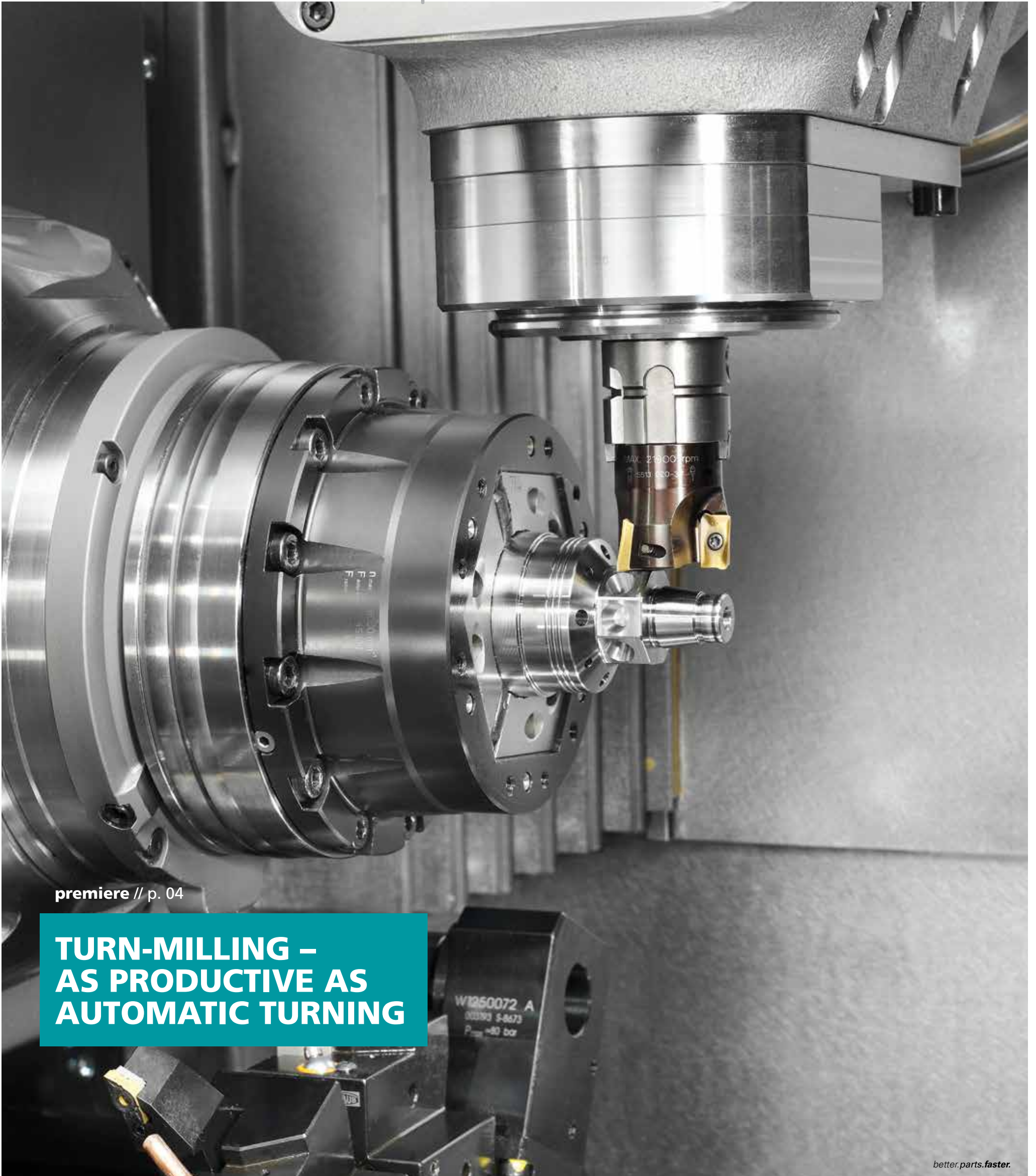


# TURNINGpoint



premiere // p. 04

**TURN-MILLING –  
AS PRODUCTIVE AS  
AUTOMATIC TURNING**

# better. pa

Dear customers and friends of the company,

Under the impact of many global challenges – of a political, economic and business nature – the economic climate appears worse than the situation really is. While the effects on consumption are low or virtually non-existent, they are quite noticeable in the propensity to invest. In this respect, each company requires special commitment and effort to ensure its stable economic development in 2016.

So it's time also to think about increase in productivity and efficiency. Against this background, we look forward to presenting you this fall numerous new developments that can significantly contribute in this regard to your production. In addition, our whole product range is aligned with Industry 4.0 technologies that actively support your internal order processing.  
Time to get inspired!

With the second generation of the INDEX G200 (see cover picture), we systematically continue the development of a successful concept that has been sold more than 2,200 times. New features include an additional turret, two additional Y-axes and a significantly enlarged work area. All this comes at a virtually unchanged footprint.

Productivity increases of 30% and more should not be uncommon in comparison to the first G200 generation.

Starting in December 2016, the extended modular system of the turn-mill center INDEX G220 will include a motorized milling spindle version with HSK63 and a magazine accommodating 100 tools.

Also the second generation of the loading magazine INDEX MBL65 builds on its successful predecessor with many new technical details. The recognized excellent guide properties of the MBL have been enhanced to include distinctly simplified setup capability. This new magazine requires no hydraulic system.

Another alternative in the field of multi-spindle machines is the new bar loading magazine INDEX MBL40-6. It combines the good damping properties of a hydrodynamic bar guide with cycle time benefits that result from drilling of bars during main time and high realizable speeds.

The modular system of the INDEX MS16C Plus has already been extended in the course of this

year by a double synchronized spindle. In double three-spindle operation, the MS16C Plus opens up new possibilities that make the replacement of cam-controlled multi-spindle machines economically feasible.

Likewise, the TRAUB TNL18 dynamic has already been introduced during the year. Based on the new control generation TX8i-s V7, it allows cycle time reductions of up to 20% without extra cost.

The new TRAUB control generation TX8i-s V7 moreover provides the basis for i4.0 ready and comes with extensive functionalities within the Xpanel product group.

We hope you enjoy reading the following pages and look forward to welcoming you at our booth in September during the AMB in Stuttgart or the IMTS in Chicago.

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





Discover the world of turning.



Visit us at the major trade fairs for the metalworking industry and discover economic solutions for your business success. Live machine premieres, software solutions for Industry 4.0, diverse machining technologies and a unique selection of tailored accessories are just a few of the many highlights at our booth.

We look forward to your visit in Stuttgart or Chicago.

Still need a ticket?

Just send us an email to: [marketing@index-traub.com](mailto:marketing@index-traub.com)



The new INDEX G200. Flexible and productive.

# TURN-MILLING – AS PRODUCTIVE AS AUTOMATIC TURNING

The new INDEX G200 is the logical development of a proven successful model. From the machine layout with increased turning length through an additional tool carrier to the capacity of the milling spindle, it meets all the requirements of a modern turn-mill center both for complete machining of bar stock and of chuck parts.

