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Ackuray User Manual

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Safety Guidelines

Read these precautions before working with the Ackuray or the materials used during print creation.

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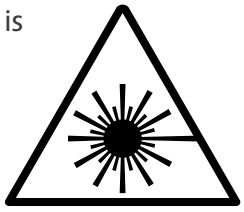
Laser Safety

The Ackuray DLP Printer is a Class 1 laser product that complies with the international standards IEC 60825-1:2007 and EN 60825-1:2007. Accessible radiation is within Class 1 limits. The laser diode used inside the device has the following specifications:

- While the printer cover is closed, the output of the laser device is fully contained.
- The printer cover includes an interlock system that detects when the cover is opened and automatically turns the laser off.
- If the interlock system is tampered with or fails, there is risk of exposure to Class 3B laser light.
- During printing, the laser output may be visible, so it is potentially dangerous to look directly into the machine during operation.
- The laser may emit minor radiation within the limits of the IEC 60825-1 standard. The printer cover further reduces this radiation to insignificant levels.



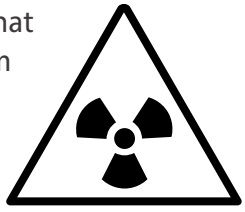
The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-2000, developed by the American National Standards Institute (ANSI). This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration (OSHA) laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems.

While the ANSI standard itself does not have the force of law, its recommendations, including warning signage, training, and the designation of a laser safety officer, may be compulsory under local workplace regulations when operating laser systems above Class I. It is the operator's responsibility to ensure that the installation and operation of the Ackuray DLP Printer is performed in accordance with all applicable laws. Copies of ANSI Standard Z136.1-2000 are available from:

Laser Institute of America
12424 Research Parkway, Suite 125
Orlando, FL 32826
(407) 380-1553

Resin Safety

Resins provided by Ackuretta are non-carcinogenic acrylic-based resin liquids that give off a light odor. These resins may cause skin, eyes and respiratory system irritation, and skin sensitivities or allergic reactions by skin contact. Inhalation of a high high-vapour concentration may cause headaches and nausea. Adverse conditions may be delivered the following ways:



▶ Acute Exposure

Skin Contact	This product may cause skin irritation. Symptoms may include a slightly localized redness or rash and swelling. Repeated exposure may cause sensitization and allergic skin reaction in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking.
Eye Contact	This product may cause eye irritation. Symptoms may include excessive tearing, itching, irritation, blinking and redness.
Inhalation	This product is a suspect slight respiratory tract irritation hazard, especially if used at elevated temperature or processes which may generate aerosols or mists. Symptoms of irritation may include coughing, headache and nausea, mucous production and shortness of breath.
Ingestion	This product may be harmful if swallowed. It may cause nausea, headache, vomiting, diarrhoea, and/or central nervous system effects. Keep all food in an area separate from storage and use locations. Prohibit eating, drinking and smoking in areas where there is a potential for significant exposure to this material. Thoroughly wash hands before eating.

▶ Chronic Exposure

Skin Contact	Prolonged contact may cause sensitivities and allergic reactions. People with pre-existing skin conditions may incur more significant irritation. Repeated exposure may cause sensitization and allergic skin reaction in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking.
Eye Contact	Prolonged contact may cause redness of eye tissue.
Inhalation	Prolonged or repeated overexposure may cause irritation, headaches, and nausea.
Ingestion	Prolonged or repeated swallowing may be a slight ingestion hazard. Chronic ingestion of high doses has shown damage to testes in studies with animals.

▶ Disposal

Resins provided by Ackuretta Technologies are not readily biodegradable. Releasing these resins into the environment may be illegal according to the regulations in the usage area.

Properly dispose of resins in accordance with all applicable federal, state, and local regulations.

For more information, please refer the Material Data Sheet found in the Downloads page.

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Cleaning Alcohol Safety

To clean prints, Ackuretta recommends using solutions of 95% ethyl alcohol or 95-99% isopropyl alcohol (IPA). Both compounds are colorless, transparent, and naturally give off strong odors. Both compounds have the following major safety concerns:

- **Highly flammable and potentially explosive.**
- Toxic and can cause adverse conditions from ingestion, inhalation, or direct contact.
- Evaporate quickly so they can become an airborne toxins.

To avoid these potential issues, do the following:

- Store in cool, dry, and well-ventilated areas.
- Label containers with instructions regarding handling and storage.
- Keep away from any sources of heat, fire, and sparks.
- Keep away from strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids and isocyanates.
- Close containers tightly with a strong seal immediately after use.
- Dispose in accordance with all applicable federal, state, and local regulations.

Adverse conditions may include:

▶ Acute Exposure

Skin Contact	This product may cause skin irritation. Symptoms may include skin discoloration, dryness, and cracking.
Eye Contact	This product may cause eye irritation. Symptoms may include excessive tearing, itching, irritation, blinking and redness.
Inhalation	This product is a suspect slight respiratory tract irritation hazard. Symptoms may include nose, throat, and lung irritation, coughing, and/or shortness of breath.
Ingestion	This product may be harmful if swallowed. It may cause nausea, headache, vomiting, and/or unconsciousness. It can also affect concentration and vision.

▶ Chronic Exposure

Skin Contact	Prolonged contact may cause sensitivities and allergic reactions. Repeated exposure may cause sensitization and allergic skin reaction in some individuals resulting in contact dermatitis, severe irritation, dryness and cracking. Alcohol can be absorbed through the skin and may result in symptoms similar to those listed under acute ingestion.
Eye Contact	Prolonged contact may cause redness of eye tissue.
Inhalation	Repeated high exposure may affect the liver and the nervous system.
Ingestion	Occupational exposure is unlikely to cause cancer, but direct and repeated ingestion may increase the risk of liver, esophagus, breast, prostate, and colorectal cancers. Pregnant women should not ingest alcohol, and repeated exposure may cause spontaneous abortions, birth defects, and other developmental problems. Repeated ingestion may also reduce fertility in males.

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Printer Overview

This section shows the dimensions and main components of the Ackuray DLP printer. All Ackuray models have the same components, and the dimensions are the same.

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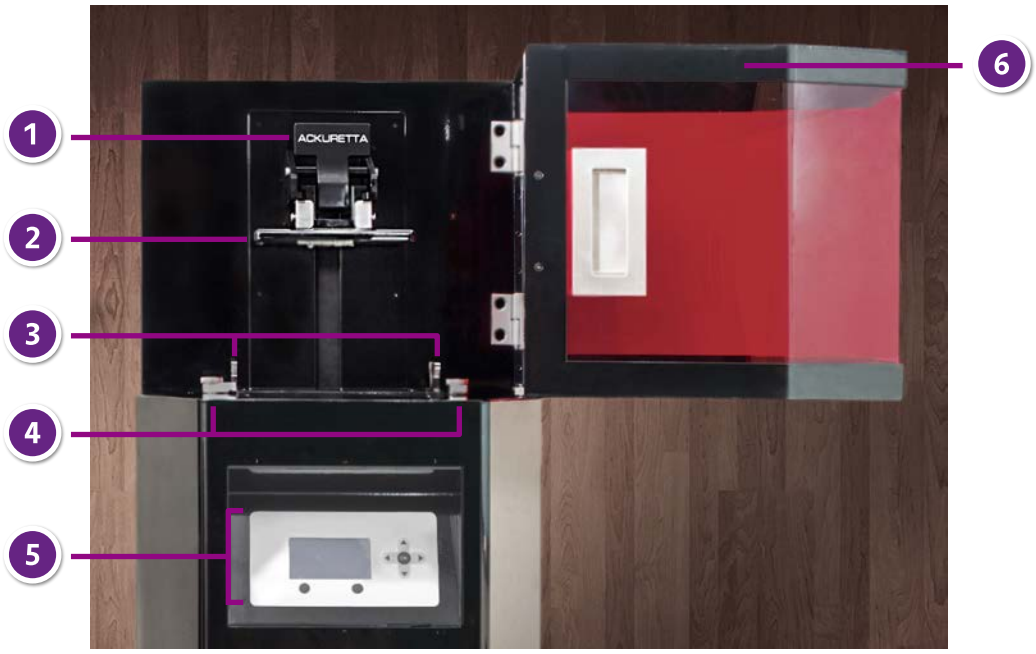
Printer Dimensions

Length (from front to back)	43.3 cm	17.0 in
Width (along back plate)	36.2 cm	14.3 in
Height (including legs)	77.0 cm	30.3 in



Printer Front and Interior

1 Build Platform Connector

2 Build Platform Plate

The build platform holds the print during printing such that the print hangs upside-down on the plate. Tilt the build platform connector upward to lock the platform in or downward to detach the platform.

3 Duravat Tank

4 Duravat Connectors

The Duravat™ resin tank is a translucent storage vessel for your resin. To remove the Duravat, twist the thumbscrew connectors so they are parallel to the machine. To lock the Duravat in, place the tank in the slot and twist the connectors inward.

5 Console

The printer console controls all mechanical and software functions of the printer. The console automatically starts when the printer is turned on. Operate the console with the buttons below and to the right of the display.

6 UV Door

The UV protected transparent door allows you to see inside the printer while also preventing outside light from affecting the print. Open the door with the handle on the left side. The printer will automatically stop any printing process if the door opens.

Printer Side

1 **USB Ports**	Connect your USB devices to these port to import your 3D models for printing or to do firmware updates.
2 **Power Button**	Press this button to turn the Ackuray on or off.
3 **Power Socket**	Attach the enclosed power cable to this connector.

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What You Need

Beyond the Ackuretta printer, users need several items in order to make a complete print. These items are used in the preparation of the model and the printer, as well as in the finishing of the print. Ackuretta supplies most of these supplies in the Finishing Kit.

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Computer

In order to run Visualizer and Magics for Ackuretta software, your computer needs to meet the following minimum requirements:

Specification	Visualizer	Magics for Ackuretta / Magics for Ackuretta Pro
CPU	Intel i3 1.7 GHz or AMD equivalent	Intel i7 3.0 GHz or AMD Phenom II X4/X6 3.0 GHz
RAM	4 GB	16 GB
GPU	NVidia/AMD card with 1 GB memory	NVidia GeForce GTX 960 or AMD equivalent card with at least 1 GB memory and DirectX 11 compatibility
Operating System	Windows 7 SP1, 8, 8.1 (32-bit/64-bit)	Windows 7 SP1, 8, 8.1, 10 (64-bit)
Disk space	2 GB of free disk space	
Software	CAD or 3D modeling software capable of exporting to STL. For software recommendations, see Making your 3D Model.	

Consumables

The following items are used during the printing process, and occasionally need to be replaced.

- **1 Duravat™ resin tank per resin being used**
  Duravat resin tanks generally last for 100 prints.
- **200 mL of each resin per print**
  Recommended: Have at least 1 liter available in case of spillage or misprints.
- **1 plastic container (at least 150 x 150 x 220 mm) for initial cleaning**
  Do not use the same container for multiple different resins, as it may cause contamination.
- **1 vat for the Ultrasonic Cleaner**
  Recommended: Have at least 1 extra vat available. Replace your vat every 2-3 months.
- **1 liter of cleaning alcohol**
  Preferred: ethyl alcohol 95% solution If ethyl alcohol is not available, isopropyl alcohol (IPA) 99% solution is sufficient, but may damage fine details.
- **Plastic bottles: 1 for cleaning alcohol disposal and 1 for each resin to store for reuse**
  Recommended: Have at least 1 extra vat available. Replace your vat every 2-3 months.
- **5 sheets of sandpaper of varying grit sizes**
  For best results, use ISO/FEPA grit sizes from P220 to P500, or CAMI grit sizes from 220 to 360.
- **Tissues or paper towels as needed**

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Finishing Tools

These items are recommended for finishing prints. Replacements for some of these items may be used, but in Ackuretta support documentation, it is expected that users have at least these items:

- Well-lit table and workspace
- Ultrasonic cutter* or scalpel
- Ultrasonic cleaner* or cleaning vat
- Electric air blower* or hand-squeeze blower
- UV oven*
- Microfiber cloth*
- Funnel*
- Mesh filter*
- Scraper*
- Rubber spatula*
- Tweezers*
- Safety gear, including protective gloves* and glasses*

Items marked with an asterisk (*) can be found in the Ackuretta Finishing Kit.

