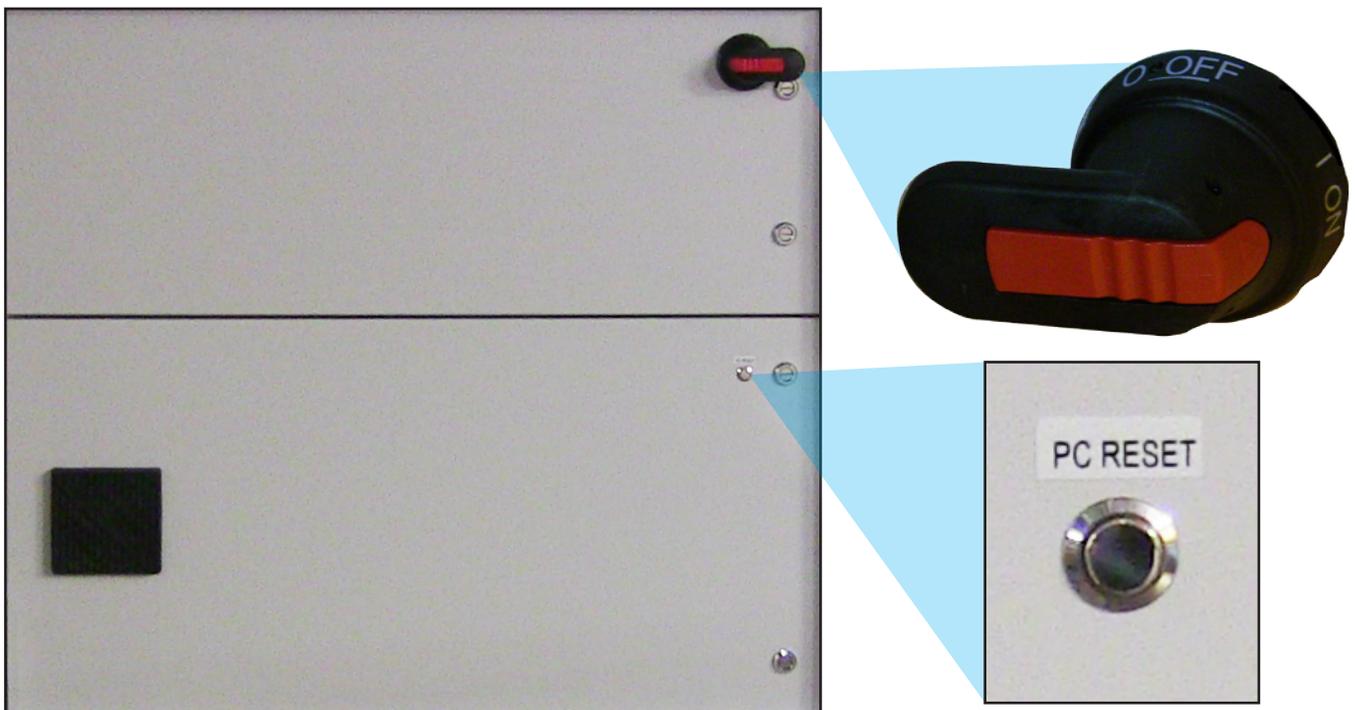
Inner Electrical Panel

L **System Controller:** A computer which controls the printer is located inside the electrical cabinet. The user does not have direct access to this device. The touchscreen user interface provides all user functionality.

MATERIAL DELIVERY MODULE (MDM)

The Material Delivery Module (MDM) manages all subsystems related to the print material including printing a part. It can hold up to 414 liters (109.3 U.S. gal.) of print material. There are three different sizes available which are listed in the section *"MDM Capacity" on page 20*. The maximum print volume is 650 x 750 x 550 mm (25.6 x 29.5 x 21.7 in).

The MDM allows for quick material changes without any material waste. Not only can you now change material in less than ten minutes, you can also swap the MDM easily, with no tools required. All components that come into contact with the material are moved with the module itself. One person can remove the MDM and replace it with another active MDM, without having to clean any wet material surface. This feature significantly reduces material swap time. In addition, you can warm up an MDM offline, enabling you to swap one MDM for another that is ready to use.

This handling method ensures that all parts that come into contact with the material during normal operation are a part of the active MDM.

⚠️ **When the MDM is removed from the printer, make sure to lock the wheel brakes to avoid hazard of any uncontrolled movement.**

For information on installing the MDM, refer to the section *"Material Delivery Module (MDM) Installation" on page 44*.

🧤 **Nitrile gloves are required to detach the print applicator, especially if there is any material left on the applicator. See the section, *"Print Applicator Installation and Removal" on page 43* for further details.**

There are two operating modes for the MDM:

Print Mode

In this mode, the MDM is online and connected to the ProX 800 which provides the MDM's power and Input/Output functionality. The ProX 800 monitors and controls the material temperature while connected with the active MDM. When the MDM is online, it can pump and recirculate material. The suitable material temperature for printing is 28 °C (+/- 3 °C).

Stand-by Mode

In this mode, the MDM is offline and operates independently from the ProX 800. When the MDM is plugged into a standard wall socket the module self-regulates the temperature keeping it stable and at operating temperature. The material can warm effectively in this mode, enabling the user to print a part while warming material for future use, allowing for no down time.

To put the MDM in stand-by mode, plug it into a wall outlet with a standard power cord and turn the MDM power switch on. The MDM will heat the material.

✏️ **NOTE: We recommend only heating the material up to 24 hours prior to use. Constantly heating the material when not in use will prematurely age the material.**

MDM Capacity

There are three models of MDM:

NAME	MAXIMUM BUILD VOLUME	FILL CAPACITY
MDM 800-50mm	650 x 750 x 50 mm (25.6 x 29.5 x 1.97 in)	95 liters (25.1 U.S. gal)
MDM 800-275mm	650 x 750 x 275 mm (25.6 x 29.5 x 10.8 in)	272 liters (71.86 U.S. gal)
MDM 800-550mm	650 x 750 x 550 mm (25.6 x 29.5 x 21.65 in)	414 liters (109.3 U.S. gal)

Material Container

The ProX 800 material containers incorporate smart cartridge technology that contains information about the material that is in the container and the MDM. This information prevents use of the wrong material, incorrect material use, or use of empty or expired containers, ensuring the material is safe to use. For more information, refer to the sections *"Material Container Removal" on page 48* and *"Installing Material Containers" on page 47*.
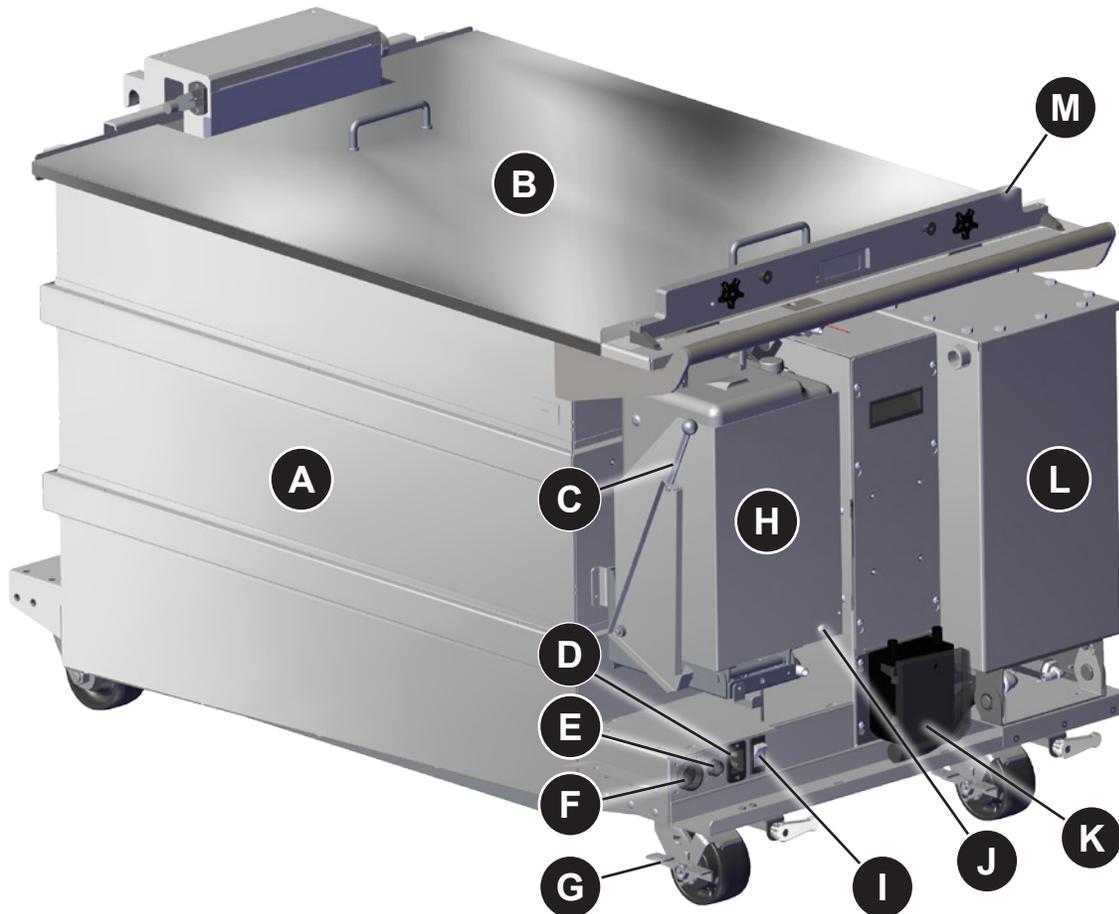
A   **MDM Basin:** The inside of the MDM contains the basin where the material used for printing is stored.

B   **MDM Lid:** The lid is used when storing an MDM offline. It prevents contaminants from getting into the material basin when the MDM is being stored offline. (see letter A).

C   **Material Bin Release Lever:** The release lever opens up the material bin so that material container can be installed and removed. Pull down on the lever to open the material bin.

D   **Heater Power Connector:** This connector plugs the heater into the MDM allowing the material to heat. When in Print mode, this is connected to the machine. When in Standby mode, it is connected to the wall.

**E**   **Serial Connector:** The Serial Connector connects the Smart Cartridge Technology reader for the material container, and establishes communication between the heater and the MDM (see letter "I" below).

F   **I/O Connector:** This connector is the interface for all communication and motion control between the MDM and the printer.

G   **Brake:** There are brakes on the two wheels at this end of the MDM. They are labeled "ON/OFF" to indicate which way to push the lever to release or engage the brake. Engage the brake any time the MDM is to stay stationary.

H   **Material Bin:** This is where the material container is docked for automatic MDM material refill. The material containers incorporate smart cartridge technology that contains information about the material that is in the container and the MDM. This information prevents use of the wrong material, incorrect material use, or use of an empty or expired container, ensuring the material is safe to use.

I   **MDM Heater Power Switch:** In the On position, the MDM will regulate material temperature. In the Off position, temperature

regulation doesn't occur. This functions in both Standby and Print modes.

J   **Container Release Button:** Press this button to release the material container when removing it from the material bin.

K   **Fill Pump:** The peristaltic fill pump controls the material height in the MDM by moving material to or from the leveling reservoir (see letter "H"). For replacing the tubing on the peristaltic pump, refer to the section *"Replace the Tubing in the Parastaltic Pump" on page 58*.

L   **Leveling Reservoir:** This reservoir is used to store material for transferring into or out of the print area to maintain the precise material height during printing.

M   **Applicator Rest:** This rest area is used to stow the removable applicator when changing MDMs.

PRINTHEAD OVERVIEW

The Printhead contains all components which power and control the laser and optics system of the printer. Only 3D Systems Certified Service Engineers are permitted to access the inside of the Printhead.
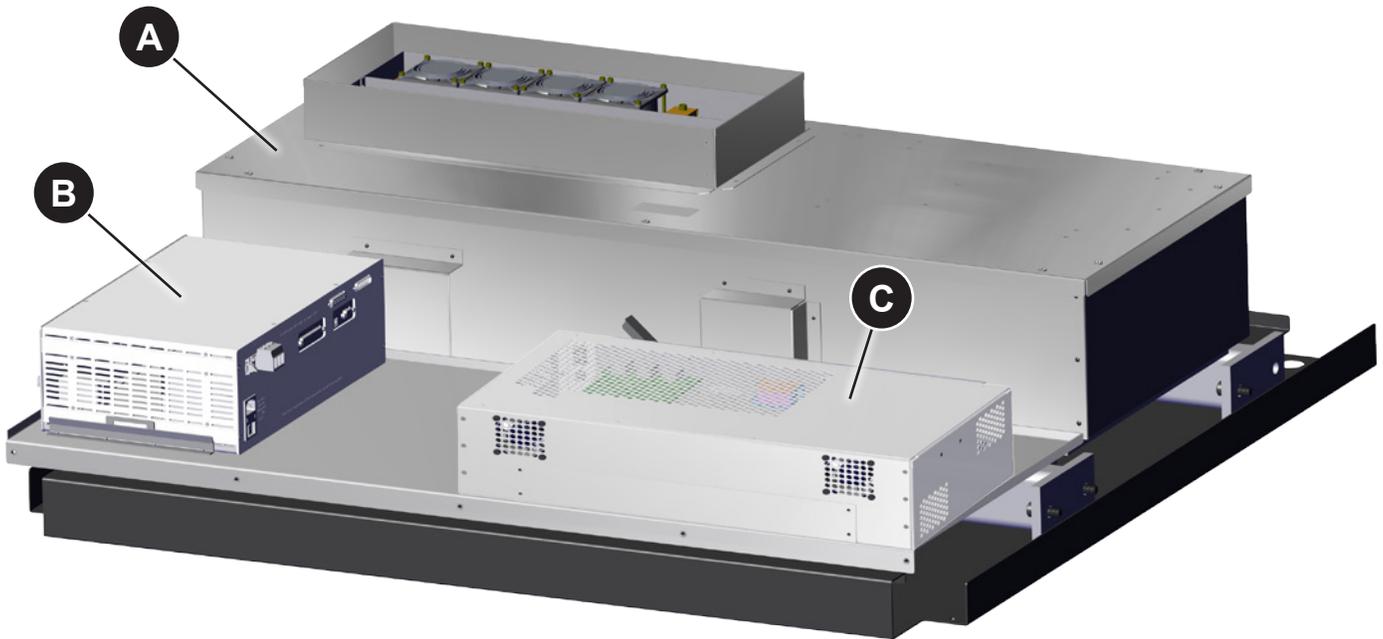
A   **IPM (Image Print Module):** The IPM contains the laser, optics, and scanning/drawing system.

B   **Laser Controller and Power Supply:** Contains both the power supply and the controller for the laser.
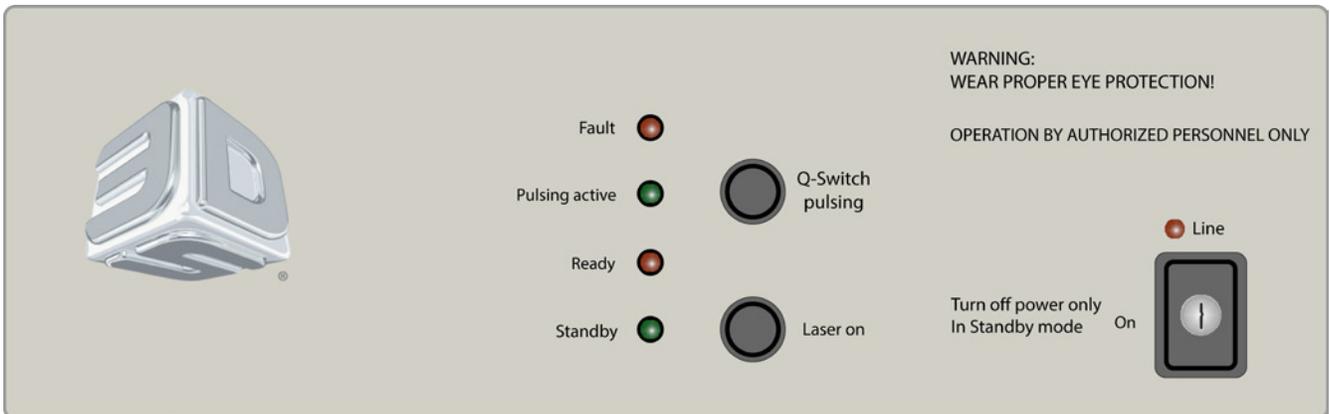
Laser Control Power Supply Interface

"Fault" LED: Turns red if a fault condition exists. Ensure all window and door interlocks are satisfied. If this does not clear the fault, restart the machine. Contact customer support if fault continues. See the section *"Customer Support" on page 66*.

"Pulsing Active" LED: Turns green when the laser is energized. The LED will switch between on and off during normal operation.

"Ready" LED: Turns red when the laser has been activated and the laser control circuits are enabled.

"Standby" LED: Turns green five minutes after the machine starts up. If this does not occur, the laser controller did not initialize properly. Restart the machine or contact customer support. See the section *"Customer Support" on page 66*.

> ✎ **NOTE: The LEDs will all briefly illuminate when the system is turned on to ensure that the LEDs are functional.**

"Line" LED: Laser controller is on.

Key: Uses a key to switch the laser power on and off.

"Q-Switch pulsing" button: Disables the laser output while remaining in ready mode.

"Laser On" button: Changes the laser state from Standby mode to Ready mode or vice-versa.

C   **Mirror Controller:** Controls the scanning/drawing system of the printhead.

USER INTERFACE

The User Interface consists of a touchscreen located on the side of the printer and the system status LED indicators. The touchscreen runs the **Print3D Pro** printer controller software. An Emergency Stop button ("E-Stop") is located above the touchscreen. See the section, *"Software Overview" on page 26* for descriptions of the touchscreen functionality.

A   **Emergency Stop (E-Stop):** This switch is located on the side panel above the touchscreen. The E-Stop immediately disables all motion controls and the laser, rendering them safe. After being pressed, it remains in the closed state until it is manually returned to the open state by pulling the red knob and turning it clockwise.

B   **Touchscreen:** Displays the Print3D Pro software which is used to control the printer.

C   **Buttons, Indicators, USB Ports**

Chamber Lights: This button turns the chamber lighting on or off. There are two chamber lights located at the top of the print chamber.

NOTE: The chamber lights can be repositioned to view specific areas as needed. Check the switch on the lights themselves if they do not come on when you press the button under the user interface. See the illustration below for the switch location.

LED Indicators: The LED indicators indicate the readiness of the machine and its Lasers.

- **"Laser" Blue LED**
  - **ON**, Solid
    - » Printhead enabled
  - **OFF**
    - » Printhead disabled or off.
- **"Control" Green LED**
  - **ON**, Solid
    - » Control systems are enabled. The machine is ready for use.
  - **OFF**
    - » Control systems are not enabled. The machine is not ready for use.
- **"System" Amber LED**
  - **ON**, Solid
    - » All safety and interlock systems have been satisfied. Laser safety shutter is operational.
  - **OFF**
    - » All safety and interlock systems have not been satisfied. Laser safety shutter is not operational.

System Enable: Once the software has been launched, the user will press the System Enable button to lock the doors so that the system is ready to print. Use the System Enable button to resume system operations after an E-Stop has pushed and any faults have been cleared.

USB: Three standard auxiliary USB ports connected to the control PC are located at the bottom of the UI.

ProX 800 User Interface

Switch
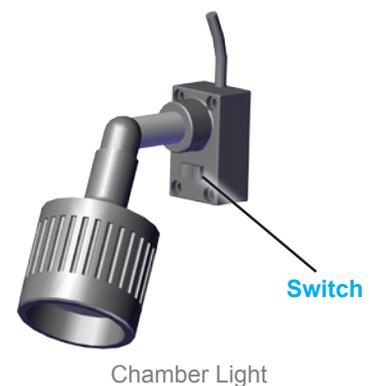
Chamber Light

LIGHT STACK

Red

- **ON**, Solid
  - » E-Stop is pressed
- **ON**, Flashing
  - » Fault condition exists, resulting in an aborted print job.
- **OFF**
  - » Normal operating condition

Amber

- **ON**, Solid
  - » Printer is being serviced
- **ON**, Flashing
  - » User warning or alert
- **OFF**
  - » E-Stop is pressed

Green

- **ON**, Solid
  - » Print Job is in progress
- **ON**, Flashing
  - » Manual operation in progress
- **OFF**
  - » E-Stop is pressed or normal operating conditions
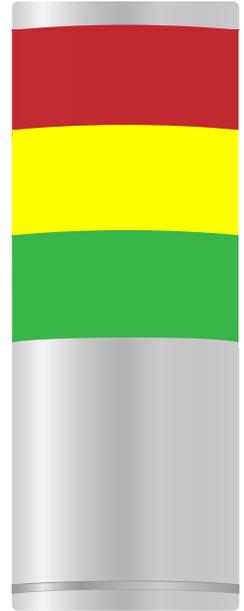
MANUAL OFFLOAD CART

The manual offload cart is an optional accessory for all ProX 800 models. The offload cart allows you to easily remove the print pad when it is loaded with a large or heavy part and transport it to the finishing area where supports are removed and the part is cleaned before it is cured.

Parts can be offloaded with the manual offload cart to ensure optimal safety. Refer to the section, *"To Remove a Part" on page 55* for information on operating the cart.
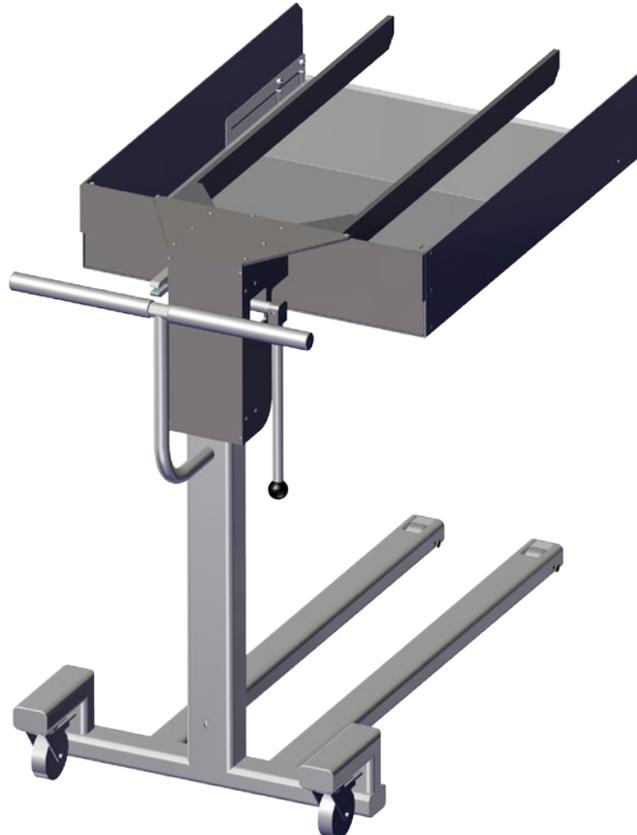
SOFTWARE OVERVIEW

The touchscreen of the ProX 800 uses 3D Systems' Print3D Pro™ printer controller software. The Print3D Pro runs on a Google™ Nexus 10™ tablet running the Android™ operating system which provides standard functionality for navigation, notifications, and application control. For further information, refer to the Nexus 10 documentation: http://www.nexus10manual.net/wp-content/uploads/2012/12/Samsung-Google-Nexus-10-User-Manual.pdf

HOME SCREEN

When the tablet is powered on, there should be a **Print3D Pro** icon (A) displayed on the Home screen. Tap the icon to launch the application. If the icon is not present, tap the **All Apps** button (E) and select Print3D Pro from the apps displayed.

