

# Material Assets

## Accuracy, Speed and Creativity Move Gear Manufacturing Forward

Matthew Jaster, Senior Editor

**You get one shot to make a first impression.** One opportunity to show your customers, vendors and suppliers that you provide a steady, reliable product that will generate repeat business. How do you make this happen? What tools and strategies are available to get gear materials (forgings, gear blanks, etc.) shipped faster and more efficiently in today's tech-heavy, fast-paced, manufacturing environment?

Lead-time is simply a numbers game. How many minutes, hours, days, (god forbid months) will it take to complete an order? That's pretty much all there is to it. Unfortunately, many organizations that supply gear materials struggle with these numbers. Equipment failure, lack of personnel and increased competition add to the growing list of challenges. By focusing on lead-time improvements, companies like McInnes Rolled Rings and Scot Forge have found innovative and creative ways to bring some much needed consistency to the materials market. Here's how:

"Lead-time is an opportunity to differentiate ourselves from the competition. We've established 1 to 2 week lead-times as our standard. In many cases we are shipping in a matter of days," said Shawn O'Brien, vice president sales and marketing at McInnes Rolled Rings. "Our mission is to offer industry leading cycles in every market. When our customers realize that they can consistently rely on this, it gives them an advantage over their competition and enables them to avoid carrying excess inventory."

"In the gear industry, quite a few of our customers are not just manufacturing new, original gearboxes. Instead, they are servicing the existing gear business with repair work," said Sarah Marski, senior account manager and business segment leader at Scot Forge Company. "For this, delivery reliability is extremely important because purchasing



**An integrally forged shaft, made as a tooled double hub, then torch cut and finished. The part displays a number of different process including loose tooling, torch cutting, heat treating and machining (courtesy of Scot Forge).**

decisions are made according to which company can service the broken gearbox the fastest. If a gearbox is down, the equipment is down. If the equipment is down, there is no way to turn out product."

### Gear Specific Challenges

Due to the fact that the gear industry cannot forecast a potential breakdown in an accurate manner, speed and nimbleness are critical to service this industry, according to Marski.

"In many cases, most of manufacturing capacity is constrained by labor, not necessarily assets. With the pickup of primary markets and the influx of orders, we have to look at several options to optimize our capacity including shifting resources and utilizing our outside preferred vendors if we can't accomplish it on-time, in-house," Marski said.

The greatest challenge in manufacturing today is finding good, skilled labor. According to a study by Deloitte, over the next decade nearly 3.5 million manufacturing jobs will likely be needed and 2 million are expected to go unfilled due to the gap between the talent manufactur-

ers need to keep growing their businesses and the talent they can actually find.

"With the long-term in mind, Scot Forge has internship programs where we partner with local technical colleges and high schools to expose students to manufacturing and trade work with the goal of adding new resources back into the field," Marski added.

McInnes Rolled Rings, like all manufacturers, relies on its people, equipment and raw material supply to meet the demands of the gear industry. "We prepare for challenges by proactively and continuously managing these areas. We maintain a full staff during recessionary conditions and take advantage of opportunities to cross train throughout the plant," O'Brien said.

A well-established preventive maintenance program keeps their equipment in top shape and a healthy inventory of critical parts minimizes any equipment interruptions. Managing the raw material supply, however, can be a bit more intricate.

"Understanding the market's appetite and matching that with our supply chain's responsiveness is critical. Our

experience and well established supplier relationships are both keys to our success,” O’Brien said.

### Invest, Improve and Innovate

O’Brien remarked that speed has been the cornerstone of the McInnes brand for years. The company always looks for new efficiencies and its lead-times have remained steady at 1–2 weeks. So what’s the recipe for success?

“There are no premiums or special programs. It’s simply our normal course of business. We continued to invest in our team and equipment during the recent economic downturn and we are fully prepared for the next upswing. Our new \$8M heat treat investment enables us to process significantly more tonnage. Maintaining a full staff of experienced associates in our plant, office and in the field enables us to meet any demand surges in stride,” O’Brien said.

In order to combat the need for more skilled labor so they can keep production flowing through the shop (which improves delivery reliability and helps reduce lead-times), Scot Forge has introduced a formalized flex-labor program along with its existing lean manufacturing principles. This helps the company stay nimble and pull labor into areas of constraint on the shop floor so that manufacturing isn’t held up. Having a cross-

functionally trained staff gives the company a better understanding of what its customers need and helps keep production on-schedule.

“Additionally, having the right material grade and stocking size on-hand so material availability doesn’t add to delivery time is something Scot Forge has improved over the years with the help of new technology,” Marski said.

Scot Forge has implemented a *Material Resource Planning* tool that gives a better visibility of material grade usage and stock size usage, allowing the organization to better service the gear market.

“If we can understand the usage by customer and particular grades, then we can make sure we have it on the ground, ready to go. Along those lines Scot Forge stocks OEM grades which is unique to the industry. Simply having this material available can shave over five weeks off of delivery in some cases,” Marski added.

### Making the Most of Your Resources

The materials market struggles with an identity crisis of sorts regarding technology. You don’t typically think of software upgrades, advanced machine technology or data analytics when discussing forgings and gear blanks (It’s more likely that you think of pulling a flaming hot piece

of metal out of an open flame). But like other areas of manufacturing, these tools are essential to improve lead-times.