Optional Tools

These items are not required, but may be useful for different printing situations:

- **Lens cleaning brush, such as a LensPen™**
To clean the projector lens

- **Vacuum suction pen, such as a PEN-VAC™**
To remove failed prints or debris from resin

- **Magnifying glass or loupe**
To view fine details of a print

- **Pipette**
To clean around and inside delicate parts with overhangs or loops

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Unboxing and Setup

Take the Ackuray, Finishing Kit, and Starter Kit out of the box and store them in an appropriate place for your workflow.

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Unboxing and Setup

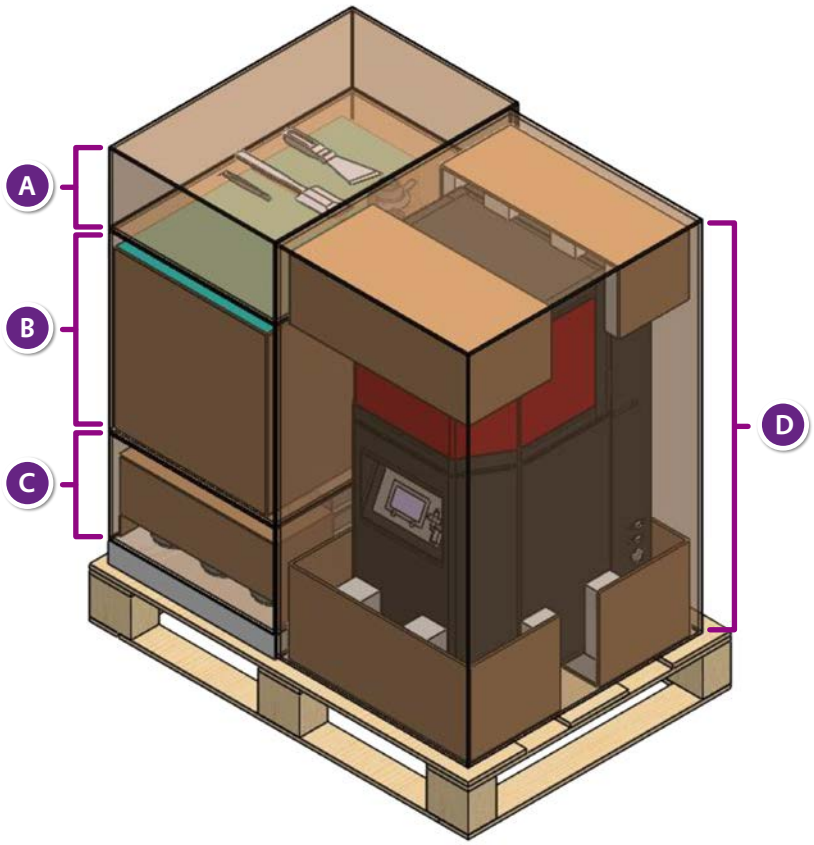
Under normal situations, your Ackuray will arrive at your country's customs office in less than one week. The weight of your package vary depending on the model of printer and whether you purchased a Finishing Kit or Starter Kit, but the dimensions of the package are standard. The outer box arrives on a fitted wood pallet with multiple sorted boxes inside.

Pallet dimensions (L x W x H)	91.1 X 63.2 X 12.0 cm
Outer box dimensions (L x W x H)	90.1 X 62.2 X 90.0 cm
Package weight	33Kg to 38Kg

Unboxing Your Ackuray

The Ackuray package contains 4 boxes inside of it. However, the smaller boxes may be empty if you did not purchase the additional components. The major parts of the package are as follows:

A	Finishing Kit: Non-Mechanical Items
B	Finishing Kit: Mechanical Items
C	Starter Kit
D	Ackuray Printer



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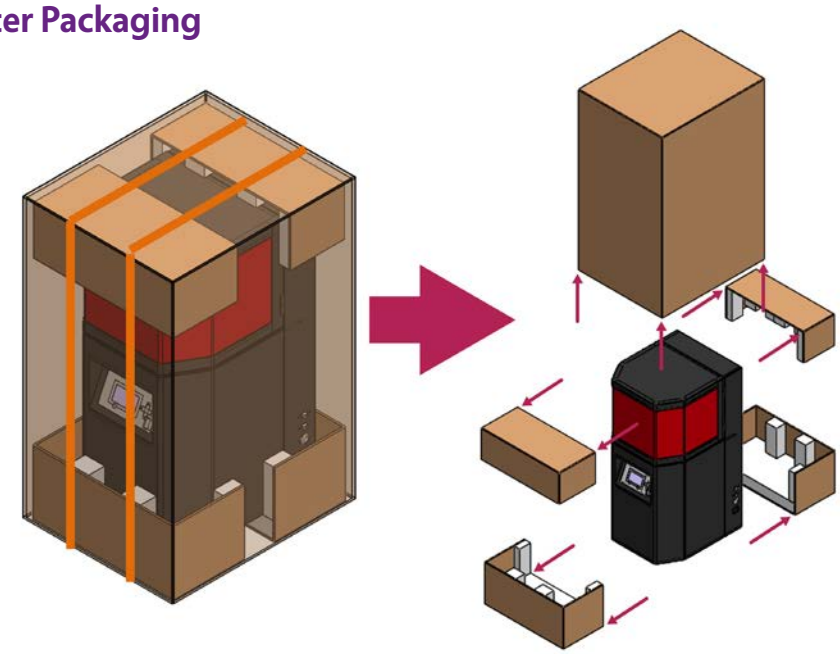
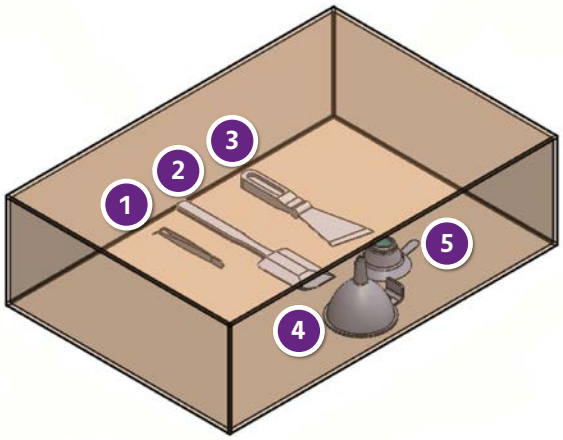
Ackuray Printer Packaging



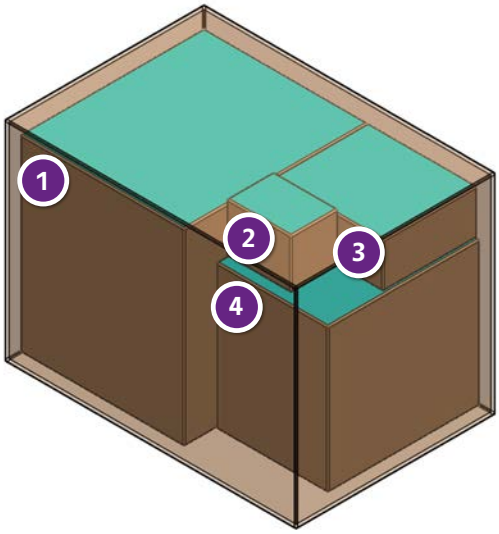
Finishing Kit: Non-Mechanical Items

1	Tweezers
2	Rubber spatula
3	Scraper
4	Funnel
5	Wire filter



Finishing Kit: Mechanical Items

1	UV oven
2	Air blower
3	Ultrasonic cutter
4	Ultrasonic cleaner



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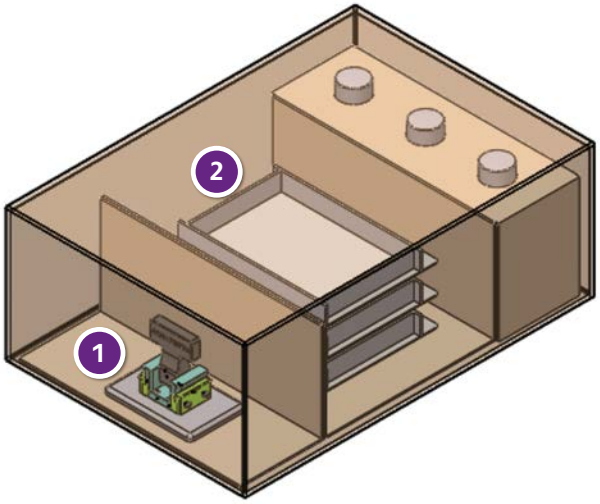
Starter Kit

1	Build platform
2	Duravat resin tanks (3)



Check that all the components that you have purchased are in the package. If any items are missing or damaged, send a message to Ackuretta support.

Choosing your Printing Location

After unboxing your Ackuray, the next step is to decide where to place it. Consider the following when deciding the ideal location to be working with your printer:

• **Temperature range: 15-30°C (60-85°F)**
During printing, if the resins are too hot or too cold, they may not cure properly. It is best to have your printer in a dry, temperature-controlled room.

• **Controllable lighting**
The UV-protected door of the Ackuray protects the resin from inconsistent curing due to outside lighting, but when you open the door, light can partially cure the resin. An ideal environment for printing would be a room with thick curtains or blinds that can be closed to prevent sunlight as well as multiple levels of light. During printing, use a lower light setting, and use a higher amount of light for finishing the prints after the Ackuray process has completed.

• **Enough space for the full process**
Depending on the types of prints you regularly create, you will certainly need additional tools for the full printing process. Leave plenty of counter space available so that you can place prints and other components on the table, usually onto micro-fiber cloths or newspaper. Additionally, have all the machines available that you need, such as an ultrasonic cleaner or UV oven as found in the Ackuray Finishing Kit.

For most users, Ackuretta recommends a counter or sturdy table with at least **5 x 2.5 m** (16 x 8 feet) of free space. Additionally, you will need sufficient nearby cabinet or closet space to hold your resins and vats, including room for separate reused resins and vats.

Note

The power supply, USB port, and door hinge are on the right side of the printer. Ensure that the right side of the printer has at least 60 cm (2 feet) of space from the nearest wall.

Setting Up your Printer

The Ackuray was designed to be plug-and-play, so setup is minimal. The printer is packaged with the Duravat and build platform already installed, so no assembly is required. Each printer is pre-calibrated, so no calibration or other setup is necessary either. To get your printer ready, all that you need to do is as follows:

1. Place your printer in your chosen location.
2. Attach the power cable to the power socket .
3. When you want to print, press the power button to turn on the printer.

Before using your printer, you will need a 3D model that has been converted to a proper print format. For information about making your 3D model, see Making your 3D Model. To convert your 3D model to a proper format, use Ackuretta Visualizer or Visualizer+ software. After you have a 3D model, you will need to do other preparation as described in Getting your Printer Ready.

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Making your 3D Model

Follow these basic tips and measurements when designing your CAD files to export for 3D printing.

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Making your 3D Model

The most important part of using a 3D printer is having the 3D model to print from. The following section describes the printing requirements and considerations when working with the Ackuray.

Supported File Formats

Ackuray printers read the following **print slice files** that are created from 3D printing programs:

VBF	Visualizer Print File	This is the standard print file format used with the Ackuray. Visualizer and Visualizer+ output their print files in this format.
ACK	Ackuretta Print File	This file format is created by the Ackuretta Print Assistance Tool. Use the Print Assistance Tool when you already have a set of slice images but you want to add Ackuretta settings to those slices.
SLC	Slice File	This is an open-source format that uses the STL convention for making slice files.

Ackuray printers support **STL and MGX file formats**, which provide vector information in the form of numerous triangles. The STL file format is supported by most CAD and 3D modelling software. If you have OBJ, 3DS, LWO, or Blender files, use your 3D modelling program to convert those files to STL.

Model Requirements

Ackuray printers have the following key requirements for models:

Dimensions

This set of dimensions is specific to the Ackuray printer stating exactly what sizes the printer is capable of printing. If you want to print an object larger than the maximum build volume, split the object into multiple connectable parts and join them together. Objects smaller than the minimum build volume may be unstable with the necessary support material.

	A-96	**A-135**
Maximum build volume:	96 x 54 x 130 mm	135 x 76 x 130 mm
Minimum build volume:	2 x 2 x 2 mm	2 x 2 x 2 mm
Minimum detail size:	0.05 mm	0.07 mm

Hollow Spaces with Drain Holes

Ackuretta recommends using hollow spaces if possible, because hollow objects require less material and the printing time is shorter. Use hollow interiors and cavities as long as the object's strength is not a major concern, like in the case with prototypes or display objects.

