



WHITE PAPER

Vulcanized Rubber Molding with 3D Printed Masters

We live in a new era of jewelry manufacturing. Demand is on the rise for detailed pavé settings and unique customized designs. Traditional wax-carved mold masters are labor-intensive, slow, and limit your design freedom. With Formlabs' industry-tested products, you can add the efficiency of digital with minimal changes to your jewelry production workflow.

The Form 3 builds master jewelry patterns in unparalleled detail, saving you labor costs and opening up lucrative new markets. Formlabs resins are compatible with high temperature and room temperature mold materials, which lets you phase out wax carving but continue to cast from wax.

Read on to learn how to take your jewelry business digital with mold masters from the Form 3.

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Introduction

An Easy Way to Go Digital

Formlabs believes in the power of digital jewelry design to open new markets and creative horizons. We also understand that the transition to digital has to make life easier, not harder.

If you've struggled to directly cast resin in the past, or just can't devote kiln cycles to a small volume of resin pieces, why give up on wax?

Wax has been used as a casting pattern material for millennia, and for good reason. It's easily formable, and is gently eliminated from the most fragile investment molds. Long before 3D printing, vulcanized rubber molds were a major leap in serial production, allowing investment casting to work at scale.

Formlabs' High Temp and Standard Resins plug into a tried and true vulcanized rubber molding process. 3D printing mold masters is one of the easiest ways to get the benefits of digital to your business. Space-saving digital inventory, lower labor costs, fast customization — same reliable wax casting process.

In this whitepaper, you'll learn when to use different mold products, and which ones are compatible with Formlabs resins

Organic Rubber, Heat Vulcanized Silicone, or RTV Silicone

A wide variety of rubber materials with different tear strengths are available. Do you need durability for mass production, or a delicate one-off?

- **Organic rubber** is preferred for long lasting, high-use wax molds, and has the highest tear strength. Organic rubber is best matched with thicker master patterns, such as signet rings, which are able to resist distortion during vulcanization.
- **Heat vulcanized silicone rubber** is vulcanized at a wide range of temperatures, and has lower tear strength than organic rubber. Silicone molds can capture superior detail, but degrade somewhat more quickly than rubber over many wax injections.
- **RTV silicone** starts as a liquid, and cures into a flexible solid at room temperature. RTV is best suited for molding around delicate 3D printed masters which could break or deform under vulcanization pressure, but has the lowest tear strength and durability.



RTV molding does not require a vulcanizer and has a lower up-front investment, but ongoing material costs may be higher.

Resin Compatibility

Formlabs Standard Resins (Black, Grey) and High Temp Resin are the recommended choice for vulcanized rubber molds. Castable Wax Resin can also be used for RTV molding, if you already use it for direct resin casting.

	STANDARD RESINS	CASTABLE WAX RESIN	HIGH TEMP RESIN
RTV Silicone	✓	✓	✓
Heat Vulcanized Silicone Rubber	✓	X	✓
Organic Rubber	X	X	✓

Recommended combinations of Formlabs Resin and types of molding materials.

Molding Rubber Compatibility

This resource will be updated with additional molding materials as they are tested. Unlisted molding materials may work, but are not yet validated by Formlabs.

Organic Rubber

FORMLABS RESIN	PRODUCT	MOLD RELEASE	TEMPERATURE	COMPATIBILITY
High Temp	Romanoff Blue Lo-Shrink Rubber	Mann Ease Release 200	155 °C (310 °F)	✓
	Castaldo White Label	Castaldo Resin Release	153 °C (307 °F)	✓

Heat Vulcanized Silicone Rubber

FORMLABS RESIN	PRODUCT	MOLD RELEASE	TEMPERATURE	COMPATIBILITY
High Temp	Belicone Red	None	175 °C (347 °F)	✓
	RiaceTech Orange	Castaldo Resin Release	80–90 °C	✗ Adhesion to mold
High Temp	Castaldo VLT	Castaldo Resin Release		✗ Adhesion to mold
	SCP Pale Pink	Castaldo Resin Release		✗ Adhesion to mold

RTV Silicone

FORMLABS RESIN	PRODUCT	MOLD RELEASE	COMPATIBILITY
High Temp	Smooth-On SORTA-Clear 40	Mann Ease Release 200	✓
Standard			
Castable Wax			
High Temp	Castaldo ICE RTV	Mann Ease Release 200	✓
Standard			
Castable Wax			



RTV silicone may be clear, which can be helpful when cutting molds with complex geometries.

Part Preparation

Post-curing parts is a critical step for all forms of rubber and silicone molding, because it allows Formlabs resins, including Standard Resin, to reach their optimal strength and temperature resistance. Post-curing also neutralizes any remaining uncured resin on the surface of a pattern, which may interfere with vulcanization or silicone curing.

Formlabs High Temp Resin requires post-curing in order to survive high heat vulcanization. After post-curing, High Temp will resist deformation up to 238 °C.

Mold release spray such as Castaldo Resin Release can help prevent resin patterns from adhering to RTV silicone. Apply mold release, and then use compressed air to remove excess.

Additional Equipment

When designs are 3D printed, master patterns can be more delicate and detailed. Specialized equipment will help you replicate the finest features regardless of design complexity.

VACUUM WAX INJECTOR

If injecting wax into designs with thin channels, Formlabs recommends a system with vacuum and mold clamping features.



US/EU:

Digital-Vacuum Wax Injection System [\[1,2\]](#)

APAC:

[Sanei Vacuum Wax Injector](#)

VACUUM/PRESSURE CHAMBER

A vacuum chamber is used to eliminate bubbles in a mold, and is essential equipment for most RTV molding.



US/EU:

Vacuum Table [\[1,2\]](#)