HMC Lassos World's Largest Gear Grinder

Höfler Rapid 6000 Makes North American Debut

Buying the notion that size—and improved lead time—indeed matter, Princeton, Indiana-based Highway Machine Company (HMC) has taken giant strides into the next generation of outsize grinders with the recent purchase of a Höfler Rapid 6000 form grinder, the largest in existence. The machine is intended to help HMC—the only North American company to own one—grow its global customer base, which includes the heavy equipment, mining and construction industries, among others. A snapshot of the Rapid 6000's features includes:

- 50 HP spindle drive
- Onboard gear inspection system
- Internal grinding attachment
- Integrated system to grind alignment journals
- Software to grind teeth into a solid gear blank
- Software to dress wheel for profile modifications
- Root fillet grinding

The world's largest grinder—36.5' x 23.3' x 19.5'

Aside from that menu of goodies, the Rapid 6000's grinding capabilities/capacities are such that HMC will soon be making and delivering bigger gears faster than ever before. The six-meter machine will enable the company to finish internally and externally gears of up to 240" diameter and to AGMA 15 tolerances. In addition, the grinder allows for pinions with face widths of up to 85", and inspection capabilities for lead, pitch, profile and runout of gears up to 240" diameter.

Despite the all-good nature of the machine's capabilities and features, the question was put to HMC president Bob Smith—Why the need for the world's largest form grinder?

"Our primary business is servicing customers with large gears, and we recognized with the dramatic increase in costs of gearing due to steel prices, primarily, that the only way that we're going to be able to give our customers a better investment is to offer them higher-quality gears, which obviously offer extended service life. And we essentially believe that it will be far easier to sell customers," says Smith.

Adds John Schnarr, HMC sales manager, "It kind of evolved. We've been seeing increasing demand for higher AGMA quality specifications for large gears, and more and more customers that have had consultants come in and do a specification for their requirement," he says. "Those requirements have come to us with higher AGMA requirements and certifications. We've actually seen this for the last four years, if not longer, heading in that direction. We knew that we needed to increase our capabilities; there's no one else that's going to be able to certify those AGMA levels (currently between 11 and 12) onboard, which we'll now be able to do with this machine."

Schnarr also believes the machine upgrade will dovetail nicely with HMC's work in gearbox development and repair, two additional capabilities the company is now pursuing. That, and

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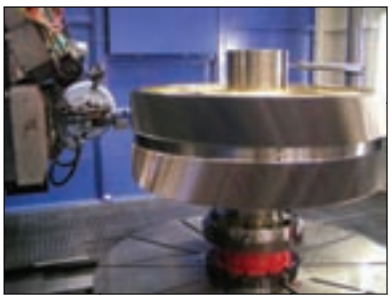

Workers (above) prepare the excavation prior to installation. Sixty yards of steel-reinforced concrete were poured to accommodate the machine's base. Another 16 yards of concrete were used around the machine's base in support of the housing. The machine is capable of producing gears with AGMA class 14–15 accuracies.

their ability to produce the largest size gears, positions HMC to go after wind turbine business as well. Schnarr is confident that the new grinder—as well as the recent purchase of a number of others, including large-gear-compatible CNCs—will provide the company an occasional advantage over competing OEMs.

"One of the things that we've always prided ourselves in is the ability to react," he says. "And being the size that we are, we've been a bit more nimble than the large OEMs can be, for example. And we can sometimes offer solutions that they can't offer, whether it be an interim fix or an alternative design."

Another huge reason for the need of increased efficiencies in the large gear world is the ever-increasing price of high-grade steel. Those companies that not only produce the gears but significantly improve their delivery time as well stand to be the suppliers of choice, if not necessity.

"About three years ago or so, we were paying somewhere around $1 per pound for seamless-forged, medium-alloy steel," says Smith. "Today we're paying upwards of three dollars." And that takes on added significance when the size of the gears HMC makes is taken into account.

"When we buy a forged ring, we're not talking four or five thousand pounds; we're talking anywhere from 40 to 80 thousand pounds," says Smith.