**INDEX G200**



## Xpanel - i4.0 ready

- > 18.5" touchscreen
- > Based on: Siemens S840D sl
- > Industry 4.0 - Features

More details:  
[index-traub.com/xpanel](http://index-traub.com/xpanel)

660 mm Drehlänge

## Y-axis in all 3 tool turrets

- > a total of up to 42 VDI25 stations
- > high rapid traverse rates of up to 60 m/min



More information:  
[index-traub.com/g200](http://index-traub.com/g200)



Download brochure  
> Scan QR-Code



**05**  
INDEX G200  
premiere

### Built-in milling spindle

- > 360 degrees - B-axis
- > max. 7,200 rpm, 22 kW & 52 Nm
- > HSK-A40

### HIGHLIGHTS

- > Generous work area designed for turn-mill machining
- > Up to 3 tool carriers with Y-axis available on main and counter spindles
- > Simultaneous machining with up to 4 tools possible
- > Powerful and dynamic milling spindle  
(max. 7,200 rpm, 22 kW and 52 Nm, HSK-A40, 360° B-axis)
- > High acceleration and fast rapid traverse rates up to 60 m/min
- > Bar capacity D65 mm / chuck D165 mm
- > Economic complete machining with high cutting performance
- > Compact installation dimensions
- > Including Xpanel - i4.0 ready operating system

The new INDEX G200. Flexible and productive.

# MORE PERFORMANCE AT MINIMUM SPACE



The second generation of the successful INDEX turn-mill centers G200 is ready: the new G200 is a compact machine offering significantly higher performance at virtually the same footprint as its predecessor. The redesign of the machine resulted in an increase of the maximum turning length to 660 mm (previously 400 mm).

A striking change compared to the first generation G200 relates to the machine bed that is now arranged vertically. This allows the machine more space in the work area, which the INDEX developers used to implement a second lower tool carrier to increase the productivity of the machine. Reducing cycle times by 30% compared to the first G200 generation is well within the bounds of possibility with appropriate workpieces. The two turrets are arranged in mirror image, and each has an independent Y-axis (+/- 45 mm). They have 14 stations, which can be equipped with live tools. Tools with internal coolant supply (up to 80 bar) can be used as well.

A special feature is the upper tool carrier, which has a Y-axis (+/- 65 mm) and a 360-degree swiveling B-axis. It also accommodates 14 tools, but additionally has – as already proven in the previous G200 – a milling spindle at the rear. Its drive has undergone a considerable power boost: while the previous version was limited to a speed of 2,000 rpm, the new milling spindle provides speeds up to 7,200 rpm (power 22 kW, torque 52 Nm at 25% duty cycle).

The tool carriers have even more features to offer. For example, the upper turret head can be swung into a horizontal position about the B-axis and then moved into the work area up to a position of 30 mm below the spindle center. In this position, the turret can machine towards the main or counter spindle, or even simultaneously depending on the application. This position is often used to perform face machining with straight tools.

Another feature of the lower tool carriers is the so-called parking positions. The turrets are designed to move to the left or right to a position that is outside the work area where there is no risk of collision. This allows the other tool carrier to work absolutely freely over the entire turning length. Also, with 845 mm, the slide travel of the upper tool carrier is dimensioned in the Z-axis such that the tool covers the complete turning length of 660 mm – without having to rotate the B-axis by 180°.

## • Including Xpanel® - i4.0 ready

• Xpanel – the cockpit for easy integration of the machine in your business organization.

## • Focus on production and control – Industry 4.0 included.

• The Xpanel operating concept provides access to networked production. With Xpanel your staff always has all relevant information for efficient production right at the machine. Xpanel is already included in the standard and can be individually extended. So you can use Xpanel as you want it for your business organization – that's Industry 4.0 tailored to your needs.

## • Future-proof.

• Xpanel integrates the latest control generation SIEMENS S840D sl and can be operated intuitively via a 18.5" touch screen monitor.

## • Productive.

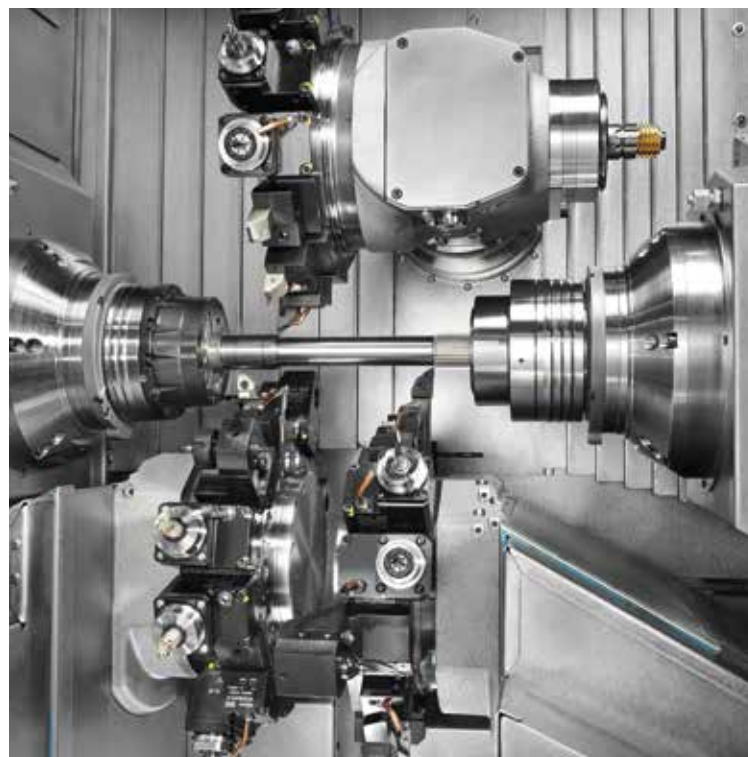
• Maximum performance through comprehensive technology cycles and programming screens, e.g., for optimum turning, milling and drilling, especially when using several tools simultaneously.

## • Intelligent.

• The machine always starts with the control home screen. Other functions can always be displayed on a second screen, and the operator enjoys direct, activity-related assistance already in the standard version, such as workpiece drawing, setup lists, programming tools, documentation, etc., right at the machine.


## • Virtual & open.

• With the optional VPC box (industrial PC), Xpanel opens up the world of Virtual Machine directly at the control. Thanks to the VPC box, the machine can also be fully integrated into your IT structure.









