3D SYSTEMS

Investment Casting Solutions

Building productivity and new manufacturing efficiencies with tool-less 3D printed casting pattern production from 3D Systems

Investment Casting in the 21st Century

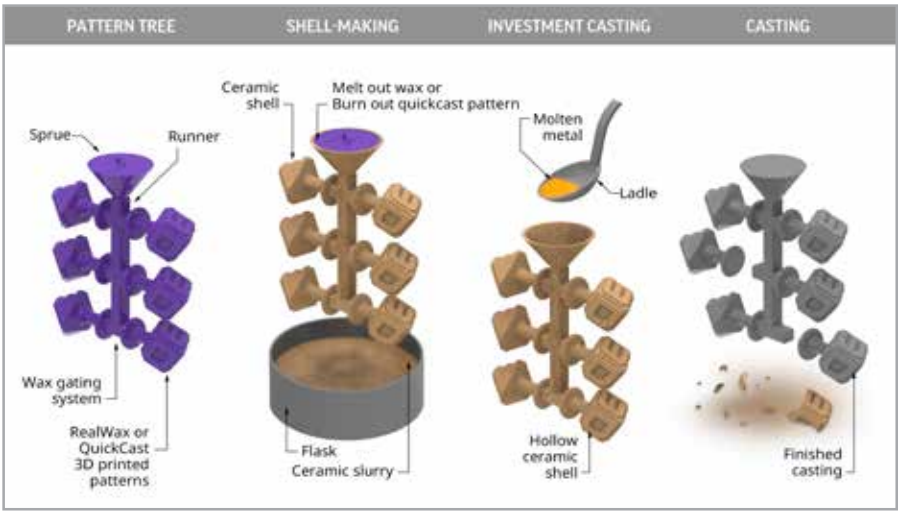
Production-grade cast metal parts in days

Investment casting is a precise manufacturing methodology that delivers value across industries, from mechanical, automotive and aerospace parts to intricate dental work, jewelry and sculpture. For centuries the trade-off for smooth and accurate investment casted parts has been high costs and long tooling lead times.

3D Systems' tool-less digital manufacturing solutions have changed the landscape of investment casting with 3D printing of high quality wax and resin casting patterns in hours that allow high complexity metal part production at significantly lower costs. Enabling the creation of the Digital Foundry, 3D Systems' technology will yield competitive advantages for those adopting digital processes, powered by 3D printing. Whether you need cost-effective low volume production, bridge tooling or one-off design validation before taking next steps, 3D Systems has the hardware, software, services and expertise you need to advance your goals.

3D printed investment casting patterns deliver the same high quality casting outcomes, but allow:

- Pattern production in hours
- Dramatic cost savings of up to 90%
- Mitigated risk for part design updates
- Individual part geometry customization or variation
- Fast and easy production of complex geometries
- Higher design complexity only possible through additive process
- True-to-CAD pattern accuracy and smooth surfaces



3D printed patterns are burned out into the lost wax or shell investment casting process

Patterns in Hours, Traditional Casted Metal Parts in Days

For industrial investment casting applications, 3D Systems primarily recommends two solutions for tool-less investment casting patterns production to meet the lower costs, quick turnaround and quality aspects your product demands.

RealWax™ Patterns with MultiJet Printing – high quality small to mid-sized wax patterns that fit directly into a standard foundry casting process. Accessibility and ease-of-use with seamless integration.

QuickCast® Patterns with Stereolithography – lower cost production of medium to extra-large lightweight high fidelity patterns that are robust and stable for shipping and storage. Clean pattern oven burnout with adjusted casting process.

BRIDGE MANUFACTURING AND SHORT RUN PRODUCTION

Meet tight deadlines for production parts without the cost or delay of tooling.

Courtesy of Owens Magnetic

LIGHTWEIGHT, COMPLEX METAL PARTS

Produce geometries that would be difficult or impossible to tool using conventional methods.