When creating a design with a hollow interior, you will need to at least make an exterior shell, and usually will have to connect the shell with some interior supports. The object will trap resin inside during the printing process, so you will also need to place drain holes in the model. The requirements for your individual print vary based on how strong the object must be, but the dimensions shown here are the minimums when using Ackuretta resins.

Minimum exterior shell thickness:	0.15 mm
Minimum interior support thickness:	0.20 mm
Minimum drain hole diameter:	2.00 mm

Multiple Connected Parts

In order to print all parts in sequence, Ackuretta recommends saving all parts as **a single component** in your CAD file. Ackuretta Visualizer is able to queue the parts for printing and save the settings for each part. You will still need to prepare the printer and perform post-processing on each print individually, but keeping the settings on the same file reduces the chance of a misprint.

When assembling pieces, the parts may not fit perfectly with each other, so it is a good idea to design your parts with additional resin that you can later reduce if necessary for tight assembly. Similarly, if the pieces are meant to be tight fitting but free-moving, you may need to reduce the print size for free-moving tolerance. Use the following suggested tolerances when creating models for Ackuray printing:

Tolerance for tight-fitting parts:	0.20 mm (added to initial size)
Tolerance for free-moving parts:	0.50 mm (removed from initial size)

Best Practices for 3D Modelling

Hollow Spaces with Support Material

As noted in the Model Requirements, Ackuretta recommends printing hollow objects when possible, but not all objects are created equally. Some hollow objects may need internal support material to maintain a solid structure during printing, and as such, these objects will need a way to remove that material.

Many programs have systems that count the number of 3D shells, the type of infill, and the infill percentage. Additionally, you have to consider that the interior support material needs to have some sort of exit, so you will need at least one hole that you can easily remove the support material through. For the majority of prints, the following are the preferred ways to configure these options:

Number of shells:	2-5 (1 is usually too few, and more than 5 becomes unnecessary)
Infill types:	Hexagonal / Honeycomb (most efficient for strength vs. material used) Triangular (stronger than hexagonal and good for thin/narrow objects)
Infill percentage:	10%-20% (increase this number for smaller prints)
Removal holes:	5 mm (large enough to pull through with tweezers)

If you need more rigidity, flexibility, or translucency, adjust these numbers for your specific case. The primary point of using hollow spaces is to reduce material used, so when testing different print numbers, always **estimate higher than lower**. If you use too little resin in either the walls or the support, your print may become unusable. In that case, you would need to reprint, defeating the purpose in using a hollow design.

Mesh Repair and Optimization

Before finalizing your print, make sure to run your 3D model through a mesh repair or optimization program. These programs can solve a variety of difficult-to-detect problems, including:

- Holes in the exterior of the model
- Non-manifold faces or edges
- Invalid orientations
- Negative volume areas

Many popular 3D modelling tools and companies have mesh repair and optimization programs. Some common programs include:

Program	Website
Autodesk Meshmixer	http://www.meshmixer.com/
Materialise Magics	http://software.materialise.com/magics
MeshFix	https://sourceforge.net/projects/meshfix/
MeshLab	http://meshlab.sourceforge.net/
Netfabb	https://www.netfabb.com/
Simplify3D	https://www.simplify3d.com/

Several of these tools can also be used as complete 3D modelling suites, depending on what you need. Research what kind of tool you will need for your task, and determine what program or tool is best to do the job.

3D Modelling Tools

There are many ways to design your model. If you have physical access to an object that you want to duplicate, you can use a 3D scanner or photographs to use with photogrammetry software. If you want to construct a model yourself, there are numerous products on the market, usually with specific niches. Of course, you can ask a friend or colleague, commission a work, or find a free model online.

The following list is not comprehensive, but shows some commonly used software and tools within certain industries:

	Product	Website
General Purpose	Autodesk 123D	http://www.123dapp.com/
	Autodesk 3DS Max	http://www.autodesk.com/products/3ds-max/overview
	Autodesk Maya	http://www.autodesk.com/products/maya/overview
	Blender	https://www.blender.org/
	FreeCAD	http://www.freecadweb.org/
	Lightwave 3D	https://www.lightwave3d.com/
	Modo	https://www.thefoundry.co.uk/products/modo/
	ZBrush	http://pixologic.com/
Jewellery	3DESIGN	http://www.type3.com/
	Jewel CAD	http://www.jcadcam.com/
	Jweel	https://www.jweel.com/en/
	Matrix	http://www.stuller.com/matrix
	Rhinoceros	https://www.rhino3d.com/
Dental	3D Diagnostix	
	ExoCAD	
	i-CAT	
	Sirona CEREC	
	Soredex SCANORA	
Engineering	Autodesk Inventor	
	CATIA	
	ProE	
	Solid Edge	
	SolidWorks eDrawings	
3D Scanners	3Shape	
	Laser Design	
	MakerBot Digitizer	
	NextEngine	
	XYZprinting Da Vinci	
Photogrammetry	Adobe ImageModeler	
	Agisoft PhotoScan	
	Autodesk 123D Catch	
	RealityCapture	
	PhotoModeler	

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Getting your Printer Ready

Physically prepare your printer by checking the vat and build platform, filling the machine with resin, and turning the printer on.

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Getting your Printer Ready

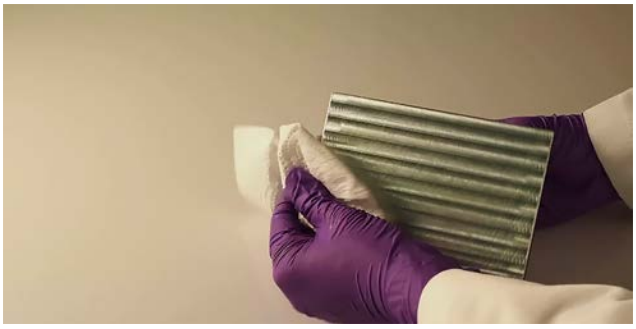
Before making any print, do the following basic steps to prepare your Ackuray printer. The process is slightly different depending on whether you are doing your first print with a certain resin, or whether you are doing a follow-up print using the same resin as before.

Preparing for a Fresh Print with a New Resin

Follow these steps every time you start a fresh new set of prints. This set of prints can be after not using the printer for some time, or when changing to a different resin after using a resin previously. If you intend to use the same resin repeatedly through one printing session, after initially using this set of instructions, for every print afterwards, follow the instructions in Preparing for a Follow-up Print with the Same Resin.

1. Clean your Build Platform

On the bottom of your build platform, you may see residue from previous. Wearing protective gloves, clean that build platform using a tissue dipped in IPA solution. After all of the residue is removed, reattach the build platform to the Ackuray printer.



Warning

Do not touch the build platform directly with your hands. The oil from human hands sticks to the platform and can prevent prints from sticking to the surface.

2. Inspect your Duravat for Damage

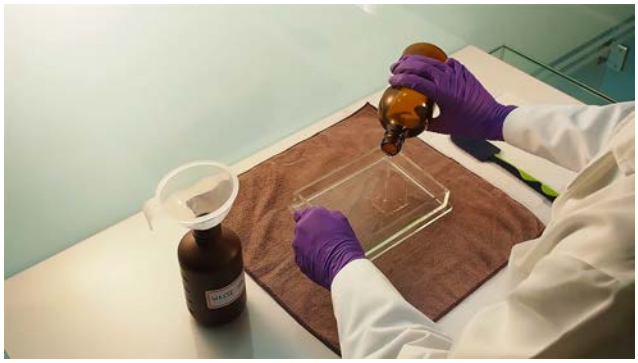
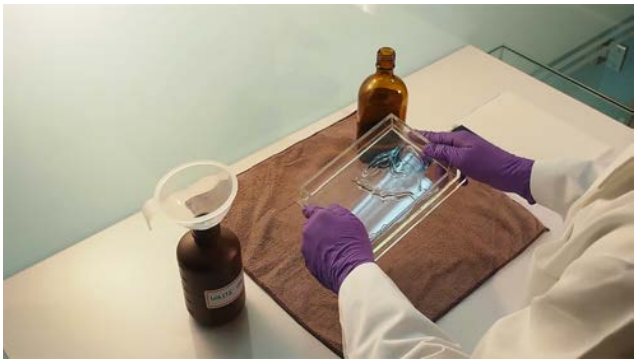
After every printing, clean your vat to ensure that no resin gets stuck on. Even if you do this, it is always a good idea to check your vat before you start printing. Make sure your vat has no damage or deformities caused by previous prints. These are the most common deformities you may see when inspecting your vat:

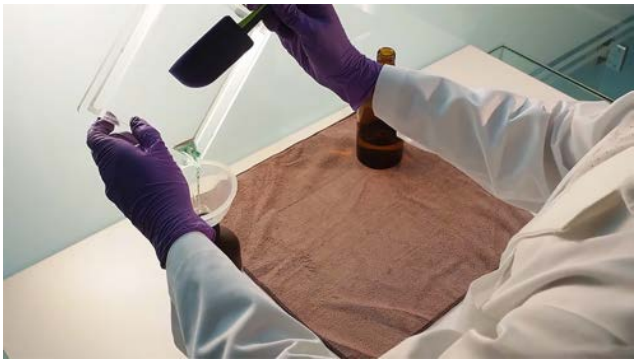
- **Stains:** Failed prints may leave resin stains or burn marks.
- **Tears:** Cleaning or removing failed prints may peel away layers of the vat.
- **Scratches:** Using a scraper on the vat may leave linear scratches.

Most of the problems with the vat come from unsuccessful or burnt prints. These can usually be prevented by ensuring that your prints are of good quality before putting in the printer, but all prints will incur some damage on the vat. With proper use, Ackuretta vats are tested to last **2-3 months of continual use, or about 100 prints**. When your vat begins to show some damage, Ackuretta recommends replacing your vat with a new vat.

3. Clean your Duravat

If your vat has little or no damage, clean your vat once more before using it. Pour a small amount of IPA into the vat, and tilt the vat so the IPA reaches all locations. Use a rubber spatula to push the IPA out into a container for IPA disposal.



Warning

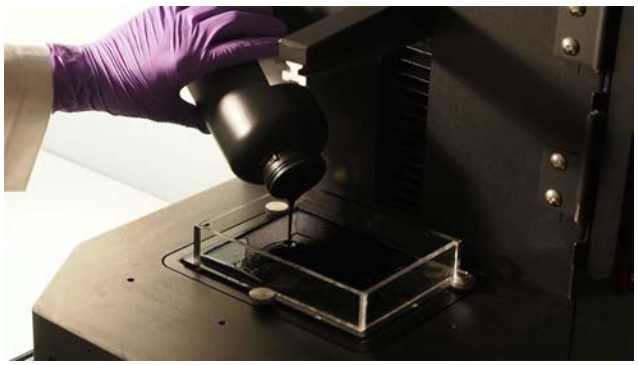
Make sure that any different resins are removed from your vat before adding new resin. Mixing resins can cause your print to crack, break, or burn because of improper heating.

Tip

To maintain your vat, clean your vat after you finish using each particular resin. You can use the same resin for successive prints, but clean your vat when you change resins or finish printing.

4. Fill your Duravat

Reattach the vat to the printer and secure the vat with the thumb screws. Fill the vat with about 200 mL of resin, which is 1 cm of depth in the vat. The printer will stir and displace some of the resin during printing, so make sure not to overfill the vat.



5. Connect your USB Device

Attach your USB device to the port on the right side of the printer. The Ackuray printer is able to detect most flash drives and external hard drives, but if you encounter a problem, ensure that your device matches the following specs:

- USB 2.0 or 3.0
- NTFS, FAT16, or FAT32 file system
- The device requires no special drivers, software, or authentication.

Preparing for a Follow-up Print with the Same Resin

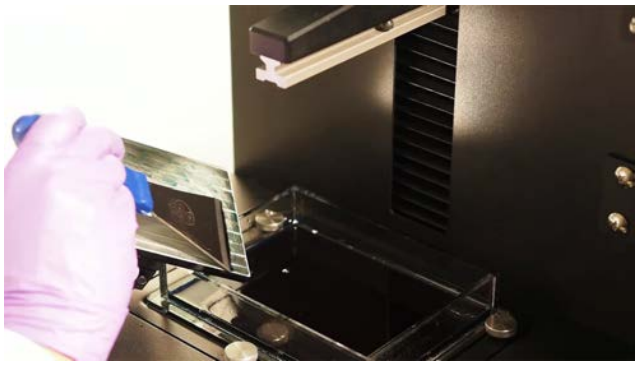
Follow these steps only if you have already finished one print in this session and are intending to continue making more prints with the same resin.

