WORLD-CLASS CASTINGS DELIVERED

What tooling method makes sense for your sand casting?

By Brad Moore, Director of Sales Engineering, Badger Alloys, Inc.

Tooling methods continue to evolve and provide flexibility for getting the best casting. Requirements like size, volume, complexity, budget, and turn-around time all play a role in finding the best techniques for each specific project. Any given method might be perfect for one situation but less than ideal for another.

Exciting improvements in technology are making robotically milled molds an affordable reality, and falling polymer printing prices make 3D-printed pattern equipment a viable option. However, traditional tooling still plays an important role in the foundry industry.

Your casting manufacturer will be able to help you determine the best tooling method for your project, but it is important for you to be armed with a basic knowledge of the strengths and weaknesses of different tooling types.

In general, for short-run, complex castings and/or those that require a prototype, robotically milled tooling or a 3D-printed mold are likely your best bet from a cost and timing standpoint. However, if you have a higher volume casting that requires multiple reorders over time, traditional patterns will probably be a more sound investment. A more sophisticated foundry will have the ability to consult with you and mix and match any of the above methods as your project requires it. All tooling requirements should be determined on a project-specific basis to provide you with the highest value part possible.

The following quick comparison of current tooling methods will help you determine which makes the most sense for your casting.

Badger Alloys now offers patternless molding with this 6-axis robotic milling center.

Brad Moore is director of sales engineering at Badger Alloys, Inc. He has been with the company since his graduation from University of Wisconsin-Madison in 2010, where he earned a degree in industrial engineering. Brad focuses on process improvement, lean manufacturing initiatives, and project management to ensure customers needs for complex castings are met. Brad leads Badger Alloys' team of engineers and has been responsible for the installation and implementation of the company's first robot, in addition to other cutting-edge technologies.

Tooling Method Comparison

	Robotically Milled	**Hybrid -Robotically Milled mold w/ Printed Core**	**3D-Printed Mold/Core**	**Traditional Tooling (wood, urethane, etc.)**
Core	None or simple	Complex/multiple	All	All
Size	Large (up to 96" square mold)- BA Limit	Between 20" and 96"	Smaller (20" sq. or smaller)	All
Model	Required	Required	Required	Not needed
Turn-around Time	As little as 1 week model to casting	As little as 2 weeks model to casting	As little as 2 weeks model to casting	Tooling plus normal casting lead time (4- to 6-week minimum)
Volume	Low (1-3 per year)	Low (1-3 per year)	Low (1-3 per year)	High
Variable cost to cast	$$	$$$	$$$$	$
Set up cost	$$	$$$	$	$$$$
Ideal for	Custom, one-off parts or prototypes that are needed quickly Large, low-volume castings	Prototypes and complex designs that need refinement Large custom, one-off parts or prototypes that are needed quickly	Prototypes and complex designs that need refinement	Simple parts Parts with complex cores that require specialty sands or core wires (e.g. those with thin core passages) Mid- to high-volume castings
Cautions	The most cost-effective decision between traditional tooling and milling depends on the part geometry Surface finish may be rougher than traditional tooling	Perfect for large castings with complex geometries	Specialty sands can be cost prohibitive	Quality of the pattern will dictate the quality of the end part Pattern equipment requires storage, handling, and maintenance Engineering changes can be expensive

At Badger Alloys, we have the ability to create traditional patterns in our dedicated pattern shop, handle the 3D-printing of your mold or core, or use our state-of-the-art robot to mill your mold directly. Our team of patternmakers, engineers, and foundry personnel are committed to working collaboratively with our customers to achieve the desired result.

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