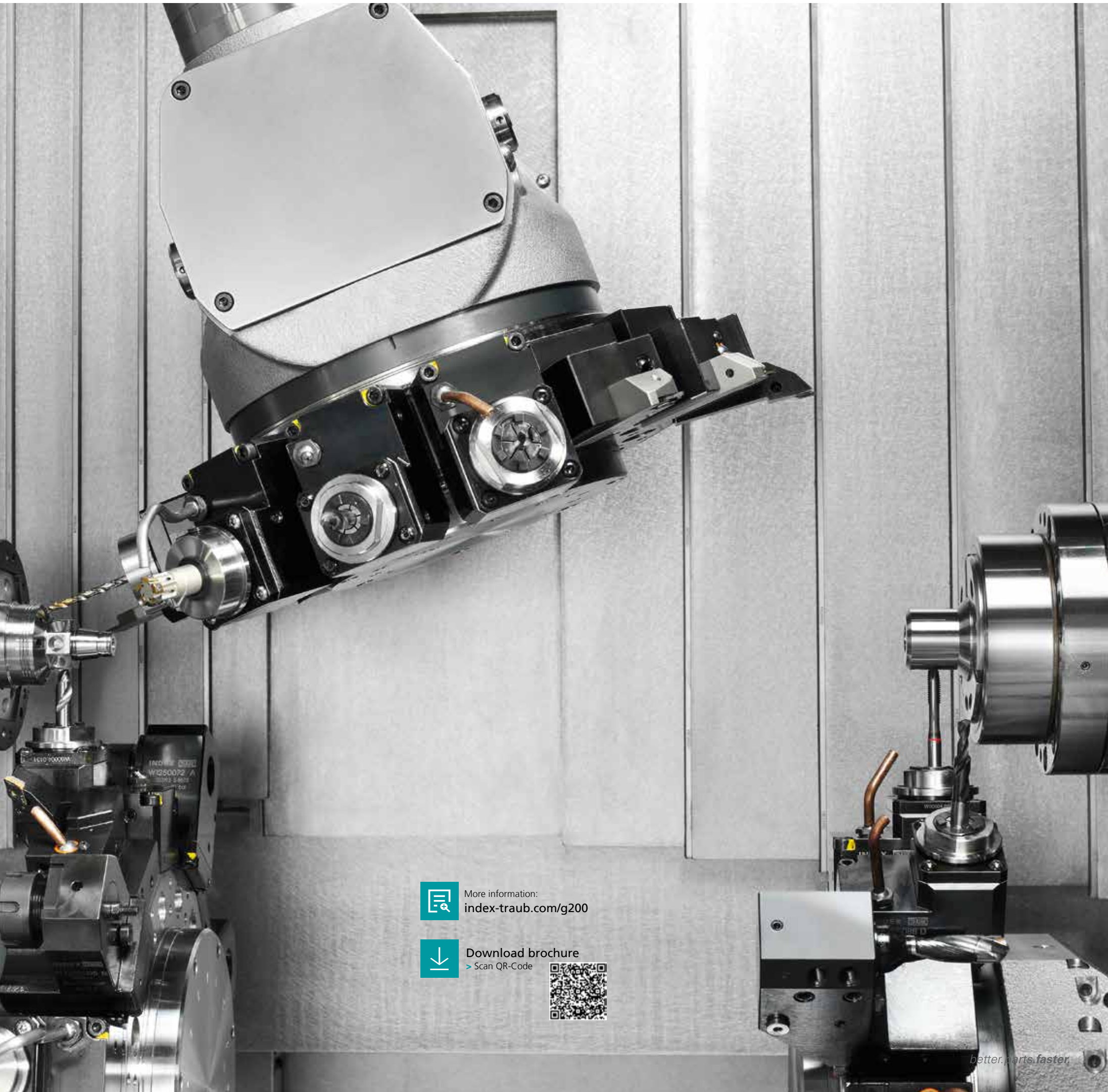
 **End piece**  
Material: 44SMn28  
Dia. 39 mm  
L: 92 mm





 **Switching shaft**  
Material: 16MnCr5  
Dia. 60 mm  
L: 170 mm



 **Base body**  
Material: Al  
Dia. 38 mm  
L: 95 mm



 More information:  
[index-traub.com/g200](http://index-traub.com/g200)

 Download brochure  
> Scan QR-Code





Contract manufacturer masters the balancing act between high precision and productivity

# THE “ $\mu$ ” GOVERNS IT ALL

When turned parts in top precision are required, Mattig is one of the prime addresses. With enthusiasm, the staff squeeze out the last micron of accuracy out of their machines and have acquired an excellent reputation among manufacturers of watches, sporting pistols, cars, motorcycles, and measuring instruments.



A strong team: Maria Kriechhammer with Johann Hoeflmayr (left) and Marco Holzner

“When our form tester indicates a roundness of 0.5  $\mu\text{m}$ , it brings joy to my heart,” admits Johann Hoeflmayr. The certified industrial master craftsman is a technician with heart and soul – and a proven specialist for turning. The higher the requirements, the more aroused his ambition to find a workable and economically viable solution.

It is therefore no surprise that Johann Hoeflmayr proposed a stylized  $\mu$  sign as the company logo, when he founded Mattig Precision GmbH in 1995 with his partner Andreas Kriechhammer, a tech-savvy businessman, in Obertrum, Austria. Since then, the “ $\mu$ ” governs it all. Johann Hoeflmayr has passed his enthusiasm for complexity and precision on to the whole team, so Mattig is traded as authority for high-precision turning among insiders.

In 2011, Johann Hoeflmayr passed his position as production manager at Mattig to Marco Holzner, but did not retire at 65 years – instead he started his own business. “I became a young entrepreneur,” he grins, “at least that’s what the Chamber of Commerce classified me as.” As such, he is still committed to precision and assists his successor Marco Holzner.

The team also includes Maria Kriechhammer, the wife of the com-

pany’s founder who died in 2004. She has assured the continued existence of the company after the death of her husband: “I know how committed our employees are to the matter, and so I wanted to support the company as far as I can. For the operational business, she hired additional support: since April, the company has been headed by Dipl.-Ing. Roman Gratzer, who gathered management experience in technology and commercial aspects at a dental supplier in recent years.

## Product fineness that can hardly be measured

Diameter accuracies up to 5  $\mu\text{m}$  – in fine turning even up to 4  $\mu\text{m}$  – are no problem for Mattig. Roundnesses are achieved within a tolerance of 2  $\mu\text{m}$  just as cylindrical shapes within 3  $\mu\text{m}$ . “At a flatness of 1  $\mu\text{m}$ , we come to the limit of what can still be measured,” explains Marco Holzner.

The reference list of customers is quite diversified: besides major automotive suppliers such as Bosch Diesel Systems, the motorcycle manufacturer KTM from neighboring Mattighofen is among the customers that account today for the majority of sales. “At KTM, we could convince through parts with special surface quality,”





Photo: Mattig

Johann Hoeflmayr remembers the beginning of the partnership. "We are able to achieve a surface quality of  $Rz = 2 \mu m$  on the lathe. If that is not enough, we are reworking on a lapping machine down to  $Rz = 0.6 \mu m$ ."

“We are able to achieve a surface quality of  $2 \mu m$ .”