1. Clean your Build Platform

On the bottom of your build platform, some residue from the previous print will likely remain. Remove all solid debris from the platform with a tweezers, and then you may reuse the remaining resin.

Pick up the build platform and hold it angled above the partially full resin vat. Scrape the resin off of the platform into the vat with long strokes of the scraper.

After cleaning most of the resin off, clean that build platform using a tissue dipped in IPA solution. After all of the residue is removed, reattach the build platform to the Ackuray printer.



Warning

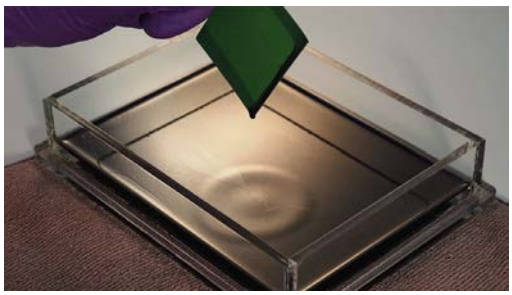
Do not touch the build platform directly with your hands. The oil from human hands sticks to the platform and can prevent prints from sticking to the surface.

2. Check Resin and Replace if Necessary

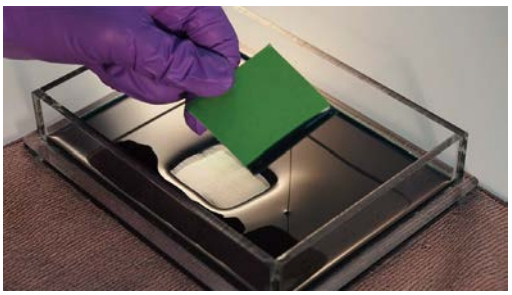
Make sure that the remaining resin is acceptable to continue printing. Do the following before continuing to use this resin:

- **Remove any debris from the previous print.** Some small pieces or sediment may remain after printing. To clean solid debris out of the resin, remove the vat, and pour the remaining resin through a metal filter into a clean plastic bottle. After filtering, clean the edges of the vat. Pour the resin from the bottle back into the vat. Dispose of the sediment and any resin waste in the same place you would dispose of used resin.
- **Check the color of the previous print for irregularities.** For a normal print, the color of your resin should remain consistent throughout the entire print. If the previous print has darkened or browner locations in the print, it is possible the resin density is inconsistent or that there is some contamination. The print itself may still match your need and you may continue using it, but Ackuretta recommends replacing the resin in your vat if you see these inconsistencies.

- **Make sure your resin is watery.** Take a scraper, spatula, or spoon and dip it into several different areas of your resin. Pour out the resin slowly back into the vat. The resin should have a thin, watery consistency. If the resin has thickened or it falls off in strings, UV light may have dispersed over the resin and started to harden it. This may cause your next model to print inconsistently or to become unstable. As such, Ackuretta recommends replacing your resin in this case.



Good Resin Sample

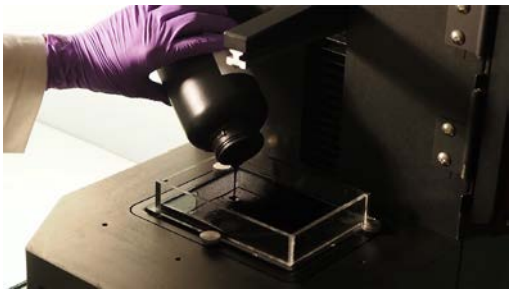


Bad Resin Sample

If you need to replace your resin, empty your entire vat into a proper disposal receptacle. Dip a tissue in IPA solution and clean the entire vat so that no resin remains inside. Dry the vat with tissues before refilling the vat.

3. Fill your Duravat

Whether the resin needed to be replaced or not, fill the vat so it has about 200 mL of resin, which is about 1 cm of depth in the vat. The printer will stir and displace some of the resin during printing, so make sure not to overfill the vat.



4. Check IPA and Replace if Necessary

The IPA in the plastic container and ultrasonic cleaner can be reused for multiple prints with the same resin, but should be replaced regularly. If the IPA is cloudy or opaque, it is generally too dirty to adequately clean the prints.

The IPA in the plastic container used for the initial cleaning becomes dirty much more quickly than the IPA in the ultrasonic cleaner. Ackuretta recommends replacing the IPA in the plastic container every 30 prints. Ideally, the IPA in the ultrasonic cleaner should be replaced every second time you replace the IPA in the plastic container.

When disposing of IPA, prepare a container specifically for waste IPA storage. Place a funnel on top of the IPA container, and pour the IPA through the funnel. After emptying the container, wipe the funnel with a tissue dipped in clean IPA.

Warning

IPA is a controlled chemical in many countries and must be disposed of properly. Check the federal safety regulations and disposal methods in your country.

When storing IPA, whether for disposal or for use, keep all containers far away from any sources of heat, sparks, or flame.

ACKURETTA
TECHNOLOGIES

Printing from the Ackuray Console

Use the LED console on the Ackuray to start printing.

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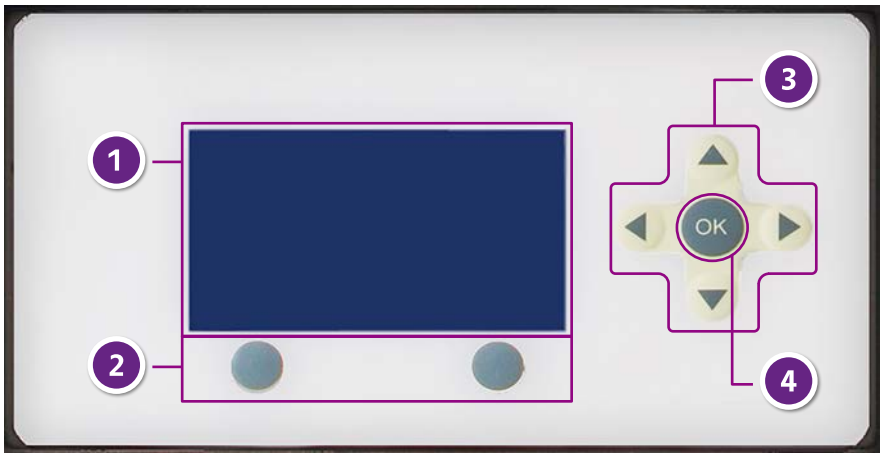
Printing from the Ackuray Console

The front of the Ackuray contains a blue LED console which controls all major printer functions. The console consists of the following parts:



1. LED display	This shows the current options available, details about a given file, and the status of printing or cleaning processes.
2. Control buttons	The LED display places options in the bottom-left and bottom-right corners. Press the corresponding control button below the displayed option. The left control button usually corresponds to going back to the previous screen or canceling operations. The right control button usually selects or confirms an option.
3. Directional arrows	Press the directional buttons to choose options.
4. OK button	On most screens, you can press the OK button to confirm a selection instead of the right control button. On screens with numerical selections, use the directional buttons to choose a number that you want to change. Press the OK button to select that you want to change that number. Use the directional buttons to change your selection. Press the OK button to confirm your change.

Main Menu

When you start up the Ackuray printer, the first screen with options that appears is the Main Menu. The Main Menu comprises the major functions that the printer performs.

Print	Perform a 3D print. The File Manager opens to select your print file. After configuring a few settings, the printer will begin printing.
Printer Settings	Set the default settings used when printing. The settings contained in this section are as follows: • First layer curing time • Number of layers in the print buffer
Clean VAT	Prepare the Duravat for cleaning. This function cures a layer of resin at the bottom of the vat, so that a user can easily remove any incorrectly cured or broken pieces lying on the bottom.
File Manager	Manage the files in the printer memory. This function has several options, including viewing print files, copying files from USB devices to printer memory, and deleting files from the printer.

To see detailed descriptions of how to use the Printer Settings, Clean VAT, and File Manager options, see Using the Printer Console Functions.

1. Attach Your USB Device

Copy or move your print files to your USB device in the root folder. The Ackuray only accepts print files in the VBF, ACK, or SLICE file formats.
Connect your USB device to either of the Ackuray USB device ports.

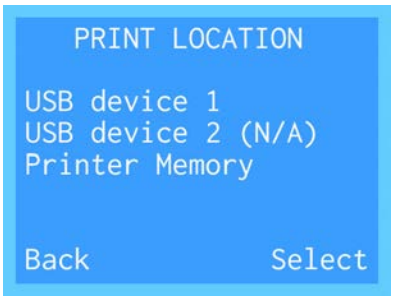
Note

The File Manager in the Ackuray printer can only read files from the root folder of USB devices. Do not store your files in folders on the device.

For example, if your USB device is in disk "E:", store your print files in the "E:\" folder. Do not store your print files in the "E:\prints\" folder.

2. Select your USB Device

Start up your printer. From the Main Menu, select **Print**. On the Print Location screen, select the USB device that contains your print file.



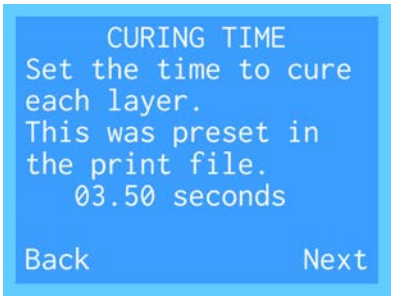
3. Select Your Print File

The console displays all VBF, ACK, and SLICE files on that device in a set of pages, with 3 files shown on each page. Use the right control button (**Next**) to turn to the next page. Use the up (↑) and down (↓) directional arrows to select your print if your print is among the available options. Press the **OK** button to select your print file.

After you have selected your print, a screen appears that shows your print information. Check that the displayed print is correct, and confirm your selection by pressing the right control button (**Select**).

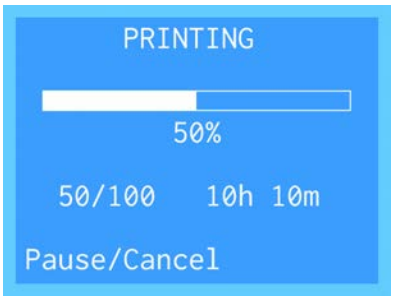
4. Set Your Curing Time

The next screen shows the time that the printer will spend curing each layer after the first. This setting comes from the print file information and was already set during the creation of the print file. It is usually not necessary to change this setting at this time. Press the right control button (Next) to accept your setting and continue.
If you want to change this information, use the left (←) and right (→) directional arrows to select the digit that you want to change. Press the up (↑) and down (↓) directional arrows to adjust that number. After you have chosen the curing time that you want to use, press the right control button (**Next**) to continue. A confirmation message will display if you have changed the value. Press the right control button (**Change**) to confirm.



5. Start Your Print

Hold the right control button (**Start**) to start your print. The print platform will move into position, and then the print will begin printing.



Warning

Ethyl alcohol and isopropyl alcohol are controlled chemicals in many countries and must be disposed of properly. Check the federal safety regulations and disposal methods in your country.

When storing cleaning alcohol, whether for disposal or for use, keep all containers far away from any sources of heat, sparks, or flame.

Finishing your Print

When the process finishes, the machine will return to the base position so that you can remove the print. At this point, you will need to clean, dry, and cure your print. See the following articles for the next steps:

1. Cleaning and Drying your Print
2. Finishing your Print
3. Cleaning your Printer

ACKURETTA TECHNOLOGIES

Using the Printer Console Functions

Perform the other tasks available on the Ackuray console, including changing the default settings, cleaning the vat, and managing your files.

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Using the Printer Console Functions

The Ackuray Console has several functions regarding the print process and file management. The **Print** function is fully described in the topic **Printing from the Ackuray Console**. This topic describes the other features on the console.

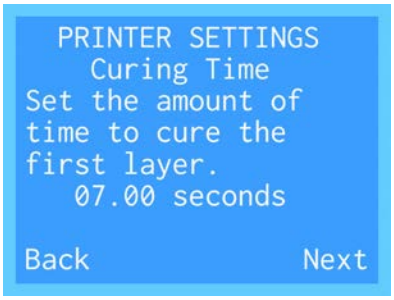
When you start up the Ackuray printer, the first screen with options that appears is the Main Menu. The Main Menu comprises the major functions that the printer performs.

