All-in-One Broaching Capability

FASTER, MORE EFFICIENT MANUFACTURING OFFERED WITH TABLE TOP DESIGN

The Table Top Broaching Machine combines new concepts with traditional broaching methods in a smaller unit (courtesy of American Broach).

The table top design features crossing T-slots for faster and more accurate setups (courtesy of American Broach).

American Broach & Machine Company, located in Ypsilanti, MI, has developed a new concept to address customer complaints regarding traditional broaching machines. The Table Top Broaching Machine is a plug-and-play device designed for fast operator setup and simple changeover that requires no special foundation, pit or operator stand and is not model dependant.

"Our customers want faster, simpler, and cheaper, and they want it in a small, convenient package," says Ken Nemec, president at American Broach. "Our Table Top design is a clever merging of technology and physics where a broach cutting tool is pulled down through the broaching table. Our design melds known and new concepts together to effect the solutions our customers have been requesting while occupying very little floor space."

While many of these concepts are not new to broaching, it is uncommon to see so many features and functions in such a small, compact machine design, Nemec says.

"No one has ever put the drive system completely under a table in such a compact manner, giving the user access to a flat locating surface with no obstructions, to produce small, light, table top broaching," Nemec says. "These machines are quickly adaptable to many different applications."

The new improvements made in this vertical, pull down broaching technology consist of a "teach function" for

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adjusting stroke, and the elimination of the machine frame as the support for force resistance thru bulk, girth and guideways.

"It is our contention that these features used together or separately will achieve the desired results within the scope of our patent," Nemec adds. "The Table Top Broaching Machine was designed to minimize space and capital equipment cost, while providing speed and performance for manufacturers with smaller lot sizes, constrained space, and a need for an efficient, quick change broaching machine."

The machine will initially be offered in 24 inch and 36 inch stroke lengths, from 2–6 tons in power, with electromechanical dual-screw drive systems that eliminate the cadence (pounding) associated with hydraulic broaching machines. The twin-screw design provides smooth and steady power, increased tool life and part quality, while reducing the perishable tooling cost per part.

American Broach's design features a simple flat table top broaching area with crossing T- slots to accommodate fast, accurate setup. This one-piece solid table top has been designed to attach to a fabricated main box assembly, which is mounted on top of a coolant sump box base.

The modular design keeps the cost of build and maintenance service low, while maintaining structurally robust physical attributes by design, without the traditional girth used by broaching machines.

"In our design, the load distribution is transferred to the table top directly through the twin roller screw assembly without traditional machine ram, box way, rails, carriage, guide rods, or bearing cars. This eliminates the need for a heavy machine frame, and allows for a modular box design that meets our customers' needs," Nemec says.

The Table Top Broaching Machine also features an unguided pull bridge powered by two spindles (roller or planetary); they are mounted under the table in a compact design to eliminate the need for guide rods or bearing ways that will not tolerate being mounted in areas with chips and coolant under the table. These spindles are fully enclosed by slide covers to prevent chip interference and coolant damage.

The spindles are powered by a tooth belt by way of over sized tooth drive pulleys; this over sizing allows a single motor to drive both spindles simultaneously and with extreme accuracy without positioning the drive belt in line in the space where the cutting tool travels. Tool location is monitored by motor rotation position tracking by a simple encoder, and the drive system is enclosed and sealed into the hollow bottom under the broaching table.

"Quick changeover between parts to accommodate small production lots is an important concept behind our machine design," Nemec says. "We developed a quick teach button feature that adjusts the stroke for the length of the tool automatically in seconds, rather than using stops and switches, which do not hold up well in an 'under table' environment."

Additionally, it takes several minutes of trial and error to set traditional stops. Now with a simple visual setting, the stroke length is set and no data entry or measurement is required. The operator simply lowers the broach tool in the teach setup slow movement mode, and when the tool is just below the part nest, the teach button is pushed. Each stroke will now stop at the exact spot.

