Liebherr's LDF 350

OFFERS COMPLETE MACHINING IN NEW DIMENSION

Liebherr's LDF 350 combines turning, drilling and hobbing in a single clamping arrangement.

The objective, according to Dr.-Ing. Hansjörg Geiser, head of development and design for gear machines at Liebherr, was to develop and design a combined turning and hobbing machine in which turning, drilling and hobbing work could be carried out in the same clamping arrangement as the hobbing of the gearings and the subsequent chamfering and deburring processes. The result of this new development, Liebherr's response to current trends and demands of the market, is the LDF 350. "This offers the latest technical options for the machining of cylindrical gear gearings, not only of wheels but also of shafts," Geiser says.

These kinds of innovative machine concepts are in demand because of: increasing workpiece complexity and the wish for increasingly smaller batch sizes; reduced cycle times; and the need for intermediate layers in production to be as small as possible. The LDF 350 enables the combination of different machining processes, ranging up to complete machining in a single clamping arrangement.

"One special challenge we faced was the controllability of both processes (turning and hobbing) for workpieces up to a maximum diameter of 350 mm, a total length of up to 500 mm and a maximum module of 5 mm," Geiser says."The most important component of the LDF is therefore the workpiece table, which fulfills two main requirements."

These requirements include the high rotation speeds of the turning process and the high rigidity of the gear hobbing.

Aligned in the center of the rotation machine and permanently connected with the machine bed, the table ensures high production turning and gear hobbing. The gripper for loading the machine and the pressure deburring unit are also aligned on the turret lathe (revolver) to the left of the workpiece table, in addition to the necessary tools for the turning and drilling processes. The gripper takes up the blank directly from the storage belt and sets it down on the rapid clamping system of the workpiece table.

To the right of the workpiece table is the hobbing head. This absorbs the high forces of the hobbing process. In order to absorb the forces of the gearing process, Liebherr optimized the entire machine by means of FEM and designed the guides of the radial infeed and of the stroke and its drives to be extremely solid. This type of construction guarantees maximum stability during the machining process, so that even the highest of cutting speeds are possible in dry machining.

The combined machining enables new dimensions for the workpieces—geared parts up to module 5 mm with diameters of 25 to 350 mm. This makes the utilization of the LDF 350 of particular interest, even in the range of larger geared parts.

For tool changes, the hob head swivels the tool axis into a vertical position so that the machine operator can insert the hob mandrel in an ergonomically efficient manner. The counterbearing is automatically tensioned and clamped. After the gear hobbing, the revolver presses the pressure deburring wheel into the gearing and thus eliminates the burrs and/or applies a chamfer to the workpiece. Residual burrs on the face sides can be eliminated by repeated stripping.

In comparison with a conventional production line with three individual processing machines for turning/drilling, hobbing and deburring, the so-called combination cell also reduces, in addition to the logistics outlays for loading and unloading, the non-productive times

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between the machining processes. "This results in a shortening of the throughput times and intermediate storage of the workpieces is dispensed with," explains Dr. Geiser. "Product changes also proceed more economically and more rapidly, as only one machine needs to be retooled for this purpose. The LDF 350 can be operated completely automatically and in conjunction with one or more turning cells."

The machine enables the complete processing of a wide spectrum of gear shafts and gears in only one clamping arrangement. In comparison with the other processes, this ensures a greater amount of flexibility and an optimized throughput. Time-consuming retooling from one workpiece type to the next with several individual machines is dispensed with. Given optimum conditions, the processing times of the LDF 350 can match those of the single specialized machines. This was one of the most important objectives for the development of the LDF 350.

As a result of the utilization of the LDF 350, the number of required machines, setup procedures and the overall throughput times for the complete machining of gears is drastically reduced, which means that both the investment expenditures and the workpiece costs are considerably lowered for the user. Advantages include no reclamping, no non-productive times and no intermediate buffering.

Complete machining also opens up new qualitative possibilities: It enables, for example, turning over the bearing seats once more after gear hobbing. This makes it possible to minimize deviations prior to hardening and any warpage which might occur to be held out in an accordingly precise manner.

"Being a specialist for gearing processes, we implemented this innovation together with the lathe manufacturing company of Scherer from Mömbris, a professional partner who has mastered the initial turning process," Dr. Geiser summarizes.