Johann Hoeflmayr,  
Production manager

#### Small – but its finest

Among the fans of Mattig's precision art are some small customers of a very special kind, such as the family company Habring Uhrentechnik OG located in the Carinthian municipality of Völkermarkt. Habring, effectively a Hidden Champion of small watch makers, has already won three times the Grand Prix de Genève d'Horlogerie (GPHG) – the last time in 2015 in the category of Petite Aiguille d'Or awarded for watches under 8,000 Swiss francs. Mattig supplied essential parts for the award-winning new watch model "Felix", such as the balance rim, the crown wheel core, the case including the barrel and drum, and the cover for it. "In one of these parts, we have to maintain a tolerance of  $5 \mu m$  even several times. But the other ones are all demanding as well," emphasizes Johann Hoeflmayr. "So we also feel a bit awarded," reveals the Senior Consultant, as he is called by Maria Kriechhammer, the boss.



Similarly, the high-precision turning specialists from Obertrum cheer at the Olympics and world championships, when the air pistol competitions are held. After all, they also manufacture key components for Steyr Sport, "the producer of the best air pistols in the world", as Marco Holzner emphasizes. "This gives the athletes the best chance to win medals."

#### More machinery meant more success

While Mattig Precision has achieved a lot of successes by now, the start was quite difficult. "Due to limited funds,

we were able to buy only some used CNC lathes. "A real upturn came with our first new CNC lathe, a Traub TNC 65DGY, with Y-axis and 65 mm bar capacity," Johann Hoeflmayr recalls the company's past in 1998. "It allowed us to expand our production capabilities tremendously." This was followed by Traub lathes of the TNK and TNL series for different diameters, and a TNX65, "a super-machine," as Johann Hoeflmayr calls it, "with a B-axis and a high-performance milling spindle. We bought it during the crisis in 2009, and it provided us additional orders through its extensive machining options."

Hoeflmayr and Holzner agree, "All of these machines rank undoubtedly at the top in terms of performance, and the service is excellent. We have had only good experience with Traub. And we should be positioned to judge on that. The fact that the Traub machines are so well suited for Mattig is partly due to the stringent requirements. The turning and milling parts are complex, and the lot sizes are between 100 and 5000, the annual volumes up to 20,000 pieces. The usual materials include steels such as 100Cr6, 42CrMo4, 18CrNi8, 50CrMo4, HS 6-5-2, but also titanium and aluminum.

The most recent purchase was a new Traub TNL18-9 that is tailored to the diverse requirements of typical long and short turned parts. It has nine linear NC axes and a counter spindle, which is identical and oriented to the main spindle and mounted on a separate X-Z slide. This offers comprehensive machining options up to a bar capacity of 20 mm. Although the machine is still in the start-up phase, it is already booked out for three months according to a statement from the management. Next, Mattig will probably approve an investment in the larger diameter range to secure further growth.

Every employee has internalized the "μ" and focuses on optimal precision.



#### Core competence: precision

Mattig Präzision GmbH, with some 50 employees, is a renowned producer of high-precision turned parts with tolerances in the micrometer range. The small and medium lots are produced for the automotive industry as well as for medical engineering, motor sports, sports equipment, watch industry, and general engineering. The machinery enables reliable production of high-precision parts from bar stock of 0.8 mm to 65 mm diameter. Chuck parts can be machined up to 150 mm diameter. Mattig supplies the products also hardened and surface coated. In addition, the company located in the Salzburger Land also handles assembly and supports in the development of prototypes.

#### MATTIG Präzision GmbH

Fürnbuch 5  
A - 5162 Obertrum am See  
office@mattig.co.at  
www.mattig.co.at

Photo: Habring  
Uhrentechnik OG

TRAUB TNL18 dynamic sliding/fixed headstock automatic lathe

# MORE DYNAMICS - SHORTER CYCLE TIMES

Now workpieces can be produced even more economically with the TRAUB TNL18 dynamic. Optimization of the CNC control of the TX8i series, in combination with more dynamic drives, allow higher accelerations and rapid traverse rates, resulting in shorter cycle times.

## 3 versions available

- > -7B: with B-axis in the upper turret plus rear end machining
- > -9: with autonomous counter spindle
- > -9P: as value package with control TX8i-p



## More dynamics

Optimization of the CNC control, axis amplifier and servo drives



More information:  
[index-traub.com/tnl18dynamic](http://index-traub.com/tnl18dynamic)



Download flyer  
> Scan QR code



## Spindle / shaft

Tools in use: 17  
Previous cycle time: 98 s  
New cycle time: 93 s

-5%



## Implant

Tools in use: 12  
Previous cycle time: 307 s  
New cycle time: 241 s

-21%





-13%



#### Aluminum housing

Tools in use: 33  
Previous cycle time: 261 s  
New cycle time: 227 s

11  
TRAUB  
TNL18 dynamic  
TX8i-s V7

The latest TRAUB control generation – prepared for Industry 4.0

# TRAUB TX8i-s V7

### Optimized drive train

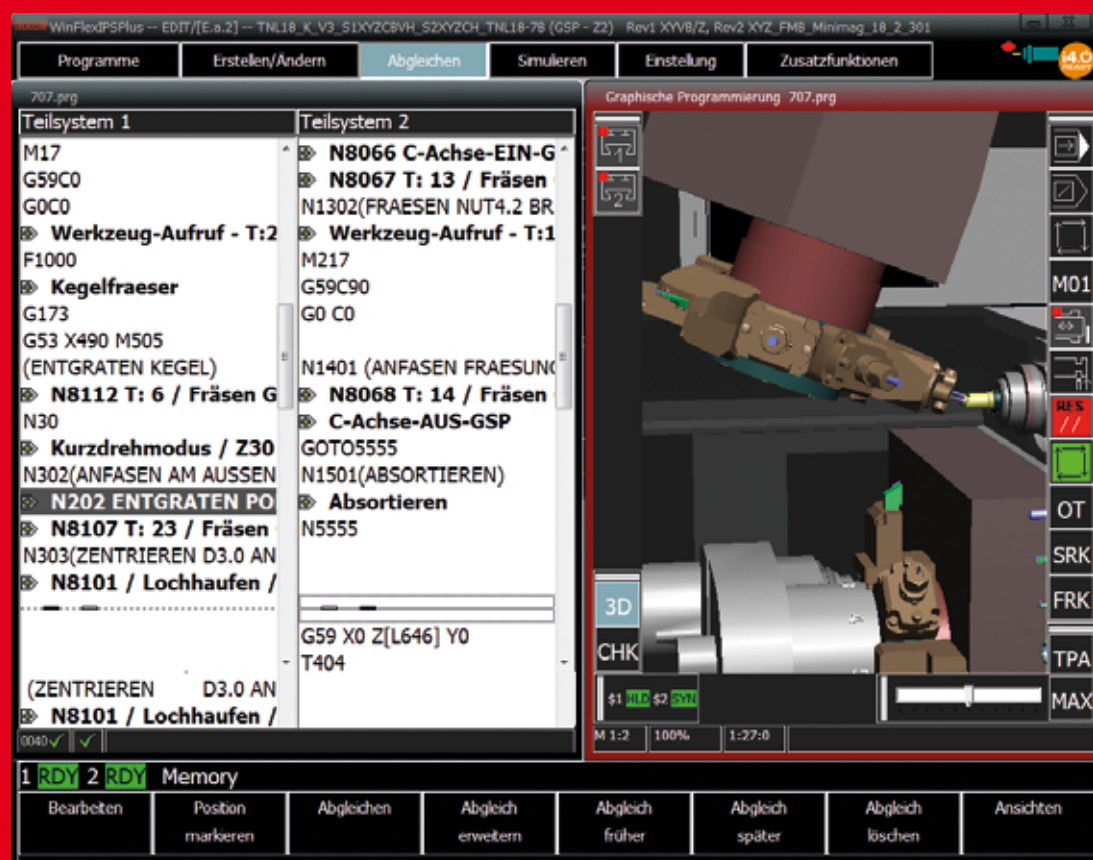
The TRAUB TNL18 dynamic is the result of continuous development. To make the machine perform even more dynamically, the CNC control, axis amplifier and servo drives have now been raised to a higher level, resulting in significantly improved accelerations and top speeds. The increase in performance in the drive train is connected with an immediate increase in productivity. A glance at the technical data reveals: The Z-axis rapid traverse rates of the tool turrets increased from 40 to 50 m/min. The maximum speed of the main and counter spindle rose from 10,000 rpm to 10,500 rpm. With the new drive package, the counter spindle accelerates from 0 to 12,000 rpm in only 990 ms instead of previously 1200 ms, and the tool drive reaches its maximum speed of 12,000 rpm now in 240 ms instead of so far 320 ms. Also the acceleration times of all linear axes have become shorter and are now at 15 ms instead of 20 ms in feed mode.

