Taking the Wait Out of High Quality Gear Blanks

Forest City Gear makes the investment to bring gear blanking in-house, giving it complete control over quality and delivery: because failure's not an option.

"You can't send a repairman to Mars."

Forest City Gear Turning and Milling Supervisor Mike Miller sums it succinctly when asked about the company's decision to bring most of its critical gear blanking operations in-house, rather than outsourcing. Today, Forest City Gear has a state-of-the-art 8,500 sq. ft. facility in close proximity to the company's main plant in Roscoe, IL dedicated almost entirely to the precision turning, milling and inspection operations needed to produce its gear blanks.

The investment gives Forest City Gear complete control over the quality and delivery of the blanks that are the 'near net shape' starting point for the fine- and medium-pitch cylindrical gears and shafts the company produces. And that's good news for the 400 or so Forest City Gear customers that are active at any one time.

"Whether it's for the Mars Rover or an application closer to home, our customers have quality and delivery requirements that are increasingly hard to meet when you outsource gear blanking to the turning houses," Miller explains. "The typical process can take weeks and stretch out even further when blanks are rejected.

"Bringing this work in-house is paying dividends every day. For example, we had a customer recently that needed an emergency order of high-precision pinion shafts for a power tool application. Fortunately, we had this facility up and running, cutting turn-around time from a typical ten or 12 weeks to just two."

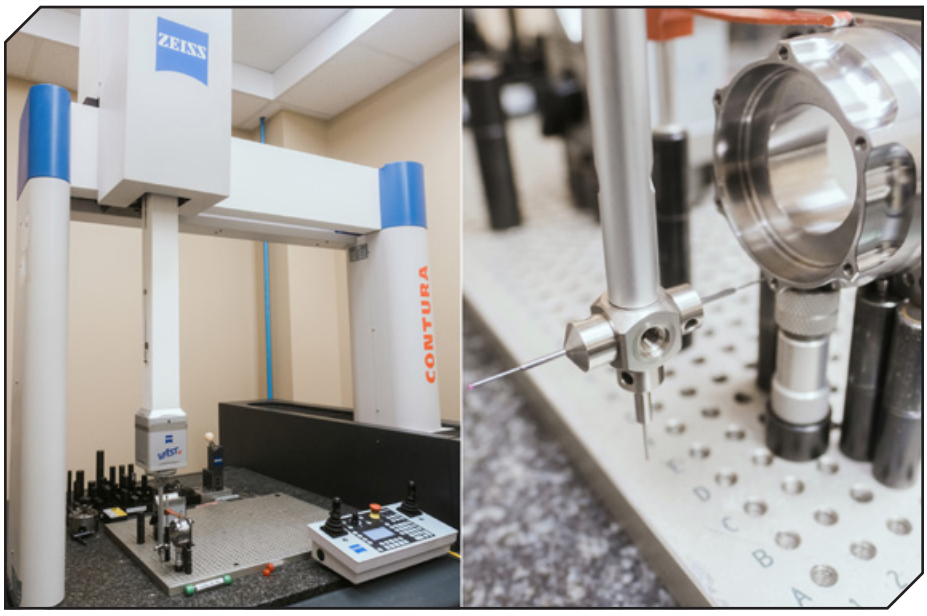
Invest in the Best. The decision to in-source gear blanking wasn't made lightly. Some valuable lessons were learned in 2012, when Forest City Gear originally built the facility and launched Roscoe Works, a division created for gear blanking, but eventually re-purposed to meet a long-term high volume gear production contract. Today Roscoe Works has come full circle — only better.

"We couldn't have gotten to where we're at today without the learning experience of Roscoe Works," says Forest City Gear Director of Operations Jared Lyford. "Since 2012, we've expanded the core competencies — people, training and technology — necessary for the production of gear blanks that can't easily be outsourced, while recognizing that there's still commodity work here that's more efficient to outsource."

The typical blanking operation for a gear or shaft seems simple enough: start with bar stock or forging, rough and finish turn the part to remove excess material, perform the necessary milling and drilling operations — everything short of producing the gear teeth. It's easily manageable in a gear production environment running the same commodity parts day after day. But at Forest City Gear, blanks on any given day might be needed for several dozen different customer orders, with gears ranging from 1/8" to 8" in diameter, shafts up to 16" long — all in lot sizes as small as one or as many as a thousand.

"We responded to this challenge the way we always do at Forest City Gear: invest in the best, most productive technology for the job," says Lyford. "For example, we've just added four advanced Mazak Quick Turn Turning Centers with multi-tasking capability so both turning and milling can be done in just one setup for shorter lead times and greater accuracy. We've also upgraded our CAD/CAM design and manufacturing software to *Mastercam*, thus giving us a more powerful, yet simple and intuitive 5-axis parts programming capability in support of these milling and turning operations."

The 8,500 sq. ft. facility includes Mazak Quick Turn Turning Centers with multi-tasking capability so both turning and milling can be done in just one setup for shorter lead times and greater accuracy.



The facility has its own dedicated Zeiss Contura CMM, putting inspection in close proximity to the shop floor to reduce queue time.

In addition to the integral main turning spindle, the Mazak Quick Turns are equipped with both milling spindle (and a 12-position turret for tool changing) and Y-axis capability to create multiple tool positions, as well as a second turning spindle so that particularly complex parts can be machined complete in a single setup to save time and help hold tight tolerances. As a result, each do the work of multiple machines, helping Forest City Gear add greatly to its existing turning and milling capacity, while reducing floor space and manpower requirements, machine and tooling costs.

More Quality, Less Queue Time. Once the blanks are machined, they're ready for completion at Forest City Gear's main facility. But first comes inspection.

"Starting off a project with blanks out of tolerance can create a devastating production bottleneck when operations downstream are sitting idle waiting for good parts to finally arrive," says Mike Miller.

That's why, according to Miller, CMM-level inspection is today the norm, rather than the exception, for the majority of the gear blanks produced at this facility. That means that fully 75% of these jobs require that a sample lot be inspected by a CMM for true position, profile and the other critical features to ensure they're made to part print. While Forest City Gear has a dedicated quality lab, inspection of gear blanks in the lab would require transport to the main plant, and then queuing up for inspection in competition with parts being completed in the main plant. All of this takes precious time. Forest City Gear's solution? Bring the lab to the new facility. The company just purchased a new Zeiss Accura CMM for the quality lab at the main plant, thus freeing up its existing Zeiss Contura CMM. This system now resides at the gear blanking facility, in close proximity to the production floor (the entire facility is temperature controlled), and dedicated to gear blanking inspection.

Beyond Blanks: What's Next. With the new operation now running two 10-hour shifts, Forest City Gear is already looking at expansion. The company has the land to add an additional 10,000 sq. ft. to the facility and, according to Jared Lyford, is looking at purchasing new equipment to completely machine products such as gear housings and small planetary carriers.

For more information:
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