It's no secret that the cost spike upwards in quality steel has been attributed to demand in developing and emerging third world countries such as China, India and others. Beyond that, Smith says the higher cost can be traced back a few years ago when an inordinate amount of scrap steel was sold to China, as their ongoing development continued unabated. In fact, he adds, "All of Asia is influencing what's happening, both good and bad here in the West."

As things stand now, HMC is booked through 2009, its new capabilities notwithstanding. As a matter of fact, the new Höfler will not be available for actual production until late July, according to Schnarr. But the die has been cast.

"We want HMC's name to be synonymous with quality and longer-lasting gearing," says Smith, (and a gear made on this machine will) "offer longer service life because of less wear on the initial runoff with the Höfler, which gives us the ability to produce more product for our customers and make faster delivery times."

And just how big is the Rapid 6000? Suffice to say that its delivery requires up to six 40-foot and a number of 20-foot shipping containers to accommodate its dimensions.

One final question had to be asked: What can one expect to pay for the world's largest form grinder?

"It would have cost five to six million dollars a few years ago," says Smith. "But Höfler has cut some corners and made the pricing more palatable."

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GROB Horizontal Machining Center

MULTI-TASKS PRECISELY

The machine tool division of GROB Systems Inc. introduced the G350 horizontal machining center that is capable of production using up to five axes, providing the ability to handle a multitude of jobs at once. The G350 features precise output, modular, cost-effective design and is long lasting in comparison to other similar systems, according to the manufacturer.

"These machines are not designed to be 'throw away,' where the machine has run its course after three to five years. We expect the lifetime to be well in excess of 10 years," says Doug Schroeder, manager of process engineering and project management for GROB Systems.

The machining center's Z-axis is particularly precise and stable with greater tool rigidity due to a slide-mounted spindle module. The spindle/slide arrangement is one of several high-strength construction elements. The spindle's body is mounted on a slide that supplies the entire spindle drive module for the Z-axis movement; the spindle moves in the X-axis by means of a second slide instrument. The front bearing acts as a support point for the tool/spindle overhang, which is maintained by the spindle mechanism's movement along the guideway surfaces. The G350 performs with positional tolerance precision of .01 mm (.00039 in) and a positional variation of .005 mm (.00019 in).

"The G-series machines in general were developed to be very robust and long-lasting machines while also being highly dynamic with excellent high-speed performance," Schroeder says.

Front and side access for part loading and tool inspection is possible from the location of the spindle and table both on one side of the machine's centerline. With this construction, program inputs and tool paths can be reviewed clearly, and the machine size is compact with a small footprint.

The machining system's travel distances are 600 mm (23.6 in) in the X-axis, 655 mm (25.8 in) in the Y-axis and 675 mm (26.6 in) in the Z-axis. The X movements reach up to 65 m/min (2,559 in/min), Y at 36 m/min (1,417 in/min) and the Z-axis travels up to 90 m/min (3,543 in/min). The spindle drive provides tooling speeds that range from 8,000 to 18,000 rpm for optional spindle drives and up to 12,000 rpm for the standard drive. The machine's table can be adapted for A/B-axes of tilt and rotation, or B-axis inclusion only.

The life, rigidity and precision of the G350 make the machine appropriate for high-volume production and tough metal removal environments including coolant-reliant and MQL operations. Chip fall and clearing under rigorous machining conditions are optimized by the horizontal spindle and the table's column-mount and slide that facilitate the Y-axis movement.

The G350 has four control options—Fanuc, Siemens, Bosch Rexroth and Heidenhain— developed for operator familiarity, enterprise consistency and to meet application mandates. GROB based these options on a market study performed with worldwide job shops, in which the company determined that these four controls suppliers are the most common controllers used by GROB's target customer base. The companies are not tied together by any sort of formal business relationship, according to Schroeder. "Control packages are all unique and typically require small changes in the way NC programs are written from one platform to the next. These companies are all 'main stream' and have spare parts and support for their products worldwide," Schroeder says. "You do not have to worry about company-specific controllers (i.e. GROB-developed only) as you might

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with some other machining suppliers."

The GROB G350 is 3,520 mm (139 in) long by 2,425 mm (85 in) wide by 2,680 mm (106 in) high. Turnkey automation components are available with pallet changer, pallet pools, robotic handling or gantry system for auto load/unload and unattended operation.