### Reduced machining times

The rugged mechanical construction of the TNL18 machines enables to fully exploit the accelerations, improved by up to 25 percent, and to significantly increase productivity. Customers who optimize their NC programs accordingly can reduce their machining times by up to 21 percent, while the quality of workpieces remains unchanged. The savings depend also on the complexity of the workpiece. For a "simple" shaft that is machined mostly at constant cutting speeds and with only a few tool changes, the savings are about five percent. There are more starting points for time saving with a geometrically complex workpiece with numerous different turning, drilling and milling operations.

### Higher contour accuracy

The user can use the same NC programs as on the previous machines. Even without individual optimization will he benefit from the new drive train. As regards the machining time, the savings potential is then already around five percent, and an additional benefit lies in the much higher contour accuracy. After all, it is the customer's decision how to utilize the higher dynamics of the TNL18 dynamic.



All TRAUB machines are henceforth supplied with the latest generation of controllers TX8i-s V7. It comes with many convenient features for programming, editing, simulating, setting up and operating. The 15" multitouch display allows conventional menu operation using a keyboard, but can also be operated by touch functions. And, with the TX8i-s V7, the user is well prepared for Industry 4.0 and future requirements. The control is able to provide the user with diverse digital information for editing and passing on – this includes, e.g., online access to manufacturing and setup information. Any user documentation, but also job-related folders, can be retrieved, containing, e.g., NC programs, tool data, and setup sheets.

The operator can view these documents at the control as needed. The control also provides important automation interfaces such as the industrial M2M protocol OPC UA and enables full integration of the machine into the corporate network. This allows i4.0-compliant communication between the machine tool and the measuring machine as well as ERP, MES and quality management systems – regardless of the operating system or platform.

Remote access via VNC (virtual network computing) enables the user to view all on-screen information on a tablet or smartphone. In addition, the operator has access to an external PC, allowing him to retrieve applications from the corporate network directly on the controller display.



More information:  
[index-traub.com/tx8i-s\\_v7](http://index-traub.com/tx8i-s_v7)



better.parts.faster.

Precision machining in North America

# RELIABLE PARTNER



North America is one of the largest and most important industrial markets in the world. Headquartered in Noblesville, Indiana, INDEX Corporation supports numerous customers who rely on the performance of the INDEX and TRAUB lathes and turn-mill centers.

“Our goal is to provide our customers with the most economical machining strategy for their precision turning parts,” says Jeff Reinert, President of INDEX Corporation. “In many cases, the capabilities of INDEX and TRAUB have opened up new markets for our customers, allowing them lucrative deals.”

“We know the advantages that can be achieved by producing difficult parts in one machining step: reduced setup times, shorter cycle times, lower personnel costs, and better quality. And we see ourselves as helping our customers with a maximum of support in the production of workpieces in small to large quantities. This applies not only to the machine but also to customer staff training, spare parts supply, service support, and advice on programming and the best selection of tools and clamping devices.”

From its headquarters in Noblesville, not far from Indianapolis, INDEX Corporation provides technology support, a well-stocked spare parts warehouse, and a reliable service for customers in the US, Canada and Mexico. On 50,000 sq.ft., the modern facilities house a demonstration center, a training center, and a measuring room. Additional service is available nationwide through qualified distributors, including in Canada and Mexico – two very important regions for the automotive and aerospace industries.

To ensure that customers receive the best solution for their manufacturing task, the application engineers of INDEX Corporation realize turnkey projects – even up to workpiece handling. This capability is particularly important for customers who are seeking the most economical production method, but do not have sufficient in-house engineering capacity.

In addition to the NX CAM-based programming system and simulation capabilities, INDEX Corporation also has the latest measurement technology.

An important area of activity is also the training of young employees. INDEX Corporation thus combats the shortage of skilled workers in the field of CNC technology. One component of this training program is the collaboration with the nearby Vincennes University.

Every year, INDEX Corporation trains four to six selected students of production engineering of Vincennes University over a three-week period, introducing them to modern CNC machining technology.

Only the “best of the best” advanced students, who have demonstrated their competence in manual programming, computer-





aided design and basic machine operation, are selected for the program. In each of the last three years, INDEX has hired one student from each group as a new employee.

Since its founding in 1982, INDEX Corporation has established itself in over 30 years as a reliable partner for its customers in the U.S., Canada and Mexico. A nationwide service network and high technical expertise will form the basis for successful marketing also in the future.



**FACTS & FIGURES**

- > 65 employees
- > 1.900 machines in the market
- > 6.500 spare parts on stock
- > Service Center in USA, Canada und Mexico

**CONTACT**

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Noblesville, IN 46060, U.S.A.  
  