Print	Perform a 3D print. The File Manager opens to select your print file. After configuring a few settings, the printer will begin printing.
Printer Settings	Set the default settings used when printing. The settings contained in this section are as follows: • First layer curing time • Number of layers in the print buffer
Clean VAT	Prepare the Duravat for cleaning. This function cures a layer of resin at the bottom of the vat, so that a user can easily remove any incorrectly cured or broken pieces lying on the bottom.
File Manager	Manage the files in the printer memory. This function has several options, including viewing print files, copying files from USB devices to printer memory, and deleting files from the printer.

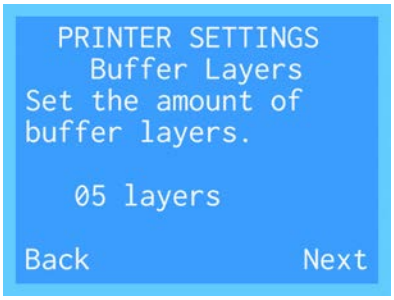
Printer Settings

Select Printer Settings on the main menu to set the default settings used when printing. The screens in this section adjust how strong of a base that the printer uses to hold the print to the build platform. For both of these screens, press the left (←) and right (→) directional arrows to the digit that you want to change. Press the up (↑) and down (↓) directional arrows to adjust that number. After you have chosen the curing time that you want to use, press the right control button (**Next**) to continue.

The first screen shows the curing time of the first layer. The first layer attaches to the build platform, so it requires additional curing time or else the print may fall off the platform and fail. All other layers of the print use the curing time set on the file or the adjusted curing time set in the Print process.



The next screen shows the amount of buffer layers to be printed before actually making the print itself. These buffer layers use the curing time of the print, but are additional layers that make up the base. Again, the purpose of these layers is to hold the print to the platform during the print process.

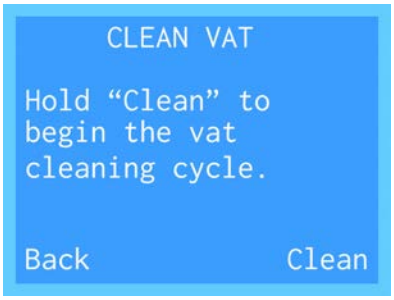


After setting the Curing Time and Buffer Layers, the console returns to the Main Menu.

Clean VAT

The vat cleaning function is designed to allow you to clean your vat without emptying the vat and pouring the resin back in. In turn, this function saves you time and material that would be lost during the double transition to remove all the resin and then pour it all back in. The way the Ackuray accomplishes this is by curing a layer of resin at the bottom of the Duravat which hardens around sediments and improperly cured spots. Then you can easily peel that cured bottom layer away, taking those pieces with it.

The Clean VAT screen only has the function to start the Duravat cleaning process. Hold the right control button (**Clean**) and the projector will begin running. The projector will cure the bottom of the entire vat without the build platform in place. After curing the resin for a few seconds, the projector will turn off and the console returns to the Main Menu.

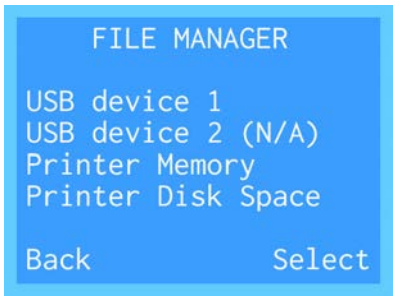


After the projector turns off, use a hard piece of paper (a business card or note card is ideal) or a rubber spatula to lightly scrape the bottom of the Duravat with the resin still inside. The cured portion of the resin will peel away in a layer. Carefully remove the layer from the Duravat and dispose of it with your other disposed resin. For details about resin disposal, see **Resin Care**.

File Manager

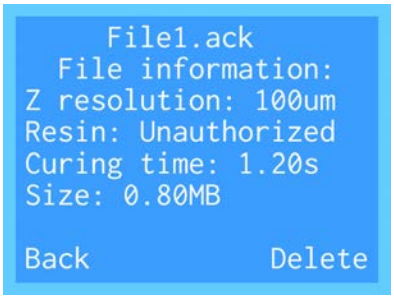
The Ackuray has 500 MB of on-board memory that can be used to store files to print later. The File Manager allows you to delete files off of the printer memory and copy files to the printer from your USB devices.

When you access the File Manager, the first screen shows the memory locations, as well as one option that allows you to view your available disk space.



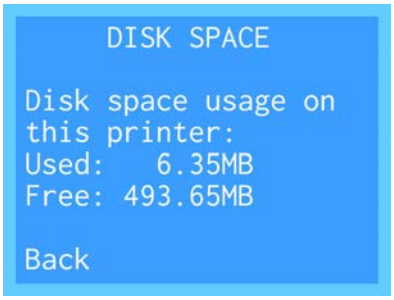
If you select either **USB device** 1 or 2 or **Printer Memory**, the next screen shows the available files in that location. Use the right control button (**Next**) to turn to the next page. Use the up (↑) and down (↓) directional arrows to select a print file and view its information.

If you select a file from the **Printer Memory**, you can press the right control button (**Delete**) to remove the file from the printer.



On the other hand, if you select a file from a USB device, you can press the right control button (**Copy**) to copy the file to the printer memory.

Finally, to check the available memory on the printer, from the **File Manager** screen, select **Printer Disk Space**.



ACKURETTA
TECHNOLOGIES

Installing Magics for Ackuretta

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ACKURETTA TECHNOLOGIES

Installing Magics for Ackuretta

Magics for Ackuretta and Magics for Ackuretta PRO share the same system requirements and installation process. Follow this document when setting up your Magics for Ackuretta workstation.

System Requirements

	Minimum	Recommended
CPU	• Intel i3 2.4 GHz dual-core • AMD Athalon 2.4 GHz dual-core	• Intel i7 3.0 GHz quad-core • AMD Phenom II X4/ X6 at 3.0 GHz quad-core
GPU	• NVidia GeForce 940 or 940M • AMD Radeon R7 450	• NVidia GeForce 1060 • AMD Radeon RX 470
RAM	8 GB	16 GB
Disk Space	1 GB	
Operating System	Windows 7 SP1 or later, Windows 8, Windows 8.1, Windows 10	
Software	Microsoft .NET Framework 4.5	

Note

To complete the installation process, you will need your **CCKey voucher code** and **access to the internet**. Ackuretta provides the CCKey to by email after you purchase an Ackuretta 3D printer.

After installation and registration, you no longer need access to the internet to run Magics for Ackuretta.

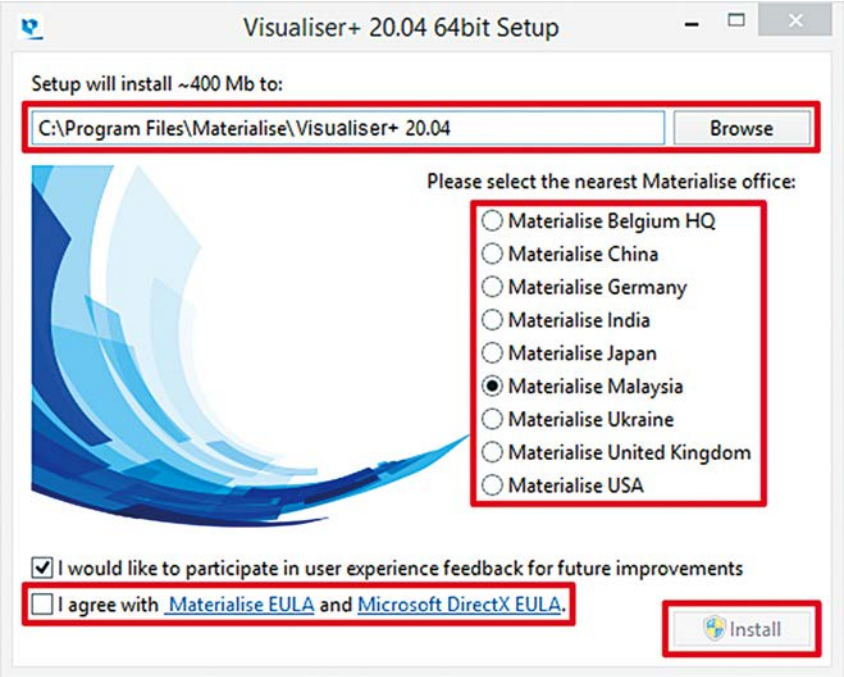
1. Start the Installer

Double-click the installer on the computer you intend to install Magics for Ackuretta on. Make sure that you have administrator privileges on that computer. If Windows User Access Control pops up a dialog, allow this program to make changes to your computer.

On the first screen of the installer, do the following:

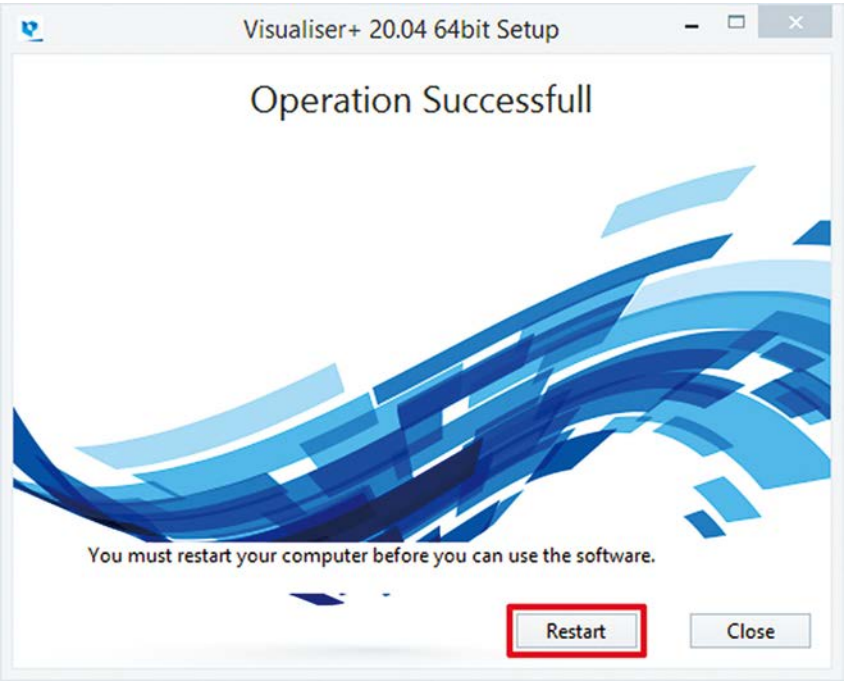
- Click **Browse** to choose the directory that you want to install Magics for Ackuretta to.
- Select the nearest Materialise office to your region.
- Read and agree to the Materialise and Microsoft Direct X EULAs.

After doing those tasks, click **Install.** Magics installs to your computer.



2. Restart your Computer

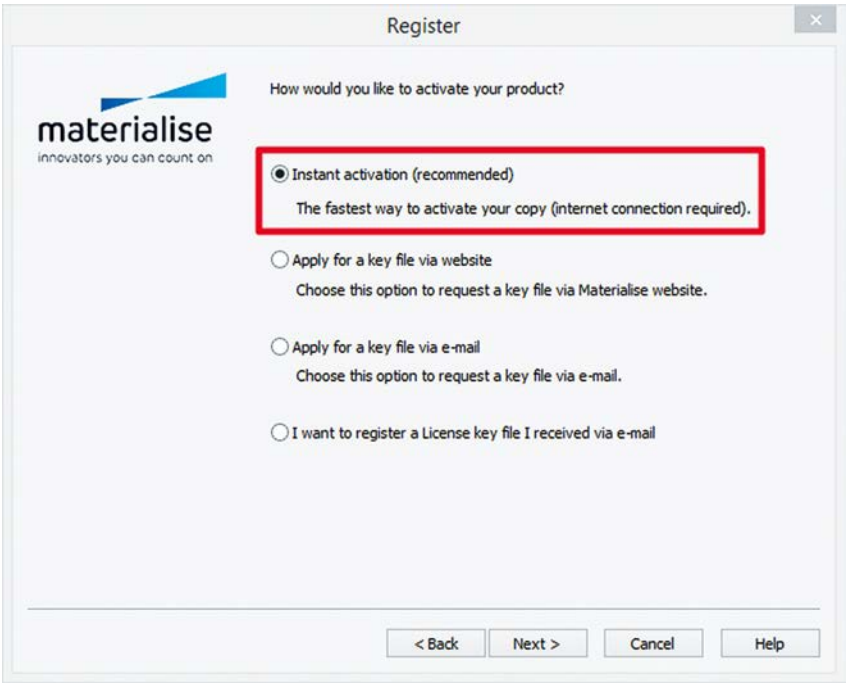
You must restart in order to open Magics and complete registration.



