

# EMO 2013: Intelligence in Production

**Even though machine tool demand had a weak start in the first quarter of 2013, experts look to the second half of the year to provide growth in orders.**

“The year’s second half now has to provide a counterweight, if the predicted growth in production output of one percent is not to be put at risk,” said Dr. Wilfried Schäfer, executive director of the industry association VDW (German Machine Tool Builders’ Association) in Frankfurt.

Expectations in Germany are once again focused on the expanding markets of Asia. In China, particularly, by far the biggest market for the German machine tool industry, faster economic growth is again being forecast. North America will remain a stable market this year as well. Russia, thanks to its substantial need for modernization in its domestic industrial sector, likewise continues to be an attractive customer.

There are also good signs from the international automotive industry, which is deploying strategic investments in the battle for market share, and from the aerospace and mechanical engineering sector. All of them intend to be making above average capital investments in 2013. There will be a good opportunity for this at the EMO Hannover 2013 (September 16–21), where you’ll find the latest innovations in the field of production technology. Here’s a look at some of the EMO exhibitors:

Newly designed gear grinding machine for profile and generating grinding with palletizer (courtesy of Liebherr).

## Liebherr-Verzahntechnik

STAND A11, HALL 26

Liebherr-Verzahntechnik will be showcasing three new machines at the upcoming EMO show. These are solutions for the automotive and commercial vehicle industry in particular: two hobbing machines, one with separate Chamfer Cut unit for workpieces up to 180 mm and one with two horizontally arranged workpiece spindles with separate press deburring unit. Also the company will present a newly designed gear grinding machine for both profile and generating grinding.

“Given their extensive technological capabilities, the new machines are designed towards meeting current and future industry requirements,” said Dr.-Ing. Hansjörg Geiser, manager development and design gear cutting machines. “It was our goal to provide the perfect solution for each particular application. The result is key: process reliability and the quality of manufactured components – delivered as cost-effectively as possible.”



## Hobbing Machine Integrates Chamfer Quality with One-Cut Machining

Liebherr-Verzahntechnik's new gear hobbing machine with integrated Chamfer Cut unit for deburring and chamfering the face edges is based on renowned technology. After hobbing with the usual one-cut strategy, the Chamfer Cut tool additionally generates precise and reproducible chamfers that are increasingly demanded by the market. The newly developed solution eliminates the former main disadvantage of Chamfer Cut, namely that the chamfering process prolongs machining time. In the past, hobbing and chamfering took too much time at the same setting. "We have solved this by integrating a complete second machining unit for Chamfer Cut tools – two machines in one so to speak," said Dr.-Ing. Oliver Winkel, director of application technology and responsible for technological development of gear cutting at Liebherr-Verzahntechnik. Geiser added: "The main design engineering challenge was to execute the chamfer-cut unit at a reasonable cost." We thus integrate the deburring unit within the existing machine dimensions without any impact on space requirements.

Functionality, operation, and CNC programming are based on familiar machine design. The operating changeover from the existing machine is thus relatively simple, once standard user training has been provided. Chamfering no longer prolongs machining time by having it take place in a separate unit within the same machine, whilst the next workpiece is already hobbled. Both chamfer tools are no longer located directly next to the hobbing tool, but in the separate unit. "We know from gearbox design development that the subject of 'chamfering' is becoming more and more important. This innovation enables the machine to combine an already undisputed high chamfering quality, provided by the proven Chamfer Cut procedure, with cycle times that correspond to the demands of the automotive industry," said Winkel.

## Press Deburring with Hobbing Machine

For some workpieces, chamfering/deburring using the chamfer cut facility is not feasible. For these cases, Liebherr has developed a gear hobbing machine, which applies a multi-cut strategy including press deburring. Continual loading and press deburring occur in parallel during machining time. Separate machine operations take place on two machine tables, each able to swivel 180° and easily accessible: roughing in two phases, pressing, and finishing. After the blank is locked in and tightened, it is swiveled and the first cut of the gear takes place on table 1, while on table 2, the chamfer is produced by pressing. After another swivel, finishing takes place in order to eliminate the bulging that occurs as a result of pressing. The finishing process is key to this cycle. It is a stand-alone process not subject to crossover impacts generated by a parallel process on the neighboring table.