As mentioned earlier, Scot Forge’s *Material Resource Planning* tool helps inventory material grades and input stock. “These analytics help determine what raw materials we need to have on hand to meet our gearing customers’ needs, which makes our turnaround to our customers faster. However, improved equipment also can reduce delivery time and material waste. Any time you can cut waste — whether that’s speed, production or responsiveness — you’re optimizing your ability to react to market needs,” said Marski.

In terms of information retrieval, it pays to pay attention to what material providers have to say and the data that is being collected. Marski said that since forging is at the bottom of the supply chain for most end-use markets, they experience the peaks and troughs of industry demand much sooner than a lot of their gearing customers.

“Using this data along with the data generated from our customer’s purchasing history helps us track and forecast demand for certain industries with better accuracy. We can work with our gearing customers, in turn, to help them anticipate demand and share information about the market so they can plan accordingly,” Marski said.

McInnes recently upgraded its *Enterprise Resource Planning (ERP)* system. ERP is an integrated software package that tracks and collects a variety of business resources including raw materials, production capacity, etc.

“While change can be difficult, the benefits far outreach the rigors of implementation. This modernization makes data more accessible so we can examine our key performance indicators in real-time and set new goals that help us continuously improve. The costs of not investing in technology are higher than keeping up with the advances that are available,” O’Brien said.

### Expanding Opportunities

At this year’s Gear Expo, Scot Forge highlighted the advances of “hybrid



**A bull gear that is machined and ready for shipment. This part was previously welded as a three component fabrication but is now being produced as a single piece forging (courtesy of Scot Forge).**



forging”. Using the advantages of open die forging combined with the near-net shape capability of closed die forging, the forging process can now be tailored to optimize time and cost savings for the gearing industry.

Companies who are looking for a better competitive advantage have started seeking the help of forging facilities with the metallurgical know-how to deliver improved products, processes and — especially — costs. This is exactly what hybrid forging can offer according to Marski.

“Instead of pushing 100 percent of the material’s surface area, hybrid forgers are able to use far less tonnage in a prescribed manner to move material more efficiently. This is due to the tooling and mechanics of the process. For impression die (or closed die), a forging company must manipulate 100 percent of the workpiece at the same time. So it comes down to pounds per square inch, which is why this hybrid process makes it pos-



The operator’s point of view from the state-of-the-art Wagner RAW 160/160 control room (courtesy of McInnes Rolled Rings).

sible to make larger, more complex parts on an open die press. It’s also a more efficient use of tooling and investment dollars; the tool design can be changed quicker and more effectively than closed die impression blocks or casting molds,”

Marski said.

This offering is ideal for prototypes or low volume production where the die block cost for impression die does not provide economic justification. The immediate availability of this tooling can also allow for a shortened production lead time offering flexible order quantities and reduced lead time in situations where needed.

McInnes has received such positive feedback from the company’s recent lead-time performance that they’ve made it the current centerpiece of its ad campaign.

“We have pages of our website dedicated to posting testimonials from our customers. The comments are not just about delivery speed, but our overall responsiveness. One example is our quote response time. We process an astounding number of inquiries each week and still manage to respond to 95 percent of them in less than 4 hours. As demand picks up I think the customer’s main concern is having lead-times and delivery performance slip. We see this as our opportunity to earn their loyalty,” O’Brien said.

### Forging the Future

According to a recent global steel forging report, the market for automotive applications was valued at over 41 billion in 2016 and is expected to reach 56 billion by 2022. Forging helps to produce

The material handler removes a rolled ring from the Wagner RAW 160/160 mill. The mill is capable of rolling rings up to 144” OD (courtesy of McInnes Rolled Rings).




desired shape and size of components. It offers tensile strength, excellent uniformity of composition and structure.

The automotive industry depends significantly on steel forged metal components. Forged steel is utilized for demanding applications, such as crankshafts, transmission gears, and bearings. Forged steel is essential in handling the torque and stress placed on those components. Additionally, intense competition is driving demand for more attractive and lightweight vehicles and material considerations and lead-times will be significant factors moving forward.

What will occur in the coming years that will improve lead-times? Nobody knows a definitive answer to this question, but preparing for peaks and valleys, skilled work shortages and fluctuating manufacturing markets will be pivotal in staying ahead of the competition.

O'Brien said that the future of the gear industry, in general, is always difficult to predict. He believes that without any significant process technology advances there will be an increased value on service.

Marski agreed. "If you have a complex problem, partner with a forging supplier that is willing to work with your engineers to help solve it. When reviewing your component, it is helpful to take a step back and ask, 'What is the purpose of my design?' Don't get stuck with something that doesn't take advantage of today's technological advancements. The best results occur if you're willing to think creatively and challenge traditional methods." 

**For more information:**

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Heat treating is the final stage of the seamless rolled ring process. The new dedicated 25,000 square-foot heat treat bay offers complete annealing, normalizing, quenching and tempering treatments to meet a desired combination of hardness and strength (courtesy of McInnes Rolled Rings).

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