Phone: +1 317 770 6300  
sale@index-usa.com  
www.index-usa.com

INDEX Corporation is a member of:



Multi-spindle automatic lathe with two synchronized spindles

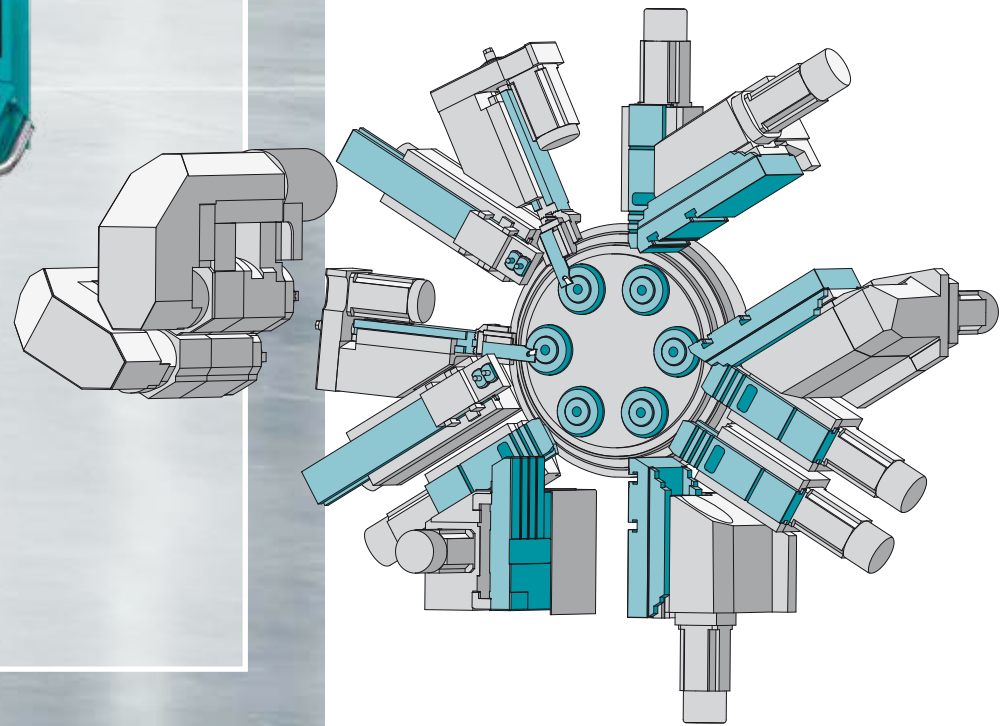
# DOUBLE SYNCHRONIZED

Built from a multi-spindle modular component system, the six-spindle machine INDEX MS16C Plus, combining the speed of a cam-controlled machine with the flexibility of CNC technology, is now available with a double synchronized spindle, opening up new possibilities in the machining of workpieces of simple and medium complexity.



## Layout as a double synchronized machine

- Synchronized spindle in position 5.1 / 6.1
- Cutoff and back-boring slide in position 5.2 / 6.2
- Grooving or drilling slide – 1x selectable per spindle position (1 to 4)
- Extension version with separate cutoff slide 5.0 / 6.0 and pure back-boring slide 5.2 / 6.2
- Cross slide – 1x per spindle position (1 to 4 selectable)
- Configuration options for machining:
  - 6 spindles with double rear end machining
  - Double 3 spindles



## Technical data

Work spindles	6
Max. bar length	22 mm
Speed	10,000 rpm
Max. output	15 kW
Max torque	18 Nm
Max. tool carriers	12
Slide travel X	45 mm
Slide travel Z	70 mm
Max. synchronous spindles	2
Max. speed	10,000 rpm
Max. output	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

## INDEX MS16 Plus – your advantages

- Outstanding dynamics and impressive flexible machining options for low unit costs
- Grooving or drilling slide for maximum cutting performance in record machining times
- Cross-slide for flexible complete machining
- CNC cutoff slide with extended stroke for rear end machining
- Max. 12 tool carriers – 1 or 2 traversing axes
- Max. 2 highly dynamic synchronized spindles with extremely short acceleration and deceleration times
- Freely accessible and setup-friendly work area



More information:  
[index-traub.com/ms16plus](http://index-traub.com/ms16plus)



Play video  
> Scan QR code





INDEX multi-spindle machines now with their own INDEX bar loader

# PRODUCTIVITY BOOST FOR LOADING

The newly developed bar loading magazine MBL40-6 is ideally matched to the INDEX CNC multi spindle lathes. It offers short loading times, a low-vibration bar guide, a large useable speed range – even for machining polygon bars – and a bar feeder in all spindle positions.

Available in two versions: 3300 & 4300  
(bar lengths 1500 - 3300 mm & 2000 - 4300 mm)



Available as bundle or rack  
loading magazine



MBL40-6 for multi-spindle  
machine INDEX MS40C

More information:  
[index-traub.com/mb140-6](http://index-traub.com/mb140-6)

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With the new loading magazine MBL40-6, INDEX complements its portfolio in the MS40C range, now offering the possibility to obtain the machine and the loading magazine from a single source.

At the center is an optimized bar guide that ultimately contributes to increased productivity of the overall package. Thanks to the bar feeder using a pusher with an internal collet, the guide channels can be adapted closely and individually to the diameter of the bar stock. As the guide channels are flooded with oil, the rotation of the bar stock creates a hydrodynamic bearing effect that holds the bar in the center of the respective channel. The result is a low-vibration guide that has a positive effect on the turning quality. This particularly applies to the surface quality and the tolerances of the machined workpieces.

Prerequisite for the use of this guide principle: the bar stock must be predrilled before inserting into the channels. Therefore, a predrilling unit has been incorporated, which is located immediately behind the bundle or rack loading station. As the drilling operation runs simultaneously with the turning operation, the user gains valuable machining time compared to comparable loading magazines.

An intermediate buffer ensures that always a sufficient number of drilled bars are available to supply all spindles. From this intermediate buffer, the bars are loaded into the free guide channel and pushed with their hole onto the

internal collet of the replaced pusher. After the clamping operation, the pusher moves the bar by the electric motor with absolute encoder in any position. When the bar machining is complete, the pusher returns to the removal position, where it removes the remnant from the internal collet and disposes of it.

Of particular importance are the guide channels. They consist of two half shells connected with a hinge and several removable bearing segments. This system allows the pusher to be swung in at a time when the bar is already in the spindle area. This design made it possible to limit the size of the bar loader to a level that exceeds the bar length only slightly.

The bar loader MBL40-6 is suitable for bar diameters from 13 to 40 mm of round stock and for wrench sizes from 12 to 34 mm of polygon bars. When changing to bar stock with a different diameter, it is required to make certain adjustments. However, the conversion effort is kept within limits. In the future, there will be matching loading magazines also for other INDEX multi-spindle machines.

## Highlights of INDEX MBL40-6

- > Setup of loading side and drilling unit during production
- > Drilling of bars during production
- > Drilled bars in the buffer, therefore minimized loading time
- > Hydrodynamic guide concept
- > Low-vibration design
- > Machining of polygon bar stock possible
- > Can be retrofitted to existing MS machines via Unimag interface



# BECOMING WORLD CLASS WITH MULTI-SPINDLE TECHNOLOGY

Cengiz Makina – a manufacturer of precision parts in the vicinity of Istanbul – has supplied parts for injection systems to the automobile supplier, Bosch, since the 80s. The company took a decisive step in improving process reliability and the cost-effectiveness of precision machining in large-scale production with the introduction of INDEX multi-spindle turning machines.