A   **Print3D Pro Application Icon:** Press this icon to launch the Print3D Pro application.
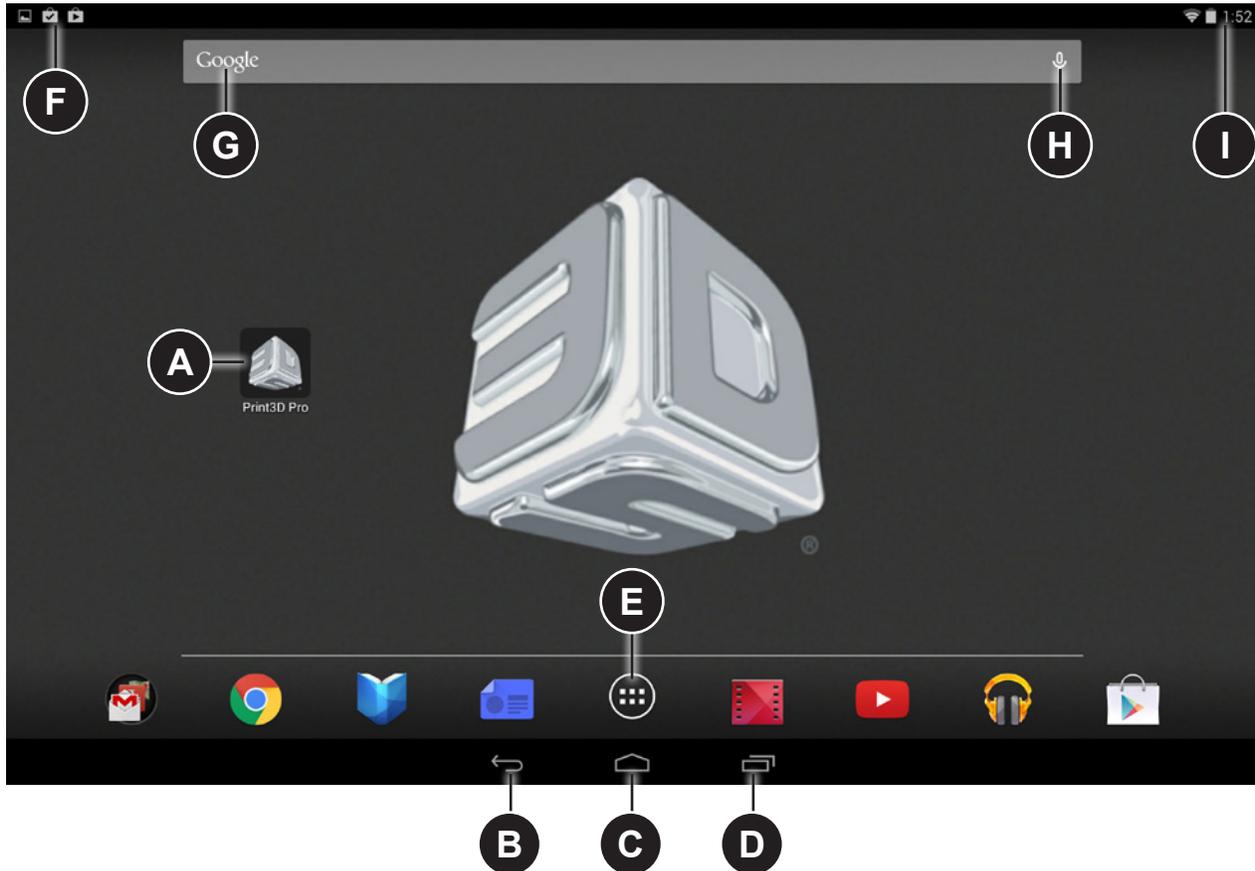
B   **Back:** Opens the previous screen you were working in, even if it was in a different application (app).

C   **Home:** Navigates to the Home Screen. If you are viewing an alternate Home screen, this opens the central Home screen.

D   **Recent Apps:** Opens a list of thumbnail images of apps you have worked with recently. To open an app, touch it. To close an app, swipe it left or right.

E   **All Apps:** View all of the applications on the device.

F   **Alerts and Notifications:** Alerts and messages occur within the annunciator bar. Swipe down from the top of the screen with one finger to view the notifications.

G   **Google Search Bar:** Open Google's search engine.

H   **Voice Input:** Press to activate voice-to-text input.

I   **Status Icons:** Various system status indicators appear here such as Bluetooth, Wi-Fi, & battery status

STATUS SCREEN

The Status screen displays important real-time information about the printer. This screen is mainly used for information purposes other than the **Navigation Bar** (B), and the **Overview Bar** (C).
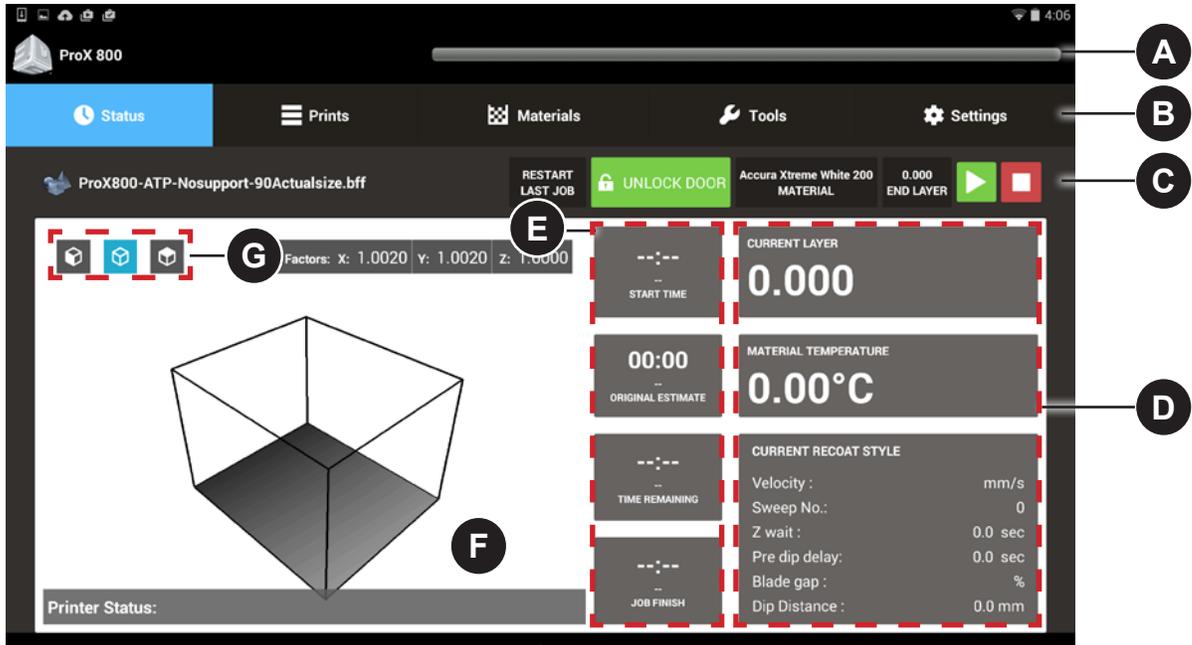
A **Status Bar:** The status bar displays the printer name, alerts/notifications, and print progress with time elapsed and estimated time remaining. The bar changes color and displays urgent alerts and print errors.

B **Navigation Bar:** The top navigation bar consists of five distinct tabs: Status, Prints, Materials, Tools, and Settings. Select any of these tabs to open up a new screen and navigate through the selected item.

C **Overview Bar:** From this bar, the user can view the progress and relevant status indicators for the current job.

> **Restart Last Job:** When Restart is pressed, it will issue a "start job" command with the restart flag.
>
> If the machine is able to restart the last job (from the last printed layer) then the machine will start printing. However, if it is not able to restart, the printer will issue a "print aborted" notification which will be displayed as a pop up on the UI.
>
> **Unlock Door:** Pressing this button will toggle the doors between Lock and Unlock positions.
>
> **Material:** Indicates the material that is currently being used by the system.
>
> **End Layer:** Indicates what the most recent layer of the print is.
>
> **Start/Stop/Restart:** To stop, start, or restart the current printing job, press the appropriate button. You will be presented with a confirmation screen to verify your choice.

D **Current Settings:** This section displays various parameters of the current print job. These are the values programmed using the 3D Manage software. Refer to the application software help screens and manual for further information about these parameters.

> **Current Layer:** The end value of the layer currently being printed.

Material Temperature: Temperature (in °C) of the material in the MDM.

Current Recoat Style:

> **Velocity:** Speed of the print applicator mechanism.
>
> **Sweep No.:** Number of sweeps performed.
>
> **Z wait:** The delay time between the print applicator sweep and the point at which the laser begins to draw.
>
> **Pre dip delay:** The amount of time between when the laser has finished drawing and when the elevator motion and applicator process begins.
>
> **Blade gap:** Percentage of distance between the applicator blade and the material surface during the applicator process.
>
> **Dip distance:** Distance that the elevator moves down during the applicator process.

E **Print Job Timing:** These fields display the following information:

> **Start Time:** Time the print job began.
>
> **Original Estimate:** Estimated time to complete the print job, calculated using the initial settings.
>
> **Time Remaining:** Estimated remaining amount of time until the print job is completed.
>
> **Job Finish:** Actual time when the print job is projected to finish.

F **View Port:** A preview of the 3D model which is being printed appears in this window. The preview can be maneuvered by touching it and dragging with your finger.

G **Preset Views:** The 3D model has 3 preset views. From left to right, they are: front, isometric, and top.

PRINT QUEUE SCREEN

The Print Queue screen displays the current jobs waiting to be processed.
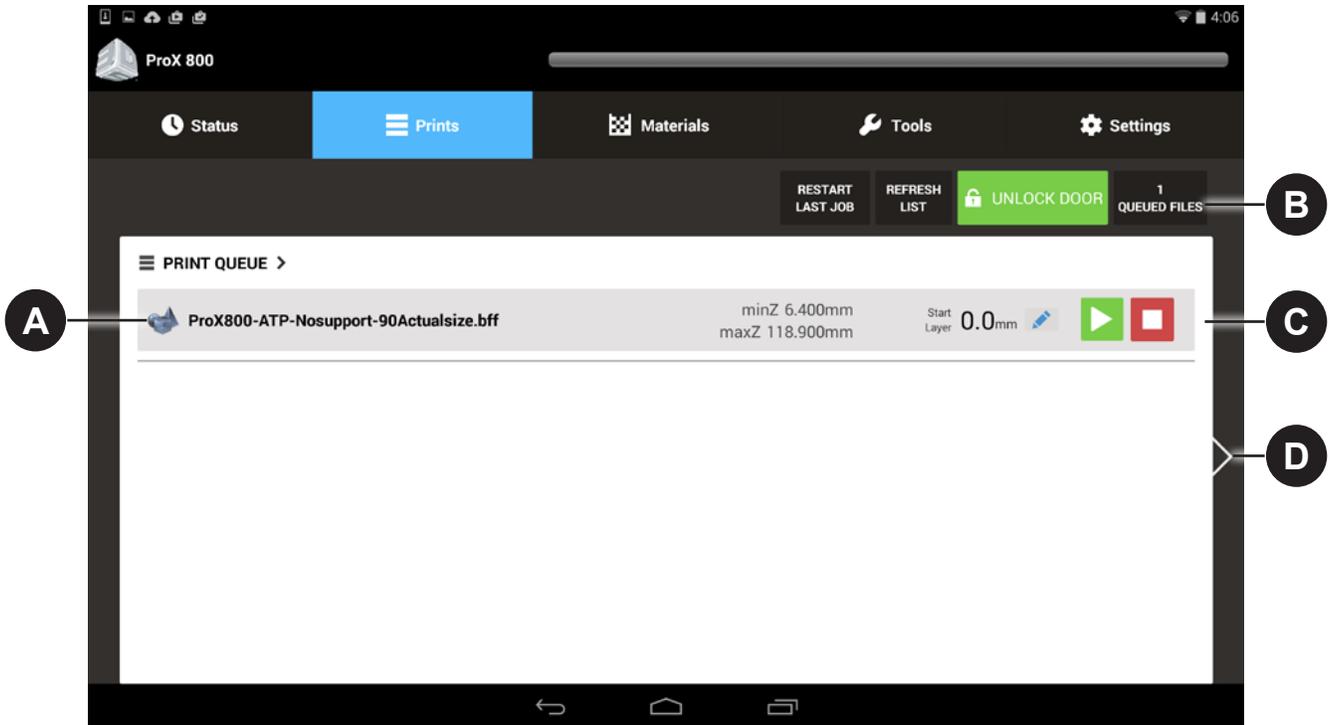
A   **Print Job File Name:** File that is currently the next to print appears here with a gray background. All the other files in the queue appear below.

B   **Print Queue Statuses:** These fields display:

> **Restart Last Print Job:** When Restart is pressed, it will issue a "start job" command with the restart flag.
>
> If the machine is able to restart the last job (from the last printed layer) then the machine will start printing. However, if it is not able to restart, the printer will issue a "print aborted" notification which will be displayed as a pop up on the UI.
>
> **Refresh List:** Refresh the queue list on the UI. If a user submits a job from a USB drive while in the queue menu, the list will need to be refreshed. Alternatively, you can exit the queue and go back–it will automatically refresh the list.
>
> **Unlock Door:** Pressing this button will toggle the doors between Lock and Unlock positions.
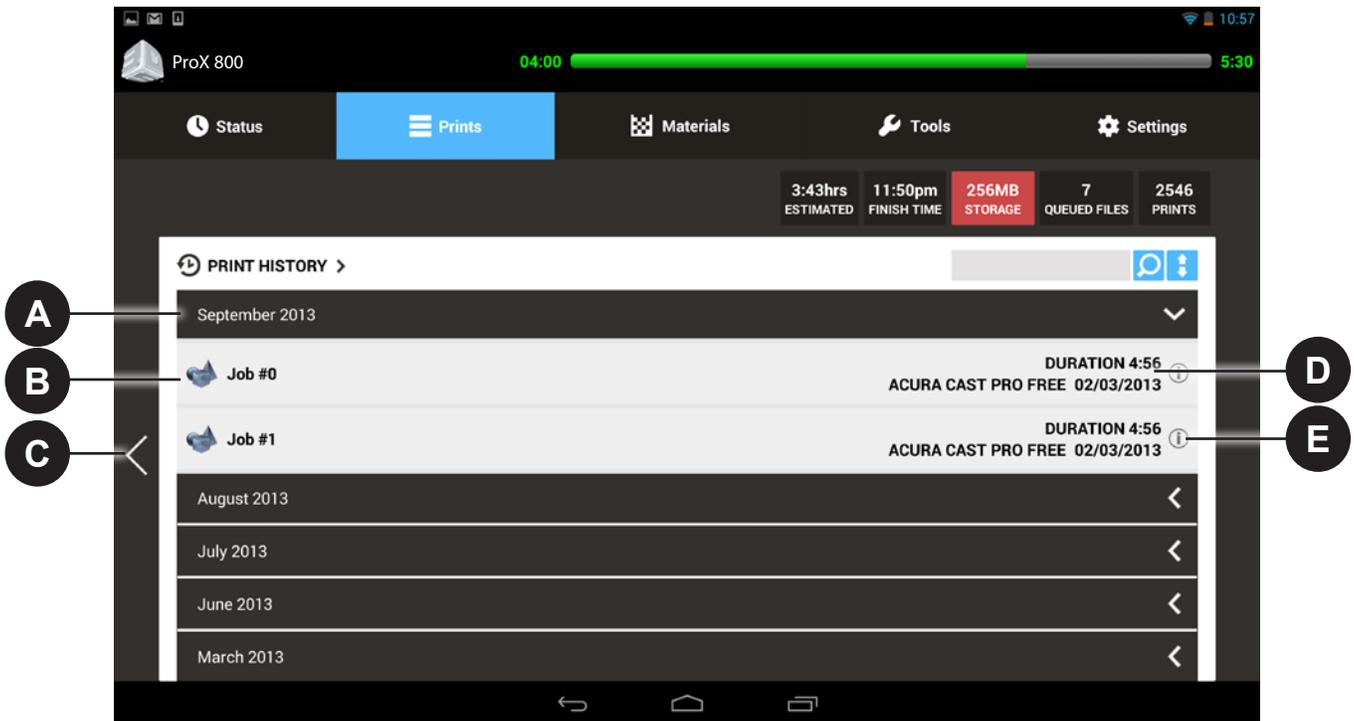>
> **Queued Files:** Number of files currently in the queue.

C   **Start/Stop/Pause:** Use these buttons to start, stop, or pause the print job.

D   **Next Page:** Navigate to the **Print History** screen, described below.

PRINT HISTORY SCREEN

The Print History screen gives the user access to information and functions related to previous print jobs.

A   **Folder (by month):** The print history is sorted and grouped by month. Press anywhere on the black bar to see a list of the print jobs for that month. When the white arrow is pointing towards the left, the folder is closed. When the arrow is pointing down, the folder is open. Toggle back and forth between open and closed by selecting anywhere in the black bar for the month.

B   **Print Job:** The specific print job is listed under the month.

C   **Back:** Navigate back to the **Print Queue** screen, described above.

D   **Print Job Information:** Information about the job is listed here such as the duration of the print job, material, and date.

E   ⓘ **Information:** Press the information icon to bring up a dialog box which gives you the choice to **Copy to Queue** which will copy the chosen job to the active print queue, or **Delete** which will remove the print job from the Print History.

DETAIL POP-UP SCREEN

This screen provides additional actions that a user can perform on a file. It is displayed when the (i) button is pressed on the **Print Queue Screen**.
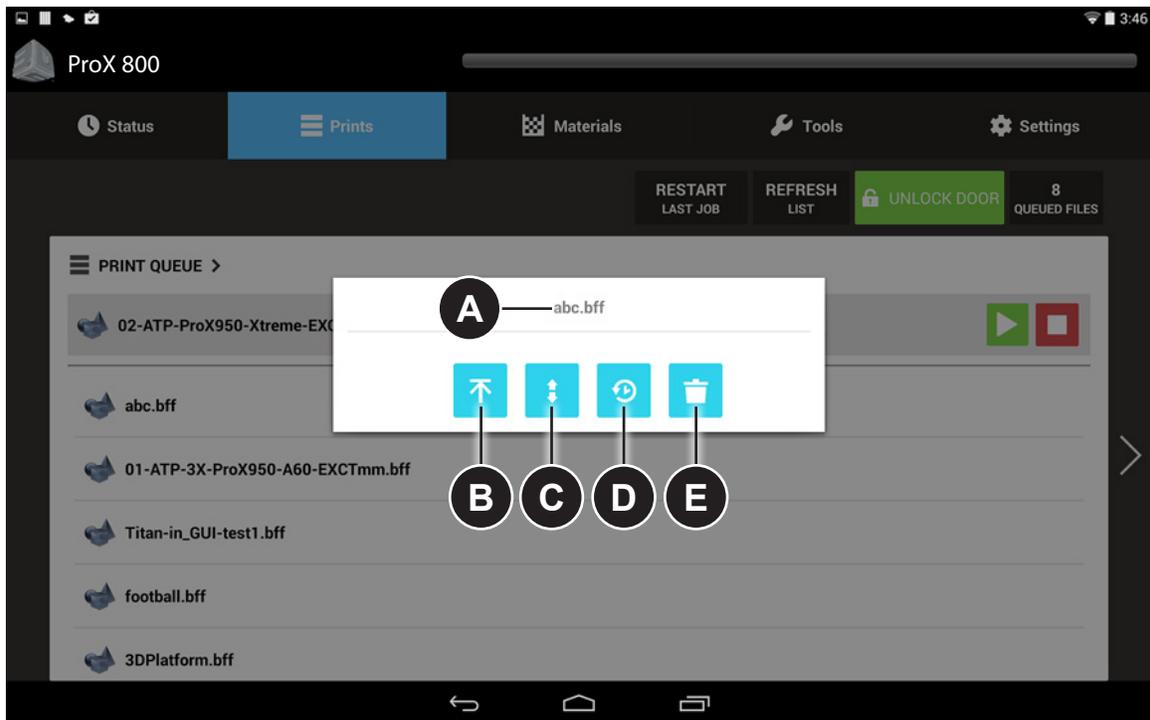
A   **Filename:** The print job on which to perform additional actions.

B   **Move to Top of Queue:** Move the current job to the top of the print queue.

C   **Move Up/Down in Queue:** Move the current job up or down in the print queue.

D   **Move to Print History:** Select this button to move the print job to the Print History. If currently in the print history, selecting this will take you back to the **Print Queue**.

E   **Delete:** Delete the job from the print queue. Selecting this button after selecting the desired job will move it to the trash.

MATERIAL STATUS SCREEN

The Material Status Screen displays information pertinent to the material in the system.
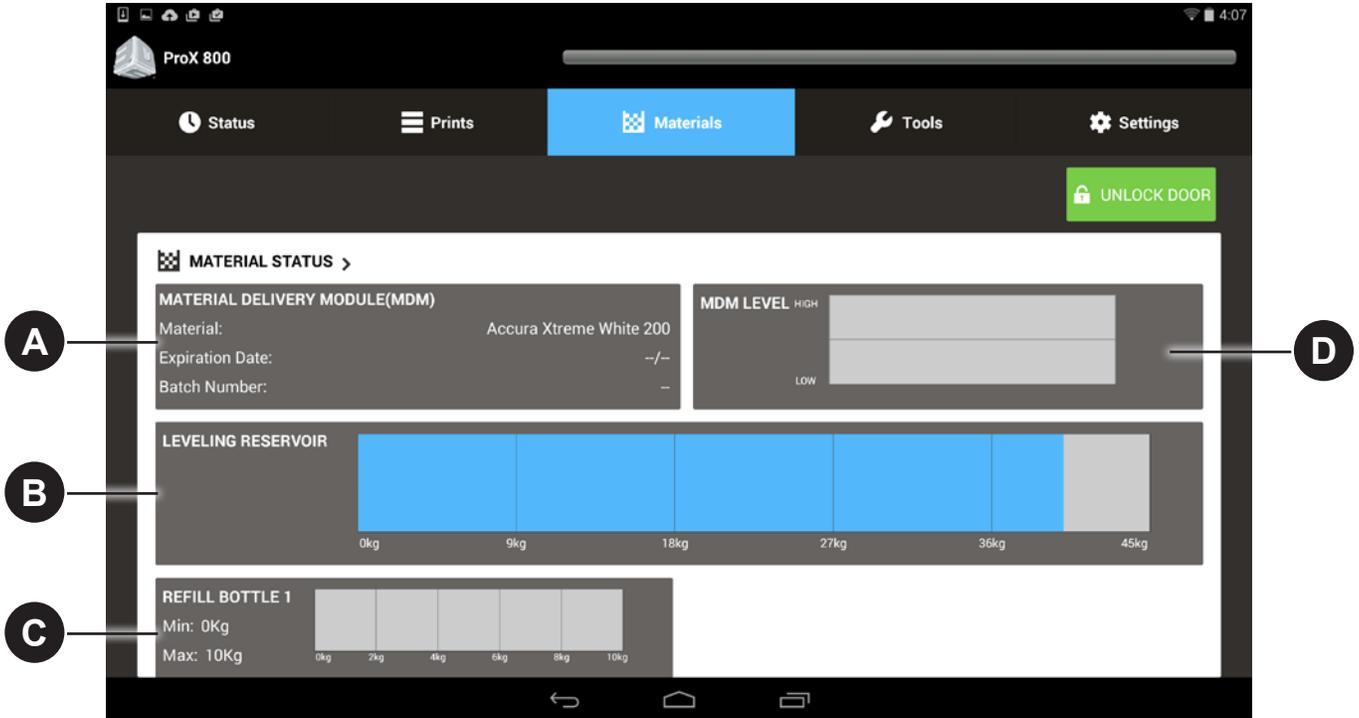
A   **Material Delivery Module (MDM):** This field provides information on the current material type, expiration date of that material, and batch number of the material in the MDM.

B   **Leveling Reservoir:** Displays the weight of the material in the leveling reservoir.

C   **Refill Bottle:** Displays the weight of the material in the refill container.

D   **MDM Level:** Indicates the amount of material in the MDM. The line indicates the nominal level of the material.