The horizontal machining center has a modular assembly produced at the company's U.S. facility for short lead times.

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Haas Mini Mill 2

EXTENDS TRAVELS

The Mini Mill 2 from Haas Automation is a CNC machining center featuring extended travels of 20" x 16" x 14" (xyz); this translates to an extension of each axis by 4". Sharing many features with the original Mini Mill released in 2000, the Mini Mill 2 combines a small footprint, full CNC capabilities and affordability.

The Mini Mill 2 receives power from a 7.5-hp vector drive system and has a 40-taper spindle capable of spinning to 6,000 rpm. The T-slot table is 40" x 14", so there is space for multiple fixtures or a single- or dual-axis rotary table. The

machine's standard equipment includes a 15" color LCD monitor with USB port, a 10-pocket carousel-style changer and one megabyte of program memory. Optional features include fourth- and fifth-axis drives, a programmable coolant nozzle, high-speed machining software, the Haas Intuitive Programming system, a chip auger and, for shops that may require more tools, the choice between a 20-pocket carousel tool changer and a 24+1 tool side-mount.

Later this year the company is releasing the Super Mini Mill 2 that features the same travel dimensions, but higher speeds, feeds and more options. The spindle is capable of 10,000 rpm with an optional 15,000 rpm spindle, along with a 15-hp vector drive system, high-speed tool changer and 1,200-ipm rapids, according to the company's press release.

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GH Gear/ Raceway Hardening Machine

HANDLES LARGE BEARINGS MORE PRODUCTIVELY

GH Induction Group recently shipped a new design gear/raceway hardening machine capable of hardening gears and bearing raceways up to 3,000 mm in diameter and 3,000 kg. The machine's design has been updated to increase productivity, reduce setup time and maintenance while improving process repeatability and monitoring, according to the company's press release.

The basic design features include multi-axis CNC control; raceway or gear teeth tracking; the ability to process OD and ID without changing inductor orientation; process monitoring; programmable setup for different diameters; automatic coil centering and gap for raceways; and self-centering

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locators that use a single crank.

When raceway hardening or tooth hardening for two teeth at a time occurs, a second IGBT power supply for pre-heat is included as an optional feature for enhanced productivity. This feature is capable of reducing cycle time nearly in half. A second rotation table is another option that could increase productivity by as much as 25 percent, according to the press release. By adding a second coil mounting and a transfer switch, users can process a raceway and gear teeth in one part loading without changing coils.

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Master Dressing Gears

RECONDITIONED IN USA

Gleason Cutting Tools Corporation, located in Loves Park, Illinois, has expanded its plated diamond and CBN products and services capability with recondition services for electroplated diamond Master Dressing Gears (MDG). By adding the new grinding technology and more capacity to the North American facility, faster turn-around and more consistent MDG performance are available to customers.

MDGs that are returned for reconditioning will now be processed through the Loves Park plant instead of at Gleason Hurth in Munich. Offering the service in the United States eliminates overseas shipments, so shorter lead times are possible and pricing will not reflect exchange rate fluctuations.

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Contouring Control

INCREASES FUNCTIONS, HANDLES BOTH CYCLE AND CNC LATHES

Heidenhain's MANUALplus 620 contouring control features more functions to handle both cycle and CNC lathes. A new NC kernel has a cycle programming feature that enables programming and machining quickly, without needing to write NC programs. A new user-friendly programming mode, Smart.Turn, enables quick working block-input. The mode aims to complement programming for cycle-based lathes, but Smart.Turn also works for standard CNC lathes, according to company's press release.

The MANUALplus 620 has three programming modes: cycle programming, Smart.Turn and DIN PLUS programming. Each of these modes allows contours to be described with Interactive Contour Programming (ICP). The contouring control is intended for lathes with spindle, one slide, one C-axis or one positionable spindle and a driven tool. Horizontal and vertical lathes are well-suited for use with the MANUALplus 620. With a tool database of up to 250 tools and a technology database, the contouring control is designed as an integrated digital servo-drive control.

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Stainless Steel Worm Gear Speed Reducer

RESISTS CORROSION

Boston Gear's 700 Series Worm Gear Speed Reducer is now offered in stainless steel. Using the same gearing and shafts as the cast iron sister series, the Stainless Steel 700 series handles the harshest caustic washdown conditions.