3. Begin Magics Registration

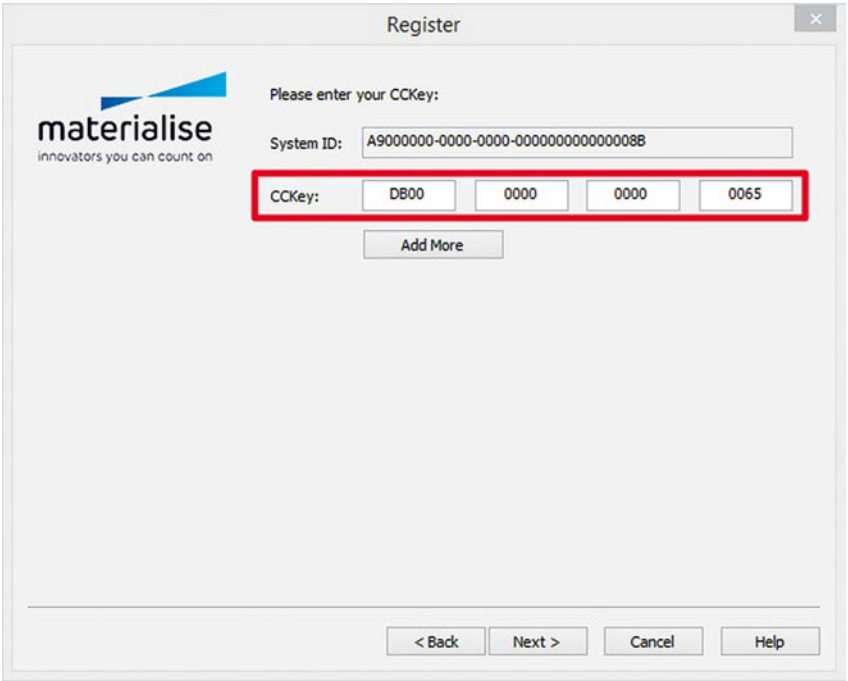
Magics installs an icon will on your desktop. Double-click that icon to open the software. The software automatically prompts you to register Magics. Click **Register** to begin registration.

On the first registration screen, select **Instant Activation** and then click **Next**.



4. Enter your CCKey Voucher Code

On the Materialise website, type your CCKey voucher code in the space provided, and click **Next**. Magics for Ackuretta verifies your CCKey with the license server.

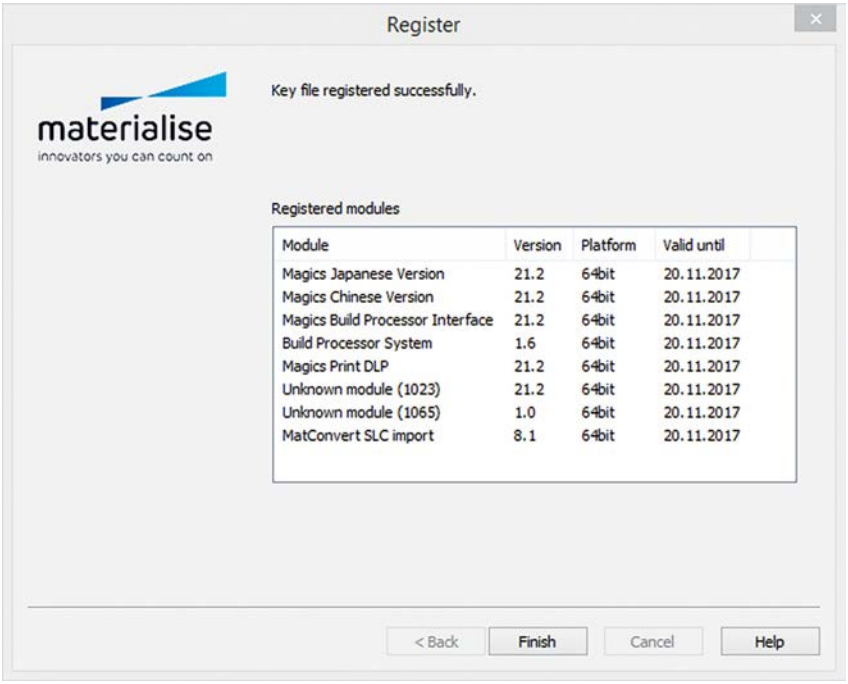


Note

If you do not have your CCKey coucher code, send an email to support@ackuretta.com. In your email, provide your product serial number and the date and location that you purchased the printer.

5. You're Done!

If the software successfully connects with the license server, then your registration is complete and you can begin using Magics for Ackuretta.



Magics Print DLP Tutorials Online

Magics for Ackuretta is built on the Magics Print DLP system. Materialise provides introductory tutorials to the features of Magics Print DLP on the Materialise website. To view the tutorials, go to:

http://www.materialise.com/en/software/magics-print-dlp/tutorials

ACKURETTA
TECHNOLOGIES

Upgrading the Ackuray Firmware

Installing firmware on the Ackuray is mostly an automated process, provided that you have downloaded the firmware update and have a USB device that you can connect to the printer. The following guide helps you to both update and roll back the printer firmware.

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Upgrading the Firmware

1. Copy the Firmware to a USB Device

The firmware will be in a ZIP file. Copy the entire ZIP file to the root folder of a USB device. Do not extract the files.

Note

The Ackuray printer can only read firmware files from the root folder of USB devices. Do not store your files in folders on the device.

For example, if your USB device is in disk "E:", store your firmware file in the "E:\" folder. Do not store your firmware file in the "E:\firmware\" folder.

2. Attach your USB Device

Connect your USB device to either of the Ackuray USB device ports.

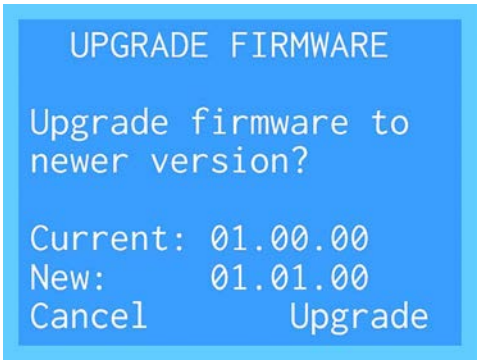
3. Start Up Your Printer

Turn on your printer, or turn off and restart your printer.

4. Upgrade the Firmware

The Ackuray automatically detects the firmware on the device at startup. Check the new version number to make sure that the proper new version has been detected. Press the right control button (**Upgrade**) to start the upgrade.
If you press the left control button (**Cancel**) at this time, the printer opens the Main Menu and skips the upgrade process.

When the upgrade completes, the printer restarts, and opens the Main Menu.



ACKURETTA TECHNOLOGIES

Rolling Back the Firmware

The process for rolling back the firmware is essentially the same as upgrading the firmware. This section only contains the differences between upgrading and rolling back.

1. Copy the Firmware to a USB Device

If you have an old version of the firmware available, copy that firmware to a USB device.

2. Attach your USB Device

Connect your USB device to either of the Ackuray USB device ports.

3. Start Up Your Printer

Turn on your printer, or turn off and restart your printer.

4. Roll Back the Firmware

The Ackuray automatically detects the firmware on the device at startup. Check the version number to make sure that the correct old version has been detected. Press the right control button (**Roll Back**) to start the rollback.

ACKURETTA
TECHNOLOGIES

Cleaning and Drying your Print

Clean and dry your print for easy handling and finishing.

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Cleaning and Drying your Print

After the printer finishes your 3D print, the print still requires some preparation before it is ready for painting, presentation, or using in a machine. The first part of this process is actually removing the print from the build platform. After that, clean and dry the print so that no liquid resin remains when you do further print curing.

What you need

- Ultrasonic cleaner
- Air blower
- Scraper
- Plastic container
- Tissues or paper towels
- Protective gloves
- Pipette
- Cleaning alcohol

Preparation

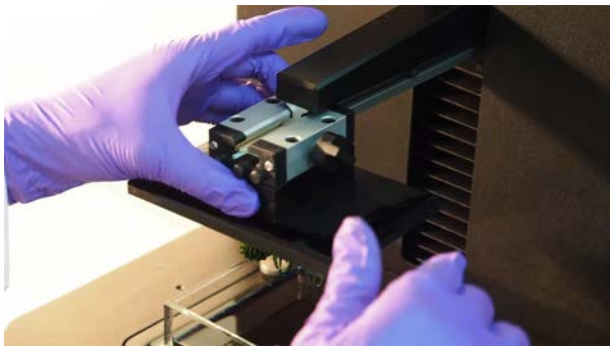
- Get the listed materials together in a well-lit room with a clean work table.
- Plug in the ultrasonic cleaner and air blower, or have an outlet ready as needed.
- Ensure that your plastic container is large enough to fully immerse the print.
- Put on the protective gloves and wear them during every step of this process.

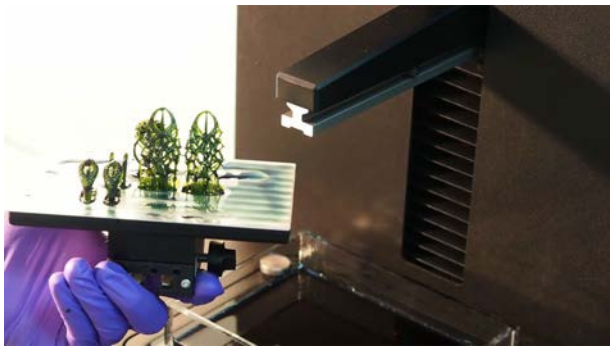
Warning

Do not touch the build platform directly with your hands. The oil from human hands sticks to the platform and can prevent prints from sticking to the surface.

1. Remove the Build Platform

Twist the thumb screw above the build platform counterclockwise to loosen it. Pull the build platform off of the printer. Place the platform on tissues so that the print is face up.





Warning

When removing the build platform, make sure the vat is still attached to the machine. If the vat is not attached, resin may drip off the platform during removal, potentially damaging the optical components under the vat.

2. Scrape the Print Off the Build Platform

Pick up the build platform and hold it so that is angled at some tissues on the table. Using your scraper, try to detach the print from the build platform. If the print detaches easily, slide the print off of the platform.

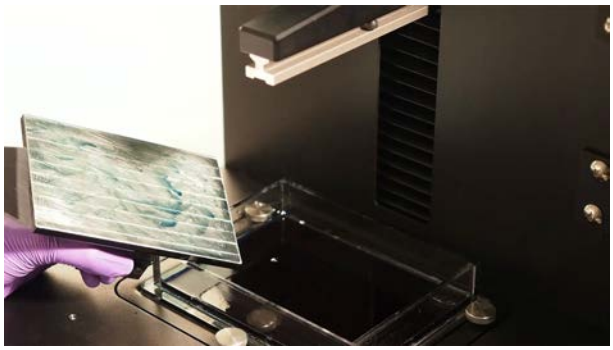
If the print does not detach easily, cut off the supports at the base using the ultrasonic cutter. For more information about using the ultrasonic cutter, see Finishing your Print.

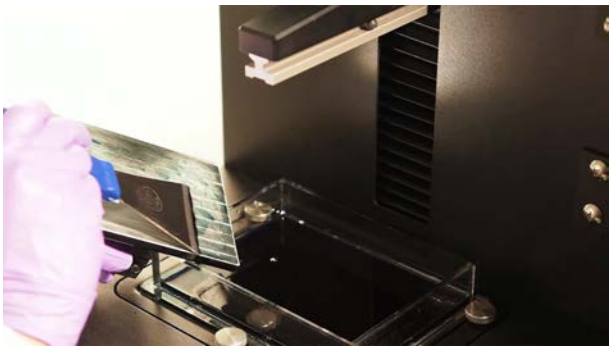
3. Clean Off the Build Platform

Remove all solid debris from the platform with a pair of tweezers, and then you may reuse the remaining resin to save material.

Pick up the build platform and hold it angled above the partially full resin vat. Scrape the resin off of the platform into the vat with long strokes of the scraper.