TOOLS MENU SCREEN

The Tools Menu Screen allows the user to navigate to various manual operations menus which are described below.
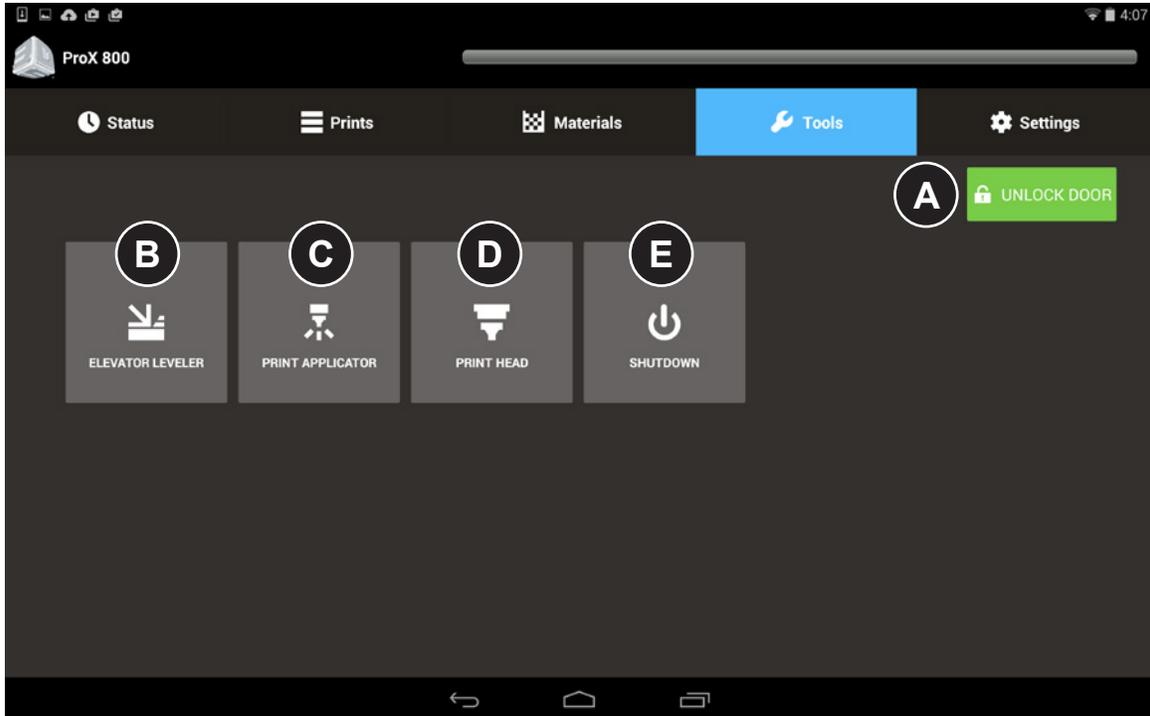
A   **Unlock Door:** Pressing this button will toggle the door between Lock and Unlock positions.

B   **Elevator Leveler:** This tool allows the user to operate the elevator leveler manually. See the section *"Elevator/Leveler Settings Screen" on page 33* for more detailed usage.

C   **Print Applicator:** The Print Applicator Screen allows you to operate the applicator manually. For more detailed usage see the section *"Print Applicator Screen" on page 34*.

D   **Printhead:** The Printhead Screen gives the user access to functionality of the Printhead. See the section *"Printhead Settings Screen" on page 35* for more information.

E   **Shutdown:** This feature shuts down the printer.

ELEVATOR/LEVELER SETTINGS SCREEN

The Elevator/Leveler Settings Screen allows you to operate the elevator manually.
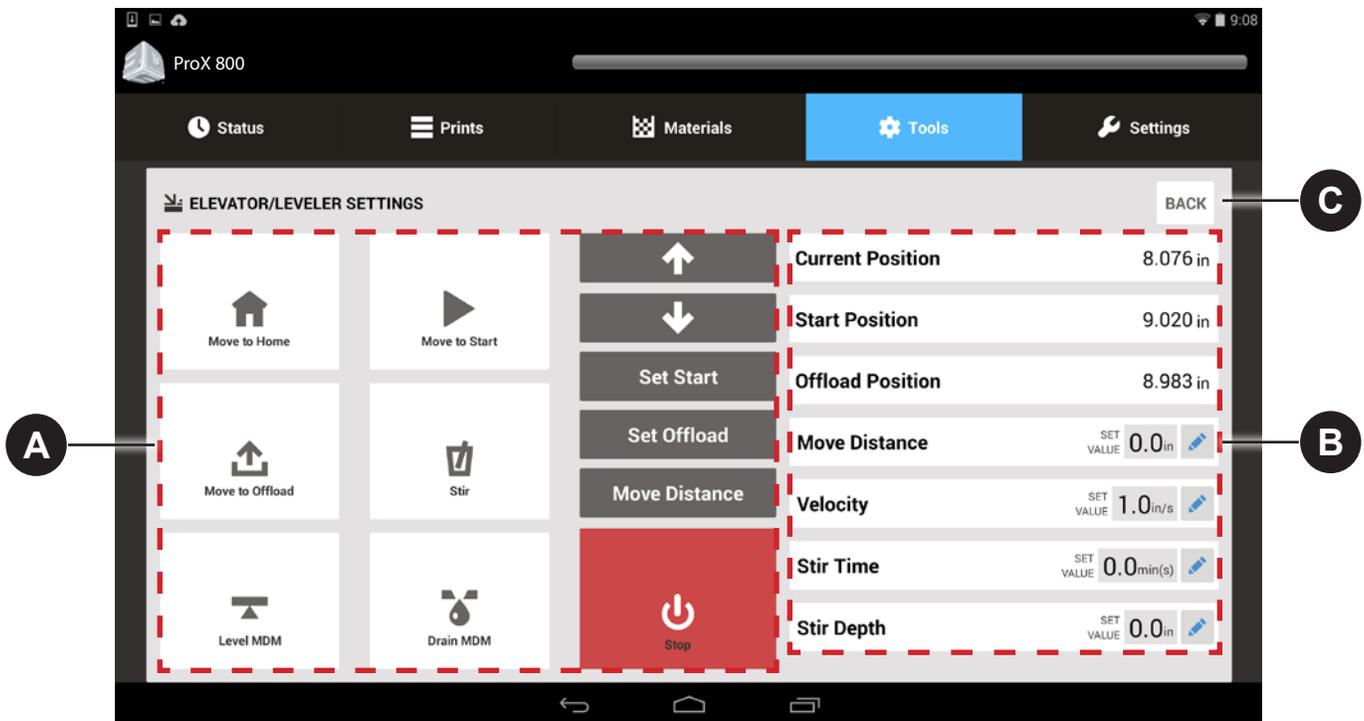
A Manual Motions:

Move to Home: Move the elevator to its home position.

Move to Start: Move the elevator to its start position, as defined in its **Set Start** settings.

Move to Offload: Move the elevator to its print offload position as defined in the **Set Offload** settings.

Stir: Pressing this button causes the system to mix the material by moving the elevator up and down according to the settings entered. Perform the following steps:

1. Using the up and down arrows, position the elevator to the uppermost stir position.

2. Set the **Move Distance** value for the distance to lower the elevator.

3. Set the **Stir Time** for the amount of time to perform the stir action.

4. Press **Stir**.

Level MDM: Pumps material into and out of the leveling reservoir until the material is level.

Drain MDM: This button drains the MDM until the leveling reservoir is full.

Up/Down Arrows: Manual motion for the elevator. Press and hold until the elevator moves in the direction of the arrow. The elevator will keep moving until it reaches its limit.

Set Start: Saves the elevator's current position as the Start position. See *"Printing a Part" on page 52* for instructions on setting the **Set Start** position.

Set Offload: Saves the elevator's current position as the **Print Offload** position. The offload position comes pre-set in the software; however, some adjustments may need to be made. If the Move to Offload button needs to be adjusted, follow the steps in *"Setting the Offload Position" on page 50*.

Move Distance: Allows you to move the elevator a defined distance.

Stop: Stop the current motion.

B Parameters:

Current Position: Shows the current position of the elevator relative to the home position.

Start Position: Displays the elevator's start position.

Offload Position: Displays the elevator's offload position.

Move Distance: Amount to manually move the elevator. Set this value using the edit button

Velocity: Specifies the elevator speed, in inches per second (ips), during manual motion. The default is 1.0 ips. The recommended range is 0.1 to 3.0 ips. This setting does not affect the applicator speed during printing. Set this value using the edit button
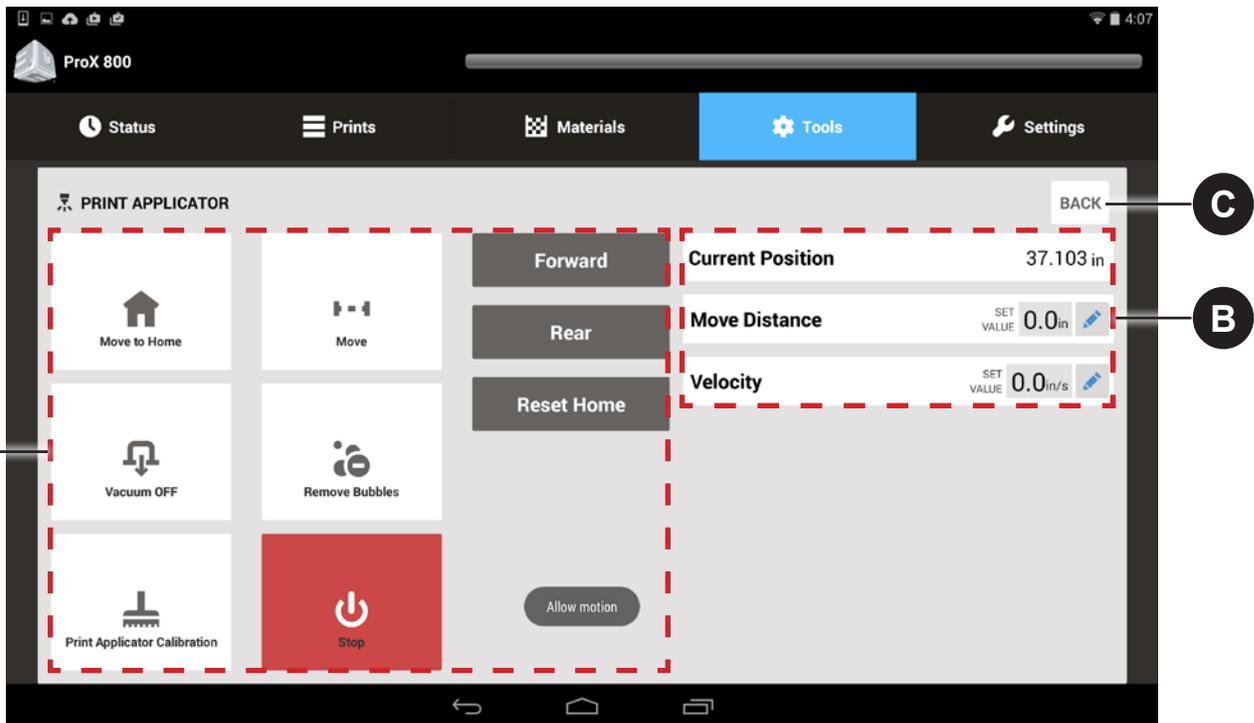
Stir Time: Amount of time to perform the stir function. Set this value using the edit button

Stir Depth: Distance to lower the elevator when stirring. Set this value using the edit button

C

Back: Navigate back to the *"Tools Menu Screen" on page 32*.

PRINT APPLICATOR SCREEN

The Print Applicator Screen allows you to operate the print applicator manually.

A Manual Motions:

Move to Home: Move the print applicator to its home position.

Move: To manually move the print applicator:

- Set the **Move Distance** and **Velocity** to the desired value by using the edit button ✏️

- When these values are satisfactory, press the **Move** button to activate manual motion.

Vacuum OFF: Switch the print applicator vacuum on and off.

Remove Bubbles: Runs a predefined operation to remove bubbles on the material surface.

Print Applicator Calibration: Runs a predefined operation to calibrate the print applicator system.

Stop: Stops the current manual motion and operation.

Forward: Manually move the print applicator towards the front of the system. Press and hold to move.

Rear: Manually move the print applicator to the rear of the system. Press and hold to move.

Reset Home: This recalibrates the home position of the applicator. This will need to be used if the motor of the print applicator blade gets out of sync.

Allow Motion / Motion Not Allowed: This message pops up when you open the screen. It indicates whether or not the system is in a state where the print applicator can be operated manually. To operate the print applicator, the elevator must be at least 2 inches below the surface of the print material and the applicator must not be able to collide with the elevator. This can usually be accomplished by pressing the **Move to Home** button on the **Elevator/Leveler Screen**.

> ✍️ **NOTE: If the Start Position has inadvertently been set to a distance that is not at least 2 inches below the print material surface, the Start Position must be changed so that Move to Home will go to the proper location. See** *"Printing a Part" on page 52* **for instructions on setting the Set Start Position.**

B Parameters:

Current Position: Shows the current position of the print applicator relative to the home position.

Move Distance: Amount to manually move the print applicator. Set this value using the edit button ✏️

Velocity: Specifies the print applicator speed, in inches per second, during manual motion. This setting does not affect the applicator speed during printing. Set this value using the edit button ✏️

C Back: Navigate back to the *"Tools Menu Screen" on page 32*.

PRINTHEAD SETTINGS SCREEN

The Printhead Settings Screen gives the user access to functionality of the laser scanning and drawing system.

WARNING: CHECK TO ENSURE THAT THE IPM GREEN CONTROL LAMP IS ON AND NOT FLASHING PRIOR TO PERFORMING ANY OF THESE PROCEDURES. REFER TO THE SECTION, *"USER INTERFACE" ON PAGE 24* **FOR DETAILED INFORMATION. CONTACT FIELD SERVICE IF THE GREEN CONTROL LAMP IS FLASHING. PERFORMING ANY PROCEDURES WITH THE IPM IN THE FLASHING STATE COULD CAUSE EXPOSURE TO HAZARDOUS RADIATION.**
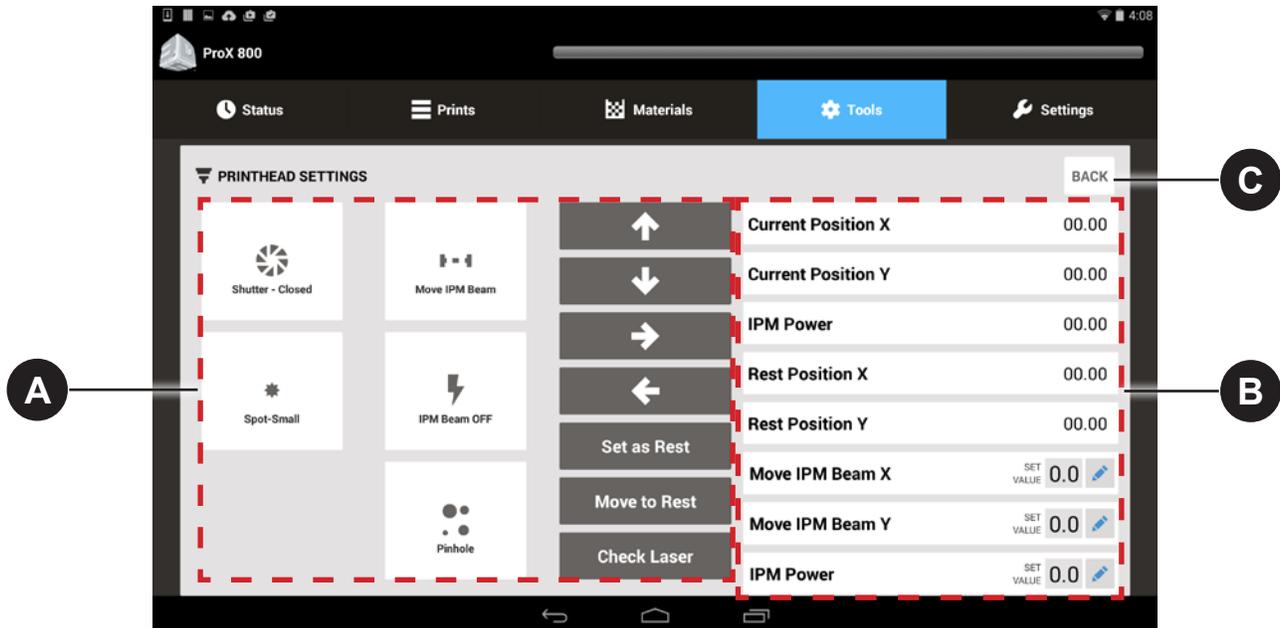
A   Manual Motions:

Shutter - Closed/Open: Switch the IPM Beam shutter between open and closed.

Spot-Small/Large: Toggles the IPM Beam spot size between large and small.

Move IPM Beam: To manually move the IPM Output Beam:

- Set the **Move IPM Beam X** and **Move IPM Beam Y** fields to the desired values.
- When these values are satisfactory, press the **Move IPM Beam** button to activate manual motion.
- Use the **Arrow Keys** to control the motion.

IPM Beam ON/OFF: Allows you to manually turn the Laser on or off. When you start a build the laser automatically turns on.

Pinhole: Opens **Profiling Mode.** In this mode the beam will check the position of the pinhole to ensure that the laser is drawing in the proper spot. This works as a checkpoint to ensure that printing is starting at the same point.

Up/Down/Left/Right Arrows: Manual motion control for the IPM Beam. Hold the arrow down to move.

Set as Rest: Set the current IPM Beam position as the rest position.

Move to Rest: Move the IPM Beam to the stored rest position.

Check Laser: Checks the IPM power and returns a value based on the IPM power setting.

B   Parameters:

Current Position X: Shows the current x-axis position of the IPM Beam relative to the home position.

Current Position Y: Shows the current y-axis position of the IPM Beam relative to the home position.

IPM Power: Displays the current requested IPM power.

Rest Position X: Shows the current x-axis rest position of the IPM Beam relative to the home position.

Rest Position Y: Shows the current y-axis rest position of the IPM Beam relative to the home position.

Move IPM Beam X: Set the value to manually adjust the IPM Beam along the x-axis using the edit button. To move the IPM Beam, use the **Move IPM Beam Arrows.**

Move IPM Beam Y: Set the value to manually adjust the IPM Beam along the y-axis using the edit button. To move the IPM Beam, use the **Move IPM Beam Arrows.**

IPM Power: Set the IPM Beam power using the edit button.

C   Back: Navigate back to the *"Tools Menu Screen" on page 32*.

SETTINGS SCREEN

The Settings Screen allows you to navigate to the settings screens for various components of the printer.
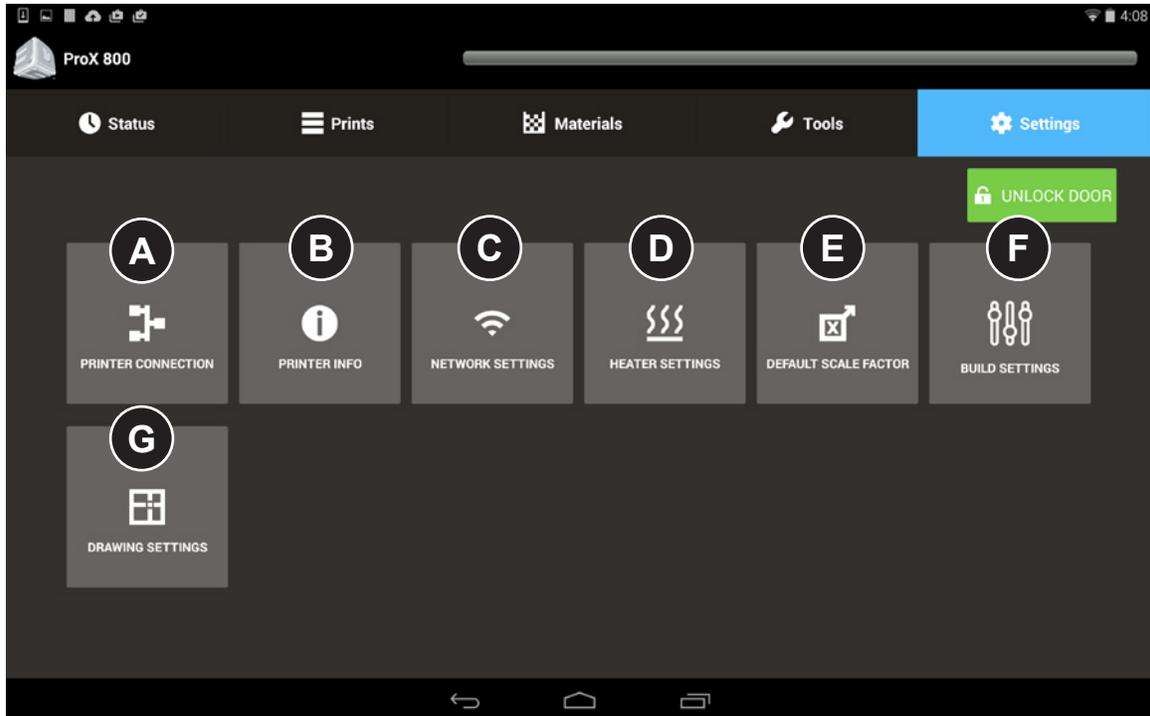
A   **Printer Connection:** Navigate to the Printer Connection Settings screen. See the section *"Manual Printer Connection Screen" on page 37*.

B   **Printer Information:** Navigate to the Printer Information Settings screen. See the section *"Printer Information Settings Screen" on page 38*.

C   **Network Settings:** Navigate to the Network Settings screen. See the section *"Network Settings Screen" on page 38*.

D   **Heater Settings:** Navigate to the Heater Settings screen. See the section *"Heater Settings Screen" on page 39*.

E   **Default Scale Factor:** Navigate to the Default Scale Factor Settings screen. See the section *"Scale Factor Settings Screen" on page 40*.

F   **Build Settings:** Navigate to the Build Settings screen. See the section *"Build Settings Screen" on page 41*.

G   **Drawing Settings:** Navigate to the Drawing Settings screen. See the section *"Drawing Settings Screen" on page 42*.

MANUAL PRINTER CONNECTION SCREEN

Your printer should already be networked correctly, in which case you will not see this screen. If it becomes necessary to set the network connection up manually, the Settings tab will appear after you launch the Print3D Pro application.
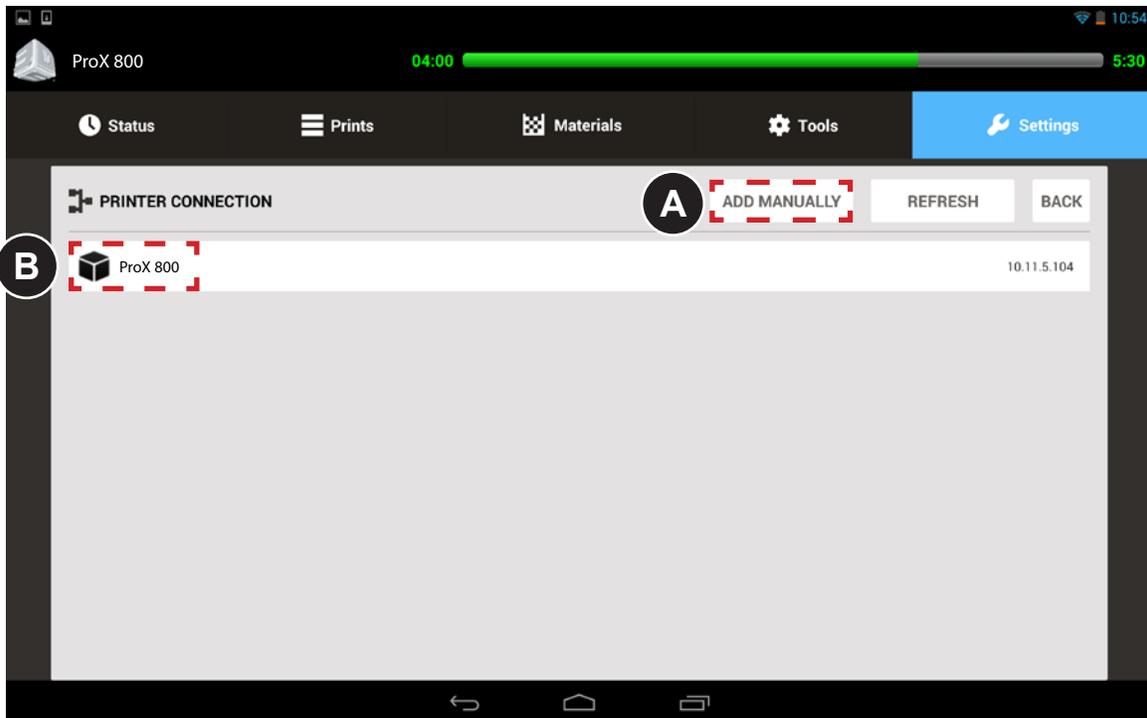
A   Press the **ADD MANUALLY** button. You will be prompted to enter the IP address for your printer. The address will vary, depending on your setup. If you do not know your address, contact your systems administrator.