With the new exterior design, the housings, motor flange and carrier are made from 316SS for caustic washdown applications. The integral input worm and shaft are produced from case-hardened alloy steel. Particle accumulation and fluid pooling on or under the unit is avoided by a rounded housing design, plastic hardware covers and two-piece mounting base. An internal oil reservoir comes filled with H1 food-grade lubricant. The 700 series functions in food and beverage applications and is available for same-day air shipment, according to the company's press release.

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Hurco

EXPANDS PRODUCT LINE

Hurco featured three of its newest machines at the WESTEC 2008 Exposition in Los Angeles, held March

31–April 3.

The VMX42SR 5-axis machining center from Hurco takes up less floor space than typically required because of a swivel head and horizontal rotary table. The *WinMax* control software is included in a special version that simplifies the setup and programming of complex, multi-sided parts. The newest member of the VMX family of machining centers uses digital drives, larger ball screws, larger linear rails and heavier servo drives to create parts more accurately.

The VM1P is a vertical machining center with mill/tap functionality capable of fast rapids, tool changes and tapping at 4,000 rpm. The machine's C-frame design is made with fine-grain cast iron and solid construction for rigorous cycles and lights-out machining. The VM1P has larger linear rails that are wedge-locked, instead of face-milled, so the machine is stiff enough to control vibration.

The TMM8 slant-bed lathe has live tooling that includes C-axis standard and programming to .001 degree. The 8" chuck lathe is designed to multitask for small to medium lot sizes that require turning and secondary milling/drilling operations with a wide door for easy access. Using a fast servo turret, instead of a hydraulic turret, to increase productivity, the TMM8 requires just one setup; refixturing, which can lose accuracy, is not necessary.

"These three machines illustrate the continuing expansion of our product line that enables us to reach more customers who are looking for the type of measurable productivity improvements that our integrated control with *WinMax* delivers," says Jim Kawaguchi, general manager of Hurco USA.

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ONLINE

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www.geartechnology.com

for the latest Product News

Swiss-Turn

PROVIDES 32 MM CAPACITY

The Tsugami SS 32 offers a 32 mm capacity in addition to the features shared with the preexistent SS20 model: a modular tool zone, increased capability over previous gang type models and a roomier tool zone.

The standard main spindle configuration includes seven turning tools, five cross rotary tools and five ID tools. The standard sub spindle setup includes four ID stations, two face drills and two cross rotary tools. The machine is capable of machining a variety of parts because quick changes can be made to the configuration of main and sub spindle cross rotary, ID and turning tools. With an adjustable face tool attachment, thread whirling, polygon turning and angular face drilling operations are possible. The SS 32 comes with CAD/CAM software, Fanuc 3li-A dual path CNC and 8,000 rpm with the main and sub spindles, according to the REM Sales website.

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New Generation Face and Shoulder Mill

REDUCES COSTS

The CoroMill 490, released by Sandvik Coromant, represents a new

family of shoulder-milling tools. For small to medium batch sizes, the CoroMill 490 reduces costs up to 25 percent in face and shoulder milling operations, according to the company's press release.

Using four-edge inserts with new grades, the tools entail less cutting force, resulting in smooth profiles and minimizing the machining time normally spent on finishing. Tooling inventories and operational expenses are also reduced by a versatile design that allows the tool to be used for contouring and edging, semi- and finish-boring with cylindrical or helical interpolation and slot milling. Where lessened cut depths and less final machining are involved, such as applications that use near-net-shape precision forgings and castings, the CoroMill 490 provides high precision, producing a finished product in one pass.

Sandvik Coromant's New Insert Generation Milling Grades feature a new geometry of the parallel land, production of very thin chips, four main cutting edges and improved predictability. In combination with the insert geometry, the new grades machine high quality components while holding tight tolerances productively, and they make the CoroMill 490 the first cutter with a true 90-degree cut without sharp steps or mismatches, according to the press release.

The CoroMill 490 comes in a range of diameters from 1" to 3" for Arbor, Coromant Capto, cylindrical and Weldon shanks. The tool is offered in metric and inch measurements with L, M and H pitch options as well.

