Thinking of offering machining services to your customers? These six DOs and DON'Ts will help you formulate your plan.

Shannon Kruse, Associate Editor

In the days of Henry Ford, manufacturers lined up to supply their services much like the assembly lines introduced in that era. Each step in the manufacturing process was handled vertically as parts moved up the chain from raw material to completed product.

However, increasing global competition for both end-users and the companies that supply them has forced the chain of events to evolve. A shift has been made by several adapting companies to move supply lines horizontally rather than vertically, incorporating more manufacturing services in the hopes of standing out from the crowd of contenders.

Some metalcasting facilities have opted to bring machining in-house, eliminating a step for its customers and adding another opportunity for profit for the company. If your business has been toying with the idea of adding this service, the following DOs and DON'Ts will help reveal the missteps to avoid and the advice to follow as you form your machine shop business plan.

**DO Know What You’re Getting Into**

“Machining is another business,” said Chris Duggan, applications manager for Okuma America Corp., Charlotte, N.C., a supplier of CNC and machine technology. “If you add machining to your casting facility, understand that it’s not just adding the equipment. There are new skills to learn and a different mindset regarding tolerances.”

One of the biggest follies of metalcasting facilities that start machining in-house is lack of knowledge of the machining process, according to Duggan. Tolerances in machining are several orders of magnitude more difficult than in the casting world, so put the same amount of effort into accumulating a knowledgeable staff as you would to buying the equipment.

“We’re dealing with much tighter tolerances in machining,” said Joe Farrar, president of Farrar Corp., Manhattan, Kan., a ductile iron metalcasting facility that performs its machining in-house. “It’s a different animal, and it takes a lot of knowledge about...
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—Mike Cocking, HyPro Inc.

Horizontal machining centers have spindles that stick out laterally from the machine and can accommodate a larger variety of parts than vertical machining centers.
Whether you decide to subcontract with a machine shop or take on machining in-house, remember to consider machining requirements in the stages leading up to the final manufacturing design. A design that works great for the OEM and metalcaster might be a costly nightmare to machine.

“It’s important that the part can fit into a machining and metalcasting equipment envelope that is the most economical,” Cocking said. “At these initial meetings, we try to see if the equipment envelope can be made smaller to fit a smaller machine. Machine shops sell time, and bigger machines cost more per hour than smaller ones.”

The location of parting lines also affects the economy of machining. The location of parting lines also affects the economy of machining. The machine shop must position the part on the machining equipment away from the parting line; a poorly placed parting line could call for longer machining periods. Casting a few locators (flat pads on which the machining equipment can clamp) onto the part can save the machine shop time and the company money, and they can be ground off after machining, if needed.

Lastly, excess sand on a casting sent to the machining department can be damaging to the machine tools, wearing allow coolant in the building will affect your decision to purchase a dry or wet machining system.

“You’re controlling chips and temperature,” Leoni said. “Machining causes heat, which causes thermal growth. If you can use a wet coolant, the thermal growth is less.”

Equipment for dry machining is available, but wet machining will allow you to achieve better tolerances due to the minimal thermal growth.

Remember the Extras

Purchasing a machining center is the first major capital investment for your machine shop, but other equipment is needed, as well. A coordinate measuring machine (CMM) will be useful in ensuring the proper specifications are met in the shop. HyPro Inc., Waterford, Wis., uses its CMM to check the dimensions of the first machined part of an order. Once it has been determined that the part meets the requirements, the go-ahead is given to commence machining on the rest of the job.

Cutting tools also are part of the expense of a machine shop. General cutting tools can be purchased by catalog from tool shops, but some parts that are high volume, heavy or call for tighter tolerances might be better machined with customized tooling. Customized tooling can be produced in-house or purchased through a separate tool shop. Of course, this tooling is more expensive, but it could last longer. —MC

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**Machine Shop Basics**

How you want your machine shop to run depends on a lot of variables—part volume, variety of parts, tolerances needed, required speed, level of complexity, etc., but following are a few basic machining concepts that will help you formulate a plan.

**Equipment Notes**

Most machine shops use vertical or horizontal machining centers, which incorporate cutting, drilling and milling operations into one machine. Vertical machining centers (VMC) are less expensive, but less flexible. With a spindle that runs up or down, it is best suited for big and flat parts. Depending on their size, VMCs range in price from $100,000 to $250,000, according to Tim Leoni, director of sales for Toyoda Machinery USA, Arlington Heights, Ill., a supplier of machining equipment.

Leoni said horizontal machining centers (HMC) range in price from $250,000 to $900,000, but they are more versatile and work at quicker speeds. With a spindle that reaches horizontally, there is more access to the piece. HMCs also feature bigger work envelopes, larger tool capacity and the capability to handle larger tools.

Parts that tend to need higher precision along intricate curves might call for a five-axis machining center. These machining centers are very expensive, and most castings can be machined more economically on the VMC or HMC. However, some high end parts in industries such as aerospace require five-axis machining.

**Wet or Dry?**

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Who’s Adding Machining?

With the proper research and planning, any metalcasting facility can start machining in-house, but according to Mike Cocking, of HyPro Inc., Waterford, Wis., some casting facilities are better suited for it than others.

“Aluminum houses are better suited because there’s minimal machining involved,” Cocking said. “The same goes for investment casting because of its near-net shape.”

Tim Leoni, of Toyoda, sees a lot of machining equipment purchased by aluminum diecasters, particularly in the automotive market.

“Customers in the automotive industry are looking more for single source,” Leoni said. “Anytime you include another entity, you add cost.”

The high volume nature of the automotive market also means fewer types of equipment to buy and less machining expertise to learn, according to Cocking.

But, the automotive industry is not the only sector calling for one-stop sourcing for machining. Leoni said he’s seen machining equipment sales pick up for metalcasting facilities in the valve, gas and oil industries.

When you add machining, you add another chunk of lead time to keep track of. Having management on staff dedicated to keeping tabs on the scheduling of the machine shop is a must. Supervisors, sales managers and quality control personnel also should be on staff to handle the machining side of the business.

Scheduling has an effect on your company’s cash flow—particularly if you opt to subcontract machining. You’ll be paying your machine shop before you get paid by the customer, so keeping a tight rein on scheduling will help you avoid tying up too much cash in the machine shop.

DON’T Expect Miracles

“Every company has to decide what they want to be,” Farrar said. “You have to define what you want to be good at and be the best. Don’t just do something (like machining) to be doing it. If you don’t have the intention of being world-class, then you shouldn’t be doing it.”

Adding machining services is not as simple as throwing a couple of machines in the back of your plant. Careful consideration should be given to how much time, effort and capital you want to invest in machining. Because of the money needed for equipment for both the machining and metalcasting side of your shop, handling both monsters is a major undertaking.

“Equipment for both sides is expensive, and shops will always have to grapple with where the capital investment should go,” Schilt said.

Remember, your machine shop also must be competitive with other outside machine shops. If your machining department can’t deliver on quality or time, it wasn’t worth adding in the first place.

Still, if done right, incorporating a valued service, like machining, into your facility can be attractive to many current and potential customers. “Many customers would like to eliminate the middle man,” Farrar said. “We used to machine 50% of our parts, and now we machine closer to 75%.”

And, an in-house machine shop can eliminate transportation costs and a link or two in the manufacturing chain. “There are some types of items that we have farmed out,” Farrar said. “But we have found that we have better control and delivery when we do it in-house.”

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