Enter the correct address into the field and press **ADD**.

B   Your printer will appear in the list. Press the name of the printer to continue launching Print3D Pro

PRINTER INFORMATION SETTINGS SCREEN

Here you will find the printer name, printer serial number, 3D Systems SLA controller software build version and build date, and the Print3D Pro version installed on your printer.
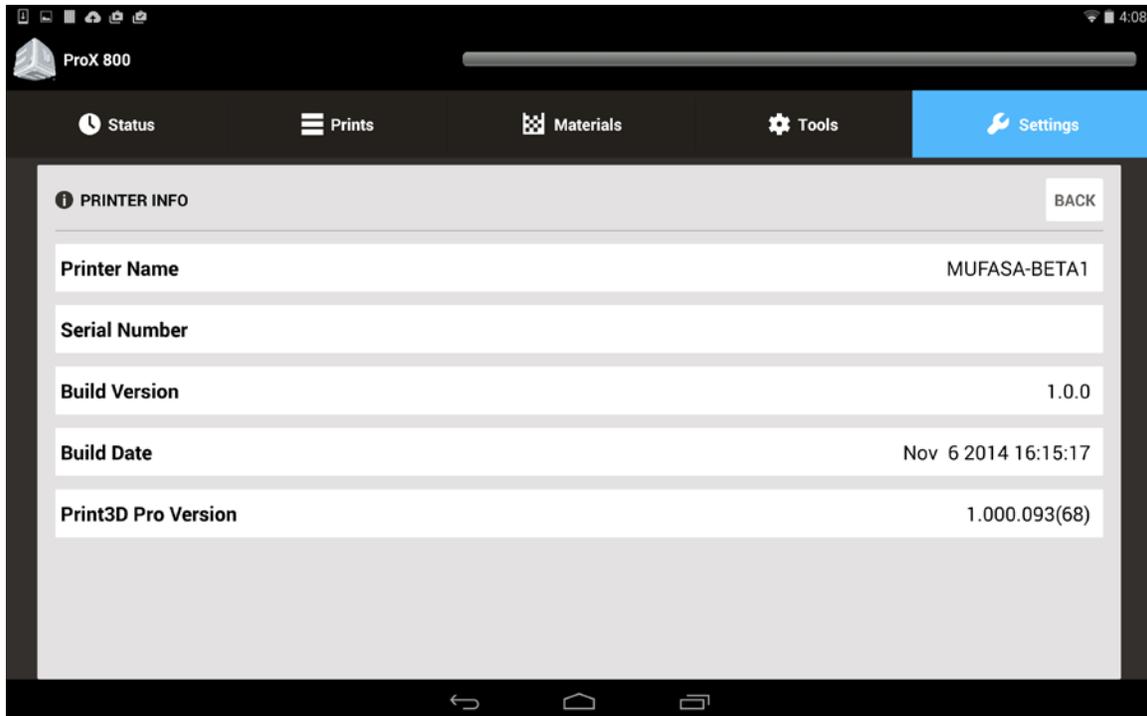
NETWORK SETTINGS SCREEN

The Network Settings Screen allows the user to view the values related to the system network.
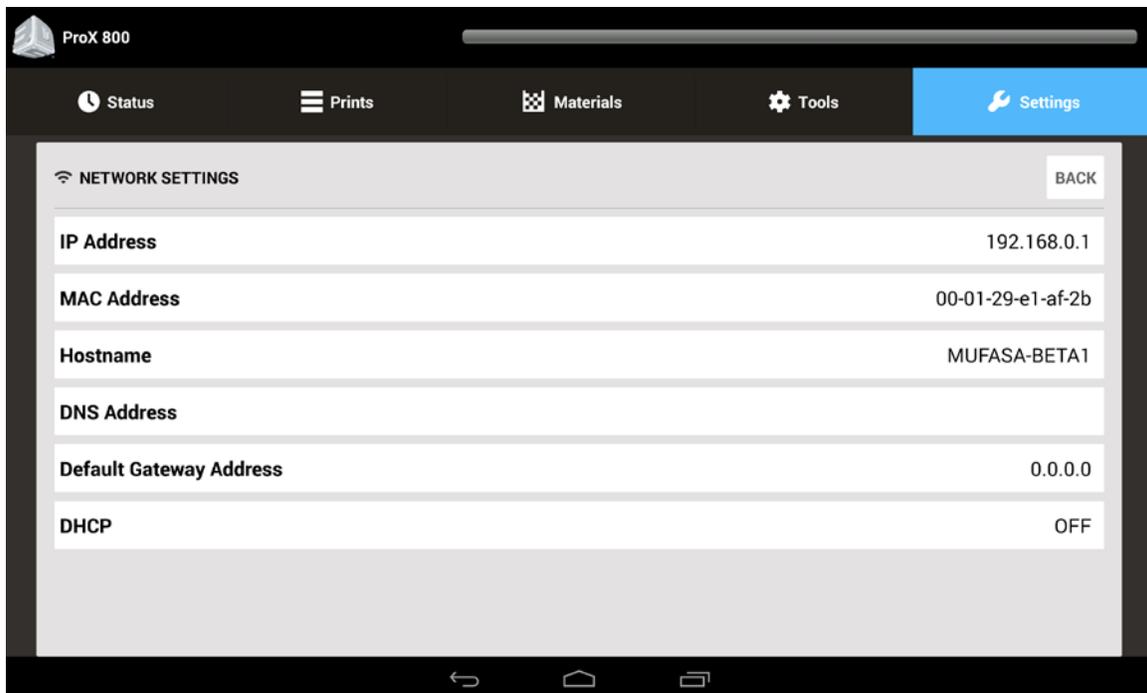
IP Address: View the IP address for the system.

MAC Address: View the MAC Address for the system.

Hostname: View the network host name of the system.

DNS Address: View the main TCP/IP address for the DNS Server.

Default Gateway Address: View the TCP/IP address for the Default Gateway.

DHCP: Switch the Dynamic Host Configuration Protocol (DHCP) on or off.

HEATER SETTINGS SCREEN

The Heater Settings screen allows the user to view and set parameters of the system heaters.
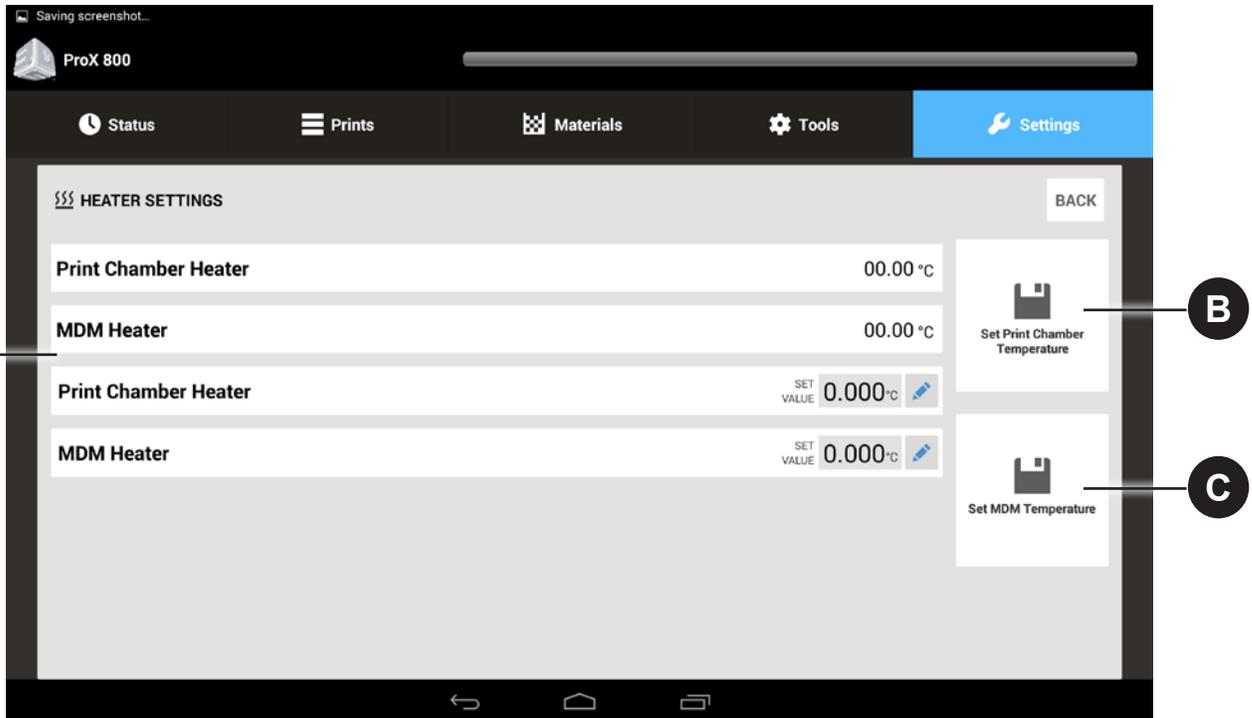
A   **Print Chamber Heater:** View the current temperature for the chamber heater.

MDM Heater: View the current temperature for the MDM heater.

Print Chamber Heater: Edit the temperature for the print chamber heater.

MDM Heater: Edit the temperature for the MDM heater.

For any field that you need to set, press the ✏ key to edit.

B   **Set Print Chamber Temperature:** Saves the settings for the Print Chamber Temperature

C   **Set MDM Temperature:** Saves the settings for the MDM Temperature.

SCALE FACTOR SETTINGS SCREEN

Scale factors are very important for part accuracy. Each machine and material requires different scale factors to print accurate parts. Typically, users will build a series of precision parts and measure them with calipers or a measurement system. If there are errors, either too large or too small, they will enter scale factors to adjust for the errors and repeat the process until the error is zero or small enough to not affect the quality of the part.
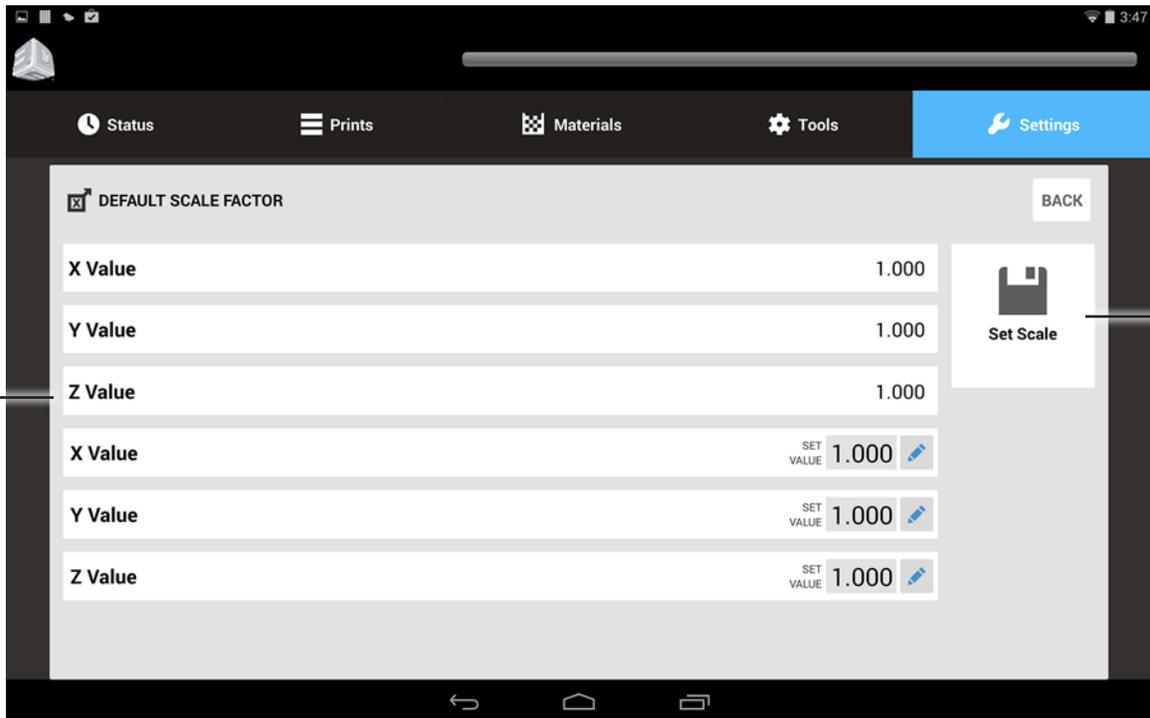
A **X Value:** View the current x-axis scale factor.

Y Value: View the current y-axis scale factor.

Z Value: View the current z-axis scale factor.

X Value: Edit the current x-axis scale factor.

Y Value: Edit the current y-axis scale factor.

Z Value: Edit the current z-axis scale factor.

B **Set Scale:** Saves the Scale settings.

For any field that is editable, press the ✐ key to edit.

BUILD SETTINGS SCREEN

The Build Settings Screen allows the user to turn the Auto Drain and Smart Sweep on or off.

Auto Drain automatically lifts the print pad from the MDM after the print is finished so that the excess material drains off of the part.

Smart Sweep confines the sweeper motion to only the area of the parts being printed. This is the default mode.
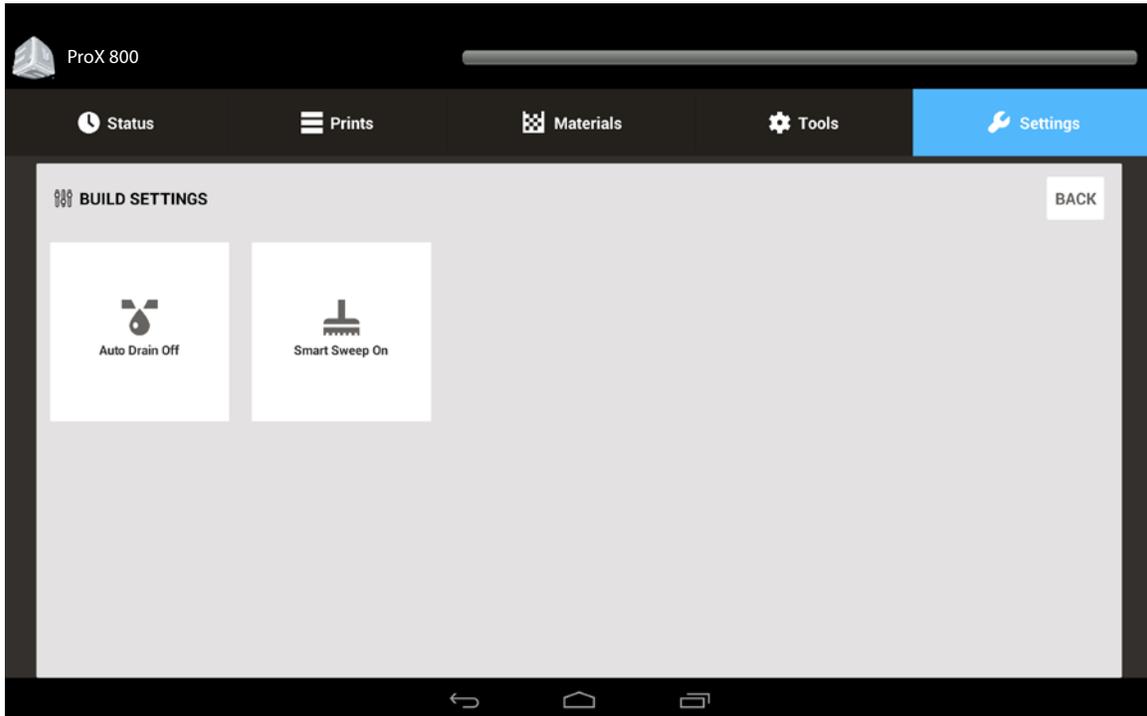
DRAWING SETTINGS SCREEN

The Drawing Settings Screen allows the user to view and set the center point of the print area. This shifts the entire range of the imaging system by the amount indicated. The image is automatically centered in the middle of the print pad. If the user wants to shift this position, they can do so by editing the X and Y values.
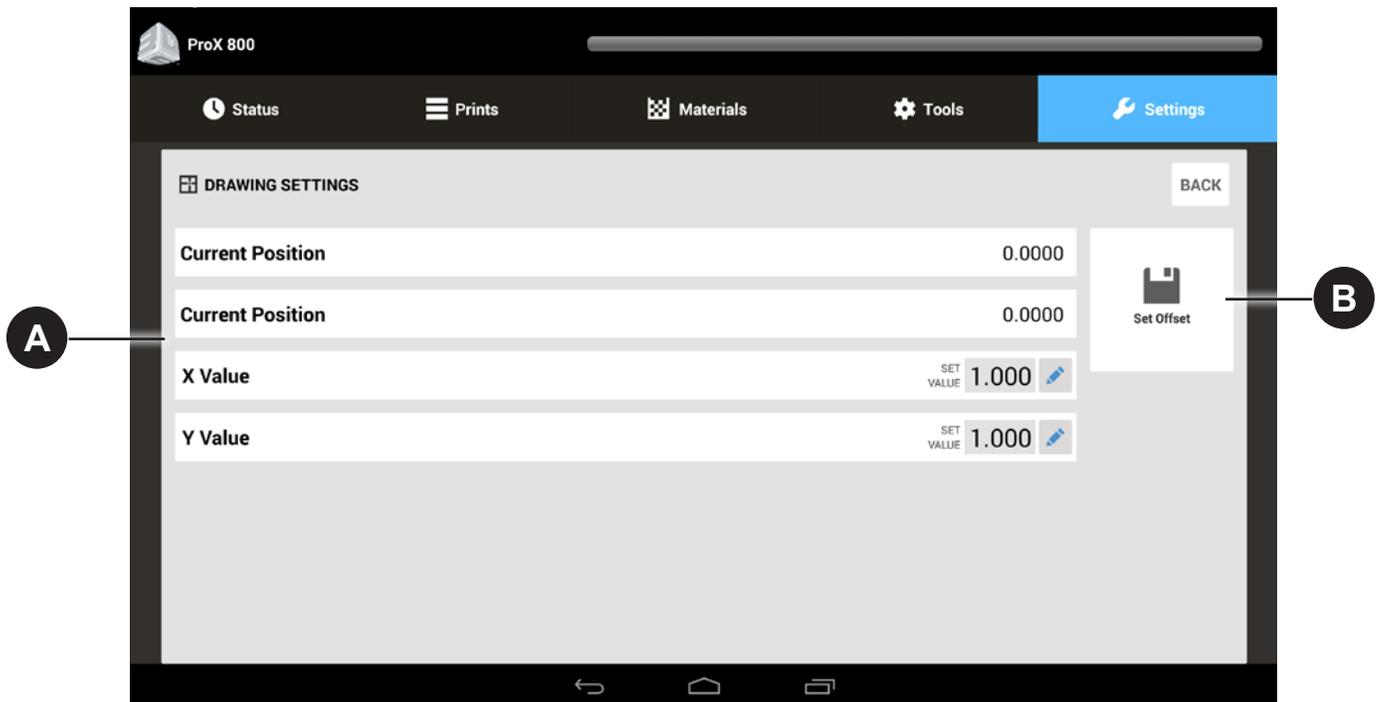
A

Current Position: Displays the current X Position.

Current Position: Displays the current Y Position.

X Value: This is where the current X Value can be edited. Select the ✎ key to edit. This will shift the entire range of the imaging system by the amount indicated.

Y Value: This is where the current Y Value can be edited. Select the ✎ key to edit.

B

Set Offset: Saves the current Offset values.

PRINT APPLICATOR INSTALLATION AND REMOVAL

The **print applicator** is on a rail system inside the print chamber, above the material delivery module (MDM). The applicator process combines elevator and applicator movements to apply material to the top of the part so that the next layer can be printed. The applicator, which contacts the material, can be removed from the ProX 800. The applicator should be kept with the MDM so that when the material is changed, the applicator remains with the material that it has been in contact with.

> ✍ **NOTE: the print applicator tabs are delicate. The tabs are called out in illustration #3 below. Extra care should be taken to prevent damage to them. If the tabs are damaged, the applicator calibration process will not perform properly, resulting in print failures. In this case, the applicator tabs will need to be replaced. If the applicator itself is damaged, it will need to be replaced.**

To install the applicator, do the following:

1. Take the applicator off of the applicator rest that is on the MDM (1).

2. Insert the locating pins of the applicator into the locating holes on the applicator arm of the rail system, as shown (2).

3. Secure the applicator by *lightly* fastening the thumb screws (3). **DO NOT OVER-TIGHTEN!**

To remove the applicator, do the reverse of the above procedure:

•   Loosen the thumb screws.

•   Remove the applicator from the applicator arm.

•   Place the applicator onto the applicator rest located on the MDM.

> ✍ **NOTE: During printing, if the print completes or stops, or if the applicator stalls, the applicator automatically moves back to the home position.**
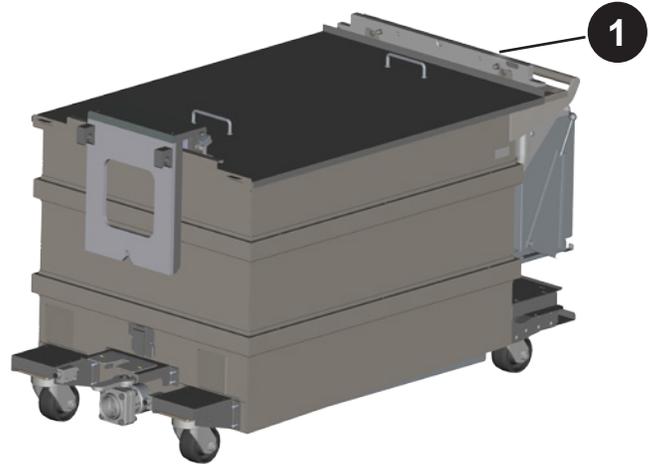
Remove Applicator from MDM

Locating Holes

Print Applicator
(Rear View)

Locating Pins

Applicator pins fit into locating holes.
Lightly fasten using the thumb screws.

