forward am
a brand of MAM – Mass Additive Manufacturing GmbH

Ultracur3D® xMOLD

Preliminary User Guideline



Introduction

The following user guideline is for professionals who use: Ultracur3D® xMOLD.
The safety data given in this publication is for information purposes only and does not constitute a legally binding Material Safety Data Sheet (MSDS). The relevant MSDS can be obtained upon request from your supplier or you may contact MAM directly at sales@forward-am.com.
For more information, please refer to the country specific MSDS for advice.

Are you looking for an updated User Guideline version? Check out the latest online version here.

Storage conditions and disposal considerations

Keep container tightly closed in a room temperature, well-ventilated place. Keep container dry. If material is not being used, fill it back through a filter in the corresponding material bottle. The filter prevents cured pieces or failed prints from going back into the bottle. Ultracur3D® XMOLD must be disposed of in accordance with local regulations.
For more information, please refer to the country specific MSDS for advice.

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Intended use

Ultracur3D® XMOLD is a technical material based on (meth-)acrylate resin for suggested LCD and DLP systems. Working wavelength: 385 nm or 405 nm. Below, you can find some suggested 3D printers and printing parameters. For more information contact MAM directly at sales@forward-am.com.

Examples of suitable 3D-Printers and settings

	Wavelength	Power	Curing time	Voxel depth
MiiCraft Ultra 125 Y	385 nm	5 mW/cm2	5 s	100 µm
Nexa3D XiP	405 nm	Set by Machine maker	Set by Machine maker	Set by Machine maker
Stratasys Origin One	385 nm	5 mW/cm2	2 s	100 µm

If you cannot find your printer in the table or using the 3D Printing and Post Processing Settings Navigator you can use the values below as starting parameters. These are only approximations, different 3D printers may require different curing times and further optimization, but these values should be a good starting point.

The given values are all for printing at a layer thickness / voxel depth of 100 µm. If you need starting parameters for a different layer thickness, please contact us.

	405 nm Wavelength 3D Printer			
Power*	5 mW / cm²	4 mW / cm²	3 mW / cm²	2 mW / cm²
Suggested curing time	3 s	3.5 s	4 s	6 s

	385 nm Wavelength 3D Printer			
Power*	5 mW / cm²	4 mW / cm²	3 mW / cm²	2 mW / cm²
Suggested curing time	5 s	6 s	7 s	8 s

* Power measured directly on the glass

Printing process

The material should be processed at room temperature. Before usage, the material should be shaken well. Pour it slowly into the vat and wait a couple of minutes, until a smooth, bubble-free surface is obtained before starting the print job.

The 3D printer examples and settings stated above are only for general guidance. The fully optimized settings should always be determined by the users themselves, according to their specific needs. Please always refer to the user manual of the employed 3D printer for instructions on printer settings and handling.

Remove the parts carefully from the build platform with a suitable tool, for more information, refer to the user manual of the used 3D printer.

Cleaning and post curing process

Ultracur3D® xMOLD can be cleaned with 2-propanol, please refer to the following cleaning procedure.

Cleaning with 2-propanol (IPA)

- Step 1: Place the parts in a container filled with 2-propanol and place this container in an Ultrasonic bath filled with water for three minutes. The cleaning time can vary depending on the complexity of the printed geometry.
- Step 2: Rinse the parts with 2-propanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing. Next, place the parts in a container filled with 2-propanol and place this container in an Ultrasonic bath filled with water for three minutes.
- Step 3: Blow dry the parts with pressurized air or nitrogen, until the parts are clean.
- Step 4: Place the parts into a warming cabinet at 40°C (104°F) for 30 minutes to dry off any remaining cleaning solvent.

Example of post curing procedures

Ultracur3D® xMOLD parts require adequate post-curing to achieve the optimal mechanical properties. After each post-curing cycle, the parts need to be flipped to achieve an even curing. After post-curing, remove any support structures and smoothen the surface if required.