"We chose this strategy, since external mechanical encumbrances should be excluded during machining, especially during the precision finishing process. The quality of the components, of the flanks in particular, and the reliability of the process as a whole benefit from this," said Geiser. The blanks are

loaded from the attached palletizer cell, where they are stored in baskets, as per the automotive standard.

## One-Table Solution

Liebherr's new machine for profile and generating grinding combines short grinding times with consistent high large-scale production quality. "This machine gives users fast processing combined with the advantages of a one-table solution," said Dr.-Ing. Andreas Mehr, grinding and shaping technology development and consultancy at Liebherr-Verzahntechnik.

For this reason and given its compact dimensions, the machine is especially suited to vehicle and transmission manufacturers and their suppliers. To facilitate installation of production lines for a complete series, making optimum use of the available space, the machines for both 180 and 280 millimeters have the same external dimensions. Vehicle manufacturers can thus develop a complete production line, in which all gearing components for a passenger vehicle transmission can be ground: planetary and sun gears, bore-type gears, as well as drive and pinion shafts with lengths of up to 500 mm. "Choosing a one-table solution means one setting, one geometry. The advantage is higher quality throughout the entire production. Every machined part is manufactured under the same conditions for the highest reproducibility. A key argument in favor of the one-table solution is the statistical capability and reliability in continuously producing controlled  $\mu$ -range finish quality," Mehr said.

In order to minimize any thermal impacts, the machine bed has been manufactured using a thermally stable material. The core of the machine is the newly developed grinding head. Conventional solutions have been chosen here in several areas in order to be prepared for yet higher quality requirements. The new grinding head allows for rotation speeds up to 10,000 rpm and has spindle power of 35 kW. Given this performance data, the head enables high cutting speeds and high feed rates. This top-rate performance makes the machine future-proof. There are also reserve capacities for new developments and coming higher demand. The new grinding machine can exploit the considerable potential of the innovative abrasive, Cubitron II.

## Innovations at EMO 2013

Geiser looks ahead to showcasing the machines: "We are looking forward to unveiling three of our innovations at our booth. The exhibition slogan 'Intelligence in Production' means implementing particular customer requirements in the most diverse production locations in a globalized economy. Our solutions support customers by achieving this goal – through high efficiency and availability as well as worldwide reproducible quality and user-friendly operation."

### For more information:

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## DMG/Mori Seiki

STAND D44, HALL 27

DMG/Mori Seiki will demonstrate its full gear milling portfolio with a focus on *gearMILL* software and the InvoMilling process. The InvoMilling process will be demonstrated on the NT series multi-tasking machines as well as the DMU series machines. “The demonstrations center around the flexibility of the machines, which leads to greater productivity in small and medium batch production,” says Nitin Chaphalkar, manager of advanced solution development. In addition to newly developed processes, traditional gear machining processes such



DMG's NL2500 will be demonstrated during EMO Hannover (courtesy of DMG).

as hobbing and broaching will be demonstrated on NL (3-axis lathe) and NT machines. A wide variety of machines large and small (from NT6600/6000 (6 m bed length) to NL2500) will be exhibited. Machining of all types of gears such as spiral bevels, spur, helical and internal gears will be demonstrated on these platforms.

### For more information:

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## EMAG

STAND C33, HALL 17  
STAND B39, HALL 26

EMAG will be presenting the VL 2 single-spindle vertical pick-up lathe for the machining of small chucked components. Nowadays, everywhere you turn in an industrial production environment you encounter the expression “downsizing” — where the term describes infinitely more than just the scaling down of the passenger car engine and its displacement. There is also a change in the direction the production of electric motors and pumps for the energy industry and for general mechanical engineering is taking, with constituent components getting smaller and smaller.

However, the trend towards downsizing increases demands for greater precision and that makes the manufacture of small

components a real challenge. “Shrinking” components and new smaller components present a particularly complex task for the mechanical engineering companies that manufacture them. One kind of machine used to master the task is shown by the turning specialists at EMAG — with the VL 2. This vertical turning machine represents a new platform for automated, high-precision production processes and low component costs in the manufacture of small chucked components.