TOPOLOGY OPTIMIZATION

Deliver better performing, more cost-effective components with topology optimization and part consolidation.

CUSTOMIZED COMPONENTS

Economically produce the exact part addressing your tightest requirements with no MOQs.

OUR PEOPLE KNOW

For more than three decades, 3D Systems has demonstrated its industry leadership and expertise to help manufacturers across a variety of industries redefine their workflows to realize the benefits of additive manufacturing. Contact a 3D Systems expert to help you determine which technology and materials best suit your needs and learn how our solutions can deliver the benefits of a digital workflow to your business.

RealWax™ MultiJet Printing Patterns

Tool-less production of 100% wax casting patterns in hours

The ProJet® MJP 2500 IC yields hundreds of RealWax™ patterns at a lower cost and in less time than traditional pattern production. Delivering design complexity, quality, accuracy and repeatability, it is ideal for customized metal components, bridge manufacturing and low volume production.

ProJet® MJP 2500 IC

CASTING RELIABILITY

VisiJet® M2 ICast 100% wax material delivers the same melt and burn-out characteristics of standard casting waxes. This RealWax 3D printing material drops seamlessly into existing investment casting processes.

MANUFACTURING AGILITY

High flexibility and versatility with an efficient solution for wax pattern production, with one or multiple printers depending on needed capacity. Create, iterate, produce and refine as required with just-in-time pattern production.

FAST OUTPUT AT A FRACTION OF THE COST

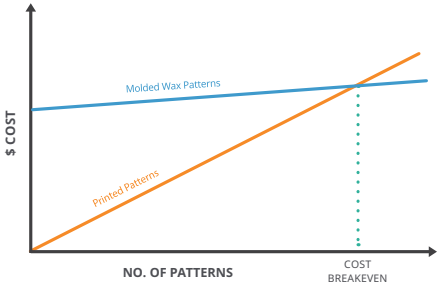
Produce hundreds of small to medium size patterns quicker and at less cost compared to the time and expense to build and run a traditional injection tool. If design changes are needed, the benefits just compound.

OPTIMIZED RESOURCES

Streamline your file-to-pattern workflow with MultiJet Printing ease-of-use and dependable process:

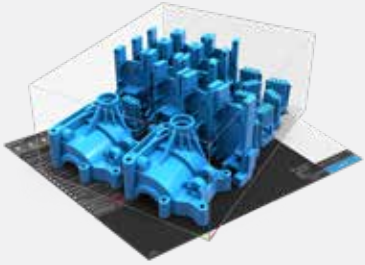
- Advanced 3D Sprint® software capabilities for preparing and managing the additive manufacturing process
- Unattended high speed printing
- Defined and controlled post-process methodology

Total Pattern Cost vs. Number of Patterns



"The parts produced on the ProJet MJP 2500 IC are incredible... The part quality, surface finish and accuracy have allowed us to move more of our production to this product." - Al Hinchey, Invest Cast Inc.

3D Sprint®



INCREASED PRODUCTIVITY. LOWER COSTS. BETTER PARTS.

As part of 3D Systems' integrated plastic and wax 3D printing solutions, the advanced 3D Sprint software delivers tools that allow you to 3D print better parts and patterns without needing additional high-priced software to achieve it.

3D Sprint delivers 3D Systems' expertise to prepare and optimize CAD data, and then manage the additive manufacturing process, providing one intuitive interface for design, model prep and printing.

QuickCast™ Stereolithography Printers

Stable and shippable medium to extra-large lightweight patterns in hours

These highly productive printers offer all the benefits of legendary stereolithography for investment casting applications: smooth surfaces, high quality for complex geometries and exceptional accuracy.

LARGE PARTS WITH FINE FEATURE DETAIL

SLA printers are able to produce highly detailed, lightweight patterns in sizes ranging from just a few millimeters, all the way up to 1.5 meters long in one piece, minimizing the amount of assembly for larger patterns—all at the same exceptional resolution and accuracy, with virtually no part shrinkage or warping.