Thumb Screws

Print Applicator
(Front View)
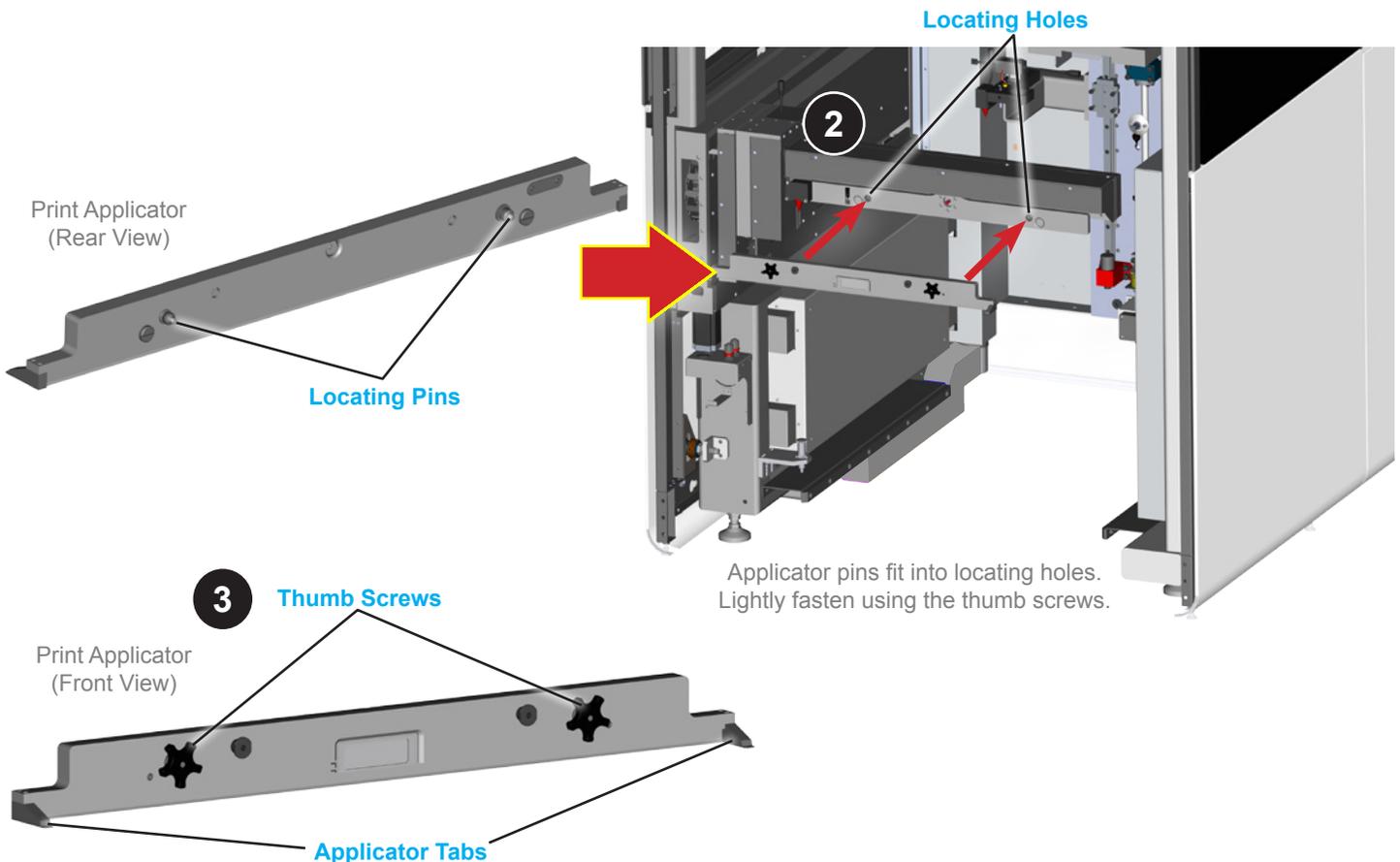
Applicator Tabs

PRINT APPLICATOR CLEANING

The print applicator will need to be cleaned periodically. Remove the print applicator and wipe it off using a paper towel soaked with isopropyl alcohol. Be careful not to contaminate the material in the MDM with the isopropyl alcohol. Be sure to wear nitrile gloves when handling the print applicator. Do not use any items which may cause physical damage to the applicator. Non-metallic items, such as a wooden tongue depressor or soft plastic implement, can be used to remove heavy debris. Wipe the applicator dry when finished.

MATERIAL DELIVERY MODULE (MDM) INSTALLATION

The MDM has two casted rail guides on each of its sides for guiding it into the print chamber. *See the illustration below*.

⚠️ **HOT SURFACE: The area underneath the MDM where the heaters are located is hot (about 40°C (104°F)) —Do not reach underneath!**

Perform the following operations prior to removing the MDM:

1. Home the print applicator by navigating to **Tools > Print Applicator** and pressing **Move to Home**.

2. Home the elevator by navigating to **Tools > Elevator/Leveler** and pressing **Move to Home**.

3. On the **Tools > Elevator/Leveler** screen, press the edit button for **Move Distance**, then type in **10** and a **minus sign (-)** and press **Set**. Press the **Move Distance** button to move the elevator down 10".

You must also ensure that the print applicator is in its storage location on the MDM. See the section *"Print Applicator Installation and Removal" on page 43* for instructions. Assuming the MDM is outside the printer, the following steps describe how to install it.

❌ **IRRITANT: While performing this procedure, wear protective clothing, disposable nitrile gloves, and goggles.**

✎ **NOTE: Move the MDM very slowly. Sudden starts and stops can create waves in the material and result in material spills, even with the MDM lid in place. Continuous slow movement is critical to preventing any movement of the printer with the heavy MDM. Any change in the printer's inner frame placement will require recalibration by a trained service technician.**

1. Open the front door of the ProX 800. Make sure that the connecting cables are out of the way before you attempt to place the MDM into the machine (1).

2. Wearing nitrile gloves, remove the cover from the MDM (2). Wipe off any excess material on the inside of the lid using a towel soaked with isopropyl alcohol. When finished, store the lid in a safe place.

⚠️ **CAUTION: Ensure no alcohol is spilled into the MDM. This will contaminate the material.**
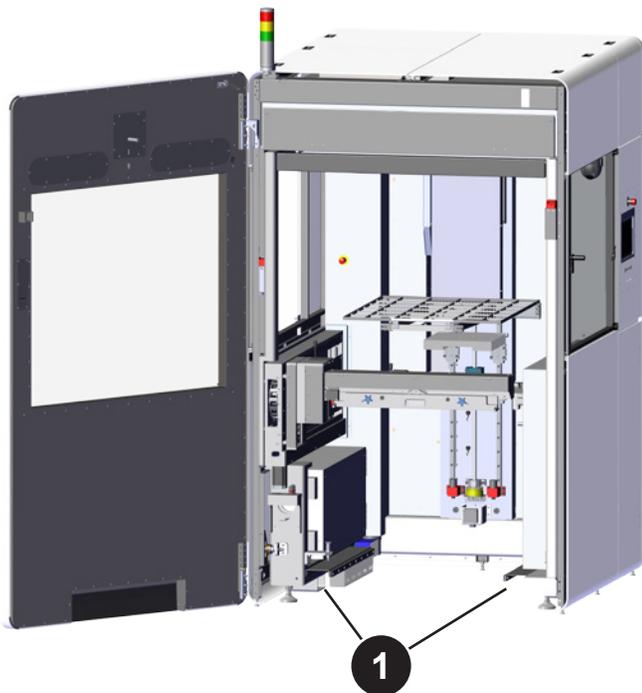
Clear connecting cables

Casted rail guides
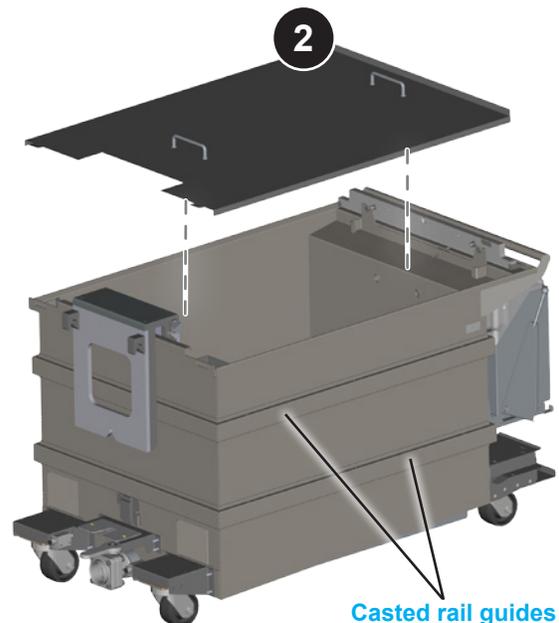
Remove MDM lid

3. Unlock the brakes on the MDM wheels and slowly roll the MDM into the machine.

4. Roll the MDM into the print chamber until the **locking pin** (located on the bottom-left of the inside of the print chamber) is lined up with the bracket on the MDM. Turn the pin until it sets into the bracket. The bracket has a hole for the pin to set into. When the locking pin attaches properly, the MDM will also hit the bumper at the back of the machine.

Locking pin

MDM bracket for locking pin

Push MDM into chamber and secure locking pin and MDM bracket

MDM Connections
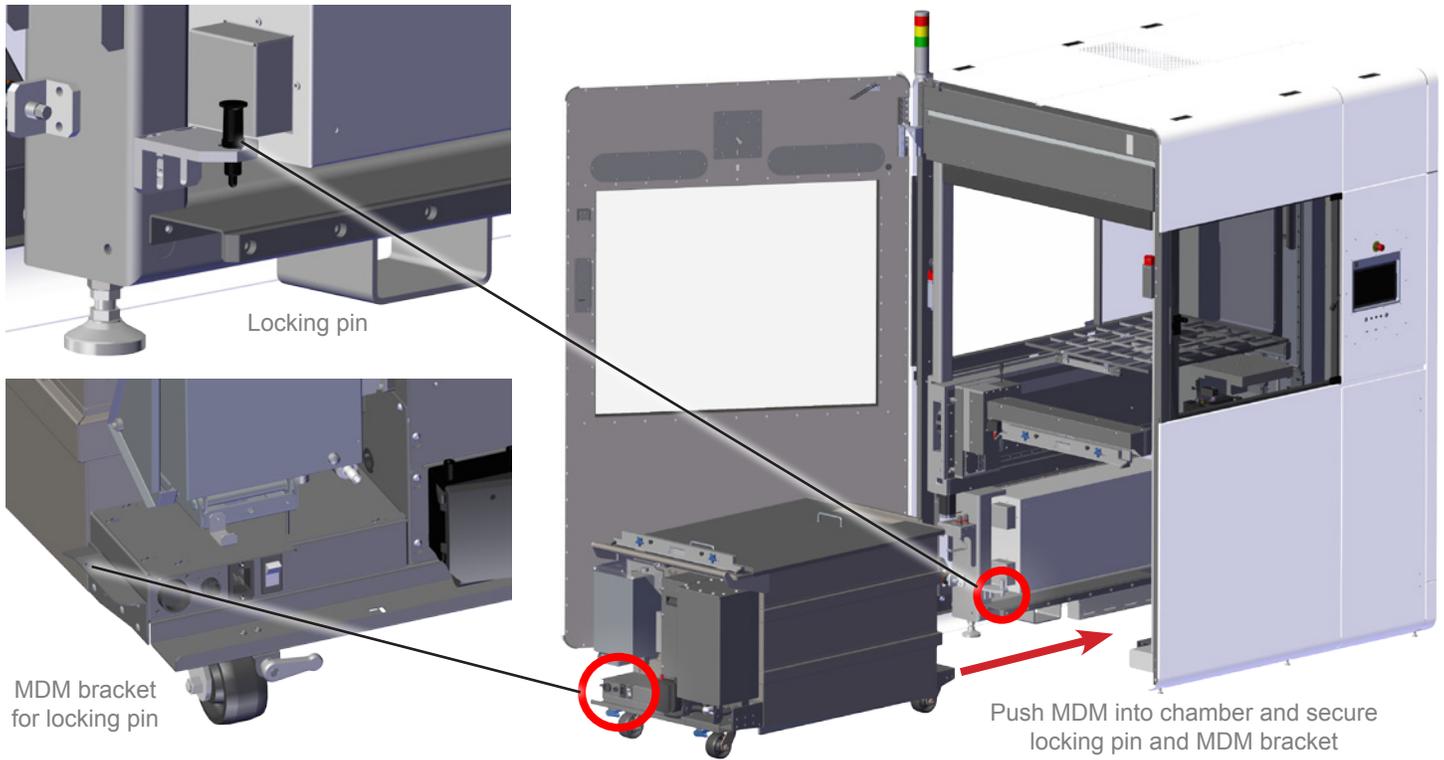
5. Once the MDM is in the machine, connect the cables on the front of the MDM as shown.

6. Plug the I/O Connector into the first input. The I/O connector is the large circular plug with the bundled gray wires.

I/O Connector

7. Plug the Serial Connector into the second input. Secure the connection by turning the collar on the connector clockwise.

Serial Connector. Turn collar to lock.

8. There is a black, three-pronged power cord that plugs into the IEC socket. This connection provides power to the heater function of the MDM, allowing the material to heat up.

9. After the connections are finished, flip the power switch to the UP position to enable power to the MDM.

10. On the UI, go to the **Heater Settings Screen** to verify that the temperature of the MDM is 28 °C (+/- 3 °C). Refer to the section, *"Heater Settings Screen" on page 39* for details on the screen functionality.

11. Level material by navigating to the **Tools > Elevator/Leveler** screen and

Power Connector   Power Switch
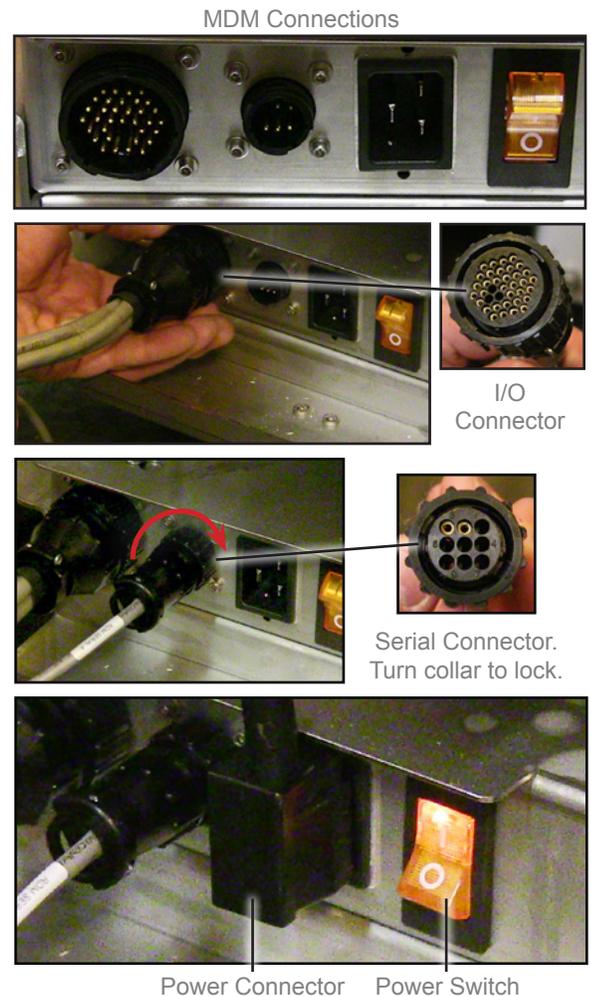
pressing **Level MDM**.

12. Install the print applicator following the instructions in the section *"Print Applicator Installation and Removal" on page 43*.

MDM REMOVAL

Refer to the illustrations in the section, *"Material Delivery Module (MDM) Installation" on page 44*.

⚠️ **HOT SURFACE: The area underneath the MDM is hot—Do not reach underneath!**

To move the MDM out of the machine, follow these steps:

1. From the **Elevator/Leveler Settings Screen**, press the **Drain MDM** button to transfer material to the leveling reservoir which will reduce the risk of overflow when rolling the MDM out of the printer.
2. Move the elevator to its lowest position so the forks can remain with the MDM. The elevator will stop when it reaches this position.
   - From the **Print Applicator Screen**, press **Move to Home** to home the print applicator.
   - From the **Elevator/Leveler Settings Screen**, press **Move to Home** to home the elevator.
   - In the **Elevator/Leveler Settings Screen**, press the **Edit** icon for **Move Distance** and set the value to "-10."
   - Press the **Move Distance** button.
3. Open the print chamber door.
4. Turn off the heater power switch and disconnect the AC power cord from the socket.
5. Disconnect the I/O Connection Cord and the Serial Connection Cable.
6. Remove the print applicator from the print chamber and place the applicator in the storage area on the MDM. See the section *"Print Applicator Installation and Removal" on page 43*.
7. Place the MDM lid onto the MDM.
8. Unlock the caster wheels.
9. Pull up the black locking pin and turn to lock it in the "up" position. The cart may now be removed from the machine.
10. Make sure that all cables are out of the way of the MDM before you remove it from the machine.
11. Carefully roll the MDM out of the machine and close the print chamber door.

⚠️ **Move the MDM very slowly. Sudden starts and stops can create waves in the material and result in material spills, even with the MDM lid in place. Continuous slow movement is important.**

MATERIAL DELIVERY MODULE TEMPERATURE CONTROL

The ProX 800 offers offline and online heating. When the power cord from the machine is connected to the MDM, the system has online heating. When the power from a wall outlet is connected, the system has offline heating. The MDM can be heated either outside the system enclosure, via the stand-by mode, or inside the enclosure. To prepare for printing, heat the material to its operating temperature of **28 °C (+/- 3 °C)**. Typical time for heating is two to three hours, but cold material can take considerably longer.

✏️ **NOTE: We recommend only heating the material up to 24 hours prior to use. Constantly heating the material when not in use will prematurely age the material.**

AUTO MATERIAL REFILL SYSTEM

The **auto material refill system** is located on the MDM. This system adds material to the MDM from the material container located in the refill slot. If the material level is too low, the auto material refill system will display the message, **"Material Autofill in Progress,"** and will empty all of the material from the refill container. The print job starts after the material reaches the correct level in the reservoir. If the material refill container is empty, the system will alert the user to replace it with a full container. For more information see *"Installing Material Containers" on page 47* and *"Material Container Removal" on page 48*.

INSTALLING MATERIAL CONTAINERS

❌ **IRRITANT! Wear protective clothing, disposable nitrile gloves, and goggles, while performing the following steps:**

🖎 **NOTE: Before adding a new container, make sure that the material bin is empty. If a container is present, refer to the section *"Material Container Removal" on page 48* before continuing.**

To place a material container into the MDM, perform the following steps:

1. Make sure you have access to the MDM. If it is in the print chamber, unlock and open the door.

2. Obtain a material container, ensuring that it is the same material that is currently installed in the MDM.

3. Verify the material bin is clean of any material and is completely dry if alcohol has been used to clean it.

4. Pull the material bin's release lever away from the MDM to a 45° angle from the vertical position.

5. Insert the material container into the slot.

6. Look at the status on the user interface. If the status is okay, push the container until you hear a click. Try to lift up on the container lightly. If it does not easily release, it is properly installed.

7. Remove the vent cap. If the container is new, puncture a small hole in the vent using something with a sharp point, such as a screw driver or drill bit.

🖎 **NOTE: All containers have a depression in the area to be punctured. Unless the vent has been previously punctured, and you are very certain of this, puncture the vent.**

8. Pull the release lever up to close the material bin, until it latches securely.

9. Close the print chamber door.

MDM showing material container location

Material Container
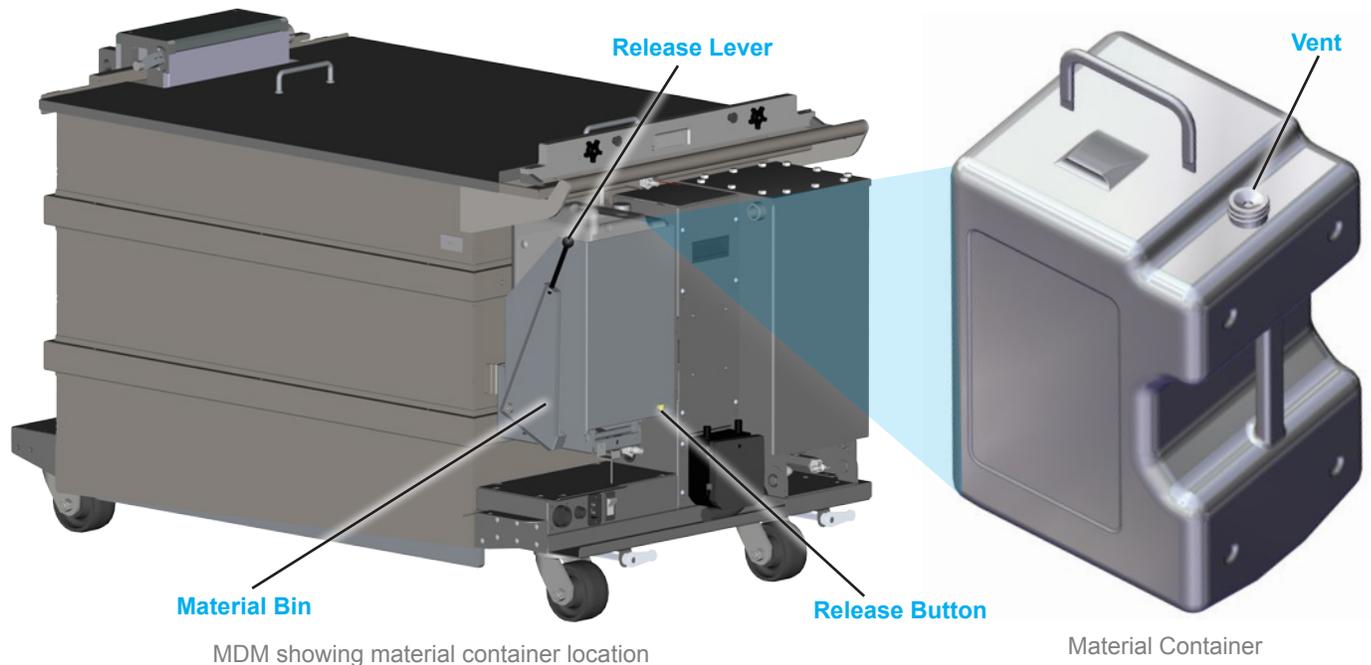
MATERIAL CONTAINER REMOVAL

When a material refill container needs to be replaced with a new one, perform the following procedure. For illustrations, refer to the section .

✍	**NOTE: It is important to verify the type of material currently in the MDM before proceeding with these steps.**

✖	**IRRITANT! Wear protective clothing, disposable nitrile gloves, and goggles, while performing the following steps:**

1. Retrieve the original **vent cap** for the current material container and fasten it tightly on the vent hole to prevent the material from leaking out when removed.

2. Pull down on the MDM **release lever**, until it is at a 45° angle from the vertical position.

3. Push the container **release button**.

4. Lift the material container out of the material bin. Dispose of the container according to local regulations.

5. Wipe any material spills from the bin, MDM, and floor with isopropyl alcohol and paper towels.

PRINT PAD INSTALLATION

Verify that the MDM is installed in the printer before starting this process. Wear nitrile gloves when handling the print pad to prevent material exposure to your skin.

1. Verify that the elevator is at its offload position. If necessary, move it to its offload position by selecting the **Move to Offload** button on the **Elevator/Leveler** screen under the **Tools** menu.

2. Place the print pad between the **L-shaped guides** (1) towards the rear of the print chamber.

3. Pull the print pad forward against the **print pad notched guides** at the front (2).

4. Make sure that the front edge of the print pad engages with the notched print pad guides.

5. Move the elevator to the Start position by pressing **Move to Start** on the **Elevator/Leveler** screen under the **Tools** menu.