The EMAG VL 2 machine opens up new opportunities for the machining of a wide range of small chucked components. Small gearwheels, planetary gears, sliding sleeves, pump components, synchronizer rings, chain gears or flange components — with a maximum diameter of 100 mm and a length of up to 150 mm — are machined on a vertical pick-up lathe with great efficiency. The machine design focuses on providing a variety of manufacturing technologies for soft and hard machining plus a complete automation system at a very favorable price-performance ratio. When developing the VL 2, EMAG had — right from the start — its eyes fixed firmly on the investment costs for the user and the fact that those costs should be kept as low as possible. “We wanted to design a machine that guaranteed the highest possible degree of productivity in the manufacture of small components, and we have been very successful in that pursuit with our VL 2. Here, too, size is of great importance. The machine’s compact construction ensures that the chip-to-chip times are kept low,” explains Guido Hegener, managing director of EMAG Salach Maschinenfabrik GmbH.

### For more information:

EMAG LLC  
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EMAG's VL 2 represents a new platform for automated, high-precision processes (courtesy of EMAG).

# Precision Technologies Group (PTG)

STAND 026, HALL B51

The theme of the 2013 EMO Hannover metalworking trade fair — “Intelligence in Production” — couldn’t be more appropriate for UK-based Precision Technologies Group (PTG). As a leading global provider of ultra-precision rotor and thread grinding machines, rotor milling machines, heavy duty lathes, deep hole boring machines and friction stir welding technologies, PTG has built its reputation on developing intelligent manufacturing solutions.



The Zenith 400 embraces a variety of grinding technologies (courtesy of PTG).

## The Zenith of Grinding Technology

Officially launched at EMO 2011, the Zenith 400 helical profile grinding machine, from PTG company Holroyd Precision Limited, has the capability to grind rotors of up to 420 mm diameter and is able to use tooling from other Holroyd grinding machines, as well as tooling from competitors.

Representing a whole new generation in grinding machine technology, the Zenith 400 features an easy-to-use intuitive control system that incorporates both a development and production software suite. It is also the first Holroyd grinder to embrace all three grinding technologies: aluminium oxide, ‘diamond hard’ plated Cubic Boron Nitride (CBN) and vitrified, dressable CBN.

## Powerstir Friction Stir Welding

Powerstir Friction Stir Welders, from PTG Heavy Industries, provide yet another example of PTG’s commitment to intelligent metalworking. Offering far-reaching opportunities for jointing often difficult-to-weld alloys, where special attention is paid to structural rigidity, Powerstir models produce superior high strength welded joints without the detrimental and visible effects often associated with conventional welding.

In 2012, a Powerstir machine was developed for use in the manufacture of railway car bodies for China’s high speed rail network. This feat of design and construction further demonstrated PTG’s precision engineering capabilities — particularly

as in building the machine in question, the organization also had to develop a 30 m x 4 m gantry.

## Presenting a Wide Range of Intelligent Solutions

Visitors to Stand 026 B51 will be able to explore the wide range of technologies and services that is provided by the following PTG companies: Holroyd Precision Limited, PTG Heavy Industries, Precision Components and PTG Customer Care.

In addition to ultra-precise large screw rotors, produced using Holroyd Precision Limited’s Zenith 400 helical profile grinding machine, a number of bespoke helical forms from Precision Components Limited will also be on display.

Delegates will also be able to view the superior, high strength welded joints created by Powerstir Friction Stir Welders from PTG Heavy Industries, as well as components and tooling.

“Over the years, EMO Hannover has established itself as the global meeting point for the entire international metalworking sector,” comments PTG Chief Executive Officer, Dr. Tony Bannan. “At EMO 2013, we intend to demonstrate exactly why the Precision Technologies Group is a leading choice for intelligent metalworking solutions.”