24/7 PRODUCTION

Get the highest productivity possible with the fastest print technology for large patterns and production runs. SLA printers run unattended until the print is complete.

COMPELLING ECONOMICS

Cut the tool time and cost with direct patterns 3D printing for lower volume production. Benefit from lower pattern costs than other precision 3D printing technologies with QuickCast SLA printing efficient material use.

ADVANCED CASTING MATERIALS

Using our advanced Accura® casting materials, you can produce investment casting models quickly and easily for clean burnout, with high geometric stability for shipping and storage. Accura CastPro Free is an antimony-free material specifically for use in aerospace-based casting pattern production.

"The ProX 800 gives us high-quality sidewalls, better tolerances, and that large print bed. We're saving time on the post-print finishing because the finish of the resins is so good, and we're also saving time from not having to build parts in two pieces and bond them together."

- Austin Wong, rapid prototyping manager for Vaupell

3D SYSTEMS QUICKCAST™ METHODOLOGY

The QuickCast build style is an SLA print methodology developed by 3D Systems to answer a pressing need for the investment casting industry. The speed advantages and the high accuracy and quality of 3D Systems' SLA technology have made QuickCast one of the most popular and effective methods for 3D printed casting patterns.

QuickCast patterns are built with a unique honeycomb structure that allows the pattern to collapse internally as it expands with temperature. These patterns are made with castable resins, and their high surface quality helps reduce post-processing requirements, contributing to a faster final part delivery. 3D Systems' castable resins are also available in antimony-free varieties for aerospace castings.

MultiJet Printing

	ProJet MJP 2500 IC
Build envelope capacity (W x D x H)	11.6 x 8.3 x 5.6 in (294 x 211 x 144 mm)
Build material	VisiJet M2 ICast (100% wax)
Resolution	600 x 600 x 600 DPI
Layer thickness	42 µm
Typical accuracy*	±0.004 in/in (±0.1016 mm/25.4 mm) of part dimension across printer population ±0.002 in/in (±0.0508 mm/25.4 mm) of part dimension typical for any single printer

* Across printer variation can be reduced to equal single printer variation via user calibration.

Stereolithography Printing

	ProJet 6000	ProJet 7000	ProX 800	ProX 950
Build envelope capacity (W x D x H)	10 x 10 x 10 in (250 x 250 x 250 mm)	15 x 15 x 10 in (380 x 380 x 250 mm)	25.6 x 29.5 x 21.65 in (650 x 750 x 550 mm)	59 x 30 x 22 in (1500 x 750 x 550 mm)
Build material	Accura ClearVue	Accura ClearVue	Accura CastPro* Accura CastPro Free* Accura ClearVue Accura ClearVue Free Accura 60	Accura CastPro* Accura CastPro Free* Accura ClearVue Accura ClearVue Free Accura 60
Max resolution	4000 DPI**	4000 DPI**	4000 DPI**	4000 DPI**
Accuracy	0.001-0.002 inch per inch (0.025-0.05 mm per 25.4 mm) of part dimension			

* Denotes materials specifically designed for industrial investment casting applications.
These materials are 3D Systems' primary recommendation for casting applications on these printers.

** Equivalent DPI based on laser spot location resolution of 0.00635 mm in 3D Systems testing.

SEEKING 3D PRINTED CASTING PATTERNS NOW? CONTACT THE 3D SYSTEMS ON DEMAND EXPERTS.

3D Systems On Demand offers the power to 3D print casting patterns through our 12 facilities worldwide with online ordering 24/7, supported by our team of experts and application engineers.

3D Systems offers two types of investment casting patterns supported by decades of experience.

- QuickCast – delivering accuracy, high-level of surface finish and larger part size capabilities for rapid production of cast components.
- RealWax – offering the highest level of surface finish, part complexity and ease of processing for casting patterns.

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