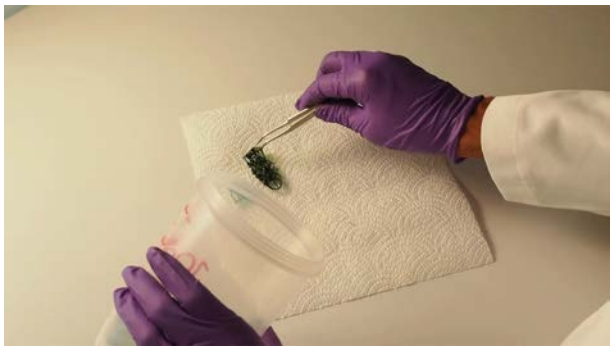
After cleaning most of the resin off, clean that build platform using a tissue dipped in IPA solution. After all of the residue is removed, reattach the build platform to the Ackuray printer.





4. Submerge the Print in IPA

Fill a plastic container with enough IPA to completely immerse the print. Pick up the print and place it into the container. Allow the print to soak for 10 minutes.



Warning

At this point, the print is not completely solid and is too fragile for direct handling. Touching the component directly can smudge or deform it. Handle the print only from the support structures or from the base.

Tip

If your part has small crevices or holes, to ensure that enough cleaning is done in those locations, you may want to use a pipette to spray IPA into those locations.

5. Clean the Print with the Ultrasonic Cleaner

Fill the ultrasonic cleaner with IPA. Pick up the print from the plastic container, and place it into the ultrasonic cleaner vat. Close the lid of the ultrasonic cleaner, and press the buttons on the console as necessary:

1. Temperature controls

Set the temperature to a value between 25 and 32°C. The temperature 28° is generally suitable for all prints.

2. Bath types

These buttons start the cleaning process.

After you have set the temperature and the timer, press one of these buttons to start the selected bath type.

- **Heating:** This setting only heats the bath, but does not vibrate it. Use this setting only for the most fragile of prints.
- **Degas:** Ackuretta does not recommend using this setting for 3D prints.
- **Soft:** The vibration speed of this setting is low.
- **Normal:** This setting vibrates at a speed that is appropriate for most Ackuray prints.

3. Timer controls

Adjust the timer in increments of 10 seconds using the controls.
The default timer of 3:00 is adequate for Ackuray prints.

After cleaning is complete, remove the print from the ultrasonic cleaner and place it on a tissue or paper towel.

6. Dry the Print with the Air Blower

Hold the print tight with a tweezers over an easily cleanable surface. Gently blow remaining liquid resin and IPA off of the print using the air blower. Turn the print as necessary while blowing, and make sure you focus on small holes and places where the IPA can get trapped.

After cleaning and drying the print, it is ready for finishing. See Finishing your Print for the next steps.

ACKURETTA
TECHNOLOGIES

Finishing Your Print

Finalize your print for display, painting, casting, or for final use.

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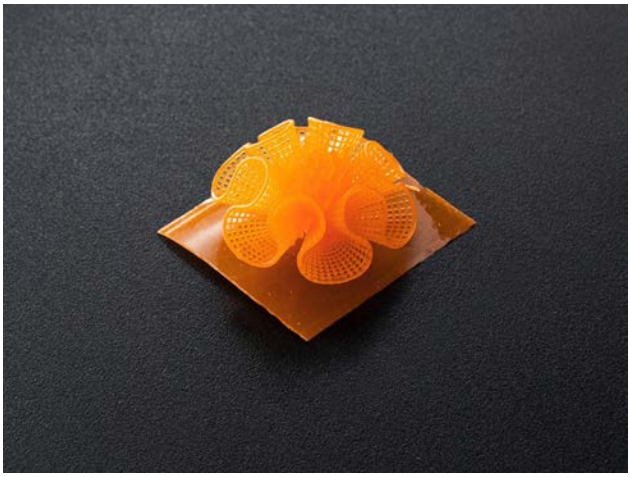
TECHNOLOGIES

Finishing Your Print

The 3D printer cures the resin to a certain level and requires support material to maintain structure during the printing process. This section describes the final stages of the process:

- Curing the resin to a complete state
- Removing the support material
- Sanding away rough points from the support joints

After completing this part of the process, your print will be ready for modifications specific to its purpose, such as painting or metal molding.



What you need

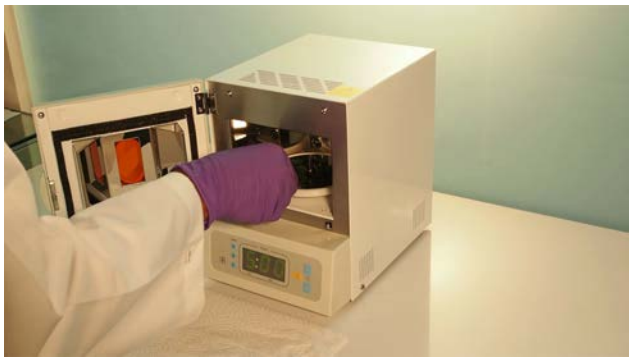
- UV oven
- Ultrasonic cutter
- Tweezers
- Scraper
- Needle-nose tweezers
- Sand paper

Preparation

- Make sure that you have cleaned and dried your print. For details, see Cleaning and Drying your Print.
- Get the listed materials together in a well-lit room with a clean work table.
- Plug in the UV oven and ultrasonic cutter, or have an outlet ready as needed.
- Ensure that your plastic container is large enough to fully immerse the print.
- Put on the protective gloves and wear them during every step of this process.

1. Cure the Print in the UV Oven

Place the prints directly onto the plate inside the UV oven. Turn on the oven by pressing the switch on the back of the oven. From the console, start the curing process by pressing buttons as follows:



1. Memory presets

Save and load up to three preset times using the A, B, and C buttons.
To save a time, after selecting the time, press and hold the button to save that time to that button, overwriting any previous setting.
To load a time, press the button.

2. Start

Press the yellow button to start the oven. The oven will automatically turn off when the time is up.

3. Timer controls

Press and hold the arrow buttons to adjust the timer.
Curing a print for three minutes is appropriate for most Ackuray prints.

When the curing finishes, open the oven and pull out the print wearing protective gloves. Check the print for any cracking or color differences, which would suggest that the print has been over-cured and may be unstable. If none are found, the print is ready for the next step.

2. Cut the Supports with the Ultrasonic Cutter

Hold the print securely in one hand or using a gripping device. Turn on the ultrasonic cutter and remove the blade from the sheath. Cut off each support about 1-2 mm away from the touch point on the print. Leave the material attached to the print, and dispose of the material cut off.

Warning

Do not try to cut off entire supports. Cut off each support away from the touch point, leaving a little bit of material attached to the print. If cut too closely, the cutter may mark or damage the print.

Tip

The ultrasonic cutter may not be as fast as other cutting methods, but you do not need to apply force when cutting. Just slowly move the cutter in the direction you want to cut, and it will do the work for you.

3. Remove the Remaining Support Material

After using the ultrasonic cutter, some support touch points should remain. These touch points are usually small and easy to remove, but depending on the type of print you made, there are a number of methods you can use to remove the material.

- **Fingers:** Sometimes the support material can be removed by hand. This is especially true if the touch points are small, and the amount of the support that you left was long enough to easily grasp.
- **Tweezers:** Use a tweezers for smaller pieces of support material that have barely any touch point remaining. These are especially useful for very small prints, such as with jewelry.
- **Scalpel:** For particularly difficult-to-remove supports with large touch points, you may want to use a scalpel to cut them off. You could also use the blade on the ultrasonic cutter with the power turned off. Don't force the blade too hard when using a scalpel, but rather saw back and forth slowly to minimize potential damage to the print.

Needle-nose pliers: A pair of pliers can greatly help for removing support material that is inside of hollowed-out prints. Put the pliers inside the print using one of the exit holes, and directly grab some of the infill. Gently but firmly pull that infill through that hole. If the print has a honeycomb or triangular infill design, most of the material should come out all at once.

4. Smooth Off Rough Spots and Deformities

Support touch points are usually small enough to leave no noticeable marks or spikes, but with highly-detailed prints, even the smallest deformities must be removed. Moreover, depending on the selected slice thickness, the surface of the print may be rough at some points, particularly where the print is supposed to be round.

In these locations, use sandpaper to make these spots smoother. Ackuretta recommends having multiple sizes of fine-grit sandpaper available, generally ranging from P220 to P360 using the ISO/FEMA grit standard (220 to 500 using the CAMI grit standard).

Grind the larger deformities, such as support spikes, with the coarser (P220, P240, P280) sandpaper first. Then use the finer (P320, P360) sandpaper to finish smoothing those locations, as well as rough spots from print slicing. When you have finished sanding, wipe the locations with a damp tissue to remove any dust.

Make sure to clean your printer and your tools after printing. For detailed steps, see Cleaning the Printer.

ACKURETTA TECHNOLOGIES

Cleaning Your Printer

Clean and maintain your printer for easy reprinting.

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ACKURETTA
TECHNOLOGIES

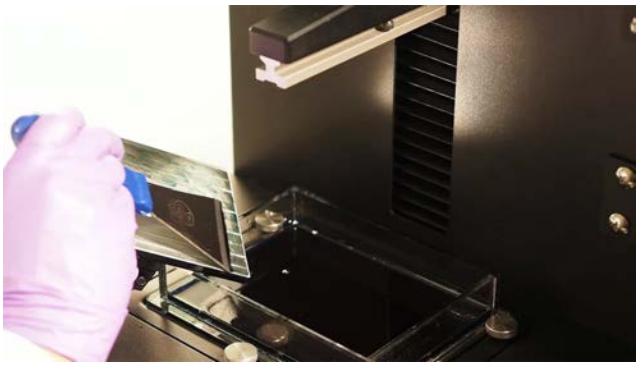
Cleaning Your Printer

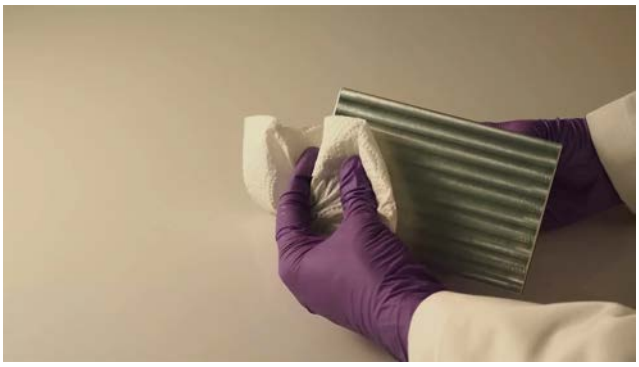
When you are finished printing using a resin, clean your printer and dispose of your waste properly. If you still intend to print during this session with the same resin, you usually can reuse your resin and IPA.

1. Clean your Build Platform

On the bottom of your build platform, some residue from the previous print will likely remain. Remove all solid debris from the platform with a pair of tweezers, and then you may reuse the remaining resin.

Pick up the build platform and hold it angled above the partially full resin vat. Scrape the resin off of the platform into the vat with long strokes of the scraper.



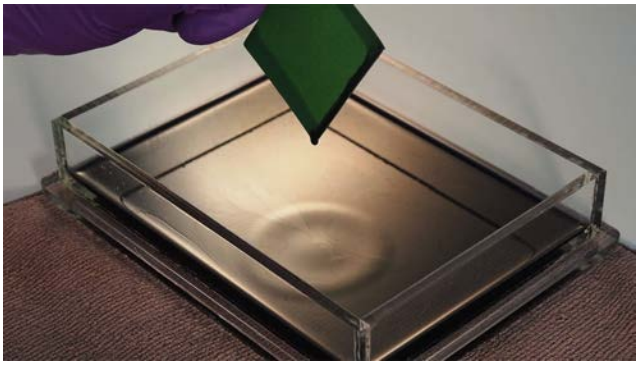


Warning

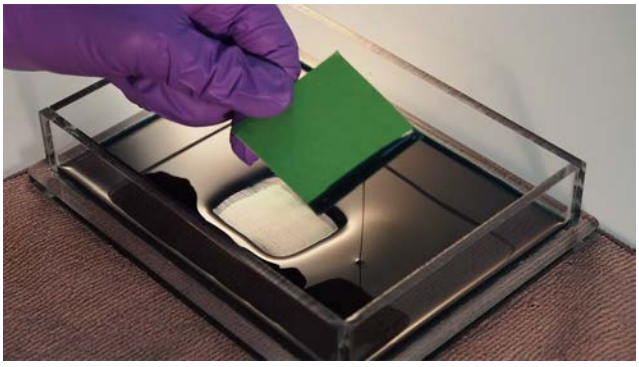
Do not reattach the build platform at this time. The next step involves removing the vat, which normally protects sensitive components, such as the projector. If the build platform is attached loosely or improperly, it may fall and severely damage the printer.