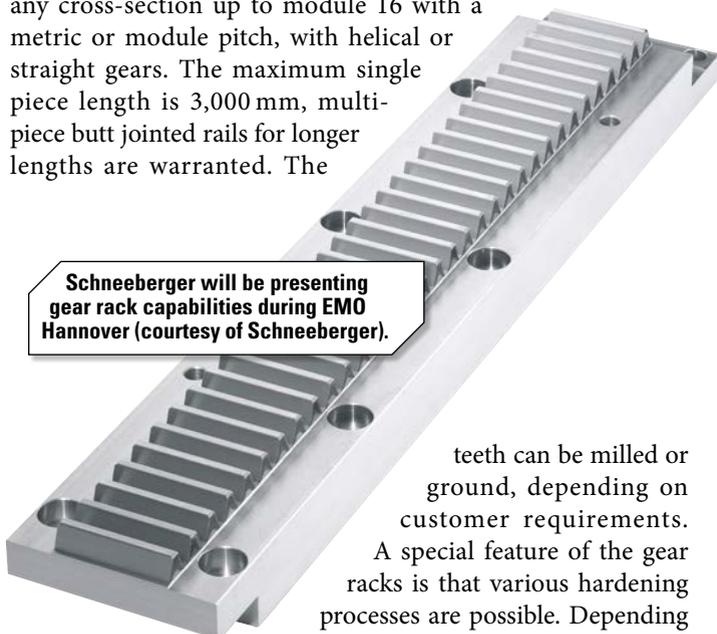
### For more information:

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# Schneeberger GmbH

STAND A36, HALL 7

*Gear Racks:* Any gear rack and gear rack guideway can be produced according to customer drawings. Gear racks are an economic drive element, especially with long strokes of more than 2 m. They are preferably applied in dirty environments and/or with big axial forces, since this drive element has the same constant stiffness over the whole length. Schneeberger offers any cross-section up to module 16 with a metric or module pitch, with helical or straight gears. The maximum single piece length is 3,000 mm, multi-piece butt jointed rails for longer lengths are warranted. The



Schneeberger will be presenting gear rack capabilities during EMO Hannover (courtesy of Schneeberger).

teeth can be milled or ground, depending on customer requirements. A special feature of the gear racks is that various hardening processes are possible. Depending

on the applying load the customer may choose among weak, induction hardened or case hardened and nitrided gear rack. The best gear quality is Q5 in accordance with DIN (individual pitch error  $f_p = 0.006$  mm, cumulative pitch error  $F_p = 0.020/300$  mm).

Schneeberger offers flexible organization, in-house induction hardening, maximum length 3 m, any helix angle between  $-30^\circ$  and  $+30^\circ$ , same accuracy with helical right hand and helical left hand. Standard gear racks: Metric or module pitch, up to module 16, helical tooth or straight tooth system, Milled or ground, arbitrarily combinable.

**Measuring Technology:** With their latest product release — AMS absolute — Schneeberger now offers the machine tool industry their magneto-resistive measuring technology with an absolute digital interface. The system offers the proven advantages of this technology, such as reliable high precision, a single reading head for all monorail sizes, as well as the availability of single piece rails, with integrated measuring system, up to 6 meters in length. Given this, AMS absolute will find many additional applications in special areas of industry and the machine market. AMS absolute also has status and diagnostics features. An LED display on the intermediate electronics unit displays various system status levels e.g. fault-free operation & voltage too low.

Additionally a diagnostics box can be installed in line, and a serial interface allows diagnostics and configuration parameters to be displayed and changed. Therefore, AMS absolute offers increased operational reliability attained by processing valid information. The general construction of AMS Absolute is a monorail linear guide and integrated measuring scale with an incremental track and a separate code track. The measuring scale is protected against damage and disturbance by a hardened cover strip which is laser welded to the rail. The reading head is mounted in a sealed attachment housing which fixes directly to the carriage. The information from both tracks is continuously recorded by the contact sensor and the absolute position calculated by the measuring electronics.

#### For more information:

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## Seco Tools

STAND A56, HALL 4

Seco Tools will spotlight innovative metal cutting solutions paired with unique manufacturing techniques. Products on display will include an enhanced Turbo 10 series of square shoulder mills, the Double Octomill face milling cutter and the Square 6 milling cutter.

