

CROWNED GEARS

SUPER SHAPING





Forest City Gear's relentless investment in new technology, like the Gleason GP 300 ES Shaping Machine, helps this custom gear producer tackle more tough jobs from customers around the world.

While many companies are scaling back and running for cover in the face of the severe global economic downturn, Forest City Gear's Fred Young has a slightly different approach – he's spending even more than usual on new equipment. "We've already invested more than 19% of our gross sales this year in new machines," says Mr. Young. "After all, the machines we're buying give us a tremendous edge when competing for new business. We can do things no one else can do. What better way to compete when business is soft?"

While some of his peers might consider Mr. Young's methods simply too risky in these uncertain economic times, few could argue with the results. To date just this year, Forest City Gear has shipped high-precision custom gears to almost 300 different customers around the world, including China, for every application imaginable: aircraft to artificial elbows...telescopes to tractors...printers to power tools...even the International Space Station and Mars exploration vehicles. According to Mr. Young, this success can be at least partially attributed to the types of machines Forest City Gear invests in. "We simply don't buy 'Plain Jane'," he says emphatically. "We gladly pay a premium for machines with unique capabilities and superior performance because, when spread over the life of the machine, this premium is negligible compared to the benefits – and the cost of losing a customer if we under-perform. Our new Gleason GP 300 ES Gear Shaper is a good example of how this strategy pays off every day."



Company: Forest City Gear

Location: Roscoe, Illinois, USA

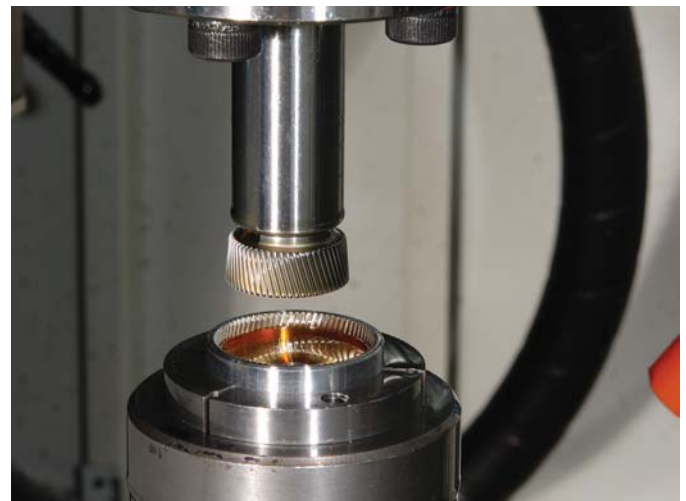
No. of Employees: 55

Major Products/Markets:

Custom gears for everything from telescopes to tractors, artificial elbows to aircraft, printers and plotters, power tools, and even the International Space Station and Mars exploration vehicles.

Gleason Solutions: GP 300 ES Gear Shaping Machine, (2) P 500 ES Gear Shaping Machines, Phoenix® 400GH Hobbing Machines, (3) Phoenix® 125GH Hobbing Machines, Cutting Tools, Workholding, and Services.

Crown shaping, super casting. Mr. Young's willingness to take on jobs which can't be hobbled efficiently -- spur gears with narrow face widths, gears with close shoulders and, most importantly, internal gears -- has come as a result of Forest City Gear's impressive, and growing, gear shaping capability. Mr. Young sees a growing demand for internal helical gears because of their load-carrying, quiet-running performance, so he's invested in yet another Gleason ES series gear shaper. Forest City Gear was one of the first companies to purchase an ES series machine, in 2002. Back then, it gave Mr. Young's company a



(above) *Crowning an internal helical gear is remarkably easy with the new GP 300 ES Gear Shaper.*



U.S. Reel's revolutionary new SuperCaster uses internal helical gears with crowning to help cast farther, with less wear over time.

significant reductions in wear, and quieter, longer-running gear performance. Crowning is done, traditionally, by using mechanical cam devices to impart the crown motion, or depth of cut, on the cutting stroke to create a crown, or slightly convex shape. But, just as with the mechanical guides used to create a helix, production and procurement of cam devices can be costly and time-consuming.

Instead, the GP 300 ES uses the same powerful controller and software that it creates a helix angle with to produce the ideal lead crown modification to the tooth flank. As compared to traditional mechanical methods, this process is amazingly fast, simple, and economical. All gear cutting, tooling and part parameters are simply entered into a user-friendly dialog program, and the CNC controller calculates all the necessary machine data/settings automatically.

Not surprisingly, particularly for those that know Mr. Young as an avid fisherman and outdoorsman, the first application of 'crowning' on the new GP 300 ES was recently performed on an internal helical gear used in the revolutionary new SuperCaster 1000 baitcasting reel from U.S. Reel. The reel has an innovative design that allows it to cast lighter lures farther than other baitcasting reels, with fewer backlashes, because line is pulled out continuously and smoothly from its patented levelwind system rather than feeding through an eyelet. This new design calls for an internal helical gear to be used on the spool that pulls out or collects line, driven by a pinion gear attached to the reel's handle. U.S. Reel has specified that the gear teeth on this internal gear be crowned in order to minimize the possibility for wear over the course of potentially hundreds of thousands of casts, and to assure the absolute smoothest 'feeling' for the fisherman.

Crowning at Forest City Gear. Just one more way for Fred Young to cast for customers.

decided competitive edge because, for the first time, a helical gear could be produced 'electronically', and without the significant expense and time needed to procure the mechanical guide generally required to produce the necessary helix angle. Instead, the ES uses its powerful Siemens 840D CNC and Gleason proprietary software to superimpose an additional rotary motion on the cutting stroke to produce any righthand or lefthand helix angle on the gear. Forest City Gear liked the technology so much that they subsequently bought two P 500 ES Shapers (for gear diameters up to 500mm) and, most recently, a smaller GP 300 ES machine.

Now, Forest City Gear is using the capabilities of this new machine to offer customers yet another unique, and highly desirable, gear characteristic called 'crowning'. Crowning can be highly advantageous because it creates the optimum face contact between gear teeth so that load is distributed more evenly across the face width of the tooth. Ultimately, this can lead to