The result of this joint development work, the Liebherr LDF 350, is expected to be available the end of 2011.

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Sicmat

RELEASES RASO 200 DYNAMIC SHAVING MACHINE

The Raso 200 Dynamic has been developed to offer all the characteristics of a gear shaving machine with a competitive price. With a footprint of just 4.4 square meters, it's also the most compact machine of the Sicmat Raso range. The Dynamic is the first shaving machine in the Raso family to utilize Siemens CNC Sinumerik 828D.

"The concept of the Dynamic was to introduce a machine that had the same performance and quality aspects of the Raso line at a reduced cost to the customer," says Carlo Amandola, sales director at Sicmat.

Global gear manufacturers are looking for machines that produce high quality parts at reduced prices, and the Raso 200 Dynamic fits these specifications. Amandola believes selling a gear shaving machine without additional frills is the advantage the Dynamic has in the gear market. "The Raso 200 Dynamic debuted at EMO Hannover in September with great results," Amandola says. "By updating the mechanical aspects and working with Siemens on the CNC controls, we've managed to produce a machine that is energy efficient, simple and inexpensive to maintain and also offers a competitive price."

The Raso 200 Dynamic offers all shaving cycles: parallel, diagonal, underpass, plunge and mixed cycles, user-friendly software and graphic interface, a self-contained coolant system and an optional automatic loader. High quality German components include the Siemens package (CNC, brushless servomotors and electric cabinet), Rittal active refrigeration and a Rexroth hydraulic system.

Technical specifications for the Dynamic include: number of axes

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5 +1 spindle with absolute encoder, min/max module 0.8–5 mm, min/max distance between shaving cutter and workpiece 120–202 mm, min/max diameter of shaving cutter 178–245 mm, shaving cutter bore diameter 63.5 (100) mm, min/max shaving cutter width 19–50.8 mm, maximum face to be shaved (diagonal cycle) 100 mm, installed power (including pump and cooling filter) 20 KVA and a net weight (including electrical cabinet) of 4,200 kg.

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Mitutoyo CMM

DOUBLES THE MEASURING RANGE

The new Crysta-Apex S Coordinate Measuring Machine (CMM) from Mitutoyo America Corporation brings new levels of performance and economy to the 1.7 µm class of CNC CMMs. With a maximum error of MPEE = (1.7+3L/1000) µm, the new Mitutoyo Crysta-Apex S more than doubles the effective measuring range at a given measurement tolerance as compared to typical CMMs in its class. Additionally, the Crysta-Apex S drive features high-speed (max 519 mm/s) and high acceleration (max 2,309 mm/s^2). These advances result in higher throughput for greater productivity and lower total owning and operating costs.

The Crysta-Apex S uses the new UC-400 controller to manage digital servo system control loops for position, speed and current. This makes it easy to implement various types of control algorithms. Additionally, the digital servo system has a wide dynamic range and is highly resistant to drift over time. Extreme rigidity helps the Crysta-Apex S maintain accuracy. The Y-axis guide rail is integrated into one side of the granite surface plate. Precision air bearings located on the bottom, front, rear and upper surfaces of the X-axis slider minimize vibration and ensure stability even during high-speed, high-acceleration operation. Accuracy is further enhanced by an advanced temperature compensation system. The system consists of a thermometer unit that measures the temperatures from thermal sensors located on the scale units of the CMM main unit and from a set of workpiece thermal sensors. The temperature data is transferred to the UC-400 machine controller for thermal compensation. For proper workpiece compensation, the thermal expansion coefficient of the workpiece material is entered by the user; since the material of scale units of the CMM is constant, this expansion coefficient is permanently stored in the temperature unit. The Crysta-Apex S supports a wide range of probes that offer increased capabilities including the MPP-310Q scanning probe that collects cloud point data at speeds of up to 120 mm/s. Other probes suited for screw depth measurement, ultra-small diameter measurement and non-contact measurement are also supported.

