

TURNINGpoint

INDEX



premiere // p. 04

**FRONT WORKING
ATTACHMENT FOR
MORE PRODUCTIVITY**

Dear customers and
friends of the company,

Europe presents itself this year in a friendly investment climate, the U.S. is enlivened by re-industrialization and China is gradually recovering its investment activity. Considerable exchange rate distortions strengthen the attractiveness of the euro area as a production location and thus of many of our customers as global suppliers of complex components.

So it's time to think about competitiveness and productivity benefits. Exactly this we would like to present to you – by this INDEX TRAUB customer magazine and at our Open House from June 16 to 19, 2015. Let yourself be thrilled and inspired, in the truest sense of the words – better parts faster.

Industry 4.0 and enterprise connectivity and provision of engineering and manufacturing-relevant production documents are a highly topical issue. INDEX presents for this the world premiere of **Xpanel** with **i4.0ready** and touch screen technology. This control-integrated solution opens up entirely new possibilities of information provision and work organization in the production environment and therefore more efficiency.

Starting in mid-2015, all machines will be supplied with **Xpanel** and **i4.0ready** as standard (requires: Siemens S840D sl).

In the range of multi-spindle automatic lathes, the **INDEX MS32C2** – the successor to the INDEX MS32C – is premiering as our first open-front multi-spindle machine. The significant new features on the **INDEX MS32C2** include liquid-cooled main spindles and slides of the latest design.

The **INDEX MS16C Plus** represents an expansion to the potential applications of our smallest multi-spindle machine.

An enlarged spindle clearance, a second optional counter spindle, and the ability to switch between using grooving and drilling slides extend the technical and commercial application of the machine – particularly for manufacturing tasks that had previously been reserved for cam-controlled multi-spindle machines.

With regard to the **INDEX G220** turn-mill center introduced in the preceding year, we are excited to present to you the first variants from this machine type's modular system.

The successful **INDEX ABC** has also been refined. The new generation of controllers, Siemens S840D SolutionLine, achieves significant reductions in cycle time depending on the workpiece. In addition, the **INDEX ABC** will also be available with W-serration on the turret tool mounting.

For **TRAUB**, the focus will be on the new **TNL32-11** (see cover picture). As the third independent tooling system, the newly developed front working attachment opens up new possibilities for machining and rationalization of manufacturing.

We wish you an enjoyable read and look forward to your visit.

Dr. Dirk Prust, Reiner Hammerl and
Uwe Rohfleisch
Executive Board

OPEN HOUSE

June 16 – 19, 2015



DEIZISAU // Main venue

Plochinger Str. 44 // 73779 Deizisau // Phone +49 711 3191-0



REICHENBACH

Hauffstr. 4 // 73262 Reichenbach // Phone +49 7153 502-0

BETTER PARTS FASTER

Highlights:

- +++ Xpanel – i4.0ready +++ 4 machine premieres +++
- +++ more than 30 machines live and in action +++ tool holders & accessories +++ myInfoshop +++
- +++ bargain machines at a special price +++ automation solutions +++ services +++
- +++ grinding technology +++ trochoidal milling with WinFlexIPS +++ gearing technologies +++
- +++ the value package +++

Powerful TRAUB TNL32-11 swiss and non-swiss type lathe shortens machining times

MORE PRODUCTIVITY WITH FRONT WORKING ATTACHMENT

The signature feature is a front working attachment mounted on a cross-slide, which raises the number of linear axes on the machine to eleven. It can perform simultaneous machining with three fully independent tools. That cuts machining times – especially for components where a large proportion of drilling is required.



TRAUB TNL32-11 highlights:

- Front working unit for 8 additional tools and gripper unit
- Turret indexing by NC rotary axis
- Large travel ranges (X = 140 mm / Z = 300 mm)
- Deep-hole drilling station with coolant pressure of 120 bar possible
- Tailstock function for bar machining
- Optional: Dual Drive system



A signature feature of the TRAUB TNL32-11 is the front working attachment, equipped with 8 tool stations, 4 of which are live.



Powerful:
Control
TRAUB TX8i-s
with WinFlex IPS^{Plus}

The TRAUB TNL32-11 features a headstock moving along the Z axis, an upper and identical lower tool turret with X, Y and Z axes, and a counter spindle traversing in X and Z directions. A front working attachment mounted on an additional cross-slide traversing in the X and Y axes has been newly added. It provides the user with additional, freely positionable tools and enables the use of up to three tools simultaneously and independently of each other.

Top flexibility with interpolated Y axis in the front working attachment

In addition to the two linear X and Z axes, the front working attachment features a CNC circular axis. By interpolating the circular axis with the X axis and the main spindle's C axis, machining in Y direction is possible with the front working attachment. The particular benefit: When a drilling tool needs to be corrected to exact center, the necessary corrections can be simply performed via the CNC controller. That can help with small parts that react with great sensitivity to even minimal offset errors. The large cutting circle of the tool mountings on the front working attachment was chosen for a reason: It allows simultaneous machining without risk of collision together with the two tool turrets at the main spindle.

Eight additional tools plus a gripper unit

The front working attachment makes eight additional tool stations available. Four of them are used to mount fixed tools, the other four are for live tools. There is also a station for a workpiece gripper that can unload a machined workpiece from the counter spindle.

With an output of up to 3.4 kW and a maximum speed of 12,000 revolutions, the tool drive in the front working attachment is extremely productive and designed for high power. A live station can be used as a deep hole drilling unit with a coolant supply up to 120 bar. The front working attachment can also be used as a tailstock when producing long components.

