



CASE STUDY

A FIELD TEST OF GLEASON'S GENESIS 130H HOBBING MACHINE SURPASSES EVEN THE MOST DEMANDING CUSTOMERS' REQUIREMENTS, RESULTING IN QUICKER THROUGHPUT AND LESS CHANGEOVER DOWNTIME.

COMPANY: Gleason Corporation

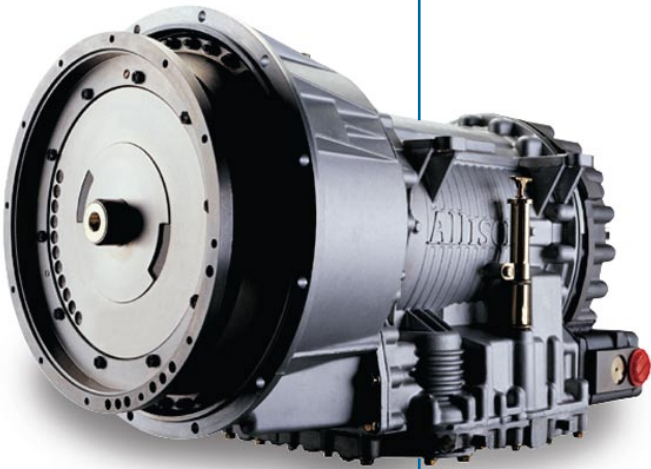
CUSTOMER: Allison Transmission

New Genesis® 130H Vertical Hobbing Machine “exceeds Allison’s most optimistic expectations” for dry hobbing a “workhorse” pinion gear, ushering in a new era of improved throughput, reduced maintenance, and greater process control.

Allison Transmission Test Drives Gleason Genesis



With Windows® based user-friendly software, fewer cutter changes and a clean, dry environment, machine operator Al Rose says operating the 130H has been a fantastic experience.



Part: 22-tooth pinion gear
(Mod. 1.43)

AGMA Class: 9-10

Material: Steel 8620

Tool: Shank-type hob,
Rex 76 TiAlN ("AlNite")

Operation: Dry hob

Parts per sharpening: 10,800

Cycle time/part: 21.6 sec.

The advanced shank-type hob used by the 130H for dry hobbing features a "D" shaped drive end as part of a new (patent pending) hob drive system. The "D" shaped end fits into a tapered spindle pocket, enabling the spindle to transmit considerably more torque, with less runout than conventional designs using collets, rotary couplings, springs, and other mechanical and hydraulic clamping components.



Somewhere in Europe a driver is enjoying his new Renault refrigerated truck, and the particularly quiet, smooth-shifting automatic transmission running beneath him. Little does he know that this Allison transmission is the five millionth produced since the company virtually invented the commercial-duty category some 50 years ago. Today, Allison Transmission supplies over 250 OEMs with more than 80 percent of the world's commercial vehicle fully automatic transmissions. And if Allison's Dale Harder has anything to say about it, this market share will only increase.

Driving Down Pinion Gear Costs by Machining Dry

As senior manufacturing engineer, Harder has reason to be optimistic. After all, he's seen hobbing cycle times cut in half, and a 100-percent increase in the number of parts produced between cutter changes, since the installation of a new Gleason Genesis® 130H hobbing machine in the cell responsible for producing Allison's 3000 series P1 pinion gear. Six P1 pinion gears are used in every 3000 Series transmission, making it one of the highest volume pinion gears produced at Allison's vast Indianapolis, Indiana, manufacturing facility and worldwide corporate headquarters.

"Naturally, with these gears being such an important contributor to unit cost performance, Allison has a strategic interest in

the new products and innovations that can generate significant manufacturing savings," Harder says. "We felt the new Genesis 130H would be an excellent solution to replace our older Gleason 125GH and G-TECH 777 hobbers and would help us understand the benefits of utilizing the dry hobbing process. This is of profound interest at Allison because of the significant utilization and disposal costs associated with machining coolants in such a large facility.

"Gleason's willingness to give us a 130H to 'test drive' and experience the benefits of ownership prior to purchase meant there was little downside, and we could experience firsthand the expected improvements in cycle time and machine reliability," he says. "The only wild card was whether machining dry would adversely affect tool cost."