*K. Mert Yilmaz is Managing Director of Cengiz Makina, Turkey. His duties include successfully transferring production to the new locations in China and the USA.*

When Cengiz Basokutan founded his company, Cengiz Makina, in 1981, he only had access to a „garage space“ of about 200 qm. He started making money completing turning jobs on two INDEX cam-controlled machines that had already seen their share of use by that time. One year later, Cengiz Makina had already secured Bosch as a regular customer with their site in the Turkish city of Bursa, supplying Bosch with nozzle bodies for diesel injection systems for high capacity utilization.

15 years later, with the relocation to a 3,500 qm, two-story factory building in the industrial area of Gebze/Kocaeli near Istanbul, Cengiz Makina turned to single-spindle CNC technology. In no time, numerous orders for various CNC turned parts flowed in. When Bosch decided to start common rail production in Turkey in 1998, the tried and tested supplier, Cengiz Makina, was on board. To be able to manage the large scale required for the production runs, the company invested in its first multi-spindle turning machine in 2002, which was to

be followed by many more in subsequent years. New sliding headstock automatic lathes were also procured in parallel: Six TRAUB TNL26 and one TNL12 are now responsible for the precise manufacturing of injection components.

#### **Front-opening construction and fully CNC-controlled**

The decision by Cengiz Makina to purchase three INDEX MS32C multi-spindle machines in 2006 was based, on the one hand, on the good experiences with INDEX TRAUB, and on the other hand, on a new large order from Bosch for nozzle bodies. The performance of the INDEX MS32C was no small factor either.

The MS32C provides six individually driven motor spindles with C-axis functionality, speed control to ensure the optimal cutting rate, favorable chipping, and short machi-

ning times, as well as twelve independently operating, CNC-controlled tool carriers, which can be equipped with one or two travel axes as an option. K. Mert Yilmaz, Managing Director of Cengiz Makina, explains: “For us, the high torque was also a deciding factor, since it allows even difficult materials to be machined reliably.”

This investment was the first step in a successful collaboration between Cengiz Makina and INDEX in the field of CNC multi-spindle technology. In the meantime, of the 31 total multi-spindle turning machines,

“It was a deciding factor for us that even difficult materials can be machined reliably.”

*K. Mert Yilmaz,  
Managing Director Cengiz Makina*

more than half of them are from INDEX – trending upward. Alongside the INDEX MS32C, there are also INDEX MS22C machines – three of which are in eight-spindle configuration. These machines are predominantly used for large-scale production.



### Cost-effective large-scale production

Mert Yilmaz emphasizes cost-effectiveness as a fundamental advantage of multi-spindle technology over single-spindle technology: "Turkey is a low-cost location, and the cost situation has been worsening due to wage increases and the shifts in exchange rates between the euro and the Turkish lira." Thus, he sees the added value per employee as one of the most important figures today. "An employee can operate four single-spindle machines, or one multi-spindle machine. If he operates two multi-spindle machines, which will be the case for us by the end of the year, the investment in this type of machine easily pays for itself." The productivity, which is to say the part output, is also significantly higher. This is enormously important at volumes like those seen at Cengiz Makina, which are currently climbing into the double-digit millions range.

Mert Yilmaz worked at Bosch for ten years before switching to the supplier side in 2009, where he has led the business since 2014. He has witnessed the technological development of Cengiz Makina: "The company stands for quality, reliability, and innovation. We have been recognized by Bosch and other customers many times for this. We currently rank among the top ten turned parts suppliers to Bosch. The further development of our machine park has been a big part of this. Now, using the modern technology, we can handle batches up to 20 million in a reliable process, and thus we also receive such projects."

Seven to nine multi-spindle machines are in operation at Cengiz Makina in a production line that achieves annual capacities in the double-digit millions range. But even production runs of 1.5 million parts are ideal for multi-spindle machines. The most critical requirement: The company must be in a position to map a manageable process on the machine.

### Achieving the zero-defect target with process reliability

The importance of reliable processes is made clear by the imposed requirements. Mert Yilmaz tells of a zero-defect target that must be met: "That is to say that from the first to the millionth part, every one must have the same level of quality. We achieve this, but to be completely sure, we have installed a 100% check downstream of every machine."

Particularly when dealing with complex components made of demanding materials, Cengiz Makina only uses INDEX MS machines, which is the case when machining stainless steel for injection components for gasoline and diesel engines. The Managing Director explains: "90% of our INDEX multi-spindle turning machines currently machine heat-treated steels and stainless steel. We can't achieve the required reliability on the other multi-spindle machines." Their precision also speaks for the INDEX MS machines, as Mert Yilmaz explains:

"Using the INDEX machines, we can turn to exactly 10 µm, ensuring process capability."

However, such results do not depend solely on the machine technology alone. Mert Yilmaz draws a fitting comparison: "It is a bit like with Formula 1: one manufacturer, two cars, two drivers, always different results. INDEX provides us with the car. We supply the appropriate interplay of machine, tool, and process know-how – and we want to stand on the podium in the end."

### Service – the basis of success

Mert Turan of INDEX also knows that the best results require more than just a good machine. That is why he has particularly high regard for the service of Cengiz Makina: "The company has developed process know-how over its many years that incorporates metrology alongside machining, and further extends to cleaning, scheduling, and logistics. This is made possible by experienced machine operators, application engineers, and a maintenance team that knows these machines inside and out. And when difficulties or capacity issues arise, we can be on hand to help with our sales and service partner in Turkey – Tandem."

Tandem is a small service company specializing in machine tools with 16 employees, which was founded by both Managing Directors, Ertan Güney and G. Tankut Koçak, nine years ago. One thing was clear at the start for the two engineers: "We never wanted a company in the field of machine construction that focused solely on selling products. Our strengths lie in our technical competence, supplemented by the commercial components."

For Mert Yilmaz, a clear argument for additional purchases at INDEX: "The INDEX MS machines offer the highest level of technology, and they do so at an acceptable price. In addition to this, INDEX offers on-site service from its partner company, Tandem, the quality of which we have not received from any other machine manufacturer."

### Expansion to China and the USA

Cengiz Makina is well positioned at the Gebze/Kocaeli location. Nearly 600 employees generate annual sales of around 50 million euros. This is expected to grow. Even now, attention is turning to China and the USA. In 2014, the precision parts manufacturer became a member of the Impro Group, which is headquartered in Hong Kong and has branches worldwide. Founded 16 years ago by Mr. Reb Lu, the Group has grown in the meantime to 6,000 employees.

The company – with its business areas in investment casting and sand casting, precision machining, and surface treatment – has a strategic focus on an international customer portfolio, including all of the prominent automobile manufacturers and suppliers, as well as aerospace, medical technology, or agricultural and construction machinery

companies. Among the names Benteler, Cummins, General Electric, Caterpillar, Schaeffler, Continental, John Deere, and Boeing, now Bosch is also at the forefront. Mert Yilmaz describes the plans: "Naturally, we have contributed to the fact that Bosch is now among the top three customers of Impro. We are ultimately the center of excellence for precision machining in the Group. Branching out from Turkey, we are building additional Cengiz Makina locations – first in China and in the USA."