	UV lamp	Power in mW / cm²	Duration of post-curing	Notes
Dymax ECE 2000 flood	Hg Metal Halide Bulb (broad spectrum)	Ca. 140 mW / cm² at 405 nm	2 x 900 seconds	Shelf height K
OtoFlash G 171	Flash-bulbs (broad spectrum)	Ca. 3.5 mW / cm² at 405 nm	2 x 6000 flashes	With Nitrogen
Nexa x Cure	405 nm LED	Ca. 2 mW / cm² at 405 nm	2 x 30 minutes	100% power

These proceedings are only general guidelines. In the end, the user has to determine the optimum post-curing procedure based on their specific requirements and the equipment used.

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Demolding / Dissolving of the Molds

The material xMOLD is recommended to be used for one time molds which can be easily dissolved in a demolding chemical (1mol/L NaOH). Please follow the instructions below for dissolving of the molds

1. Using an ORYX Demolding Station

- Pour cold water in the demolding station, filling it halfway.
- Weigh out the appropriate amount of NaOH pellets, for a 1M solution. 1L of water requires 40g of pellets, i.e., a 40L vat will require 1600g of NaOH.
- Gently pour the pellets into the demolding vat.
- Add remaining water to the demolding station
- Switch on the machine and set temperature to 70°C.
- Wait for the machine to heat up. You can expect a heating speed of 1-3C per minute.
- Place your items in the basket and lower gently into the vat.
- Close the machine lid and wait for items to demold, checking progress hourly, depending on size. For thin Molds, 70% dissolution should be expected after around 16 hours.
- Most of the molds should be dissolved within the first 24 hours. If not, continue the process until the parts are dissolved.
- Rinse the demolded parts in water to remove any residual demolding solution.

2. Using an Ultrasonic Bath

- Fill up the Ultrasonic bath with water.
- Heat up the ultrasonic bath at 70 °C.
- Fill up a beaker with the demolding chemical and add the parts in the beaker
- Place the beaker in the ultrasonic bath filled with water and start the sonication with the preset temperature of 70 °C.
- Based on the thickness and complexity of the mold, the material should be checked every 5-6 hours.
- Most of the molds should be dissolved within the first 24 hours. If not, continue the process until the parts are dissolved.
- Rinse the demolded parts in water to remove any residual demolding solution.

3. **Using a Thermal oven**

- Fill up a beaker with the demolding chemical and add the parts in the beaker
- Place the beaker in an oven preset at 70 °C
- Based on the thickness and complexity of the mold, the material should be checked every 5-6 hours.
- Most of the molds should be dissolved within the first 24 hours. If not, continue the process until the parts are dissolved.

NOTE: NaOH molar solution will saturate at 18% dissolved Ultracur3D® XMOLD by weight.

Example of tests carried out at Forward AM

Cubes (30 × 30 × 30 mm) were additively manufactured and post-cured, then subjected to the dissolution procedures detailed previously; results are summarized below:

Process / Time	Hardware	16 hours	24 hours	Observation
Agitation	Demolding station	No dissolution	10% dissolution	Not recommended
Heating at 70 °C	Oven / Ultrasonic	33% dissolution	57% dissolution	Moderate dissolution
Ultrasonic + 70 °C	Ultrasonic bath	47% dissolution	67% dissolution	Good dissolution
Agitation + 70°C	Demolding station	80% dissolution	97% dissolution	Best dissolution

The data contained in this publication are based on our current knowledge and experience. They do not constitute an agreed contractual quality of the product and, in view of the many factors that may affect processing and application of our products, do not relieve processors from carrying out their own investigations and tests. The agreed contractual quality of the product at the time of transfer of risk is based solely on the data in the specification data sheet. Any descriptions, drawings, photographs, data, proportions, weights, etc. given in this publication may change without prior information. The customer and/or user is responsible to consider and respect all hazard and safety issues according to the MSDS of Ultracur3D® XMOLD and take, implement and/or install adequate measures and precautions to avoid any personal injuries, property damages and/or environmental pollution. Therefore, Mass Additive Manufacturing GmbH shall not be liable for any personal injury, property damages and/or environmental emissions arising out of or related to the testing, handling or usage, storage and possession of Ultracur3D® XMOLD. It is the sole responsibility of the recipient of our product to ensure that any proprietary rights and existing laws and legislation are observed (02/2020)