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Signicast's Rule:
Dip It & Ship It

Who Needs Inventory?

Signicast Corporation did away with inventory and focused on speed and continuous flow to be able to deliver a part to its customers in 5-10 days.

Shannon Kruse, Associate Editor

Signicast Corporation-Hartford Manufacturing Complex
Hartford, Wisconsin

Year Founded:	1993.
Metals Cast:	Carbon and low alloy, stainless, tool, and corrosion-resistant steels, copper-base alloys, monel, nickel-base alloys and cobalt-base alloys.
Casting Process:	Investment casting.
Casting Range:	Ounces to 100 lbs.
Key Markets:	Power tools, hand tools, fluid handling, heavy equipment, lawn and garden, railroad, firearms, fitness equipment, safety, agriculture, recreational vehicles and electronic controls.
Employees:	670.

In chemical plants, material flows via pipes from station to station where it is processed with automated controls. It is untouched by human hands, and long waylays at one station or another are avoided. This sounds like something relatively easy to accomplish with the fluidity of a liquid or gas product, but what about the cumbersome metalcasting process? Could a metalcasting facility produce a casting from start to finish in one continuous flow? Could the castings be shipped directly from the finishing room to the customer, without hanging around as inventory?

For investment casting facility Signicast Corporation, this manufacturing philosophy was a worthy—and reachable—ambition.

"For years in the late 1980s, we could see trends toward just-in-time," said Terry Lutz, president of Signicast. "We plotted out that we wanted to be a process industry like the chemical industry and not a job shop. So we had to figure out, what was the flow? And how do we organize it?"

"Just-in-time means just in time. It doesn't mean keep it inventoried."
—Terry Lutz, president, Signicast Corp.

The desire to achieve a continuous work flow on the plant floor was matched by innovative thinking, a strong employee culture and the opportunity to build from scratch.

Signicast started as an investment casting facility in Milwaukee in 1972, and by 1990, the facility had maxed out its real estate with eight expansions.

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With business still growing and a spark of an idea forming in Signicast's control room, thoughts turned to opening a second facility elsewhere.

The company serves commercial markets, such as power and hand tools, fluid handling, agriculture and firearms, avoiding high volume parts that might clog the line. With its new facility, the company could apply continuous flow manufacturing methods from the start and incorporate new engineering ideas to achieve the best, smoothest flow possible without having to change or accommodate pre-existing equipment or floor plans.

Lutz sketched out his vision of a long-term building plan while he was watching T.V. one evening. Although it came from humble beginnings, the sophisticated design incorporated five modules—built as expansions over the next 20 years—that would house stand-alone investment casting facilities, along with a central support module/office building. It was a plan that the firm stuck to.

"We realized we needed specialized plants for our product mix," Lutz said. "Once we had the vision, we looked at automation. From there, it was just a matter of finding the land."

Signicast chose Hartford, Wis., as the site for the new facility, and construction on the first module was complete in 1993. In 1995, a support module with offices was built. This module would eventually become the center hub of the pentagonal campus. Module 2 was erected in 1997 as a matching investment casting unit to the first module. In 2001, Module 5, which houses all the company's machining and finishing cells, was added, and Module 3, a third investment casting unit, was added in 2003. Module 4, which will begin full production in September, is a match to Module 3 and is the final planned module of the plant, bringing the total facility size to more than 436,000 sq. ft.

Each new addition was equipped with newer, updated models for production. And all the modules utilize a unique automated storage/retrieval system (ASRS) for material handling, which transports the product from cell to cell, wax station to finishing room. Combined with in-house machining and finishing operations and an abundance of robotic systems, ASRS has enabled Signicast to streamline its production flow to complete a part, from wax injection to shipment, in five to 10 days.

"Almost everything we do is done to increase speed and quality, which ends up bringing cost savings with it," said Bob Schuemann, executive vice president. "The jobs we are doing this week are what our customers need next week."

No Need for Inventory

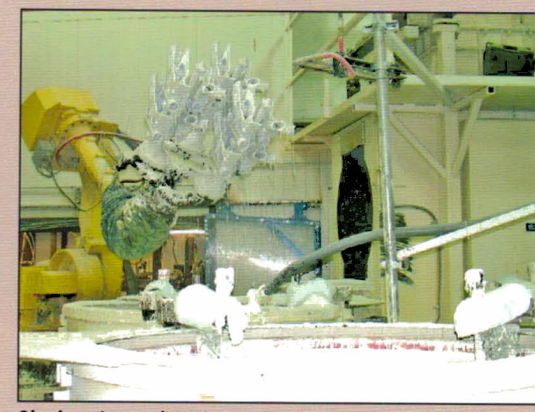
When Signicast's management began thinking about opening a new facility, speed was the primary objective. "We have to overcome major challenges in the face of Chinese competition," Lutz said. "We saw the market go toward product innovations and new product launches, where speed is more critical. Being good is not good enough anymore. You have to be good and fast. So we focused more on speed."