Two drives in one turret

The tool turret technology is particularly impressive. Indexing is performed using an NC rotary axis in any position without requiring a mechanical lock. This allows multiple tools at each station. The patented "Dual Drive" solution comprises two drive trains integrated within one turret. While one tool is in use, the tool intended for the next work step can be accelerated during main time, and is immediately available at full speed after the turret indexing operation. The user benefits from reduced secondary times and cycle times, and also from the reduction in tool holder wear. Even with live tools, chip-to-chip times are around just 0.4 seconds.

Improved tool mountings

The TRAUB compact shank system is used in the turrets, enabling extremely precise mounting of tool holders. They are seated deeper in the turret than in other commercial systems, which results in less leverage effect and thus greater stiffness. For live tool holders, the large shank diameter of 45 mm allows for the installation of spindle bearings with equally large diameters. A quick-change system enables high-precision exchange of tools without removing the tool holder. The compact shank system verifiably increases the tool life and also contributes to improved surface quality.

TRAUB TNL32-11 // Technical Data

Main / counter spindle	Ø 32 mm
Speed, MS / CS	8,000 / 8,000 rpm
Power max., MS / CS.	10.7 / 4.5 kW
Headstock stroke (long / short)	305 / 127 mm
Turrets / stations	2 / each 10
Tool drive speed	12,000 rpm
Tool drive power max.	3.4 kW
Front working attachment	
Tool mountings (driven tools)	8 (4)
Speed max.	12,000 rpm
Power max.	3.4 kW
Deep-hole drilling station (driven tools)	1
Speed max.	12,000 rpm
Coolant pressure max. (Option)	120 bar

Additional variants

Learn more about
TNL32-7B, TNL32-9 &
TNL32-9P at:
www.traub.de/tnl32_en



ENGEL injection molding systems are characterized by stable processes, high productivity, and outstanding part quality

ALL IN THE NAME OF EFFICIENCY

With many innovations, the injection molding machine manufacturer, ENGEL, has emerged from Schwertberg, Austria (near Linz) as a global market leader. When equipping your production, ENGEL focuses on an optimal cost/benefit ratio. Deliberate care is taken to invest in powerful machine technology.



At ENGEL in Schwertberg, Christian Leitner, Gerhard Aigner, and Josef Büchsenmacher (from left to right) are excited to see the results of the INDEX R300 turn-mill center

4,500 employees and nearly one billion euros – key data for the global market leader of injection molding machines, ENGEL AUSTRIA GmbH. Since its founding 70 years ago, the company has remained 100% family-owned and independent of external investors. This leaves room for innovative ideas, like the tie-bar-less technology, for example: In 1989, ENGEL became the first machine manufacturer worldwide to introduce an injection molding machine with tie-bar-less clamping unit – a unique selling proposition that is still protected by patents to this day. With its large clamping area and easy accessibility to the tool area, tie-bar-less injection molding machines are ideally suited to meet the requirements of being highly efficient and cost-effective. The successful tie-bar-less machines with more than 60,000 sales worldwide are just a part of ENGEL's broad portfolio: Machines from 280 kN to 55,000 kN clamping force, from hydraulic to all-electric, oriented horizontally and vertically. ENGEL has also evolved into a system supplier over the years, offering automation, process technologies, mold project planning, training, and services in addition to the machines. With more than 20,000 installed automation solutions, the injection molding specialist is also at the forefront of this field worldwide.

High productivity – including for their own manufacturing

The germ of these types of innovative product developments lies in the headquarters in Schwertberg, Upper Austria. Around 1,700 employees work here – more than at any other location. They handle the company's key duties, like design and development, sales, and marketing. However, the site in Schwertberg also houses the

production of small and medium-sized injection molding machines with clamping forces up to 5,000 kN. This is the production facility that is responsible for a significant share of ENGEL's success. It ensures the high quality of the machines and competitive prices. Gerhard Aigner, Head of Production in Schwertberg, bears responsibility for this: "We employ around 200 people who manufacture about 90% of all the mechanical parts at turn-mill centers. We stay competitive with other suppliers with regard to costs and quality, which is why we are continuously focused on the high performance of our machinery and we always push to improve. Continuous improvements at the site that results in added value can only result from very good and highly motivated employees, who come from the in-house apprenticeship workshops at ENGEL." One key to the cost-effective manufacturing is the complete machining of the parts to the extent possible in a single clamp. This requirement also plays an important role when replacing a CNC turning machine that was no longer productive enough for the people in charge of production. Gerhard Aigner explains: "We do not evaluate our machines by age, but by the productivity they achieve. We wanted to improve this with a new quickly and easily adjustable turn-mill center."

Dual five-axis machining in one machine

In the search for a suitable system, ENGEL became aware of the RatioLine series from INDEX, the design of which corresponded to what people in charge of production envisioned. The INDEX R300 turn-mill center, in particular, fulfilled their requirements. A key feature of this machine are the two in-

Center image: Promot automation handles the tool change and allows intermittent unmanned operation.