Standard features in the machine design include coolant and air ports designed into the table top (plenum) for ease of distribution in various applications. A removable ring type splash guard accommodates large or irregular shaped parts that cannot easily be broached on conventional broaching machines.

As an add-on option, the Table Top Machine is offered with a simple retriever attachment that will allow for complete auto cycle without requiring the operator to handle the broaching tool. This modular retrieve unit can easily be attached via a precision prepared surface that is part of the Table Top. The retriever is quickly and accurately located with keys and standard T-slots to assure it is on centerline with the pull head. The unit is electric motor and belt driven; once the retriever is mounted and bolted down, it is just plugged in and is ready for use.

American Broach plans to officially debut the Table Top Broaching Machine at IMTS 2010, although three machines have been sold to broaching customers to date.

"What sets American Broach's Table Top electromechanical broaching machine apart is that we have combined all of these recognized best broaching concepts and developed solutions together under the table, with a small compact footprint and simple

design with a low price tag," Nemec says.

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Cutting Tool Sharpener

HANDLES LARGE DIAMETER HOBS

In response to market demand for a machine capable of sharpening large, heavy hobs, J. Schneeberger has developed the Corvus C500 Coarse Pitch Hob Grinding Machine, which is capable of handling hobs up to 20 inches in diameter using wheels with equally large capacity.

"The need for larger hobs is created by wind generation. Larger gears demand larger hobs," explains Rolf Herrmann, general manager for J. Schneeberger. "Mining, large machinery, drilling (and) coal are other fields and industries where large hobs are required. Of course the tooling has been around for a long time but machine manufactures making machines for that market have diminished.

"In the tool grinding market, there are maybe three manufacturers left that will build machines up to three meters in travel length, machines to accept long tools such as broaches, long hobs, any long tool needed to be thread ground. In the last 10 years, Schneeberger has supplied that specialty market with the most sophisticated

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machine in design and technology."

The Corvus tool grinding machine is available in five- and six-axis versions and in different machine lengths to accommodate longer or heavier parts. The hob grinder relies on high horsepower to meet the substantial contact area sharpening that large hobs require. A 52 horsepower (78 horsepower duty cycle) direct drive motor is responsible for high stock removal and productive cycle times.

The machine is designed with a traveling column and stationary tool table, so extremely heavy tools can be set up on the table. The 1,200 Nm

torque drive positions any tool quickly and accurately to meet quality requirements for indexing. Fanuc 310i technology is employed; linear drive motors provide accurate positioning. Other features include high rates of linear axis acceleration and deceleration and high positioning accuracy, cycle times and part quality.

The machine's base is constructed of polymer concrete to increase thermal stability and reduce vibration. The Schneeberger *Quinto5* software was developed to support operators preparing a tool. The software features a large tool and wheel database, a graphical and interactive touch screen interface for quick tool programming. The tools are simulated instantly in 3-D format and can be edited as needed by clicking on a desired geometry. "The ability to develop the software in the same location as the machine enables the software, mechanical and application engineers to fine tune the final product, our software, in the shortest period of time," Herrmann says.

"Other machine manufacturers are not equipped to develop software in house and rely on outside sources, which makes the R&D very time consuming and difficult."

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Gleason Grinding Process

CUTS FINISH TIMES IN HALF

Gleason's new line of Titan Grinding Machines was designed to reduce finish grinding times by up to 50 percent on cylindrical gears up to 1,500 mm in diameter.

On a single platform, the Titan machines offer users both pure profile grinding for the maximum flexibility producing single parts and threaded wheel grinding and profile grinding working together for faster, fully-automated large-scale production.

Power Grind is the new process introduced. It allows users to reduce grinding production time significantly by first using threaded wheel grinding to "rough" gears faster and then profile grinding for optimum gear quality, surface finish and complex gear modifications in the finishing operation.