Harder need not have worried. Over the course of eight months and thousands of P1 pinions, the 130H's tool cost per piece has stayed essentially the same vs. the older hobbers. This, despite the fact that the 130H uses a new shank-type hob made from cobalt-alloyed Rx76 high speed steel and coated with Gleason Cutting Tool's new AlNite® (TiAlN) coating. AlNite makes the tool extremely heat resistant and ideal for achieving longer tool life in dry conditions. (The older hobbers, cutting wet, use a more conventional bore style hob with M35 HSS and TiN coating.) Any additional tooling costs have been offset by productivity improvements that Harder

says are nothing short of phenomenal.

"We've reduced cycle times by 53 percent with the 130H running dry, enabling us to meet pinion demand level with just one machine instead of two," Harder explains. "We're also producing 100 percent more parts between cutter changes which, coupled with the 130H's faster hob clamping system, has reduced down-

time associated with hob cutter change by 30 percent or more."

Direct-drive, high speed, high torque motors on the hob head and work spindle enable the 130H to take full advantage of the productivity benefits of the new tooling. Non-productive time has been reduced too, with a double-gripper loader, common to all Genesis machines, that

performs load/unload in just a couple of seconds. The loader integrates nicely with the cell's existing material handling system that gravity feeds both the incoming blanks and finished hobbled parts into and out of the 130H load/unload area.

Genesis: A Perfect Fit

A key consideration in Allison's purchasing decision was the 130H's ability to be easily integrated into an existing manufacturing cell, using the same material handling automation and requiring no additional floor space. Initially, Harder thought the only way to achieve effective chip evacuation in dry cutting conditions would be converting to a horizontal-spindle hobbing machine, but this would have played havoc with cell material handling systems already configured to vertical hobbing machines. Then he learned about the new Genesis design.

"The 130H's new enclosure design meant you could employ a dry-hobbing process in a vertical-spindle machine and still effectively evacuate the cutting chips," Harder says. "Additionally, the configura-

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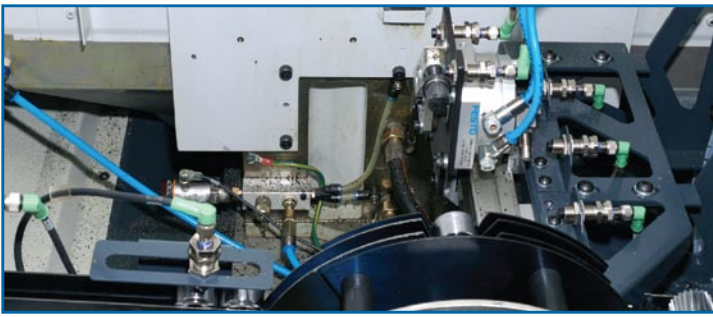
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The 130H uses a completely new hob clamping system, with both the cutter spindle slide and outboard support slide traveling tangentially on the same set of linear guideways to clamp the hob. Extremely rigid hob clamping is faster and easier for the operator.




130H's high-speed double gripper loader has reduced load/unload time to just a few seconds. It easily interfaces with Allison's existing automation. A rotary device (foreground) picks up blanks from incoming automation and positions them for loading, while simultaneously depositing finished parts on outgoing automation.

tion of the machine, with all its accessories integrated into an exceedingly compact footprint, permitted easy installation into the same space required by our existing machines." Harder alludes to a number of revolutionary new features unique to the Genesis design:

- A work area contained by an internal guard and funnel that is completely separate from the machine's base/frame to minimize thermal expansion that would otherwise result from hot chips coming in contact with the base. In addition, the funnel that directs chips to the chip conveyor has a particularly steep inclination to ensure that chips fall completely clear of the work area.
- A footprint that measures just 7 sq. meters (73 sq. ft.) including all hydraulics, lubrication, chip removal, coolant, and pneumatic systems—all fully self-contained as a single, readily transportable unit.
- A new single-piece frame, cast from an advanced polymer composite material rather than the conventional cast iron casting. Harder cites this new design, with its inherent vibration damping and thermal stability characteristics, as an important factor in helping deliver the exceptional accuracies and repeatability they've measured on the 130H to date.

Win-Win-Win

"We're in our eighth month of utilization, process capability remains excellent and, with the exception of a very few residual chips, the machine enclosure is as clean as it was on day one," Harder concludes. "When you can increase throughput, improve process capability and also provide an environmentally friendly gear hobbing process all at the same time, that's like having a win-win-win situation." 

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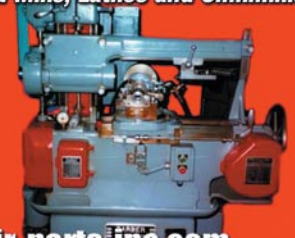
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