Top right image: INDEX control C200-4D SL supports simple operation of the R300

Bottom right image: A gantry loader system integrated into the machine handles the loading and unloading of the main and counter spindles.

dependent subsystems that are each equipped with one motorized milling spindle (HSK 63, 24.5 KW, 9,000 rpm) and one associated work spindle (52 KW, 3,500 rpm). This allows complex workpieces to be machined simultaneously and independently from each other – in five axes. Likewise, certain machine details contribute to the desired high flexibility with the available spectrum of machining and parts. For instance, with the two tool strips additionally mounted at the side of every milling spindle, the user has quick access to up to six fixed tools (VDI30) per spindle. This provides the versatility and performance of a milling spindle while approaching the functionality of a turret. The dual chain magazine can hold up to 140 tools that can be exchanged quickly by two independent tool changers in both motorized milling spindles, enabling chip-to-chip times under 6 s.

and clamping side of an ENGEL machine. Parts made of chromium-nickel steel in most cases, that are designed to transfer forces and motions and also assume sealing functions as hydraulic components. The requirements with regard to concentricity, parallelism, and surface quality are correspondingly high. To Josef Büchsenmeister, Head of Manufacturing, the investment in the R300 was a direct hit: "The INDEX machine is a perfect fit for us and our manufacturing philosophy. It brings with it a high, reproducible base level of precision. That is the basis for being able to adhere to tolerances of 1/100 mm with repeat accuracy in a reliable process." The high power density, with two motorized milling spindles and work spindles each in the smallest space, also fully met his requirements. There is also automation integrated into the machine, including the 15-workpiece pallet circulating system, which made it



The INDEX R300 enables full rear end machining as well as parallel machining with identical sequences. Both heavy-duty roughing operations and highly accurate finishing operations can be performed simultaneously on the main spindle and counter spindle. Convincing qualities. After visiting INDEX in Esslingen, and intensive discussions, the team around Gerhard Aigner developed a good deal of trust in the R300 from INDEX-Werke, which – like ENGEL itself – is also a system supplier. They were one of the first customers to decide on the purchase of an R300, enhanced with a Promot workpiece handling system integrated into the machine. The Head of Production does not beat around the bush with the results: "Our early decision to procure this machine has paid off. It allowed us to reduce our manufacturing costs and gain ground against other suppliers."

Reproducible signs of quality

Since December 2012, the INDEX R300 has been located in mechanical manufacturing 1, where a multitude of parts are machined continuously. The spectrum stretches over numerous components of the injection side

possible to establish multi-machine operation at ENGEL. His enthusiasm also extends to the large number of tools: "The turning center that we replaced was a turret machine on which we had to setup the tools with every part. With the R300, we can cut hundreds of parts without having to perform even a single tool change. This has increased the spectrum of parts enormously, and the setup times decreased considerably at the same time."

Added to that are the fixed tool strips of both milling spindles. For Josef Büchsenmeister, that is an element that gives the INDEX R300 another competitive edge: "Together with our programming department, we worked out the optimal configuration for these fixed tool strips so we can ideally use them to perform heavy roughing operations and internal machining on the counter spindle." Christian Leitner, Head of the CAM department, is also very happy with the new turn-mill center and the INDEX support: "We design our parts completely in 3D, and use the Siemens NX CAM system for programming and simulation. The simulation provides all of the important data before the part is



manufactured. This brings us a step closer to production 4.0. It was important to preserve this process chain without diversions. The fact that INDEX was able to provide us with a special post processor was naturally an important argument for the INDEX R300."

The ENGEL programming department had to adjust to the new dual spindle machine in the process. For some parts, the cutting passes had to be updated, the machining

"We were able to reduce the manufacturing time by up to 50%."

Gerhard Aigner, Head of Production

forces had to be distributed differently, and the cutting speeds had to be adjusted. The result, however, made the Head of Production, Gerhard Aigner, very happy: "We were able to reduce the manufacturing time for some parts by up to 50%. The complete machining also drastically reduced the idle periods for the parts. That is why at the end of 2014, we ordered another R-series machine from INDEX." This was the somewhat smaller INDEX R200, which ENGEL can also automate.

Top-class injection molding machines

ENGEL AUSTRIA GmbH is the leading single-brand manufacturer of injection molding machines and associated automation systems.

In the 2013/2014 business year, the 4,500 employees worldwide (2,800 of whom in Austria) generated a total revenue of 935 million euros. The group of companies have nine manufacturing locations in Austria, Germany, Czech Republic, USA, China, Korea, and 29 sales and service branches, as well as 60 representatives. Sales is categorized into five business units: Automotive, Technical Molding (white goods, household goods, toys, sporting goods), Teletronics, Packaging, and Medical. Many machines can be encountered across all of the branches, above all the tie-bar-less ENGEL victory and ENGEL e-victory machines, or even the all-electric ENGEL e-motion machines. The automation solutions are also used in every branch. Along with the ENGEL viper linear robots and the ENGEL easix multifunctional robots, the portfolio can also include special automation solutions that are custom-developed, and systems from partner companies.

ENGEL AUSTRIA GmbH

Ludwig-Engel-Straße 1
A - 4311 Schwertberg
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www.engelglobal.com