Print Pad inside Print Chamber
(MDM not shown for clarity, but should be installed)
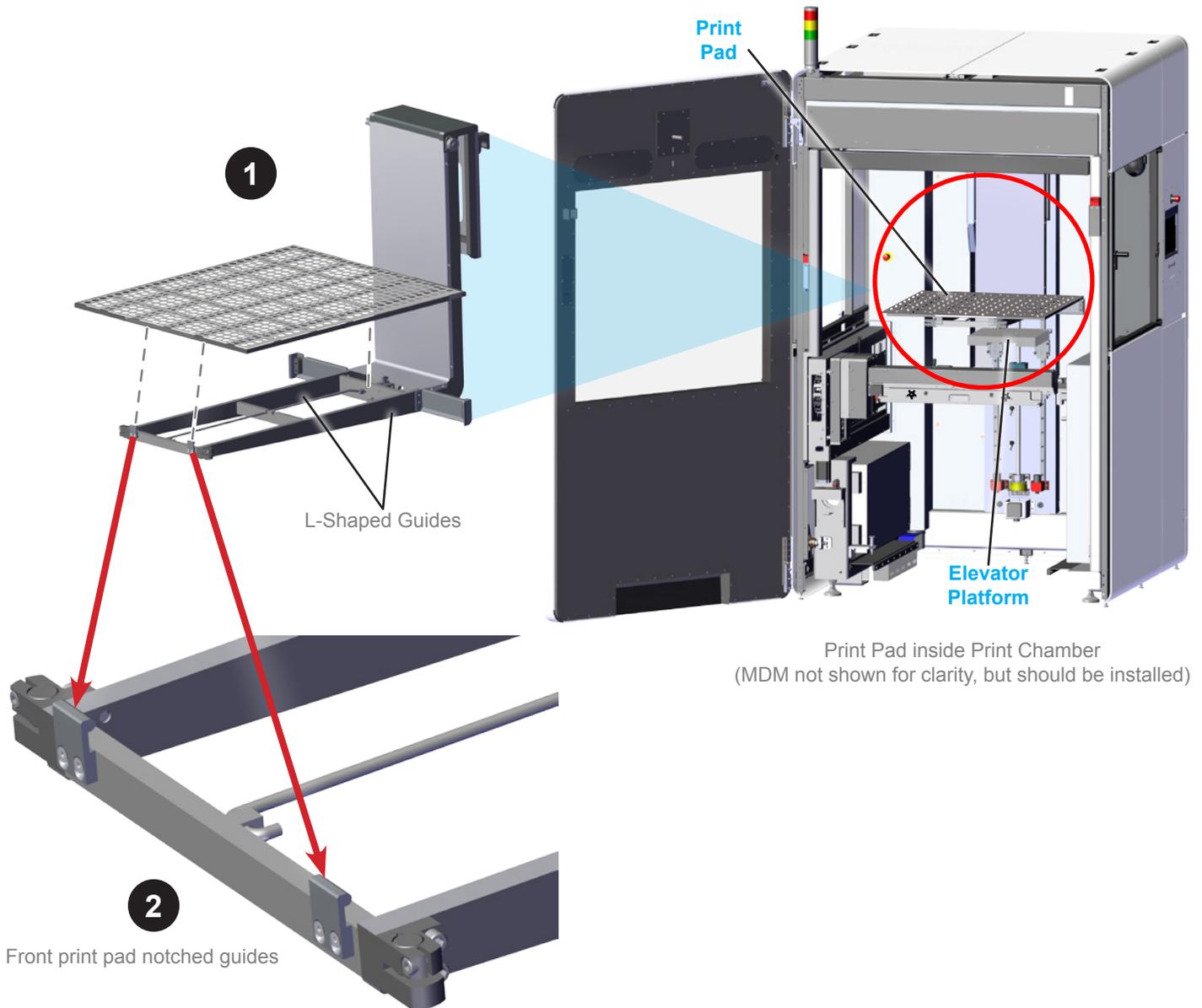
PRINT PAD REMOVAL

To remove the print pad, you need to raise the elevator enough to reach the **Timing Plate**.

Navigate to the **Tools > Elevator/Leveler Settings** screen. Press the **Manual Offload** button. If this does not raise the elevator high enough to reach the proper location on the Timing Plate, you need to manually set the offload position so that it does. See the section *"Setting the Offload Position" on page 50*.

If the elevator does reach the Timing Plate correctly, the print pad will disengage from the L-shaped forks so that it may be removed. If there is any material on the print pad, wait until it drains off before removing it. At that point, the print pad can be lifted off of the forks manually or with the offload cart while wearing nitrile gloves. Place the print pad in a safe location such as on paper towels located on a work bench so that it does not come into contact with other print material or other components of the system.

If a print job has just completed, use the manual offload cart to remove the print pad and parts. Refer to the section, *"To Remove a Part" on page 55*.
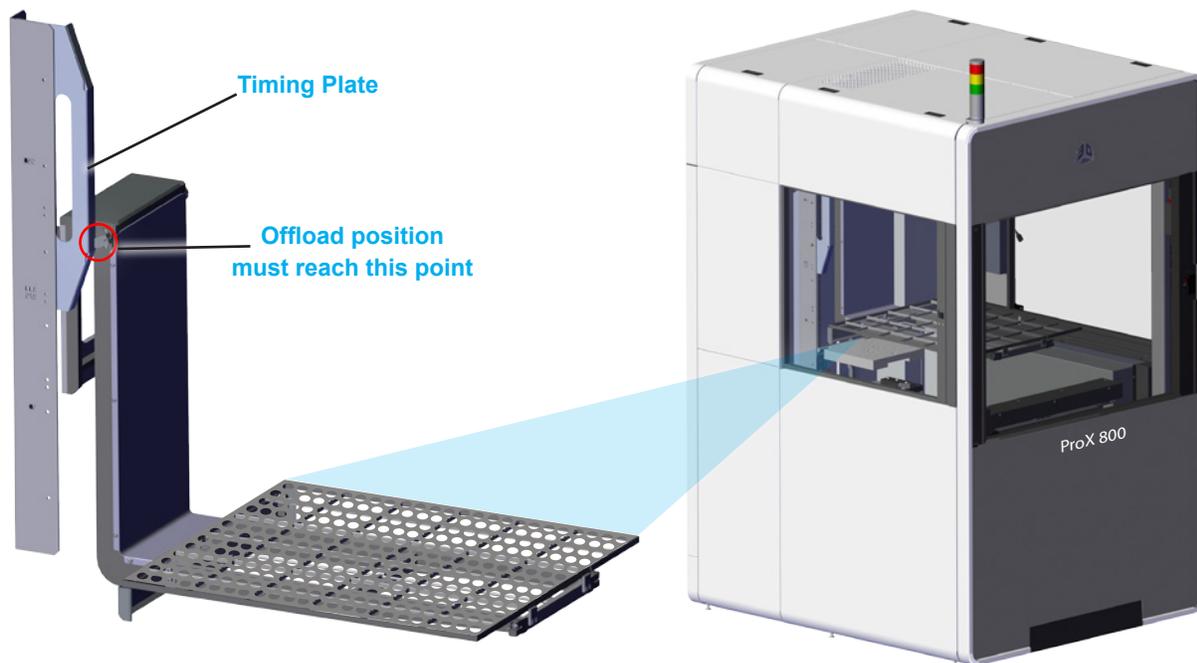
Offload position to disengage the print pad lock

Setting the Offload Position

If the **Manual Offload** needs to be adjusted, you can do so by following these steps:

1. Select **Edit** ✏️ from **Move Distance**.
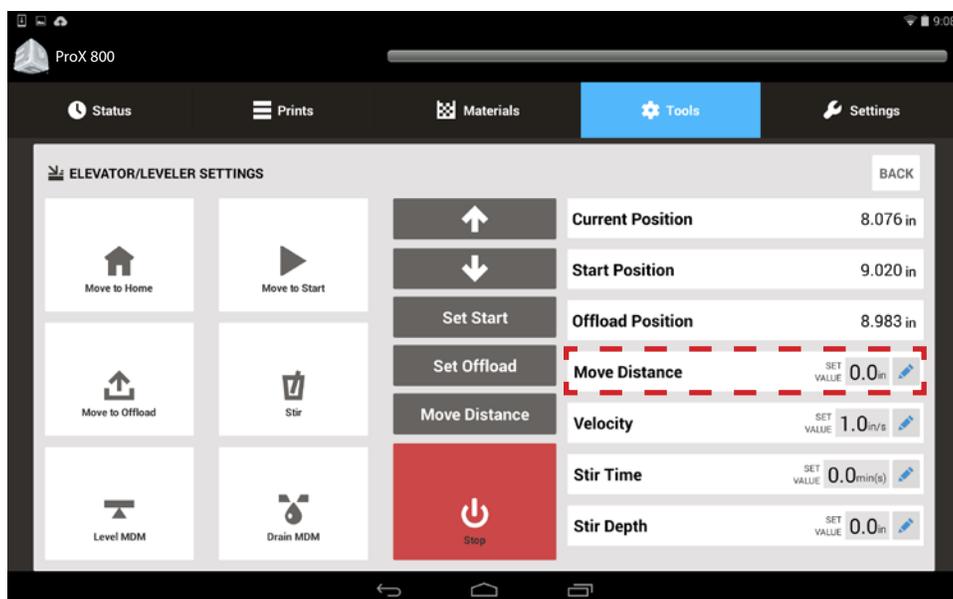
2. The editing keypad pops up. Type in the amount to move (ex. ".5" will move print pad up ½"). This is a good place to start.

3. Press **Set**.

4. Repeat these steps until the print pad is far enough up to get the Manual Offload Cart under it without damaging the recoater or to reach the timing plate. Refer to the sections *"To Remove a Part" on page 55* and *"Print Pad Removal" on page 50*.

> **NOTE: If the print pad is too high, you can reverse it by typing .5 > - (minus sign) > Set in the editing keypad to set a negative value. This moves the print pad down ½".**
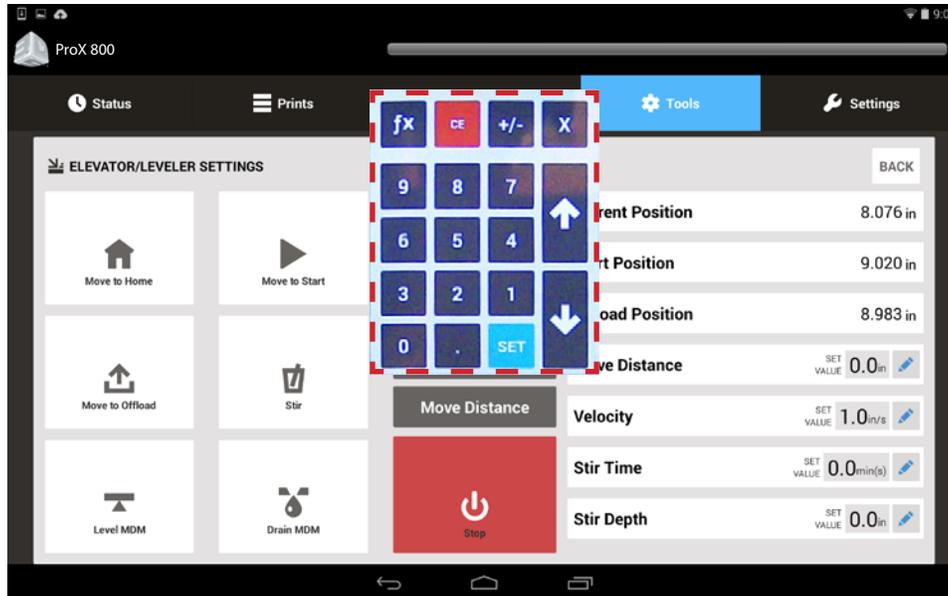
5. Select **Set Offload** (1).

> **NOTE: This position will now be saved and can be used from now on by selecting Move to Offload (2).**
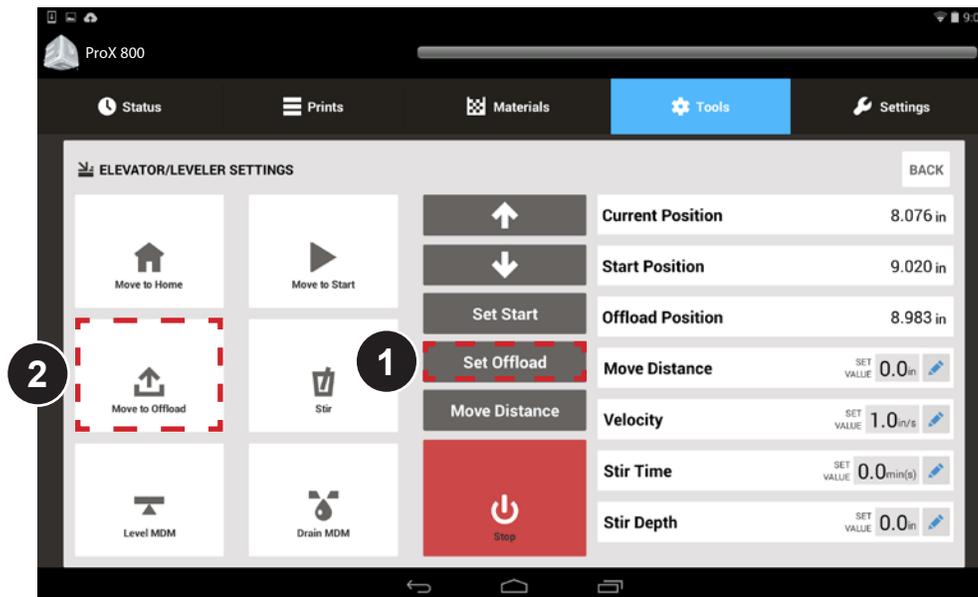
PRINTING A PART

Now that you are familiar with the various screens within the User Interface, you are ready to print. Follow these basic steps to print your first part.

> ✍ **NOTE: Ensure print pad is installed prior to printing a part. See** *"Print Pad Installation" on page 49* **for more information.**

1. If necessary, turn the machine on by ensuring that the printer is plugged in, then turning the power disconnect switch to the **ON** position. For the location of the switch, see the section *"ProX 800 Printer - Inside View" on page 18*.

2. Press the **Print3D Pro** icon (1) on the touchscreen to launch the application.

3. Press the **chamber lights** button (2).

> ✍ **NOTE: This is optional. The machine will print without the chamber lights on.**

4. Ensure all doors are locked by verifying that the **System** (3) light is on. If not, press the **System Enable** (4) button.

5. Verify the doors are locked by looking at the main Status Screen on the UI. The green lock button should show **Unlock Door** if the doors are locked. If not, press this button to lock the doors (5).
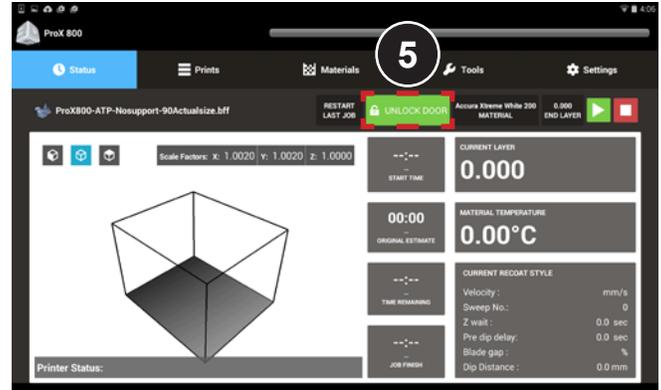
Home the Elevator

If the printer was not already turned on:

1. Select **Tools** from the main screen (6).
2. Select **Elevator/Leveler** (7).
3. Select **Move to Home** (8).
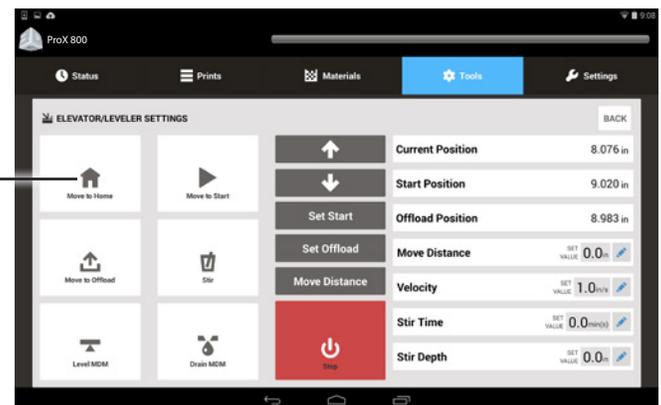
Setting the Start Position

The **Start Position** is the position of the print pad when the machine is set up for optimal printing success.

The start position will need to be set when the printer is first set up or when any of the following conditions exist:

a. The top of the print pad is not exposed.

b. The bottom of the print pad is not submerged.

c. The Omron Sensor does not read approximately 30.000 (+/- 0.001).

> **NOTE: See illustrations of the locations of these items in the section,** *"ProX 800 Printer - Inside View" on page 18*.

If **any one** of these conditions exists, the **Start Position** must be set.

> **NOTE: You should be able to see the entire print pad including all the holes. If any holes are completely submerged and cannot be seen, the Start Position needs to be set.**

To Set the Start Position:

1. Navigate to the **Tools > Elevator/Leveler Settings** Screen (1).

2. Press the **Level MDM** button (2).

3. Select **Move to Start** (3). Wait for the elevator to move to the current start position.

4. In the **Move Distance** field, select **Edit** ✏ (4).

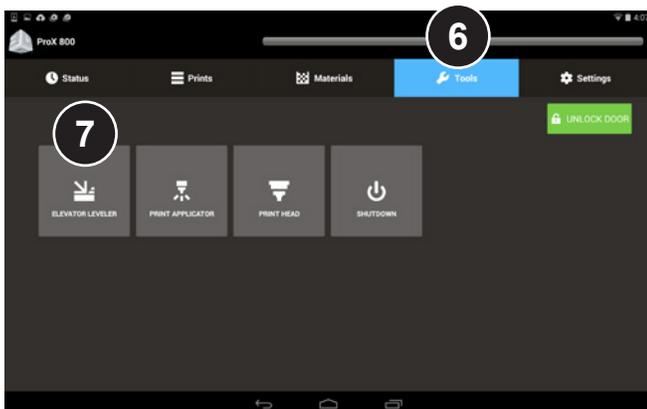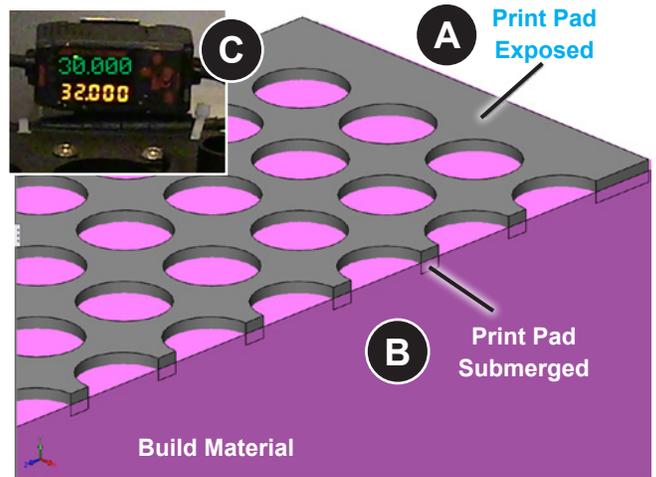5. Type in the value you wish to move the print pad, for example, **.1 > Set** (5).

> **NOTE: If at any time the print pad needs to be moved in the other direction you can enter a negative value using the following sequence: Value (.1) > - (minus sign) > Set. This will move the print pad down instead of up.**

6. Select the **Move Distance** Button (6). Continue to move the elevator until conditions (a) and (b) (listed above) are cleared.

7. Select **Level MDM** (7)

8. If any of the three conditions still exist, repeat Steps 4 and 7.
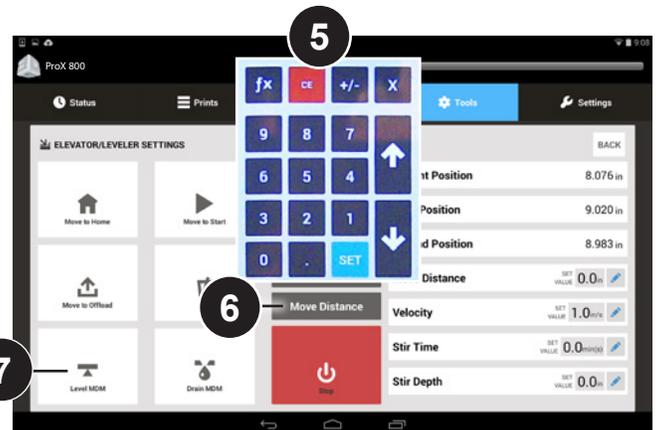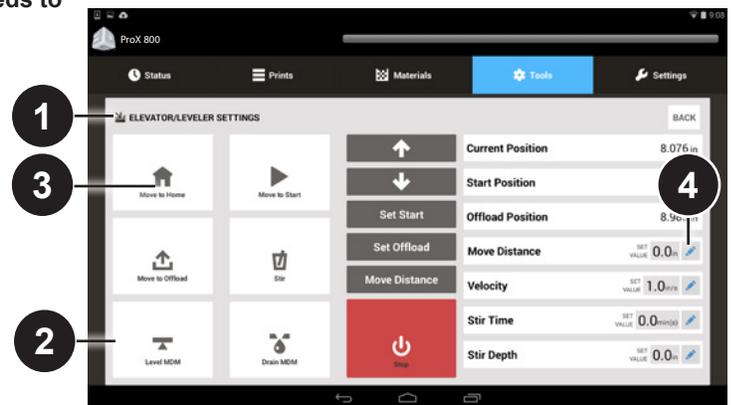
Once the conditions have been cleared, press the **Set Start** (8) button to set this position.

> **NOTE: If the Start Position is not set, the elevator will move to the original default Start Position during printing.**

Any time the print pad is removed and reinstalled, it is advised that **Move to Start** (9) be selected and the MDM leveled (by pressing the **Level MDM** button) to make sure that all settings have been retained for optimal printing. If not, you will need to repeat the preceding steps to reset your Start Position.
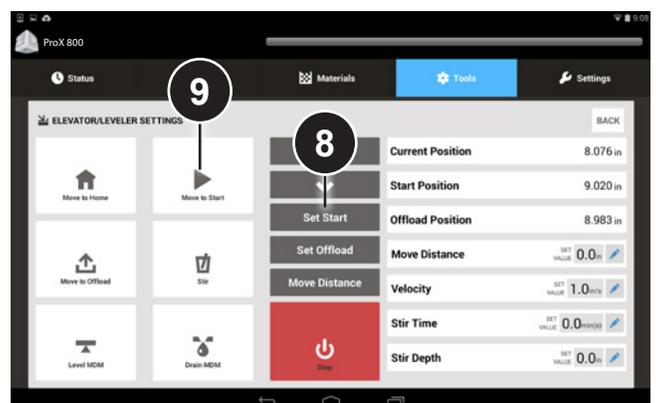
NOTE: After setting the Start Position, there may be bubbles in the MDM. Bubbles must be removed before printing. To remove bubbles, follow the instructions in the next section.

Removing Bubbles

If bubbles appear in the material, they must be removed prior to starting a print. Follow these steps to remove the bubbles:

1. Navigate to the **Tools** menu.
2. Select **Remove Bubbles** (1).
3. Wait while an automated procedure manipulates the hardware to remove the bubbles.

Once the automated procedure has been completed, the printer is ready to print.
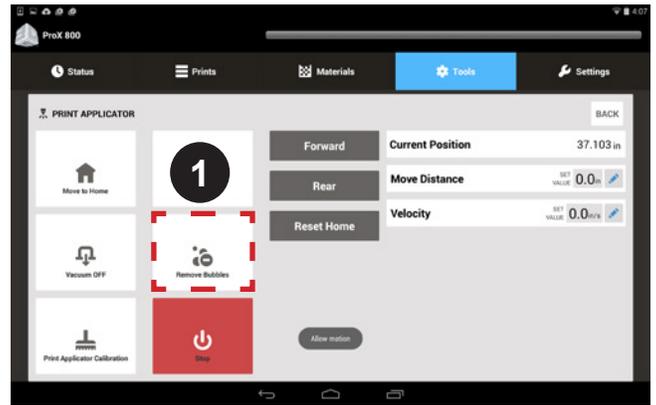
Selecting a Print Job and Printing the Part

1. A print job can be started either from the home status page or by selecting the **Prints** menu (1).
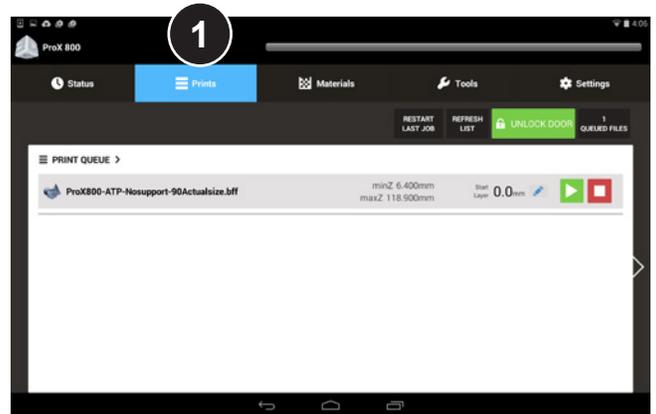
2. If a file needs to be loaded, either insert a USB drive into the port below the touch screen (2) or transfer the file from the **3D Manage** application to the printer. Refer to the 3D Manage documentation for instructions.
3. If a USB drive has been inserted, all **.bff** files will pop up on the screen. Select the file you wish to print and press the **Submit** button. The file selected should be loaded in the Print Queue.