Available software options enable the Crysta-Apex S to tackle a wide variety of measurement applications. Software packages include *Geopak*, a high-functionality general-purpose measurement program which is at the heart of *Mitutoyo Controlled Open System for Modular Operation Support* (*MCOSMOS*) software. *MCOSMOS* supports virtually every CAD format while providing routines for in-line measurement, data feedback, and process management. Additional software supported includes: *CAT1000S* for freeform surface evaluation; *CAT1000P*, an offline teaching program; *Scanpak*, for contour measurement; and a range of programs supporting laser and vision probes. Crysta-Apex S provides USB communications for connectivity. Additionally, Crysta-Apex S supports *MeasurLink STATMeasure Plus*, Mitutoyo's proprietary statistical-processing and process-control program. *MeasurLink STATMeasure Plus* per-

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forms statistical analysis and provides real-time display of measurement results for SPC applications. The program can also be linked to a higher-level network environment for enterprise-wide functionality.

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Sandvik

OFFERS COROMANT CAPTO AND COROMILL 176

For all types of heavy machining operations in large components, Coromant Capto size C10 improves performance by allowing higher feeds and greater depths of cut. A flange diameter of 100 mm means a coupling suitable for heavy loads, providing extreme stability in milling and turning applications. Designed to increase removal capacity at higher torques, the C10 gives the entire tool set up higher bending strength. The C10 includes a wide range of holders and adapters from shrink fit, SL adaptors and ER-chucks to tap adaptors. The stable tool holding system makes it possible to use only one system for the entire workshop, regardless of machine type: turning center, machining center, multi-task machine; manual or fully automatic. The tool system permits standardization, reduces inventory costs, and simplifies physical and administrative handling of tools. The unique polygon shaped Coromant Capto coupling, introduced in 1990, has proven its excellence over the years and is now an ISO standard (26623).

In addition, Sandvik Coromant recently introduced a new full profile hob for gear milling, Coromill 176.

This indexable carbide insert hob can reduce cutting time by 50 percent and double tool life compared to traditional high speed steel cutters. For roughing, semi-finishing and finishing, the hobbing tool solution covers gear profile sizes in the range module 4–6. With standard carbide inserts for gear profiles according to DIN3972-2 it is custom-made for specific profiles with, for example, addendum modification and protuberance. The hob is easy-to-use with the iLock interface ensuring precision and stability. Coromill 176 is registered as Quality class B in accordance with DIN3968.

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Seco

RELEASES NEXT GENERATION MINIMASTER

Seco introduced its original Minimaster line of end mills with replaceable carbide inserts nearly 25 years ago. Today, the company is presenting its new Minimaster Plus, with advanced features for tackling the most demanding of milling applications in steel, stainless steel, cast iron, aluminum and other difficult-to-machine materials. The most notable new feature on the Minimaster Plus is the high-precision interface between the replaceable carbide insert and the steel shank. The insert has an internal thread and external taper, while the shank has an internal taper with a threaded center pin for added reliability and stability as well as minimized run-out. Additionally, a new axial

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stop on the shank increases repeatability and productivity by allowing end users to replace an insert without having to remove the tool from machine spindles. The new insert then repositions axially within 25 microns. Intended for general machining in the aerospace, power generation, die and mold, automotive and medical industries, the Minimaster Plus replaceable tip milling system makes tool-length re-measurement obsolete. The milling system offers a large selection of inserts and shanks for a multitude of

tough milling applications. Twenty-four versions of the shank are available, along with square shoulder and ball nose inserts that have through-tool coolant on all two and three flute designs for excellent cooling and efficient chip removal. Inserts come in two grades for machining all types of materials and E- and M-geometries for a smooth cutting design. Insert diameters range from 0.375" to 0.625" and corner radii are available from 0.0157" to 0.122" to match a variety of design requirements.

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Adcole Tester

MEASURES CAMSHAFTS WITH GEARS

An upgraded camshaft measuring machine that is designed with a wide diameter offset follower to accommodate larger diameter cams with built-in gears is being introduced by Adcole Corporation of Marlborough,

Massachusetts. The Adcole Model 911 Camshaft Gage is suitable for measuring camshafts up to 90" long and has an offset follower with 6.1" travel to accommodate larger diameters with built-in gears. Featuring an air-actuated open-close of the tailstock, with a video monitor to assure the center hole is lined up and engaged, this camshaft measuring machine has a ball bearing spindle with run-out under 0.2 µm and a footswitch-operated tailstock restraint.