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PRICE-PERFORMANCE RATIO



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DELIVERY TIMES



MACHINE ACCESSORIES & TOOL
HOLDERS FROM ONE SOURCE

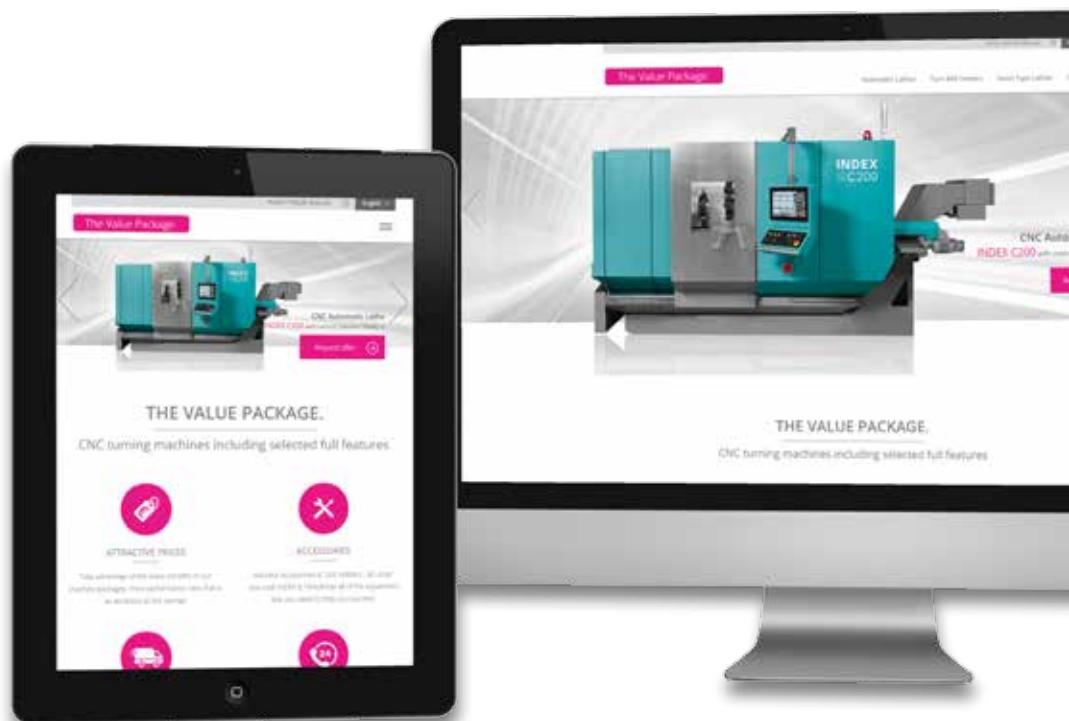


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AUTOMATIC LATHES

INDEX C100



Control: FANUC 31*i*-B // Siemens S840D sl
Main and counter spindles: Ø 42 mm
Max. speed: 7,000 rpm
Max. power: 29 kW

INDEX C200



Control: FANUC 31*i*-B // Siemens S840D sl
Main and counter spindles: Ø 65 mm
Max. speed: 5,000 // 6,000 rpm
Max. power: 24 // 32 kW

INDEX ABC



Control: FANUC 31*i*-B // Siemens S840D sl
Main spindle: Ø 60 // 65 mm
Max. speed: 6,000 rpm
Max. power: 29 // 27 kW

TURN-MILL CENTERS

INDEX G200



Control: INDEX C200-4D
Main and counter spindles: Ø 60 mm
Max. speed: 6,000 rpm
Max. power: 20 kW

TRAUB TNX65/42



Control: TRAUB TX8i-s
Main and counter spindles: Ø 65 mm
Max. speed: 5,000 rpm
Max. power: 24 kW

SWISS TYPE LATHES

TRAUB TNL18-9P



Control: TRAUB TX8i-p
Main and counter spindles: Ø 20 mm
Max. speed: 10,000 rpm
Max. power: 3.7 kW

TRAUB TNL32-9P

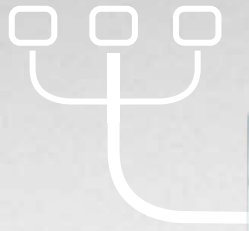


Control: TRAUB TX8i-p
Main and counter spindles: Ø 32 mm
Max. speed: 8,000 rpm
Max. power: 10.7 kW

www.index-traub.com/valuepackage

The value package.

NETWORK / SERVER



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STANDARD* // included

Information & data network for paperless manufacturing



Workpiece drawings & quality documents
Setup information & tool assignment
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Custom documents
Parts counter
Production times
Maintenance intervals

OPTION

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3D simulation / Virtual Machine on board
VirtualPro Programming support with VPro Guide
CAM system on board
Customer applications / open interface

Questions about Xpanel ?
xpanel@index-werke.de

Including industry 4.0

FOCUS ON PRODUCTION AND CONTROL

The complete integration into the network structures allows the newly developed operating system Xpanel® to offer comprehensive added operator support. The data communication is virtually limitless.

The new INDEX operating system, Xpanel®, places the focus on the optimal machine control for effective workpiece machining with the maximum productivity, on the one hand. On the other hand, Xpanel® establishes a direct connection between the machine control and the company's organization.

A basic requirement for Xpanel® is the new C200 sl control generation, based on Siemens S840D sl control. Another fundamental component is the 18.5" widescreen touch display, which itself is suitable for sophisticated 3D simulations, and features a separate controller. A custom software was developed for this mini-computer. It is used to provide the machine operator with exactly the information that best supports him with his respective tasks.

After starting up the machine, the familiar control screen appears. A vertical control strip is located on the right side, which contains the ABC keyboard, number pad, cursor keys, and some additional touch function buttons.

One of these is the "i4.0-ready" button, which changes the control strip on the right side of the screen to a task-based view when it is pressed. This contains the preselectable areas, Production, Setup, Programming, Maintenance, General, and Diagnostics, which are each assigned numerous functions.

The Xpanel® software allows the operator to switch back and forth between the "normal" control view, and this "second page" at any time. If the operator selects the icon for the workpiece drawing, for example, he is shown the drawing on the second page on the screen, and he can always navigate back to it at the press of a button. The same goes for other types of tasks, like calling up setup sheets, tool setup information, order or quality requirements, operating and programming instructions, or electric circuit diagrams and hydraulic diagrams.

Displaying whole pages in PDF format in combination with the intuitive navigation and zoom functions on the touchscreen allow all of the information to be conveyed safely. Xpanel® also offers an editor that can help the machine operator or programmer attach custom notes to the workpiece order.