4. If the file is not in the top position, tap the file to highlight it, then tap the **Jump to Top** button to move the file to the top of the queue (3).
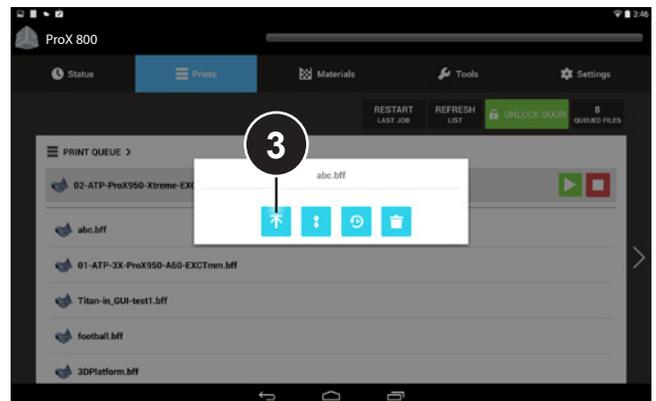
5. Press the **Play** button next to the desired **.bff** file, or wait for the file to pop up in the top left corner and then tap the **Play** button (4).

6. The printer goes through a series of checks and processes when a print is started:

   • Checks material level

   • Checks elevator position

   • Homes the elevator, if necessary

   • Moves elevator to start position

7. Observe the first few layers of the print to ensure that the part(s) are adhering to the print pad. You can see which layer the machine is printing by looking at the Status Screen.
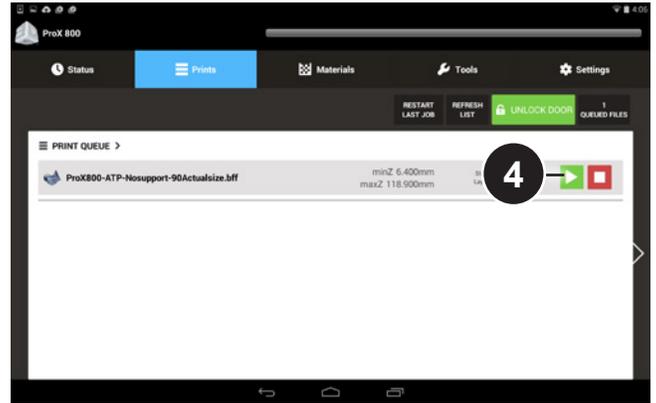
To Remove a Part

1. Navigate to **Tools > Elevator/Leveler Settings** and press **Move to Offload**. This will move the recoater down 2" and the print pad up.

> ✍ **NOTE: the Move to Offload settings are already set in the software. If any adjustments need to be made, follow the steps in *"Setting the Offload Position" on page 50*.**

> ✍ **NOTE: Always wear nitrile gloves when removing the print pad. If any material gets on your skin, wash immediately with soap and water.**
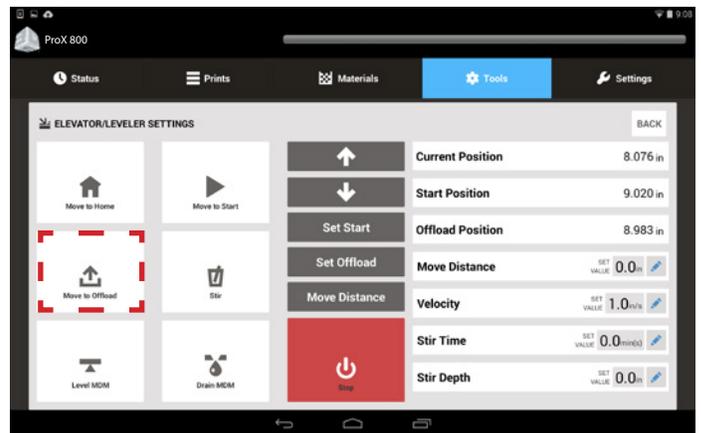
2. Ensure there is enough room to slide the offload cart under the print pad without touching the print applicator assembly (1).

Open door for access

Space for cart

ProX 800

Print applicator assembly
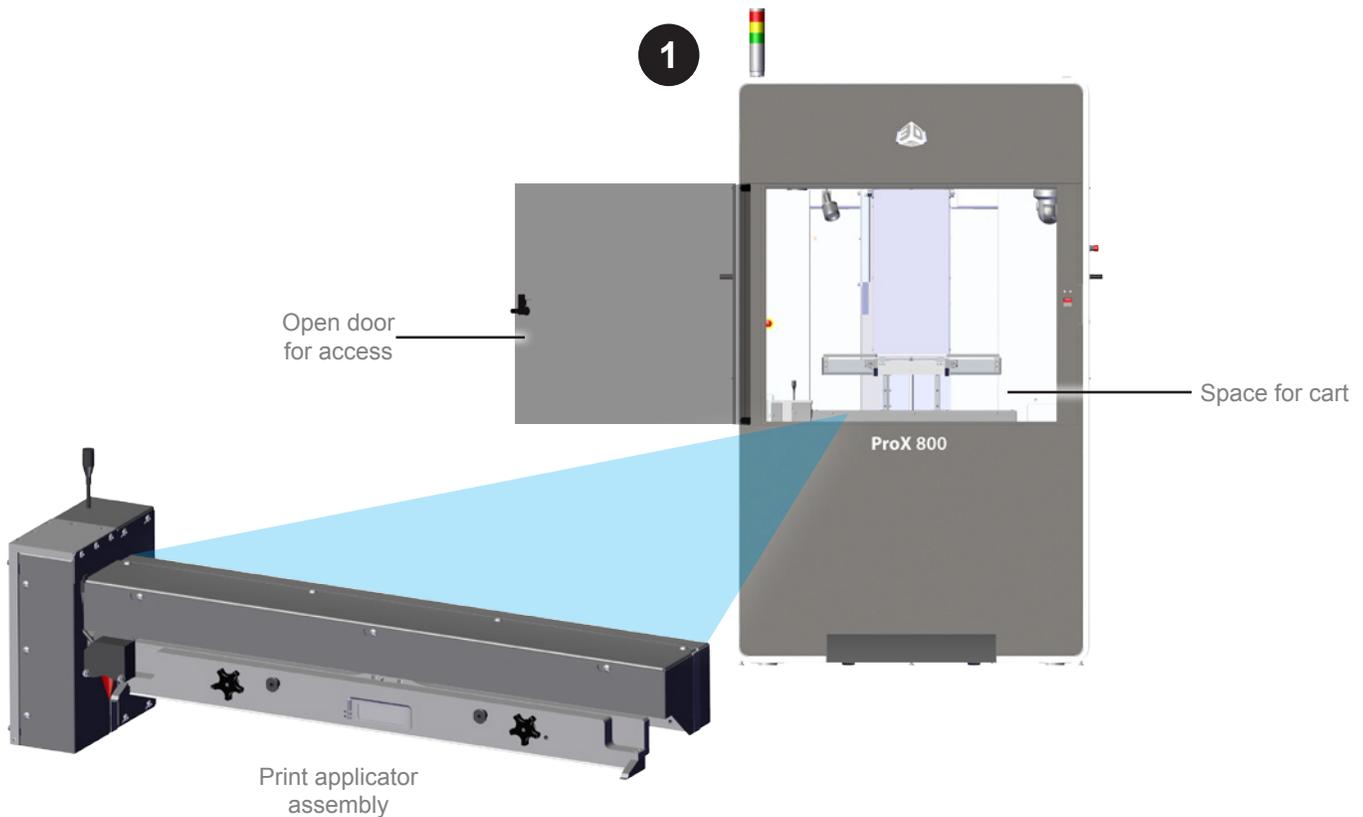
3. Put the offload cart into its lower position by pulling the handle up (2).

4. Open the panel window and push the cart into the system. The forks of the cart will slide underneath the print pad (2).

2 Slide cart forks under print pad

Pull adjustment lever up

Slide bottom of cart into entryway

Cart inserted into system
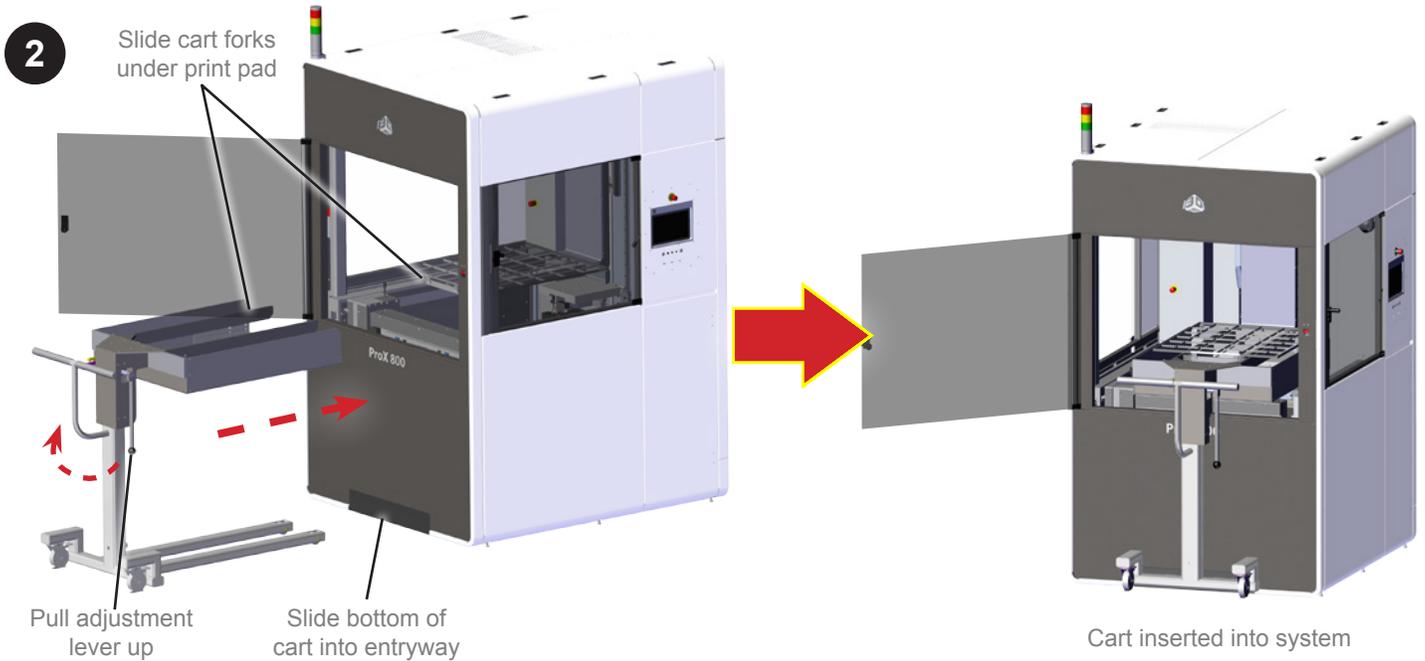
When the print pad is in the offload position, the latches for the print pad will be disengaged.

5. Push the adjustment lever on the cart to the down position to lift the print pad off of the elevator

6. Using the handles on the cart, carefully pull the print pad out of the machine.

12 MAINTENANCE

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

DUST REMOVAL

Remove dust from the outer surfaces of the ProX 800 by wiping with a clean, dry, lint-free cloth.

⚠️ **CAUTION! Do not remove any outer panels when cleaning the system. Panels must be removed only by a qualified 3D Systems Customer Support Representative.**

PREVENTIVE MAINTENANCE

Your ProX 800 must have preventive maintenance performed by a qualified 3D Systems Customer Support Representative. Contact 3D Systems to schedule this.

There is a charcoal filter at the top of the back side of the machine that will be replaced every six months during the preventive maintenance performed by a qualified 3D Systems Customer Support Representative.

CUSTOMER PREVENTIVE MAINTENANCE

The following procedures can be performed by trained operators to maintain optimal printer functionality.

Cleaning the Print Applicator

Refer to the section, .

Replace the Tubing in the Parastaltic Pump

If the tubing for the pump becomes damaged or clogged, you can replace it using the following procedure.

Tools Needed:

- Paper towels
- Wire tie snips
- Wire (zip) ties
- Nitrile gloves
- Flathead screwdriver
- Receptacle to catch excess print material from tubing (i.e., a Tupperware container)

Procedure:

1. Note the routing of the hose on the MDM. You will need to reinstall it as it exists on your MDM. The routing of your hose may differ from some of the pictures below.
2. Tighten the reservoir connection valve (1) by turning it clockwise to stop the flow of print material.
3. Loosen the two hose clamps from the valves using a flathead screwdriver. (2)

MDM Pump Connection

MDM Showing Pump Tubing

Peristaltic Pump **Pump Tubing** **Leveling Reservoir Pump Connection**

Hose clamp
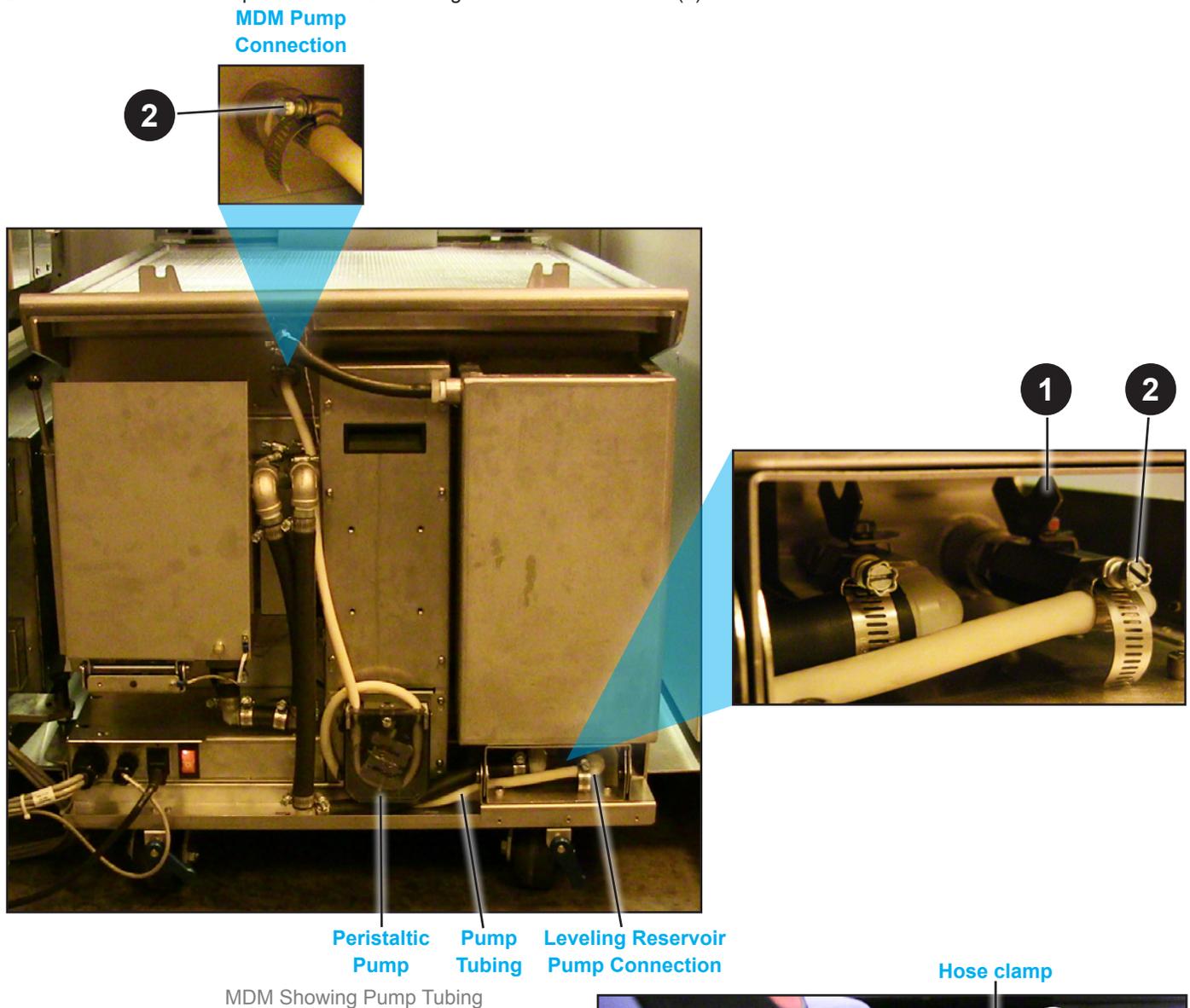
4. With a drip container and paper towels ready, pull the bottom hose loose from the connector (3) and position the hose over the container (4).

Hose connector

Remove hose from connector

Drip Container

Place hose over drip container to catch any excess print material

Have paper towels available to wipe up excess print material

5. Using a pair of wire cutters, cut all zip ties which are securing the hose to the MDM.

6. Unfasten the peristaltic pump cover using a flathead screwdriver (5). Open the panel to gain access to the internal mechanism (6).

Remove cover with flathead screwdriver
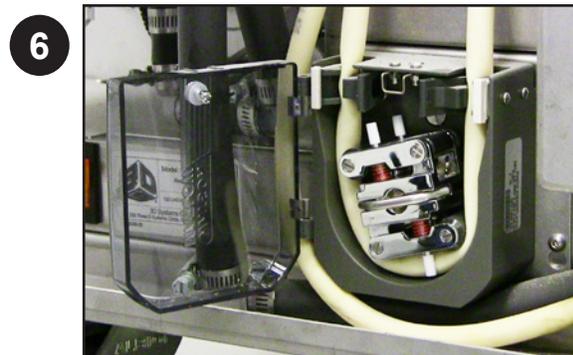
Open cover to access inside

7. While squeezing the two tabs together on the pump mechanism (7), use the latch to rotate the mechanism until the hose is freed (8).
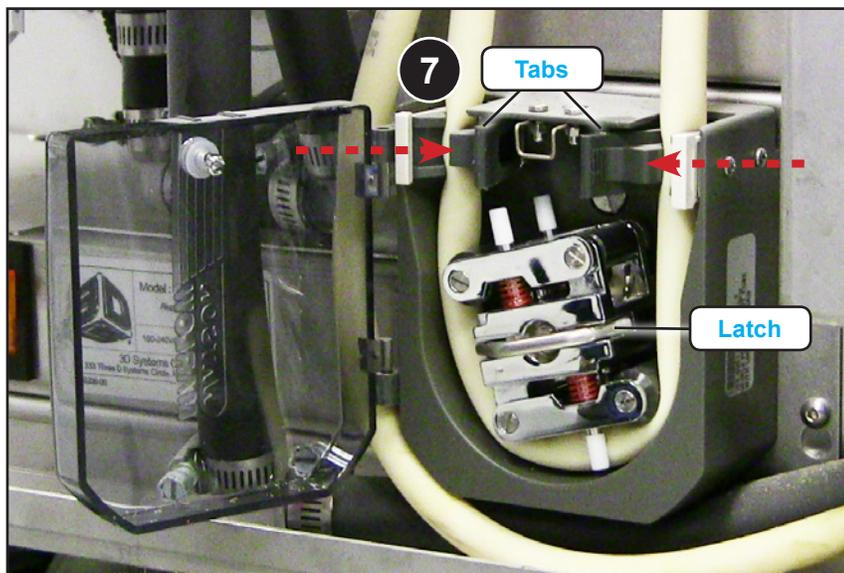
Tabs

Latch

Squeeze two tabs together to release hose. Use latch to turn mechanism.
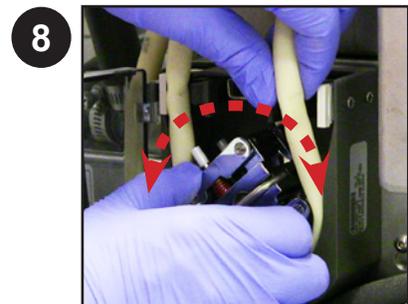
Turn mechanism to remove hose
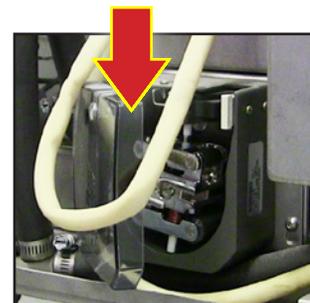
8. Remove the upper part of the hose from the connector and hold it in a vertical position (9). Stretch the hose to its full length. Let the print material drain from the hose into the drip container (10).

Remove top of hose from connector and hold vertically

Let print material drain from hose into the drip container

9. Dispose of the hose and excess print material according to any applicable regulations.

10. Replace with the new hose, connecting it as the original hose was:

  •   Slide hose clamps onto each end of the hose.

  •   Connect the top part of the hose to the connector and fasten the hose clamp.

  •   Insert the hose into the pump mechanism and close the pump cover.

  •   Reinstall zip ties.

  •   Reattach bottom portion of hose and fasten hose clamp.

  •   Clean up any spilled print material.

  •   Open valve on the lower hose connection by turning counterclockwise.

Reboot the Computer

If it becomes necessary to reboot the computer, press the **PC Reset** button on the electrical panel. See the section *"ProX 800 Printer - Inside View" on page 18* for an illustration.

TROUBLESHOOTING

Below is a brief outline of some simple troubleshooting procedures for the ProX 800. For electrical diagrams, see the following placard illustrations which are also physically located on the machine:

- *"Power Panel Connections Placard" on page 62*
- *"Power Panel Layout Placard" on page 63*
- *"Electrical Block Diagram Placard" on page 64*
- *"Chamber Controller Placard" on page 65*

POWER OUTAGES

If you are present when a power outage occurs, or if you discover that the main power is off, switch the main power disconnect off (see *"Master Power Shut-off" on page 8)* which is located on the right side of the machine.

ProX 800 PRINTER SHUTDOWN

If you do not plan on operating the system on a regular basis and want to shut it down for an extended period of time, power off the UI and turn off the main power disconnect. See *"Master Power Shut-off" on page 8*.

ERROR SYMPTOMS AND OTHER PROBLEMS

SYMPTOM	CAUSE	ACTION
Printer does not operate.	Breaker on DC power supply is tripped.	Reset breaker. Refer to the *"Power Panel Layout Placard" on page 63*
	Loose cables or poor electrical connections.	Check the plugs and cables to ensure that they are tightly connected and that the electrical outlet is working. Verify that the unit power switches are **ON**. Refer to the *"Electrical Block Diagram Placard" on page 64* for connector locations.
Entire system does not power up	An E-Stop is depressed.	Reset the E-Stop(s) and press **system enable**.
	Main power plug is not engaged.	Plug cord into the wall outlet.
	No power is coming from the wall.	Reset circuit breaker for the wall outlet.
	The circuit breaker is tripped.	Reset circuit breaker in the back of the machine.
Printhead (IPM) does not operate.	The laser is not turned on.	Turn the laser power supply key to the **ON** position. Verify that the switch on the laser power supply is **ON**. Turn on the laser. Refer to the illustration in *"Printhead Overview" on page 23* for the location of this.
	Laser interlock not satisfied.	Read error shown on laser power supply. Call *"Customer Support Hotline" on page 66*.
	3D equipment interlock safety relay not satisfied, system will not enable.	Satisfy all safety interlocks or the laser will not operate. If interlocks cannot be satisfied, and the system cannot be enabled after pressing the **System Enable** button, contact *"Customer Support Hotline" on page 66*.
Elevator, leveler, or applicator does not move.	Loose cables.	Secure all connections. Refer to the *"Electrical Block Diagram Placard" on page 64* for connector locations.
	Interlocks not satisfied.	Check that interlocks are satisfied and that the system is enabled.
	Bad circuit board or motor driver.	Try to move using the Print3D Pro touchscreen application. If no motion is possible, press **Restart** on the Tools Menu Screen to restart the system. Otherwise, contact *"Customer Support Hotline" on page 66*.