Signicast's 24/7 tooling department recently acquired this new five-axis CNC machine to increase its ability to build almost all of its tools in-house.

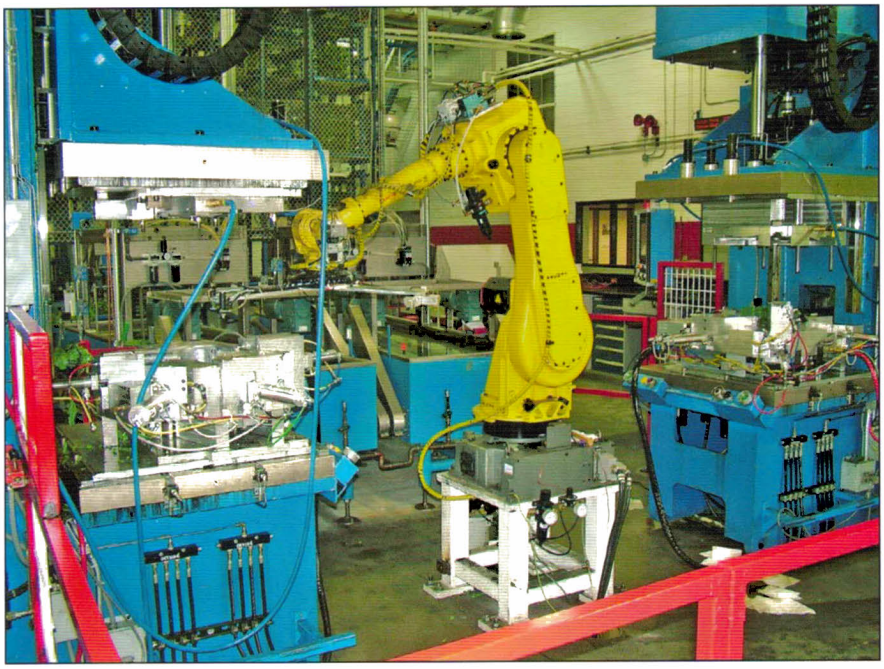
The Higher Art of Double Dipping

Much of Signicast's leadtime comes from dipping the wax pattern trees into the ceramic slurries to form investment molds. Each piece is dipped between five to seven times, with drying periods in between. Because a wide variety of parts needing different slurries go through Signicast's production line daily, the firm uses a rotating wheel that automatically positions one of three slurries into place for the molds to be dipped. This rotating wheel cuts back on the time needed to position the correct batch of slurry for each new part.

After the wax patterns travel through the ASRS to the dipping station, they are picked up by a robot, which automatically recognizes which part it is and which slurry is needed. The slurry wheel will rotate to position the correct batch into place, taking just seconds to accommodate a new part. ***MC***



Signicast's rotating slurry wheel can accommodate the ever changing line of parts with just a few seconds of rotation.



Robots inject wax into horizontal and vertical presses to create the molds. The wax is a toothpaste-like consistency when injected, so there is less shrinkage as it hardens.

With the first module, Signicast introduced the use of the ASRS as the main mode of transporting the castings throughout different stages of manufacturing in the facility. This $1.5 million system was the first of its kind to be used for material handling at a metalcasting facility, and with the system, the firm was able to make a conscientious shift to just-in-time manufacturing.

The casting facility has no place to keep its inventory because there is none. It uses the ASRS as the only type of inventory staging, and the maximum time a part is in the ASRS is 18 hours. The automated system, which is linked by computer to the manufacturing process throughout the facility, frees up employees from spending time and labor on physically transporting the investment molds from cell to cell. And the electronic tracking allows employees to keep apprised of the molds' progress.

With the equipment for continuous flow in place, one of the first things Signicast realized was that any type of re-work in the facility would jam up the manufacturing progress. To avoid this, the employees on the floor were required to make decisions on the line right away.

"We took out the re-work choice and forced people to make a decision," Lutz said. "We gave them the responsibility, but also the tools and information to make the right decisions. Technicians have all the information they need at the computer stations because of the electronic tracking."

Round the Clock Tooling

With the continuous flow established on the shop floor, Signicast looked to the tooling department to help cut down lead-times. The company, which makes 90% of its tools in-house, began streamlining its tooling operations in the spring of 2005 using the principles of continuous flow.