As an optional feature, the Power Grind process can include an external set-up table, so the workpiece and workholding package can be set up parallel to primary production, instead of sequentially. This allows workpieces to load automatically through an optional workpiece changer. This, along with a new high-speed tool changer that automates the exchange of threaded wheel for profile grinding wheel, reduces non-productive time significantly.

The Titan 1200G and 1500G machines— for 1,200 mm and 1,500 mm workpiece diameters—also feature a patent pending universal dresser. Users can dress threaded grinding

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wheels and profile grinding wheels on the machine with a single dressing tool. This eliminates the changeover time and expense of multiple dressing tools.

Another optional feature is a patented dual-flank, twist-free grinding option that is capable of creating asymmetrical tooth trace modifications in half the time of conventional single-flank grinding.

The Titan machines are equipped with Siemens 840D CNC and Gleason's Windows-based Intelligent Dialogue software. One feature of this is a grinding technology database that recommends a production methodology for the Power Grind process before machining starts; this is useful for less experienced operators.

According to Antoine Tüerich, Gleason director of product management, the Power Grind process is an answer to the market's need for faster production of larger cylindrical gears, flexibly and with high quality. "Due to high market demand, manufacturers, particularly those that produce higher volumes of cylindrical gears, are under increasing pressure to greatly increase productivity while maintaining the highest levels of precision," Tüerich says. "Titan is the only machine that does both, with Power Grind. Roughing with highly productive threaded wheel grinding is followed by a fully automatic tool change to use profile grinding for the finishing operation, with all its well-known advantages and features.

"Users of course get all the proven functions, such as automatic centering, dressable grinding and final gear measurement that comprise the fundamental elements of this process. But when roughing large numbers of teeth up to module 14, threaded wheel grinding can be employed to reduce grinding time significantly, especially for large volumes. Optimal gear quality, surface finish and complex gear modifications are then achieved by profile grinding in the finishing operation. In, for example, the case of a workpiece with module 14 and a tip diameter of approximately 1,500 mm, the high gear quality achieved by the profile grinding process can be realized with a 55 percent increase in productivity."

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Double-, Triple-Cut Hobs

ROUGH OR FINISH LARGE GEARS

The PWS large coarse pitch hobs available from Star SU are ideal for hobbing wind turbine gears. They come in a range of materials and coatings as well as ground forms up to DIN AAA quality. The hob sizes range from 20 (1.25 DP) to 40 (0.635 DP) module and lengths up to 430 mm (16.9 inches). CNC inspection reports as well as resharpening and recoating services are available.

For more information:
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Wireless Bore Gauge

CUTS OUT CABLES

The Wigigauge wireless bore gauge (WBG) from Solartron Metrology is the first in a new line of Bluetooth-enabled linear measurement and gauging systems.

The high-precision IP65-rated gauge functions without cables to download measurement data. Manufacturers can design and place workstations with respect to this freedom of limitation.

Previous hand-held electronic gauges connected tools to the receiving SPC system, printer or data logger. Cable

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damage and tangles were common and lead to downtime, and cable length and routing often dictated the design and placement of gauging stations.

"Industry has been asking for this type of wireless gauge for quite some time," says Neil Curtis, sales and marketing director for Solartron Metrology. "We are delighted to offer the solution. Applications for the Wigigauge WBG include any manufacturing plant producing precision bored holes, such as automotive components."

The Wigigauge is compatible with industry standard M6 and M10 gauge

head threads. The transducer is linear along its full measuring range, making it easy to set up and adaptable for applications other than bore gauging. Users choose resolution up to 0.1 µm. A NiMH battery pack provides up to 10 hours of continuous data transmission and is removable for off-line charging.

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Supertec Machinery

DEBUTS GEAR GRINDING MACHINES

Two CNC worm and thread grinding machines and a CNC gear profile grinding machine are the latest product additions from Supertec Machinery, Inc.

The WT200 has a 7.9-inch diameter capacity and the WT300 has an

11.9-inch grinding capacity. These two CNC worm gear and thread grinding machines feature a combined control, PC-based computer with Smart Grinding software, a direct drive motor and a linear motor ensures the machines' high precision.

