

Fast and Agile at **AxleTech®** International



AxleTech® has invested in new Gleason bevel gear cutting, lapping and testing machines at its US Gear® facility to add much needed capacity, and agility, to fast-growing precision gearing operations.

AxleTech® International

Well over 100 bevel gear cutting machines crowded this Chicago, IL factory floor just a few years ago, all busy producing spiral bevel gearsets by the thousands. Now those machines are gone. If you guessed that this is yet another example of a rust belt manufacturer losing its competitive edge, or shipping jobs offshore, you'd be wrong. In fact, bevel gear manufacturing at this US Gear® facility of AxleTech International is not only alive and well, but running 2-1/2 shifts a day five days a week and producing more gearsets than ever for the high performance gearing and aftermarket axles that the company is famous for around the world. If ever there was a testament to the power of new technology this is it, says US Gear Manufacturing Engineering Manager Mike Lobaugh, as he proudly points to the cell of three Gleason Phoenix® 600HC Bevel Gear Cutting Machines now doing the work of the 100 machines they replaced.



The High Cost of Wrench and Idle Time

"This was a 'sea of green,'" Lobaugh says, alluding to the distinctive green color of the Gleason 'five-cut' mechanical machines that once occupied much of this factory floor. "But the old tried and true five-cut face milling process (requiring two machines for ring gear roughing and finishing, three machines for pinion roughing and finishing of the convex and concave sides of the tooth) becomes a liability when today's customers expect shorter leadtimes on smaller batches of our fast growing product families."

According to Lobaugh, it could take an experienced machine operator as long as two days of tedious, labor-intensive 'wrenching', cutting parts and making adjustments just to change over his five machines from one gearset model to another. Then, once the first ring gear was cut, the machines could sit for days waiting for the ring gear to return from heat treat. Only then could the pinion be cut to match the gear, and full-scale production begin. "This process was acceptable when lot sizes were in the many hundreds or thousands," Lobaugh explains, "But today, we need to accommodate batches of as few as 25

from dozens of different gearset product families and gear ratios. Fortunately, what once took many days now can be done in just a few hours with our new Gleason machines."

From Five-Cut to Phoenix®

US Gear began making the transition from its older Gleason five-cut machines in 2011, when it installed two Gleason Phoenix® 600HC Bevel Gear Cutting Machines. Based on the success of these two machines, a third 600HC was installed in late 2016, enabling US Gear to move all of its spiral bevel gearset production to the three-machine Phoenix® cell. These gears range in size from 2" to 23" in diameter, and include hot-selling products like their new Ford Super 8.8" IRS gearset.

"The difference between changing over a five-cut versus a Phoenix® is like night and day," says Lobaugh. "Steps that used to require hours of wrench time now resides in a gear summary and the CNC."

“AxleTech gears operate in some of the most demanding applications including off-highway and performance coupled with the high-mix nature of our business, which necessitates lots of changeovers. We therefore needed a partner that we could rely on and Gleason has been that company for us for 50 years.”

– Bill Gryzenia / Chief Executive Officer / AxleTech International





shown here operating the new Gleason 600HC, and one of three 600HCs that do all the spiral bevel gear

Once you've verified the first part, every run thereafter is 'plug and play'. With the mechanical machines, you started from scratch each and every time."

Lobaugh also says that the Phoenix® machines have cut cycle times in half, using Gleason's PowerDryCutting™ process. The 600HC's clean work chamber ensure that high volumes of hot chips produced are easily collected away from the cutting zone. It's an ideal platform for Gleason's highly productive Pentac®Plus, a cutter system that couples Gleason's AlCroNite® Pro-coated carbide stick blades with an innovative design that prevents the chip packing common in dry, high speed cutting applications.

The cutter systems are also easy to build, using a Gleason CB Cutter Build Machine. The CB is used to build and 'true' different diameter Pentac® Plus cutters in as little as 45 minutes.

Gleason TurboLapping and TurboTesting machines have greatly streamlined the lapping and testing processes.

Blade re-sharpening and re-coating is performed at the Gleason Cutting Tools facility in Loves Park, IL.

Finally, The Phoenix® machines make parts load/unload and tooling changeovers much faster and less fatiguing, and significantly reduce the non-productive time typically required to perform these operations. Their unique monolithic column puts the pivoting cutter spindle and work spindle in close proximity to the operator, and the latest Gleason bevel gear quick change tooling greatly eliminates costly non-productive time.

Gearsets then are lapped and tested on two Gleason 600HTL TurboLappers and two Gleason 600HTT TurboTesters that have also replaced mechanical counterparts.

"TurboLapping is of course much faster, but what's really significant is the TurboTester," says Lobaugh. "The old roll testers only checked contact pattern and the operator had to rely a lot on 'tribal knowledge' – and what he sees and hears. Now, we've got a lot more actual data to work with, such as single-flank measurement of transmission error."

This inspection data can be easily networked with Gleason's Engineering and Manufacturing System (GEMST™) and its CAGE™ gear design software to calculate machine corrections and make summary changes.

Lobaugh says that the new machine selection process was weighted not only on machine capabilities but also on US Gear's 50-year association with Gleason. "There's no learning curve. And their service is exceptional. If there's an issue we pick up the phone. We know them, they know us."

Mark Kay, AxleTech Senior Director, Operations, concurs. "In 2017 with increased internal and external demand for our spiral bevel gear sets and to support our long term growth strategy we again turned to Gleason to provide the technology and equipment we need to expand our business. I am very pleased with the results and Gleason's commitment and look forward to continuing our partnership."



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