"We took every task we could think of and measured it for time. Then we figured out how to shrink it," Schuemann said.

The department was switched to a 24/7 operation, so more than one person would be working on the same tool throughout the day and week. Master toolmakers concentrate on the highest skill level activities, while the other technicians deal with the lesser-skill level activities.

"Continuous flow was pretty radical for toolmakers," Lutz said. "That was probably the hardest sell we had to do. Now we have multiple workers on the same tool, and we do all the tooling for a job at once."

The company also recently purchased and installed a half-million-dollar, five-axis CNC machine that cuts the entire tool. So far, the changes to the tooling department have resulted in increasing tooling production from 20-30 tools a month to 40 tools a month. As it stands,

Keeping a Small-Shop Culture on a Sprawling Manufacturing Campus

Signicast started as a modest investment casting facility in Milwaukee, growing over the years to a 100-employee operation. But when the Hartford complex opened in 1993, opportunities abounded for expansion, both in manufacturing space and work force. Now, Signicast's Hartford facility currently employees more than 500 people, and providing an optimal working environment is a priority.

In Signicast's five-module plan, each module acts as a stand-alone business unit—four investment casting facilities and a machine shop. Employees on the shop floor are considered technicians because they are cross-trained to work at different stations throughout the facility. Each investment casting unit competes against each other in quality, scrap level and profit.

"We thought teamwork was important, but the bigger a group gets, the harder it is to have that teamwork attitude," said Signicast President Terry Lutz. "Our modules help keep the teamwork attitude."

Employees at Signicast also are aware constantly of their shift's progress. Digital signs showing the production goal and the current rate of production hang throughout the cells of the facility. For instance, one sign might show a goal of 168 molds per shift with the current number of molds made so far. Below that, it will show the current rate of molds per hour and the rate needed to reach the goal of 168 molds per shift.

"It's the drumbeat for manufacturing, but it's also the drumbeat for sales," said Bob Schuemann, executive vice president at Signicast. Just as the manufacturing teams have a production goal, the sales team at the facility has a goal to keep each unit at sustainable capacity (the volume of production that can be handled while still keeping things flowing smoothly and efficiently). ***MC***

One of the few times a technician will physically handle was patterns to glue them onto the investment tree. From this station, the molds will be placed into the ASRS, which will do the rest of the transporting work.

Signicast's timeline for a new job can be as short as one week to build a tool, one to two weeks for sample-making and one to two weeks for production—the part can be delivered in five weeks.

Now, the biggest obstacle to getting a new part delivered fast is the time spent on the sampling step.

"On the front end, we have to speed up tooling while cutting costs in half," Lutz said. "We've done that material-wise, and now we're focusing on the wait portion."

This will entail more CAD/CAM work, more product engineering on Signicast's part, and being proactive in getting customers to be faster in communication and response.

"Signicast to the Rescue"

When you boast a one- to two-week leadtime like Signicast's, helping out a customer that's standing 2 ft. from a deadline is common. By focusing on cutting speed rather than cost, Signicast has been able to meet the needs of companies looking for a quick start while showing customers that the cost of a part is more than just a piece price.

"A lot of times, we're Signicast to the rescue," Lutz said.

For example, one company came to Signicast with an order that had to be filled fast after its original order with a Chinese competitor fell through. According to Lutz, machined castings were delivered, after tooling and machined samples, two and a half weeks from the time the customer came to the firm.

"The job shop mentality won't make it," Lutz said. "Our whole thrust was not to do it cheaper, but to do it faster."

Often, customers don't know what to do with the shorter leadtimes. Rather than have the parts pile up in inventory at the plant before shipping out the entire order to the customer, Signicast ships a portion of the order in several lots. According to Lutz, the cost of transportation actually is less than the cost of keeping inventory, but it takes some consulting with the customer to get them on this type of schedule.

"A lot of times we have to teach the customer about what to do without a six-week leadtime," Lutz said. "We want to ship almost daily, and we want small lots more often. So after meeting with the customer, we'll often do their scheduling based on what we think their needs are going to be."

Robots pour molten metal into the molds.

Value-Added on the Fly

Signicast further accommodates its

Signicast performs machining, heat treating, finishing and painting in-house.

customers by offering complete component manufacturing. With machining, heat treatment, assembly, finishing and packaging performed in-house, it can further cut customer's time to get a completed part.