The control's specially developed software is flexible and provides an almost infinite number of profiles, management of grinding cycles, dressing cycles and storage of machine processes and profile data. The flexible dressing software allows profile of grinding wheels for standardized worm profiles and multi-ribbed grinding wheels for thread grinding, including tip root modifications and profiles of pump rotors.

The WT200 and WT300 are designed for double lead grinding, taper thread grinding, single flank grinding, dual pressure angle grinding, plug thread gage, rolling die and crusher roller grinding.

The PG-400 achieves class AGMA 12 (DIN 4 grade) on profile and lead gears for tens of thousands of dollars less than other CNC gear profile grinders. Features include direct drive and linear motors and a Fanuc 2li-MB PC-based control with shop floor language. Other features include simple tooth tip modification, tooth flank (crowning) and reference root.

Thermal growth is minimized by the linear motor and grinding wheel spindle cooler, cutting oil chiller and an electric cabinet air conditioner. The PG-400 has a 5.1 inch thru hole

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bore on the workhead and 15.7 inches between centers for large part capability. The machine can grind very small teeth. The PG-400 is capable of grinding spline gears, modifying profiles and leading edges and grinding profile shifted gears.

For more information:
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Versatile Reishauer Grinder

ADAPTED FOR LARGER GEARS

The RZ 260 gear grinding machine from Reishauer is based on the successful RZ 150 series, but not only has size been increased, but all components have been adapted to handle higher loads and forces that occur when grinding larger gears. The machine is capable of grinding gears with an outside diameter of 260 mm and modules up to 4 mm.

One focus of Reishauer's in designing the RZ 260 was having the ability to achieve different production requirements for a range of customers. The machine can be fitted with one or two work spindles. The two-spindle version minimizes loading times. The single work spindle option is appropriate for when investment and tooling costs must be reduced and/or the workpiece handling times are less important.

Both versions of the RZ 260 can be equipped with a fixed or CNC-controlled axis for swiveling the dressing tool. With this option, dressing tool flexibility can be increased, so they can

be used for a range of gears, compared to a fixed dresser, where tools are typically workpiece specific.

Other Reishauer design characteristics incorporated in the RZ 260 include the Reishauer generating module for highest gear quality, low noise shifting technology for low gear noise emissions, twist control grinding technology to create defined values for flank twist and the Reishauer HMI for fast change-over and set-up times.

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High-Speed Tool Resharpener

PRICED COMPETITIVELY

The small-footprint ANCA FastGrind CNC tool and cutter grinder for high-speed tool resharpening is appropriate for tools 0.35 mm to 12 mm in diameter. The concept behind the FastGrind is to provide grinding quality and reliability of the ANCA range at an economical cost, according to the company in a press release.

The FastGrind provides high positioning accuracies in all five mechanical axes with an additional four software axes. Linear axes are ball screw-driven, and the two rotary axes are direct-driven. The FastGrind sharpens drills, step drills, end mills, burrs, profile tools, routers and special tools.

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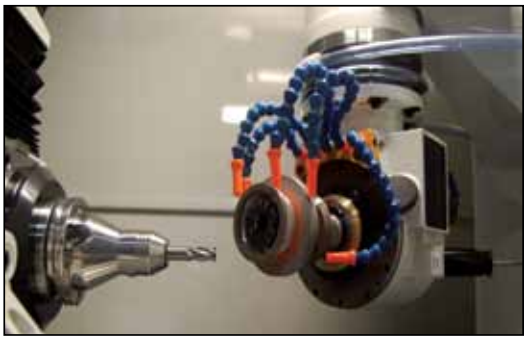
The machine features a double-ended HSK40 wheel spindle for flexibility and minimizing set-up time. Maximum wheel diameter is eight inches. A part probing system comes standard.

The FastGrind features the ANCA *iGrind* software and is priced at $120,000.