### Turbo 10 Square Shoulder Mills

The enhanced Turbo 10 series of square shoulder milling cutters now includes more inserts with new geometries and radii as well as helical cutters for increased machining flexibility in tough materials. The insert range expansion includes both direct pressed and ground insert alternatives with corner radii



The Double Octomill provides 16 cutting edges to minimize cost per edge for a lower cost per part (courtesy of Seco).

ranging from 0.4 mm to 3.1 mm. The new geometries for the ground insert range provide increased performance in materials with unique challenges, including aluminum, stainless steels and titanium alloys.

The new helical cutters are ideal for helical shoulder milling applications that require process stability, flexibility and high precision. The cutters are available in diameters ranging from 20 mm to 54 mm and include Weldon, Seco Weldon, Combimaster heads, Seco-Capto and Arbor mounting options.

All Turbo 10 cutters include precision milled pocket seats that improve run-out, stability and tool life by providing optimal contact between the tool body and insert. Integrated through-coolant channels support high productivity and promote excellent chip evacuation. Because of their high levels of flexibility, Turbo 10 cutters work in slotting, shouldering, ramping, facing, pocketing, plunging and turn milling applications.

### Double Octomill Face Milling Cutter

The Double Octomill face milling cutter is highly versatile in that it can be used for both roughing and finishing operations. And while more traditional face mills typically use inserts with four edges, the Double Octomill provides 16 cutting edges to minimize cost per edge for a lower cost per part.

Seco achieves 16 cutting edges because each pocket on the Double Octomill cutter features a negative axial angle that allows for the use of double-sided inserts. The inserts them-



Seco's Turbo 10 series includes more inserts with new geometries (courtesy of Seco Tools).

selves use a positive rake angle to minimize power consumption while achieving higher cutting speeds for a significant increase in productivity.

The Double Octomill is available in three different pitch versions. On the normal and normal+ versions, the insert locks into place via a center lock mounting with a strong screw. The close pitch version offers wedge mounting using a new, stronger and self-orienting wedge.

### Square 6 Milling Cutter

With three cutting edges on each side, six in total, Square 6 cutters provide lower cost per cutting edge and bring enhanced performance to a variety of operations, including face milling, contouring, plunging, slotting and square shoulder milling. With three geometries, two radii, eight grades and six indexable cutting edges, the Square 6's peripheral ground inserts allow users to achieve greater accuracy, exacting tolerances and high-quality part surface finishes when machining tough materials.

#### For more information:

Seco Tools  
Phone: (248) 528-5444  
[www.secotools.com](http://www.secotools.com)

## Sandvik Coromant

STAND B20, HALL 5

At EMO Hannover 2013 cutting tool and tooling systems specialist, Sandvik Coromant, is offering a "journey of discovery" including the launch of an innovative technology that will set new standards for metal cutting performance. EMO visitors are invited to join Sandvik Coromant at the company's Smart Hub



Sandvik helps optimize milling applications for large gears module 12-22 (photo by David Ropinski).

Gear milling technologies will be showcased during EMO (photo by David Ropinski).



at 2:00 on September 17 for the unveiling of this new tool generation.

"What will you Discover?" is the theme of the 528 m2 Smart Hub, where an international team of Sandvik specialists will be based throughout the event. Visitors will be able to explore the latest drilling, milling and turning technologies as well as finding out about important manufacturing industry trends.

A yellow "Discovery Line" provides a guide through a number of key Sandvik Coromant solutions including the new generation of tooling technology, the latest developments in high-pressure coolant (HPC) applications and toolholders for sliding head lathes.

Elsewhere in the Smart Hub there will be several displays relating to specific sectors and applications. For example, there will be special areas for hard part turning (HPT) in the automotive sector and details of solutions for the aerospace and energy industries. New gear milling technologies and the use of Silent Tools in drilling applications will also be showcased.

Continuing the theme of innovation, Sandvik Coromant president, Klas Forsström, will be giving a lecture on next generation machining at this year's VDMA Congress. This event with its "Inspired by Technology" theme runs in parallel with EMO and Forsström's lecture will take place on September 17.

#### For more information:

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