All of this is provided as standard. The full power of Xpanel® unfolds with an optional industrial PC (VPC box) installed in the control cabinet. This can be connected with the control panel via an Ethernet

interface, and it uses the second page of the control screen. Using the VPC box allows the virtual machine (VM) to operate directly on the machine control panel. This “VM on board” can be used to create and run in new NC programs in parallel with the machine operation directly on the machine. The “CrashStop®” mode enables predictive simulation of the current workpiece program. If it detects a collision, the function triggers a prompt machine stop before an actual collision occurs. In “RealTime” mode, the machine program can be simulated in parallel, thereby enabling real-time analysis of the machining sequence in difficult-to-access work area situations.

Xpanel® also offers helpful support with machine programming with INDEX's own VPro programming studio, which can run directly in the VM as well as on the machine control. With an integrated VPC box, under the "CAM on board" button, there is even the option to use the NX CAM system with INDEX post processor directly on the machine. Naturally, other CAM systems and the customer's own applications can also be used. To this purpose, INDEX has opened up direct access to the VPC box in the control cabinet for the user's IT department.

Xpanel® from INDEX –
i4.0 ready® & uncompromisingly productive.

The Xpance® philosophy elevates the machine control panel to a command post. In exchange with the control view, a second page on the screen becomes an information center on the machine: The operator receives precisely the task-based information that best supports him with his current work.



Encoders and motor feedback systems are represented in electric motors and machine construction projects worldwide

PERFECTLY POSITIONED

They make sure elevators arrive at the right floor, gantry cranes are positioned properly, and electric motors can operate at low energy: The rotary encoders from SICK. The foundation for these quality products is laid in the mechanical manufacturing in Donaueschingen – beyond the factory walls, the turning machining is of particularly high quality throughout the entire company.



The Head of Production, Markus Mucha (left), and the Head of Machining Manufacturing, Roland Burghart (right), express excitement with technician, Frank Schrade, about the performance of the TRAUB turn-mill centers. This equipment makes it possible to save additional seconds of machining time.

Since 2002, SICK Stegmann GmbH has been a fully-owned subsidiary and at the same time the largest subsidiary of SICK AG, Waldkirch, which is known for its intelligent sensors and sensor solutions. The rotary encoders from the Donaueschingen-based subsidiary are an important and successful segment of the Group's range of products. The SICK Stegmann motor feedback systems are used in electric motors worldwide

motions of manufacturing robots. And when it comes to precise position detection in industrial automation – for distances, positions, and angles – encoders from SICK Stegmann are often the first choice. Their resolution is in the micrometer range for distance measurements and in the range of a few thousandths of a degree for angle measurements. This allows them to control machines and system components of all types with high precision.

an enormous rise in CNC machining productivity in recent years, however, this is rarely necessary." Commensurate with the wide variety of motor feedback systems and encoders, a number of different shafts, flanges, and housings have to be machined, as illustrated by Markus Mucha: "We have both small production runs of 10 to 50 pieces as well as large runs with 300,000 parts per year. Around 80% are made of stainless steel and aluminum." As the end product, "rotary encoder," indicates, most of the workpieces are round parts, which points to machining on turning machines. Roland Burghart, Head of Machining Manufacturing at SICK Stegmann, explains: "We rarely have purely milled parts. We use our milling machines almost exclusively for subsequent machining of turned parts. But even this use case is rarer and rarer with the complete machining on our TRAUB turn-mill centers."



Top image: After the turning, live tools in the turrets start the milling so that parts come out of the machine completely finished.

Bottom image: SICK Stegmann produces approx. 300,000 of these aluminum housings. The cycle times were able to be reduced considerably with the new machines and optimizations in the last three years.

“We have achieved an enormous rise in CNC machining productivity.”

Markus Mucha, Head of Production and Facility Management

to measure the speed, on the one hand, and detect the position of the motor shaft, on the other hand. The extremely fast data transfer between the motor feedback system and the speed controller ensures smooth elevator motion, for example, or mirror-smooth surfaces and edges on workpieces from machine grinding processes. They also enable the high-precision

High-quality in-house manufacturing The foundation for the high quality of SICK Stegmann products lies in the mechanical manufacturing. Markus Mucha, Head of Production and Facility Management, explains: "We machine all of a rotary encoder's components that determine its accuracy in-house. We only use external suppliers to deal with bottlenecks. Since we achieved



The new product building
in Donaueschingen

Turning and milling on a single machine

Complete machining is an important subject for the Head of Production, Markus Mucha, when it comes to increasing the productivity of CNC manufacturing. In this regard, he was able to make considerable progress together with the workshop team around Roland Burghart. The pool of machines played a significant role in the process. These are dominated by turning machines manufactured by TRAUB, with which SICK Stegmann has long been maintaining a partnership. Roland Burghart, having already worked there for more than 40 years, remembers cam-controlled machines from the Reichenbach-based manufacturer from his apprenticeship period in the hall: "The quality of the machines was even impressive back then. However, our new TRAUB sliding and fixed headstock lathes deliver performance that brings true joy to a machinist."

The ten turning machines at SICK Stegmann include five TRAUB swiss type lathes from the TNL series, and three TRAUB TNX65/42 turn-mill centers. "We have continuously upgraded our fixed headstock turning range with the three latter machines since 2011, and we have another order pending," declares Markus Mucha. "With this machine type, we can machine up to a diameter of 65 mm from the bar and cover more than 90% of our tasks in the fixed headstock turning range." There are currently around 200 different articles machined on the TNX65/42 "Most of these are fully machined," highlights the Head of Production. "The live tools perform the required milling operations perfectly so our parts come out of the machine completely finished, they go to the washing system, and then they go directly to assembly. In the end, we profit from the shorter idle periods and setup times, as well as the reduced manufacturing costs. In the process, the quality from not having to change machines is even better than with subsequent machining on a turning and milling machine."