The ANCA *Iview* tool inspection software package is optional. The software works smoothly along with the machine operating software and a camera, which mounts inside the grinder. *iView* has a standard magnification of 300:1, and other magnifications can be supplied. The system accuracy is two microns. The software generates



the ideal shape for standard tool geometries and protracts it over the actual tool image.

The machine axis saddles are constructed from a single-piece casting, so they feature extreme rigidity and reduced vibration during machining. The grinding spindle is mounted on a single piece casting as well for robustness. Optional features include a fire suppression system, manual steady and manual hydraulic Schunk chuck.

According to Russell Riddiford, ANCA, Inc. president, "With the FastGrind, we created a way for the tool-making shops to access ANCA technology affordably, without compromising ANCA quality."

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25 Bar Furnace

A VIABLE ALTERNATIVE TO OIL QUENCH

Seco/Warwick introduced a 25 Bar Single Chamber Vacuum Furnace as a process alternative to vacuum furnaces using an oil quench. The 25 Bar HPQ provides the same hardness properties as an oil quench, and when it is equipped with optional PreNit and FineCarb advanced LPC vacuum carburizing technology, the furnace can reduce cycle time by up to 50 percent in certain applications.

Using helium as a quench medium, the 25 Bar furnace lowers distortion and renders parts washing unnecessary. Loads are both heated and quenched in the same chamber with the single chamber furnace. Many of the problems associated with oil quenching are minimized with the 25 Bar HPQ including the disposal of spent quench fluids, the requirement for a washer to clean parts and post heat treating machining needed to compensate for part distortion in oil.

Helium is used as a process atmosphere to maximize cooling. Recycling systems are available to recover and reuse the helium, which tends to be higher cost than other process gases; however, there are many choices for supply systems, and helium follows the same installation guidelines as nitrogen.

Seco/Warwick is offering free trials for a limited time at their R&D facility, so companies interested in the process can obtain a full metallurgical report for their samples without any risk. Customers that decide to invest in the new technology will receive extra field support to assure proper installation and efficient operation.

For more information:
Seco/Warwick
P.O. Box 908
Meadville, PA 16335
www.secowarwick.com

Grinding Wheel

IMPROVES SURFACE FINISH

The SK23w ceramic grinding wheel specification from Burka-Kosmos drastically increases the Q'w and V'w rates. This type of grinding wheel is more reliable in respect to burning/cracking while improving surface finish and lowering grinding times. Since grinding wheel wear is reduced and there is the capability to self-sharpen during the grinding process, form is maintained, which results in reduced dressing cycle. The SK23w provides for longer wheel life and lower cycle times.

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One LMC Chuck

HANDLES OVER 40 GEARS

Specialty finger chucks from LMC Workholding are designed for hard turning gears on truck axles or drive line components. By changing pin locations, one chuck is capable of handling over 40 different gears. These

hard turning chucks handle a maximum of 2,800 rpm for gears up to 20 inches in diameter.

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Mobile Induction Heater

TREATS METAL PARTS

Digimac is a compact, transportable induction heating system from GH Induction Group. It is capable of outputs up to 25 kW and 20 kHz.

The system includes the generator with digital interface for control and a handheld transformer and coil. The MPC control provides power regulation, alarms and cooling water flow data. There is an optional semi-automatic mode with energy control available. Temperature feedback can help control the heating cycle, and pre-programmed

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heating cycles can be stored in memory. Digimac is used for various industrial applications including heat straightening metal parts, welding cooling pipes, paint and varnish cleaning and sealing.

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Fuji Vertical Turning Center

CUTS CYCLE TIMES

The VTP-1000 vertical sub-micron turning center from Fuji performs finish hard turning of parts more accurately, in up to 75 percent shorter cycle times and with less capital investment. The turning center is available with four-axis simultaneous ID/OD diameter rough and finish turning. A stiff RS zero friction box/roller slide construction ensures sub-micron accuracy and high surface finish output during linear and circular interpolation.

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