POWER PANEL CONNECTIONS PLACARD

MDB

AIR HEATER

LASER

CCB

ELEVATOR

LSR INTLK

MDM

P4

P1

MDB

CCB

J2

J5

USER INTFC

DOOR SW
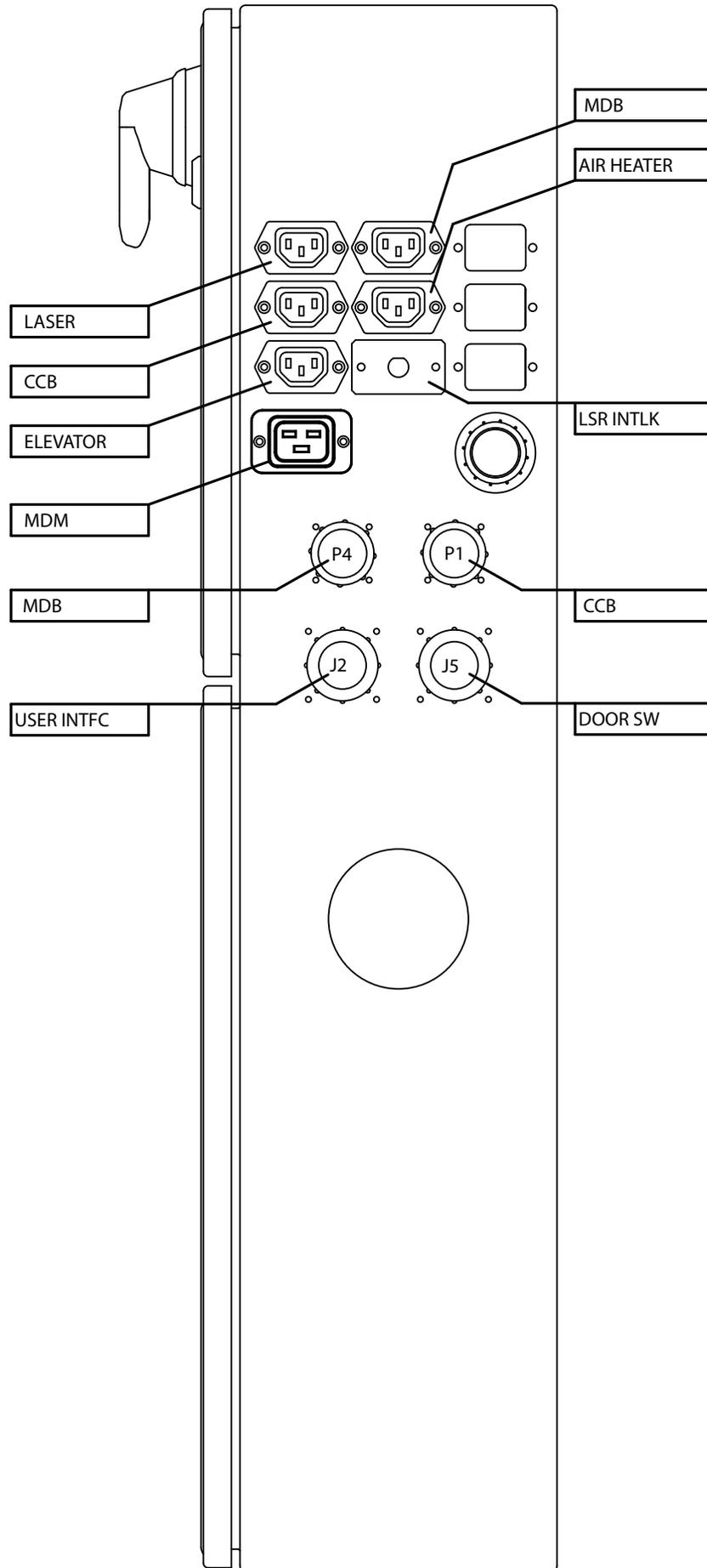
POWER PANEL LAYOUT PLACARD
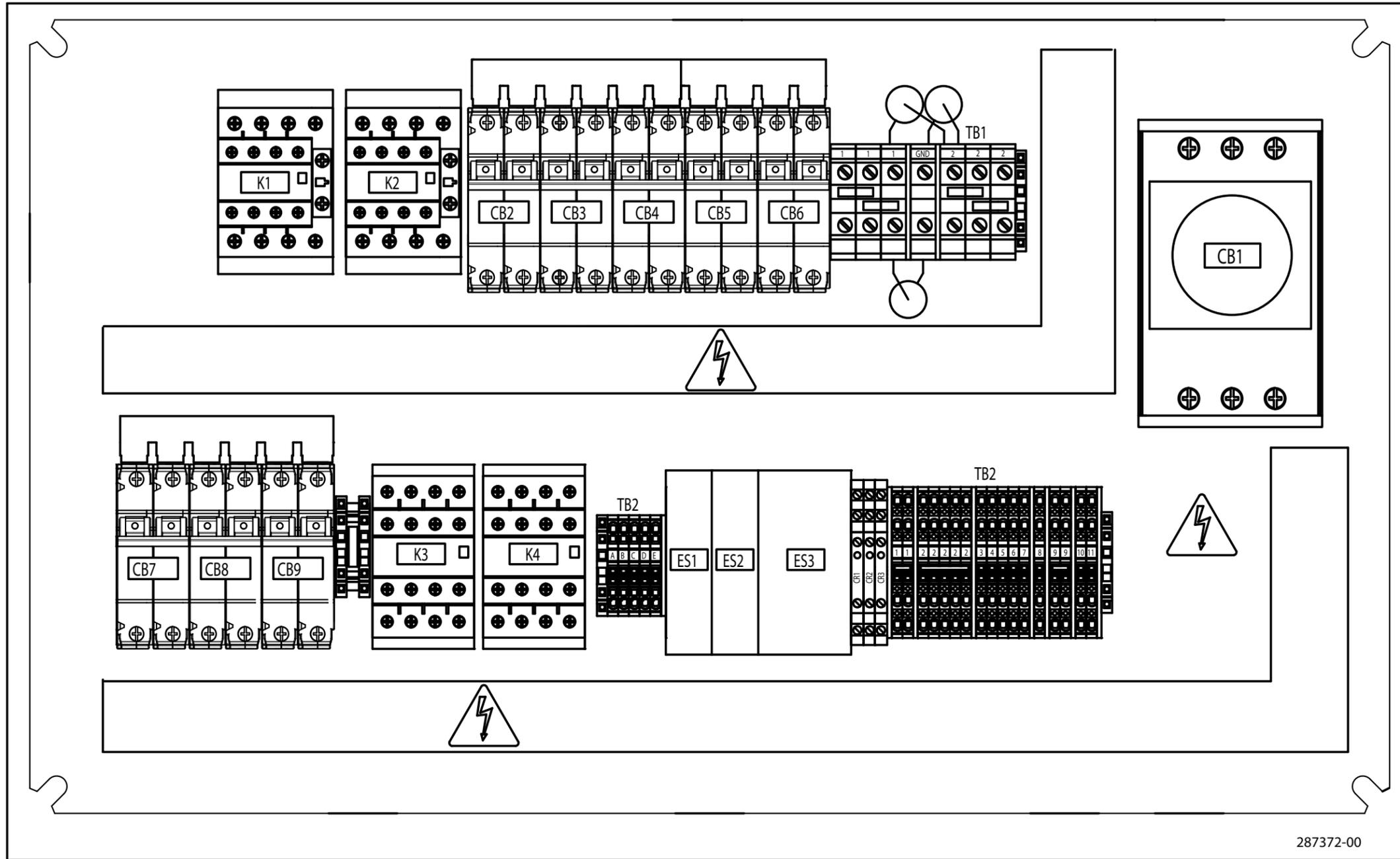
287372-00

Component	Component Specification	Load Rating	Load
CB1	30A, 480VAC IC=35kA	28A	MAIN BREAKER
CB2	20A, 240VAC IC=10kA	2250W	ESTOP CIRCUIT LOADS
CB3	6A, 240VAC IC=10kA	400W	COMPUTER
CB4	8A, 240VAC IC=10kA	1000W	CCB POWER
CB5	6A, 240VAC IC=10kA	600W	MDB POWER
CB6	5A, 240VAC IC=10kA	1450W	LASER
CB7	5A, 240VAC IC=10kA	850W	AIR HEATER
CB8	8A, 240VAC IC=10kA	1200W	RDM HEATER
CB9	5A, 240VAC IC=10kA	200W	ELEVATOR
K1	IEC CONTACTOR 30A, 24V COIL	2250W	ESTOP CIRCUIT
K2	IEC CONTACTOR 30A, 24V COIL	2250W	ESTOP CIRCUIT
K3	IEC CONTACTOR 12A, 24V COIL	200W	DOOR SWITCH CIRCUIT
K4	IEC CONTACTOR 12A, 24V COIL	200W	DOOR SWITCH CIRCUIT
CR1	RELAY 3A SPST, 24V COIL	< 1W	ESTOP CIRCUIT
CR2	RELAY 3A SPST, 24V COIL	< 1W	DOOR SW CIRCUIT
CR3	RELAY 6A SPST, 24V COIL	1.5W	DOOR SW CIRCUIT
TB1-1	TERMINAL BLOCK, ST6 52A	46A	LINE
TB1-2	TERMINAL BLOCK, ST6 52A	46A	LINE
GND	GND TERMINAL BLOCK, ST6	N/A	GND
TB2-1	TERMINAL BLOCK PIT2.5 QUAT	N/A	24VDC
TB2-2	TERMINAL BLOCK PIT2.5 QUAT	N/A	24R
TB2-3	TERMINAL BLOCK PIT2.5 QUAT	N/A	ESTOP
TB2-4	TERMINAL BLOCK PIT2.5 QUAT	N/A	211
TB2-5	TERMINAL BLOCK PIT2.5 QUAT	N/A	111
TB2-6	TERMINAL BLOCK PIT2.5 QUAT	N/A	215
TB2-7	TERMINAL BLOCK PIT2.5 QUAT	N/A	115
TB2-8	TERMINAL BLOCK PIT2.5 QUAT	N/A	24V-ES1
TB2-9	TERMINAL BLOCK PIT2.5 QUAT	N/A	24V-ES3
TB2-10	TERMINAL BLOCK PIT2.5 QUAT	N/A	DSTAT
TB2-11	TERMINAL BLOCK PIT2.5 QUAT	N/A	24V-SOL
TB2-A	TERMINAL BLOCK ST2.5	N/A	BYPASS
TB2-B	TERMINAL BLOCK ST2.5	N/A	SSL
TB2-C	TERMINAL BLOCK ST2.5	N/A	START LT
TB2-D	TERMINAL BLOCK ST2.5	N/A	CLS
TB2-E	TERMINAL BLOCK ST2.5	N/A	ENA STAT
ES1	ESTOP MONITOR	N/A	ESTOP SWITCHES
ES2	DOOR SWITCH MONITOR	N/A	DOOR & WINDOW SWITCHES
ES3	DOOR SWITCH MONITOR	N/A	IPM DOOR SWITCHES

ELECTRICAL BLOCK DIAGRAM PLACARD

MIRROR DRIVE ELECTRONICS

IPM

AC IN

DC +/-15V, +5V

LV PS

MDB PCB CONTROL INTFC

LSR LED

LASER WARNING LED

SERVO MOTOR
ENCODER
MOTOR
FDBK
PWM

ELEVATOR MOTOR AMPLIFIER
AC IN
RS232
24V IN

LASER
LASERHEAD
QS LASERHEAD
LD POWERCABLE

LASER PS
AC IN
INTLK
200-240VAC
LASER PWR
RS232

LOGO LED

12V

OPERATOR INTERFACE

COM1
COM3

COMPUTER

ETHERNET
ETH-USB
DISPLAY

5V & 12V UI PWR

USB
HUB

ETHERNET
EXTERNAL COM

5V
USB
AC IN
200-240VAC

CAT 5E CBL, 3X

CAT 5E CBL, 2X

RECOAT MECH.
STEP MOTORS (4)
DIG SENSORS (9)
ANALOG SENSORS (2)

24V, SWITCHED 24V FROM CCB

LT TOWER

USB-SERIAL 8-PORT
COM8 COM7 COM9 COM5 COM6

AIR HEATER
THERMISTORS (2) & FAN
THERMAL CUTOUT
HEATER

COSENSE
SKYEREAD

POWER/SAFETY PANEL

IPM SW (1)
DOOR SW (4)
SWITCH CONTROL

CKT BRKRS
CB9
ELEVATOR
K4
K3

CB7
CB8
AIR HEATER
VAT HEATER

24V, SW 24V

CONTROL INTFC

ANALOG IN & 24VDC

CCB

RFID

HEATER CONTROL

DC +24V, -12V +5V

LV PS

SSR

AC IN 208-240V~

ANTENNA

ID TAG

VAT
LVL MOTOR
VAT PCB
PCB
FILL MOTOR
BTL LOADCELL
RES LOADCELL
24V
BTL RFID
RS232

CH LIGHT

TO ESTOP SWITCHES:
OP INTFC
CHAMBER
IPM

ESTOP CONTROL

K2
ESTOP CONTACTORS
K1

LASER INTERLOCK AUX CONTACTORS
K2
K1

CB2 CKT BRKRS
CB3
CB4
CB5
CB6
COMPUTER
CCB
MDB
LASER

200-240VAC OUTPUT

CB1
MAIN CKT BRKR 30 AMPS

LINE FILTER
200-240VAC NOMINAL MAIN POWER IN

THERMAL CUTOUT
VAT HEATERS
HEATER CONTROL
CB51

CHAMBER CONTROL

CHAMBER CONTROLLER

LIGHT TOWER

CRTL

K21

SKYEREAD

SWITCHED 24V
TO MOTOR DRIVES

TO PC COM 7

INTERLOCK

24V & INTERLOCK
(TO POWER PANEL)

VAC PUMP

INTFC
CARD

CAT 6 CBLS

TO COMPUTER (DSP)

ELEVATOR

BRAKE POWER
24V
ENABLE

CH LIGHT

CCB

MOTOR & LIMS
ENCODER

Y AXIS

RFID
ANTENNA

CABLE CARRIER

Z AXIS PCB

Z AXIS

STEP MOTOR
ENC & LIMS

6PR SHLD

X AXIS

RESIN HEIGHT

RECOAT PCB

RECOAT

VAT

ANALOG INS
LVL MOTOR
ENCODER
FILL MOTOR
DIGITAL SENSORS

STEP MOTOR
ENCODER

TH AXIS

14PR SHLD

4PR SHLD

SENSORS:
LIMS, REC BAR
RESIN HT, VAC

LASER SENSOR
VACUUM SENSOR
PROX SENSOR

RECOAT PCB

K22

FAN POWER (24V)
THERMISTOR

CB21

PWM

ENCLOSURE
FANS

DC
+24V
-12V
+5V

DUAL
SSR

HEATER ELEMENT

LINE INPUT
(FROM ESTOP CONTACTORS)

LV PS

LINE INPUT

14 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 your ProX 800 (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 print, 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

15 SERVICE

GENERAL

ProX 800 service procedures must be performed only by a 3D Systems-certified service technician unless this guide explicitly states otherwise. If your system 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.

3D Systems' support portal is located at http://www.3dsystems.com/support

For Material Safety Data Sheets / Safety Data Sheets (MSDS/SDS), go to http://www.3dsystems.com/support/materials/msds

LASER

UV Radiation

All Laser service procedures may only be performed by 3D Systems certified service technicians. Attempts by non-certified personnel to perform Laser service procedures can result in serious injury. All ProX 800 users must observe the guidelines and warnings located in the section *"Laser Safety" on page 8*.

The ProX 800 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 beams are 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" on page 8* for more information.

COPYRIGHT AND CORPORATE IDENTITY

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.

RADIO FREQUENCY TRANSMISSION

This product generates 13.56 MHz using an Inductive Loop System as a Radio Frequency Identification device (RFID). This RFID device complies with the requirements specified in FCC Part 15, Industry Canada RSS-210, European Council Directive 99/5/EC, and all applicable local laws and regulations.

Operation of this device 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.

The device referenced in this guide contains transmitter, FCC ID: 2ADGF-SKTKM1   IC: 12666A-SKTKM1

The device referenced in this guide contains transmitter, FCC ID: 2ADGF-CLDRIDQK   IC: 12666A-CLDRIDQK

Access to the transmitter for service technicians is available through common enclosure access methods including use of common tools and removal of covers.

NOTE: Changes or modifications to this equipment not specifically approved by 3D Systems may void the user's authority to operate this equipment.

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:

STEROLITHOGRAPHY APPARATUS

Machine type:
Usiner le type:

ProX 800 Production Modeling System

Serial Number:
Numéro de série

****

Year of Manufacture
Année de Fabrication

****

Applicable EC Directives:
Les Directives applicables
de CE:

EMC Directive (2004/108EC)

Name of Person Authorized to compile the technical Construction file: Deborah Beebe

Applicable Harmonized EC

Standards:
Les Normes de CET Harmonisé
applicables:

EN/IEC61010-1, 3rd Edition; EN/IEC60825-1:2007, EN 61000-6-2:2005; EN6000-6-4:2007

Manufactured in USA for
Fabriqué dans l'USA pour
Company Name:
Nom de compagnie: :

3D Systems, Inc
333 Three D Systems Circle
Rock Hill, SC 29730

3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7UA

Brian Alexander
Director, Manufacturing
Le directeur, les fabriquant

****

Date

Beam profile
A pattern of circles or numbers representing the spatial distribution of Laser beam power. This power distribution automatically calculates drawing speeds to determine whether the Laser should be adjusted or replaced, and to indicate whether the optics should be adjusted, replaced, or cleaned.

Beam profiler
A UV-sensitive detector over which the Laser beam is moved to generate beam profiles.

Border
A vector that defines the perimeter of a layer. Hatch and fill vectors are drawn between borders to make the layer solid.

Print file(s)
The data file(s) produced by the Print3D Pro software which are used by the printer to print parts.

CDRH
Center for Devices and Radiological Health.

CFR
Code of Federal Regulations.

Control computer
The computer located inside the electrical cabinet of the system which interfaces directly with the hardware used to print parts.

Cure
The process of turning liquid material into a solid by exposure to UV light.

Cure depth
The thickness or depth of cured material. The cure depth of any line is determined by the laser beam power and distribution, Laser draw speed, and material characteristics.

Curl
A characteristic type of part deformation.

Draining
Enabling material to drip from the finished part into the MDM when the elevator is at its top position to minimize material waste.

Drawing speed
The speed at which the Laser traces over the surface of the material to form solid plastic lines and surfaces. The drawing speed varies depending on the depth of solidification requested ("cure depth"), laser beam power and distribution, and material characteristics.

Dynamic mirrors
Motor driven scanning mirrors with encoder feedback that direct the Laser beam to any point on the surface of the material.

Elevator
The hardware components that raise and lower the print pad and part in the vertical (Z) axis. Also called Z-stage.

Exposure
The total light energy absorbed by a point on the material surface. Exposure increases with higher Laser power and decreases with higher drawing speed.

Fill vectors (skin fill)
Overlapping parallel vectors that comprise the horizontal surfaces (skins) of stereolithographic parts.

Green part
A stereolithographic part which has been removed from the printer, prior to UV post-curing.

Hatch
A vector that is drawn between layer borders and comprises the interior of the part.

Hatch spacing
A parameter that specifies the perpendicular distance between adjacent hatch vectors.

Laser
Light Amplification by Stimulated Emission of Radiation. The device that generates the light energy required to polymerize photocurable material.

Layer
Thin horizontal section of laser-solidified material.

Layer thickness
The depth of a solidified layer of material, as requested by the user.

Leveling
The process whereby the surface of the material is adjusted to the correct distance from the dynamic mirrors.

Line
A line of cured plastic generated by overlapping bullets. See also **vector**.

Line width
The horizontal width of a Laser cured material line.

Monomer
A low molecular weight chemical species, which is a printing block of polymers.

MSDS/SDS
Material Safety Data Sheet / Safety Data Sheet. Federal government mandated information about the chemical makeup of any chemical substance, such as photocurable resin. Usually includes identification of toxic substances and safe handling guidelines.

NIOSH
National Institute for Occupational Safety and Health.

Photoinitiator
A chemical in photopolymers that reacts with photons and catalyzes the polymerization process.

Photopolymer
A chemical substance composed of photoinitiators and monomers that polymerizes when exposed to light energy.

Photopolymerization
The process whereby light energy converts monomers into a polymer.

Polymer
A material built up from a series of smaller units (monomers). The molecular size of the polymer helps to determine the mechanical properties of the plastic material.

Polymerization
The process of linking small molecules (monomers) into larger molecules (polymers) comprised of many monomer units.

Post-Curing Apparatus (PCA) and ProCure equipment
A device which generates ultraviolet energy used to cure green stereolithographic parts.

Post-process
The process of cleaning, curing, and finishing stereolithographic parts.

Print3D Pro
Touchscreen interface application through which the user operates the system.

Printhead
Also called the IPM (Image Print Module). This is an assembly that contains the laser and scanning mirrors.

Print Applicator
The assembly of a ProX 800 that either applies material to, or removes excess material from the part, as the applicator moves across the material surface.

Print chamber
The chamber in which the MDM, elevator, and beam profiler are located.

Print Pad
The perforated base on which parts are printed by the ProX 800.

Print Pad Locators
Features that secure and position the edges of the print pad.

Print Pad Supports
L-shaped brackets that support the print pad and attach it to the elevator.

Material Delivery Module (MDM)
The metal container inside the process chamber in the ProX 800 that holds the material from which the part is formed. On older SLA Centers, the MDM is referred to as the vat.

Safety shutter
A mechanical device that blocks the laser beam when an interlock switch is activated or when closed via the user interface.

Scan speed
See **Draw speed**.

Sensitization
An allergic response to a chemical stimulus, such as photocurable resin, generally resulting from repeated skin contact.

Skin (skin fill)
See **Fill vectors**.

SLA Center
See **Stereolithography apparatus**.

Stereolithography apparatus
The equipment used to produce stereolithographic parts.

Stereolithography
A three-dimensional imaging process that forms plastic objects by solidifying successive layers of photocurable material.

Stereolithography file (STL)
The tessellated (triangulated) CAD input file.

Supports
Structures designed using the 3D Manage software to support a part above the print pad, provide a rigid foundation on which the object may be printed, and attach and support layer sections.

Sweep
A pass of the print applicator from the front of the material delivery module to the rear or from rear to front. The act of removing excess material from the upper surface of the part or adding a layer of fresh material during the layer additive process.

Tessellate
To represent 3D CAD surfaces in polygonal format.

Trapped Volume
During printing, a volume of material within the part that cannot flow out to the surrounding liquid in the MDM.

Triangle normal
A line perpendicular to a triangle starting at its center and pointing away from the mass of the part. Triangle normals are used to differentiate between inside and outside surfaces of a solid.

Ultraviolet (UV)
Electromagnetic radiation having a wavelength shorter than visible light, (i.e., below 390 nanometers).

Vat
On older SLA Centers, the metal container inside the process chamber that holds the material from which the object is formed. On the ProX 800, this container is called the MDM.

Vector
A directed line segment represented by starting and ending coordinates as defined in a stereolithography slice or print file.

Zephyr™ Print Applicator System
A print applicator system that uses an internal vacuum cavity to deposit material onto the part.

Z-Stage
See **Elevator**.

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