2. Store or Dispose of Resin

Make sure that the remaining resin is acceptable to for reuse in the future. Do the following before storing your resin:



Good Resin Sample



Bad Resin Sample

Check the color of the previous print for irregularities. For a normal print, the color of your resin should remain consistent throughout the entire print. If the previous print has darkened or browner locations in the print, it is possible the resin density is inconsistent or that there is some contamination. The print itself may still match your need and you may continue using it, but Ackuretta recommends disposing of this resin if you see these inconsistencies.

Make sure your resin is watery. Take a scraper, spatula, or spoon and dip it into several different areas of your resin. Pour out the resin slowly back into the vat. The resin should have a thin, watery consistency. If the resin has thickened or it falls off in strings, UV light may have dispersed over the resin and started to harden it. This may cause your next model to print inconsistently or to become unstable. As such, Ackuretta recommends disposing of your resin in this case.

Storing Unused Resin from the Vat

1. Find a dry, opaque empty bottle that has not been used for any other purpose.

> **Note**
>
> Do not use a bottle with another resin, or even the original resin bottle that you poured this resin from. This is to prevent resin cross-contamination.

2. Place a funnel on the mouth of the bottle and put a wire filter inside the funnel.
3. Hold the vat diagonally over the bottle and slowly pour the resin into the funnel. The watery resin will pass through the filter, and any sediments or debris will be trapped by the filter.
4. Label the bottle with the type of resin used and the date that you stored it.
5. Use a tissue dipped in IPA solution to wipe down the funnel.
6. Clean the filter into the ultrasonic cleaner with your previously used IPA for about 1 minute. For more information about using the ultrasonic cleaner, see Cleaning and Drying the Print.
7. Remove the filter from the ultrasonic cleaner and clean it with a tissue dipped in IPA solution.

Disposing of Unused Resin

1. Find a dry, opaque empty bottle that has not been used for any other purpose.

> **Note**
>
> Do not use a bottle with another resin, or even the original resin bottle that you poured this resin from. This is to prevent resin cross-contamination.

2. Place a funnel on the mouth of the bottle and put a wire filter inside the funnel.
3. Hold the vat diagonally over the bottle and slowly pour the resin into the funnel. The watery resin will pass through the filter, and any sediments or debris will be trapped by the filter.
4. Label the bottle with the type of resin used and the date that you stored it.

5. Wipe build platform.
6. Clean the filter into the ultrasonic cleaner with your previously used IPA for about 1 minute. For more information about using the ultrasonic cleaner, see Cleaning and Drying the Print.
7. Remove the filter from the ultrasonic cleaner and clean it with a tissue dipped in IPA solution.

3. Prepare a Container for IPA Disposal

Choose a plastic container to use specifically for waste IPA storage. The container should be dry and have a tight seal. Ensure that you have enough space in a storage cabinet for this container, and that the container will be kept away from any heat, flame, or sparks. The container should not be stored in a cabinet alongside strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids and isocyanates.

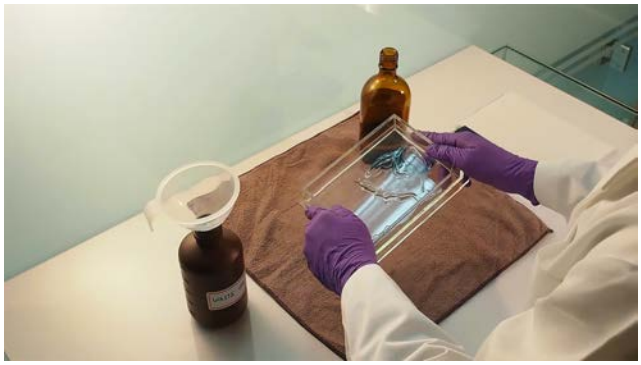
Warning

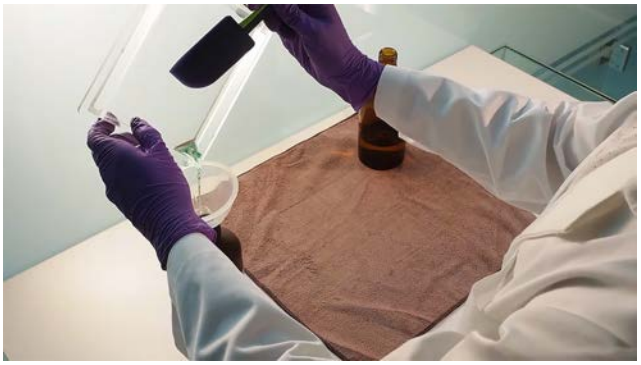
IPA is a controlled chemical in many countries and must be disposed of properly. Check the federal safety regulations and disposal methods in your country.

When storing IPA, whether for disposal or for use, keep all containers far away from any sources of heat, sparks, or flame.

4. Clean Your Vat

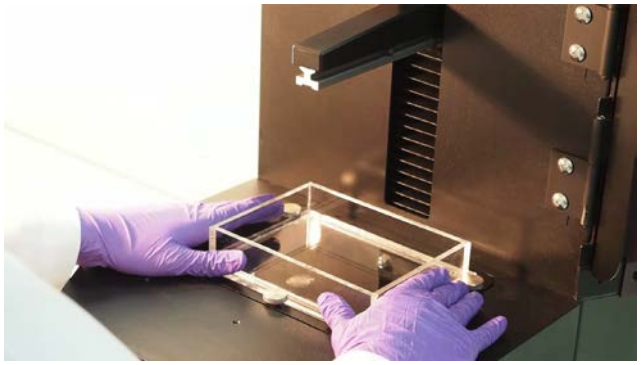
Pour a small amount of IPA into the vat, and tilt the vat so the IPA reaches all locations. Use a rubber spatula to push the IPA out into your IPA disposal container.





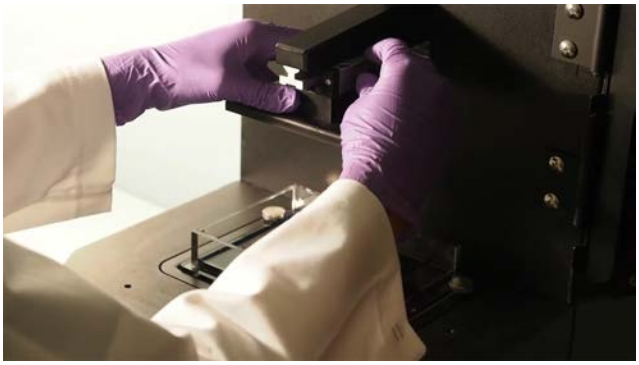
5. Reattach the Vat to the Machine

Slide the vat above the thumb screws, and pull it back into place on the machine. Twist the thumb screws clockwise until they hold the vat securely.



6. Reattach the Build Platform

Slide the build platform onto the machine arm. Twist the thumb screw clockwise to hold the platform securely.



ACKURETTA TECHNOLOGIES

Resin Care

Store the resin for reprints with optimal performance.

2017/07

ACKURETTA TECHNOLOGIES

Resin Care

While maintaining your printer is important to reduce repairs and downtime, proper care of your resins is important for minimizing material costs and time spent purchasing new resins. Ackuretta resins are photopolymers with a wide range of properties, but the following tips and tricks generally apply to all Qura resins.

Note

Before handling any resins, read the Safety Guidelines for resins and wear proper safety gloves and eye protection.

Keep Resins Separate

The first thing to know about working with resins is that they can easily cross-contaminate each other. Resins of different consistencies, densities, curing times, and material properties can make prints fail, even if only a small amount of one resin mixes inside another resin. When working with multiple different resins, store and label the resins and their accessories in different locations. Specifically, you will need to separate the following:

Resin reuse bottles	When you are finished using a resin, do not pour the resin into the original bottle that you poured the resin from. Instead, find a clean, dry, opaque bottle that has not been used for other purposes to store the unused resin in. Label that bottle with the type of resin you used and the date of reuse. From that point, do not use this same bottle for other resins.
Duravats (resin tanks)	After you have begun using a Duravat (resin tank) for one resin, do not pour a different resin into that same vat. If you intend to switch your resin to a different type, switch your Duravat as well. You can reuse a Duravat for other prints involving the same resin that has been used. Ackuretta recommends labeling and storing one Duravat for each resin type that you use. **Warning** Remove the build platform before you remove the Duravat. If the vat is not attached while the platform is still attached, residue on the platform may drip or fall onto the sensitive optical components under the vat.

IPA solution	The IPA solution that you use to clean your prints during post-processing fills with resin as you perform repeated cleanings. When you perform additional cleanings, a small amount of residual resin from previous cleanings will adhere to prints that are dipped in the same solution. Then, when you perform final curing with the UV oven, that residual resin will cure along with the print. If multiple resins mix in that final curing, the print may have inconsistencies in material properties or inconsistencies. Because there is potential for this problem, Ackuretta recommends changing your IPA solution every time you switch resins during a printing period.
Sponges or cotton balls	If you dry your print using a sponge or cotton balls, switch your drying material every time you switch your resin. This is for the same reason Ackuretta recommends changing your IPA solution every time you switch resins.

Clean Residue Immediately

Working with resin can be time-consuming, messy work, but if the resin isn't cleaned right after use, it can also be costly. Resin buildup during any part of the printing process can make a follow-up print cure inconsistently or fail. Moreover, direct contact with uncured resins on the skin or eyes can cause irritation, so resin should not be left on surfaces unattended. To keep your environment clean and safe, clean the following locations immediately after printing:

- The bottom of the build platform
- All parts of the Duravat resin tank
- The outsides of any resin bottles
- Any funnels or wire meshes used for filtering or pouring
- The ultrasonic bath and UV oven
- Scalpels and scrapers
- Your work area

After usage of any of these items, pour out any remaining liquid and dispose of IPA solution and liquid resin properly. Clean the surfaces of these items by dipping a dry tissue paper into IPA solution and gently removing any lingering debris or residue. After all residue has been wiped away, dry the surface with another dry tissue. Finally, after cleaning, thoroughly wash your gloves to remove any lingering resin and IPA on them.

If you touch any resin or IPA directly with your skin, remove your gloves and find an uncontaminated washcloth. Thoroughly wash the affected area with soap and water using the washcloth. Put the washcloth aside for later cleaning, and wash your hands before putting your gloves back on.

ACKURETTA TECHNOLOGIES

Store Resin in a Secure Place

One fundamental concern with resin maintenance is how and where you store your resin. If stored without a proper label or in an easily accessible location, other team members or unqualified people may accidentally tamper with your resins or your resin may be too exposed to oxygen, and may deteriorate. To make sure that resins are stored properly, do the following:

- For reused resin, use only dry, opaque containers that have not been used for any other purpose, including other resins.
- Store resin in a dry, ventilated space with temperatures not exceeding 35°C (95°F).
- Keep resin away from sources of heat, ignition, and fire.
- After pouring or filling any resin container, close the container tightly.
- Label reused resin containers and vats clearly with the resin name and date.
- Ensure that the storage location is out of reach of children and is secured from unqualified personnel.
- Dispose of resin stored for reuse that has been in storage for more than 2 months.

Dispose of Resin Properly

Completely cured (solid) resin presents no major environmental concern and may be disposed of by simply throwing cured pieces into the garbage. Liquid and semi-solid resin, however, is a potentially hazardous chemical and must be disposed of according to local and federal regulations. Contact your local municipal council for waste regulations.

When cleaning your vat, build platform, prints, and other parts, use IPA solution to make sure that as much resin as possible cleans off the surfaces. Put of all waste on tools used in the process, such as scrapers and filters, directly into your waste IPA solution, because that solution is already contaminated and will need to be disposed of properly anyway. For the majority of prints, you will not need to waste any resin.

If you have uncured or failed prints, you can cure them using your UV oven in order to easily dispose of them. Place the print into the oven and cure it for 4 minutes at high temperature. After it has been over-cured, let the print cool, and then dispose of it in your general trash.

If you have contaminated or deteriorated resin that must be disposed of, one method that you can use is to allow the resin to cure in sunlight before disposal. Pour the resin into transparent bags in small portions (around 100 mL). At this point you can either cure it in your UV oven, or place it directly into the sunlight for about 1 week while it hardens. After curing it either way, you can dispose of it in your normal trash.

ACKURETTA

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