Automatically measuring 360 degrees around the part, including all cam lobes, reference journals, timing features, and keyways, the Adcole Model 911 Camshaft Gage is capable of the submicron detection of material buildup or other form irregularities. This cam tester has become the world standard for milling and grinding machine tool users to make certain there is product conformance among suppliers and OEMs, claims the firm.

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LMC Face Drivers

IMPROVE TURNING PRODUCTIVITY

Gear hobbing is easier and more productive with Neidlein's FDNC face driver from LMC Workholding. With Neidlein's FDNC Face Drivers, hobbing can be done in one operation, eliminating the use of a chuck. These face drivers also deliver high-tolerance concentricity/runout specifications

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of .00003" to .00007". Also, the center pin and drive disk system can be adjusted to achieve zero runout.

Using a Neidlein FDNC Face Driver allows the entire workpiece to be exposed for machining and turned in one operation, which eliminates a step in the production process and reduces cycle time. Also efficiency and accuracy are improved since hobs stay on one machine and tolerance stack-ups are eliminated. What's more, the single-axis reference point established by the face driver's center point allows for a higher concentricity.

Neidlein gear hob face drivers are available in flange mount and two shank styles: Morse-taper and straight shank. Specials are available that are produced to customer specifications and needs.

FDNC Face Drivers also offer a quick-change drive disk for faster job changeovers, optional coolant flush, and spring-loaded or fixed-center pin. Drive disks are available in clockwise, counterclockwise and bi-directional drive disks.

Neidlein makes a complete line of face drivers that use quick-change center points and drive pins for increased productivity and cost efficiency. An online video at its website is available to see face drivers in action.

LMC Workholding engineers and manufactures high quality chucks and standard and special workholding equipment, including international style power chucks and cylinders, wheel chucks, high volume machining power chucks, Neidlein face drivers and centers, Atling hydraulic steady rests, Richter manual steady rests, Stiefelmayer specialty clamping tools, Chandox brand chucks and cylinders and T de G large chucks.

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Royal Filtermist Series

CONTINUES DESIGN IMPROVEMENTS

While many companies are aware of traditional problems associated with oil mist (health and accident risks, cleaning and maintenance costs, etc.), few are aware that failure to adequately address mist and smoke issues often result in reduced productivity and increased machine downtime. In addition, production is often reduced as a result of employees dialing back on feeds and speeds in order to minimize production. An often overlooked maintenance problem is the effect of oil mist on electrical contacts and electronic circuits. For the past 30 years, the Royal Filtermist has been collecting oil mist and smoke generated by all types of metalworking machinery. There are currently more than 125,000 Filtermist units operating in more than 40 countries worldwide. It has undergone continuous design improvements through the years—the latest version, the Filtermist FX Series, is the product of extensive computer-aided modeling and laboratory testing. The Royal Filtermist is avialble in four sizes ranging from 275–1200 cfm, and its flexible design enables it to be mounted in a variety of ways. Maintenance and operating costs are minimal. All Royal Filtermist units are sold with a 45-day risk-free performance guarantee.

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Rex-Cut

OFFERS ABRASIVE DISC LINE

A full line of cotton fiber quick change abrasive discs for blending and finishing stainless steel, aluminum, and exotic alloys are available from Rex-Cut Products, Inc. of Fall River, Massachusetts. Rex-Cut Cotton Fiber Quick Change Discs incorporate multiple layers of reinforced non-woven cotton which are impregnated with abrasive grains and then pressed, bonded together, and fitted with 3M Roloc and Sockatt style fasteners. Constantly exposing fresh abrasives as they work, these quick change discs grind and finish in one-step with smooth operation. Flexible for use on flat and contoured surfaces, yet rigid enough to reach into corners, Rex-Cut Cotton Fiber Quick Change Discs last up to 25 times longer than unitized discs, claims the firm. Impregnated with either aluminum oxide or silicon carbide abrasive grains, they come in 1", 1-1/2", 2", and 3" sizes in a variety of grits with flexible and medium bonds. Rex-Cut Cotton Fiber Quick Change Discs are priced according to size and quantity. Free samples are available upon request. Kits are also offered.

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