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Low-Profile, Five-Axis Clamping System

PROVIDES EXTRA PART CLEARANCE

Kurt Manufacturing's low-profile, 5-axis clamping system has a clamping height above the machine table of 100 mm (3.937 inches), so in applications that involve continuous 5-axis cutting motion of complex pockets, sculptured and contoured surfaces and intricate 3-D features, the Kurt VB 5x100-L Schenke 5.1 Clamping System supplies high-speed machining in all axes. The product extends the operating range of most machining centers, so they are capable of their full output potential, according to the company's press release.

The low-profile clamping system can be adjusted for any clamping width solely limited by the machine table size. The two clamping jaws, stationary and moveable, can be arranged at any distance from each other in the working envelope. Jaw deflection and part misalignment that occur during machining operations are eradicated by the 5-axis clamping system. When the tension spindle is located directly under the workpiece, the machine table retains its shape without any distortion, and the jaws do not flare out under tension. The system is suitable for both blank and machined workpieces as well as round and irregularly shaped workpieces, and accuracy is repeatable. The low-profile clamping system mounts easily on standard T-slot tables, location grid machine tables or custom fixtures.

"This new, lower-profile 5-axis vise opens up many new machining applications, particularly with medical device, electronic, aerospace, military manufacturers and mold makers," says Steve Kane, sales manager for Kurt Manufacturing. "We've had numerous

requests for a lower-profile model to meet the needs of the latest generation of 5-axis machining centers. Now we can supply that need."

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Pressure–Blast System

CONTROLS SURFACE ROUGHNESS ACCURATELY

An expanded rotary indexing spindle-blast machine with direct pressure media delivery and special media reclamation features is new from Guyson Corporation. The RXS-1400 is designed to control the surface roughness of components more precisely to prepare them for advanced functional coatings.

The unit dimensions are 1.98 x 2.44 x 2.59 meters (78 x 94 x 102 inches), and the vertical sliding doors were built wide to process components up to 500 mm (20 inches) in diameter. The machine has six ball-bearing spindles placed around the circumference of the rotary table, each with a capacity of 25 kg (55 pounds).

Seven pressure-blast nozzles are located around two blasting stations with three nozzles programmed to traverse vertically from one station, and four nozzles traverse horizontally at the other station. The nozzle motion is synchronized with controlled, adjustable and programmable rotation of a component to ensure the desired coverage, according to the company's press release. The RXS-1400 is equipped with a touch-screen interface for

continued

machine programming and monitoring with compatible software.

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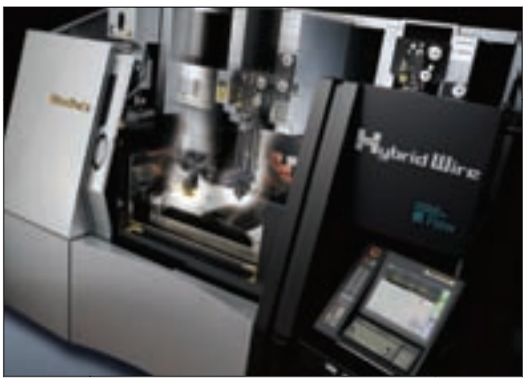
Hybrid Wire EDM

COMBINES WATERJET AND EDM TECHNOLOGY

The Hybrid Wire EDM from Sodick Inc. blends the cutting speed of a waterjet machine with the accuracy of a wire EDM to provide more productive machining. The machine is capable of performing initial hole cutting, which can't be done on a traditional wire EDM, and the die plate's slug is automatically disposed of in the hybrid's deep worktank. Operators need only set a hardened steel plate on the machine to achieve core handling and finishing.



Just released to the U.S. market, Sodick's Hybrid Wire EDM handles workpieces up to 2,200 pounds, with an axis travel of 22" x 14" x 10" and a maximum workpiece size of 30" x 15" x 10". The waterjet is capable of cutting to an 8-degree angle, and the wire EDM can cut a 30-degree angle. The machine features a high-speed annealing AWT, jumbo wire spooler and wire chopper. The Hybrid Wire EDM was developed by a partnership with Flow International Corporation, the world's largest waterjet manufacturer, according to Sodick's press release. View an informational, demonstrative video of the machine at *www.hybridedm.com*.

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