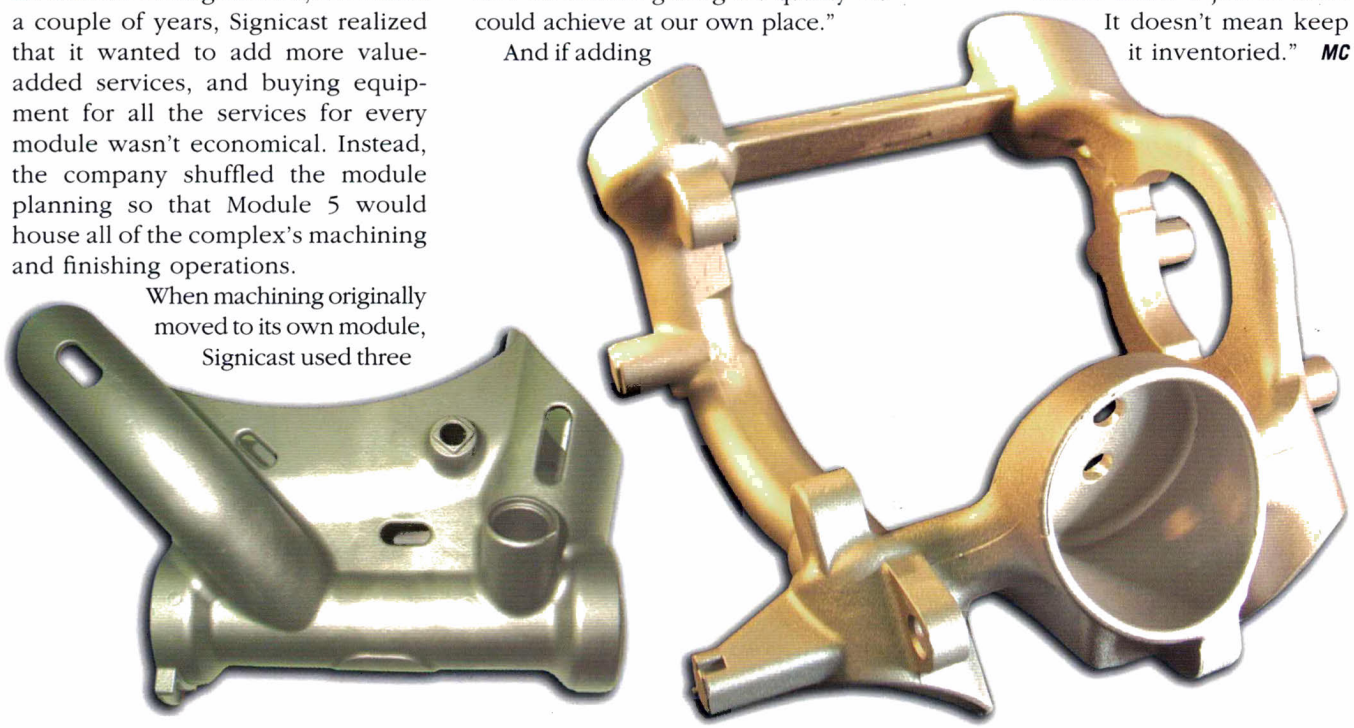
Originally, the plan was to put separate machining centers in each investment casting module, but within a couple of years, Signicast realized that it wanted to add more value-added services, and buying equipment for all the services for every module wasn't economical. Instead, the company shuffled the module planning so that Module 5 would house all of the complex's machining and finishing operations.

When machining originally moved to its own module, Signicast used three Brother CNC machines; now the firm makes use of 20. Painting also was added to its value-added capabilities.

"Originally we outsourced all the painting, but their leadtime was two weeks," Schuemann said. "That was too long. We added painting because we couldn't wait for our supplier to finish, and we weren't getting the quality we could achieve at our own place."

And if adding painting in-house meant getting the finished part to the customer faster, Signicast was on board. It's part of a vision 13 years in the making, and being a true continuous flow manufacturing facility is a goal the company constantly strives to improve upon.

Lutz put it simply: "Just-in-time means make it just in time. It doesn't mean keep it inventoried." ***MC***



Signicast produced these components for the recreational vehicle and motorcycle markets. The castings are made of 8620 steel.

CREATING THE FUTURE

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... SPEED, QUALITY, AND TOTAL COST.

With Signicast's technologically superior investment casting process, our production can turn on a dime, so we deliver on time, every time. Beyond the outstanding quality of our castings, we collaborate and innovate with you throughout the process to ensure a premium overall experience. All of this comes at a total cost that makes us competitive with companies that do little more than take orders and deliver product.

We are opening our fourth plant in just nine years, increasing our capacity to meet your needs.

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