Versatile turn-mill center

The TRAUB TNX65/42 is a turn-mill center designed to be modular, compact, and low-vibration with a generously sized work area. The 60° incline on the bed ensures good accessibility and chip removal. The machine can be equipped with two, three, or even four tool carriers, or even with a milling unit with two tool carriers. The CNC specialists at SICK Stegmann decided on the three-turret variant – but "fully equipped" as noted by Roland Burghart. "Every turret has an independent Y axis, and each of the respective ten stations can be equipped with live tools. A 3-m bar loader supports automated material replenishment." All three of the tool carriers can be used at both identical spindles of the TNX65/42 simultaneously and independently. They achieve high accuracy and geometry/position tolerances for their machining results. Due to the quality requirements, the machining uses oil as the cooling lubricant, which has also proven itself, according to Roland Burghart, in the achieved surface quality and tool lives. Every turning machine at SICK Stegmann is also equipped with a cooling lubricant temperature control.

"IT6 tolerances are not a problem for my CNC team," says the Head of Machining Manufacturing, who thinks the world of his employees: "We work in three-shift operation from Sunday evening to mid-day Saturday, and thus always have qualified individuals available at any time – day or night – to program, setup, and troubleshoot any of the machine groups. As a result, we do not experience long standstill times."

The person in charge of CNC considers it a significant advantage that all of his TRAUB machines use the same control concept. This means that every machine operator is well versed in the details of programming every machine, and can tease out the final seconds of optimization, which can ultimately be seen in the achieved increase in productivity.

Increased productivity

A solid example of this is the motor feedback system, HIPERFACE®, a SICK Stegmann product that sells at large volumes. Around 300,000 aluminum housings, which exist in four variants, are produced throughout the year in Donaueschingen. Four years ago, the production of half of the housings had to be contracted out to an external service provider. With the new turn-mill centers and the associated optimizations, the CNC department is able to manufacture all of the housings in-house – without having to significantly expand the machine capacity.

The utilization of CNC machining has increased in the process, because the team around Roland Burghart has since developed a reputation as turning specialists in the Group. This had led SICK Stegmann to also machine products for other units in the Group. These are mostly outside of the traditional spectrum of parts, made of stainless steel, titanium, or Hastelloy, and pose a significant challenge, as the Head of Production explains: "Even if some of these jobs make us sweat, we have been able to find a solution for all of them so far. That is definitely a source of pride for us."

The turning specialists elicit the maximum potential of their machines. For example, they now manufacture gears on the TNX65/42 and the swiss type lathe using hobbing, which significantly reduces the cycle time. Before, the parts were sent out for gear cutting after the turning.

Roland Burghart's team does not shy away from forging new paths either. They recently started using a rolling head on the TNX65/42 to machine threading for a new SICK product. Markus Mucha affirms the success: "Our Group customers were so happy with the quality and costs that we are now the second supplier for this part alongside a renowned turned parts manufacturer."



For more than five decades, the products of SICK STEGMANN GmbH have been making sure elevators arrive at the right floor, gantry cranes are positioned properly, and electric motors can operate at low energy.
Photo: SICK STEGMANN GmbH



Sensors for every requirement

Ranging from plant to logistics automation, and down to process automation, SICK is among the leading manufacturers of sensors. Founded in 1946, the company today has nearly 50 subsidiaries and assets, and is well represented around the globe. In the 2013 business year, SICK employed more than 6,500 people worldwide, and achieved more than 1 billion euros in Group sales. The largest subsidiary in the Group is SICK Stegmann GmbH in Donaueschingen, which produces motor feedback systems for drive technology and encoders for machine construction. Around 400 employees work there in design, engineering, CNC manufacturing, and assembly.

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TECHNOLOGY INTEGRATION AT ITS BEST

INDEX has developed a technology package for bevel gear hobbing, which consists of a special control cycle and four INDEX cutter heads with module-dependent inserts. Equipped with these features, the INDEX R200 and R300 turn-mill centers become gear cutting machines on which spiral bevel gears (module from 0.6 to 4 mm) can be produced – also from bar stock.

For a long time, there have been turn-mill centers at INDEX that master the two chipping techniques almost equally well. Grinding technology is also fully integrated on various INDEX machines. INDEX now offers a technology package that also makes the INDEX R200 and R300 turn-mill centers full-fledged gear cutting machines. By hobbing using a continuous indexing method – which corresponds to the Klingelnberg Zyκλο-Paloid® method – spiral bevel gears can be produced with constant tooth height in a module range of 0.6 to 4 mm, all in a single setup. Compared to the conventional process chain with classic gear cutting machines, users can achieve shorter cycle times and better geometry and position tolerances. And it is much more flexible.

The starting point of this development lies in its manufacturing, governed by the principle: Quality-determining components are made in-house.

When the tool holder production was reorganized several years ago, the decision was made to produce the required bevel gears in-house. After all, their quality is largely responsible for smooth running, the transmissible torque, and wear. Since no sufficiently productive, modern gear cutting machine was found on the market for these parts, the management decided to upgrade the technology of its own turn-mill center accordingly.

To sum it up: The technology integration was so successful that INDEX meanwhile covers its high in-house demand for bevel gears using an INDEX R200 and is now offering the technology to the broad market. Dr. Volker Sellmeier, Head of Technology Development, explains: “My team is committed to offering our customers a significant added value through the integration of machining processes such as gear cutting. We have achieved this with the new INDEX method for bevel gear hobbing, which enables complete machining on one machine. Because you can achieve significant advantages in terms of cycle time, process, and quality.”

Bevel gear cutting requires a machine with high rigidity and a B axis as the basis. Due to their excellent static, dynamic, and thermal properties, the innovative turn-mill centers of the INDEX R-series sell themselves, particularly when they are equipped with the “bevel gear hobbing” technology package. Their axis configuration and equipment with two milling spindles on Y-B axes with hydrostatic bearings make it possible to machine on the main and counter spindle simultaneously in five axes. However, according to Dr. Sellmeier, this is not necessarily limited to just the R machines: “In principle, it is possible to transfer this technology to other machines, such as the INDEX G220. For mass production, it is absolutely possible to port the technology package to a multi-spindle turning machine.”

Of particular importance are the tools that are developed and distributed by INDEX. Two cutter heads are required per bevel gear. These cutter heads differ slightly in their cutting circle radius to produce the longitudinal crowning. INDEX offers the cutter heads in four different sizes that can be fitted with up to six carbide inserts and feature internal cooling. In contrast to the classical Zyκλο-Paloid method with a two-blade cutter head, the INDEX method uses two separate cutter heads per bevel gear.

“The complete machining of bevel gears on a single machine provides the user with considerable added value.”

*Dr. Volker Sellmeier, Head of
Technology Development at INDEX*

Advantages of bevel gear hobbing on the INDEX R200 & R300



The INDEX R200 and R300 turn-mill centers have a main and counter spindle. There are two tool carriers in the work area that each have a motorized milling spindle. The axis configuration makes machining possible on both spindles in five axes.

Dr. Sellmeier explains: "With two separate cutter heads, we can improve cutter head mobility, which allows us to achieve an increase in cutting performance and more freedom for contact pattern correction."

The control cycle developed by INDEX is another essential part of the technology package. There, the user enters the same parameters as on a conventional gear cutting machine. These include, for example, machine distance, eccentricity and auxiliary angle. The cycle translates these values into the movements of each axis so that, in the end, the same relative movements are effected.

While the workpiece has to be set up on several individual machines in the classical gear cutting process chain, INDEX's approach is to run all the operations on the turn-mill center. The bevel gears are

turned, drilled, milled, and finally cut on a single machine. Even brushes for deburring can be set up. The soft machining process is thus completely autonomous with a gear quality of IT5 in a reliable process. This is then followed by hardening. A final finishing process is usually required only for the installation dimension and the polygonal shaft/hub connection.

The benefits can already be seen with the materials usage. Since the INDEX R-series can handle bar stock, automated operation is supported even without a workpiece handling system. An integrated gantry-type removal system is available for automatic

Throughput advantage

- Replacement of several machines with one INDEX R200/R300
- Machining from bar stock possible
- Reduced cycle and setup times
- Tool magazine with sibling tools

Process advantage

- Front and rear end machining
- Automatic parts removal
- Easy and stable clamping when machining from bar stock
- Machine can not only be used for gear cutting, but also for turning, drilling, milling, tapping, brushing (deburring), internal/external grinding, and measuring

Quality advantage

- Minimization of re-clamping errors
- Very tight geometry and position tolerances, achievable through complete machining in one setup
- Rear quality of IT5 in a reliable process



parts removal. The complete machining results in a clear advantage in cycle time. Dr. Volker Sellmeier provides figures: "When we machine the typical bevel gears with module 1.15 mm and approximately 25 teeth for our tool holders completely from bar stock, we achieve a cycle time of less than 3 min. The share of gear cutting amounts to about 30 seconds."

While conventional gear cutting machines do not have a tool change magazine, the R200 and R300 allow the stocking of sibling tools, among others, for setup when needed, thereby allowing autonomous production over several hours. Complete machining also brings with it benefits to quality. Because the gearing and the polygonal shaft/hub connection are created in one setup, re-clamping errors are avoided and tight geometry and position tolerances are maintained.

The investment is also relatively low compared with specialized machines. With its gear technology, INDEX addresses both contract manufacturers that need to produce small lot sizes with high flexibility, and mass producers that want to produce bevel gears in large quantities at minimal cost.

GearEngineer can calculate the target measurement data for the edge topology. The data is loaded on a 3D coordinate measuring machine for target/actual comparison. The measured deviations can easily be entered in the INDEX control cycle, which automatically calculates the corrections for the machine setting data.



INDEX MS32C2 & MS16 Plus

The upgrades to the two multi-spindle machines facilitate an expanded technical and economical field of application as well as custom, customer-specific configurations.

VERSATILE SERIES
PRODUCTION



18.5" TOUCHSCREEN
NEW:
Xpanel – i4.0ready,
including new control
INDEX C200 sl

THE CORE OF THE MS32C2:

6 liquid-cooled motor spindles with synchronous technology



Technical data

Work spindles	6
Max. bar length	32 mm
Max. speed	7,000 rpm
Max. power	9.5 kW
Max. torque	32 Nm
Tool carriers max.	12
Slide travel X	73 mm
Slide travel Z	120 mm
Slide travel Y	42 mm
Synchronous spindles	1
Max. speed	6,300 rpm
Max. power	8 kW
Max. torque	14 Nm
Slide travel Z	120 mm
Rear end machining tools	3
Dimensions, L x W x H in mm	3329 x 2032 x 2854



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The **INDEX MS32C2** multi-spindle turning machine – with its support for custom configurations with up to 12 cross-slides, Y axes, synchronous spindles, and additional options – can be used for highly productive manufacturing of bar parts up to 32 mm and chuck parts up to 60 mm.

The **INDEX MS16 Plus** wants to do away with the faster, but more labor-intensive to set up, cam-controlled multi-spindle turning machines. It scores points not only because it combines the extreme speed with the flexibility of CNC technology, but also thanks to its compact design (1.3 m wide), it only requires a small installation area.

Flexibility with system.

Live tools and auxiliary equipment can be mounted on all of the slides per spindle position in both multi-spindle machines, and together with the C axes of the work spindles, they open up versatile manufacturing capabilities: Off-center drilling, thread cutting, inclined drilling, cross drilling, deep-hole drilling, contour milling, hobbing, and multi-edge turning are only a few of the many possibilities.



NEW ON THE PLUS VARIANT:

Spindle clearance up to 22 mm

VARIABLE USE

Free selection of grooving slides, drilling slides or cross-slides

Technical data

Work spindles	6
Max. bar length	22 mm
Max. speed	10,000 rpm
Max. power	15 kW
Max. torque	18 Nm
Tool carriers max	12
Slide travel X	45 mm
Slide travel Z	70 mm
Synchronous spindles max.	2
Max. speed	10,000 rpm
Max. power	12 kW
Max. torque	14 Nm
Slide travel Z	140 mm
Rear end machining tools	
Max. / live	3 / 2
Dimensions, L x W x H in mm	2599 x 1300 x 3044

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The tool holder repair service

FAST, COMPREHENSIVE AND PERSONALIZED

To keep a machine standstill caused by a worn tool holder as short as possible, INDEX-TRAUB has expanded its service portfolio again. For a quick and free pickup service and repair of outside tool holders, »My Infoshop«, a new, personalized customer portal is launched.



INDEX and TRAUB have been focused on solving problems to reduce machine standstills to provide the best possible support for customers. As a result, a center of excellence for tool holders was established in 2008 at the Reichenbach location. The core in this area is modern assembly in which the workstations and the material flow were optimized using value stream mapping to reduce idle periods and waste. Because standstill times can be reduced for customers with shorter repair times.

After arriving at the Reichenbach factory, the holder to be repaired "flows" to disassembly without any bureaucratic hurdles. In general, after receiving approval from the customer, repair can begin immediately. This depends, for example, on the individual maintenance agreement in which the customer had previously stipulated the value limits up to which the customer authorizes a repair without a cost estimate or consultation. Since the required material is already stored in the assembly area, repair can begin immediately – a reduction in administrative effort, avoiding any loss of time by waiting for customer approval. After the repair, the holder is subjected to the same quality assurance process as every new holder. It goes through a procedure on the run-in test bench based on the many years of experience in custom spindle manufacturing. The results are archived as with the report for the geometric test under the serial number of the tool holder. This makes it possible to account for quality control across the entire lifecycle of the holder without any gaps, which is evaluated in the quality circle and used to make improve-

ments in the design and production planning. The customer therefore receives the same warranty as with new holders. The holder is sent to the customer in its original packaging, which safely protects it from being damaged during transport. The average time for the repair process for INDEX-TRAUB standard tool holders from goods receipt in Reichenbach to shipping is less than five workdays. And it is even faster when the customer uses our free pickup service. If the repair is requested before 12:00 a.m., the holder to be repaired is picked up on the same day, and delivered to INDEX-TRAUB the next day (by 9:00 a.m.). For jobs like this with advance notice, all of the necessary items (materials, working papers) are already prepared in the repair department in Reichenbach to avoid any loss of time from preventable idle periods. "In these cases, the machining time can be reduced to an average of three days," according to Alexander Hoffmann, the product manager in charge of tool holders.

Alternatively, INDEX and TRAUB also offer replacement holders in many cases. In this case, a replacement holder is delivered to the customer immediately. They then send their defective tool holder in to the factory. If it can be repaired, the customer receives a credit for the replacement holder or has the original tool holder repaired. The replacement holder service further reduces the standstill time for the machine.

Another benefit to the customer is the repair of products from other manufacturers. All tool holders are repaired

that fit and are compatible with INDEX-TRAUB machines without exception. This makes it easier and faster for customers to handle repairs, since only a single contact is required for their tool holders. The basis for these new services is a highly motivated service team of qualified employees who are always working to improve their results. Because even service that is already good can and must find ways to improve if your goal is to lead the competition as a full-service tool holder supplier.

Started as an information and service page for in-house tool holders, the infoshop has gradually grown to an established equipment portal with more than 8,000 visitors per month. More than 80,000 articles consisting of INDEX-TRAUB tool holders, spindle reductions, and machine spare parts are now online.

And with "My Infoshop," a new customer portal is now available. Information about offers, jobs with their current status, and a history of repair jobs can be accessed around the clock. Tracking of delivered jobs is also available.

Test our established and new service offerings at:
www.infoshop.index-werke.de

CONTACT:

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Technical advice: +49 7153 502-9854
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FAIRS & EVENTS

METALMECANICA // BRA

July 22-25, 2015, Maringá

MSV // CZE

October 5-9, 2015, Brno

MERCOPAR // BRA

October 6-9, 2015, Caxias do Sul

AMB CHINA // CHN

October 14-16, 2015, Nanjing

SIANE // FRA

October 20-22, 2015, Toulouse

NORTEC // GER

January 26-29, 2016, Hamburg

SIMODEC // FRA

March 1-4, 2016, LaRoche

You will find further
exhibition dates online:
www.index-werke.de

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