We already have a 3,000 qm hall in Wuxi, China, which is currently being filled with machines. The strategy is clear according to Mert Yilmaz: "We want to transfer our process know-how. A similar machine park will serve as the basis for this, and this will also include INDEX multi-spindle machinery for the complex jobs."

INDEX has been active with own subsidiaries for some time now in China and the USA to ensure fertile ground by providing the proper level of service. Mert Turan argues: "Without reasonable service, you cannot sell multi-spindle turning machines anywhere in the world. Since our market in China is opening up more and more, we also built a corresponding service and sales force in Shanghai. An experienced service manager from Germany and multiple employees with experience in the field of CNC multi-spindle machines are on hand to actively support our customers."



More than half of all multi-spindle machines at Cengiz Makina come from INDEX. They play to their strengths regarding precision and process reliability, above all with high-quality parts made of difficult-to-machine materials.



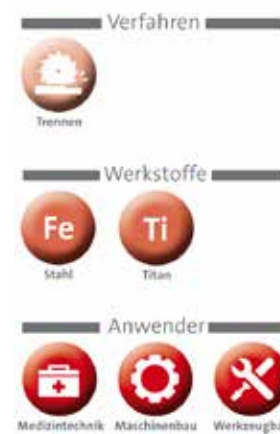
(From the left) K. Mert Yilmaz, Managing Director at Cengiz Makina, Mert Turan, Asia Sales Manager at INDEX, G. Tankut Koçak & Ertan Güney, both Managing Directors at Tandem, discuss the optimal machining options for difficult parts.

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Thread whirling by synchronized turning

# EFFICIENT WHIRLWIND

On the road to increasingly intelligent production and the products of tomorrow, there is no way around technology innovation and high-performance manufacturing processes. One of these techniques is the synchronized turn-whirling, which opens up new productivity benefits particularly in the production of threads.



A project funded by the Federal Ministry of Education and Research (BMPF) is dedicated to further develop the technology of whirling. The four participating partners are INDEX-Werke, Paul Horn, Smith&Nephew, and wbk - Institute of Production Technology. INDEX-Werke took over the consortium leadership and, in the form of a TRAUB sliding headstock automatic lathe, provides the platform for the pilot application of the turn-whirling high-performance manufacturing process to be developed.

The research project started in August 2014 and runs until July 2017. Under coordination by Dr.-Ing. Volker Sellmeier, Head of Technology at INDEX, the whirling technique, which has experienced no significant further development since it was invented in 1942, is being studied with the goal of eliminating the shortcomings of conventional whirling and achieving a significant increase in efficiency in production.

In the conventional whirling process, whirling is performed first, and then the head geometry is turned. With synchronized turn-whirling, the component speed is considerably increased by modified process kinematics. This allows simultaneous turning, providing the user with significant time savings. The tests on the TRAUB sliding headstock automatic lathes TNL18-7B and TNL12 provided other significant improvements as well. By the improved adherence of the cutting edge trajectories to the thread, the cusp height is considerably reduced. For the future, it is planned to apply the findings of the research project also to other components such as steering worms or augers and threaded spindles.



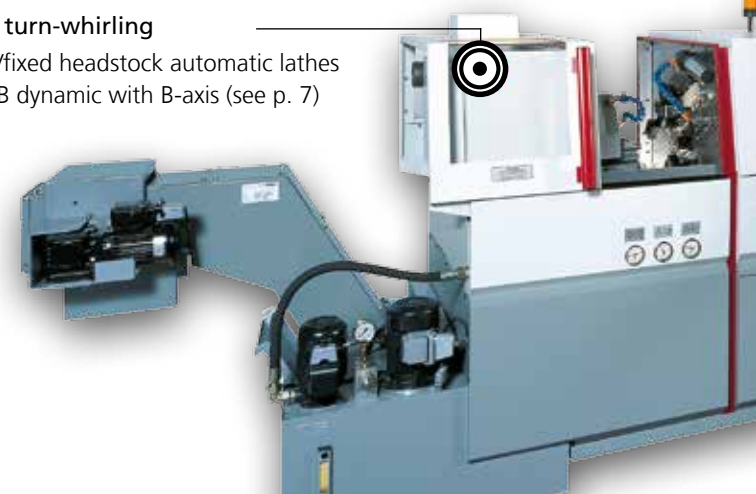
More information:  
[www.dreh-wirbeln.de](http://www.dreh-wirbeln.de)

## Advantages of turn-whirling

- > Increased productivity through simultaneous turning
- > Reduced whirl volume and cusp height
- > Machining of multiple threads by single-start cutting inserts
- > Improved component quality by better adherence of the cutting edge trajectory to the thread
- > Significantly higher feed rates possible

## Ideally suited for turn-whirling

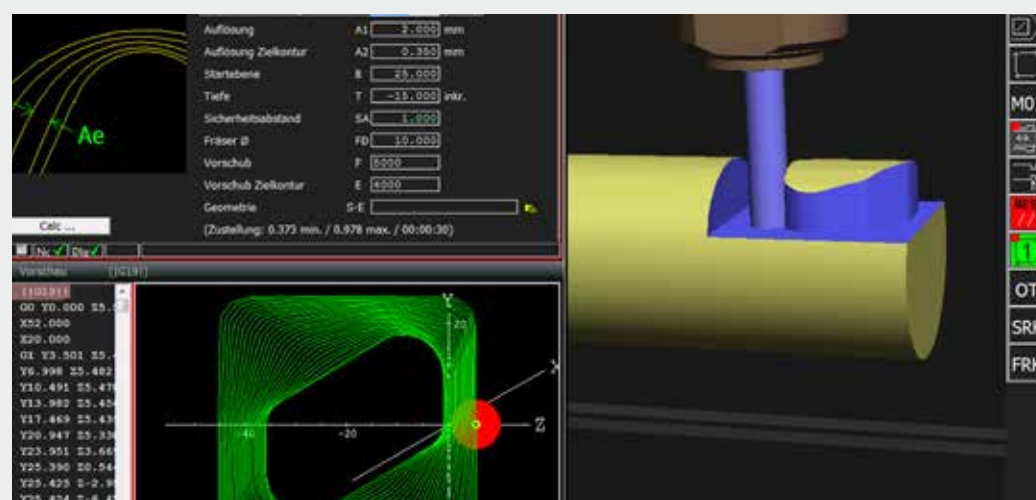
The TRAUB sliding/fixed headstock automatic lathes TNL12 or TNL18-7B dynamic with B-axis (see p. 7)





# POWERFUL MILLING PACKAGES

Machining strategies with state-of-the-art technology contribute to the reduction of cycle times and tool paths. This is exactly why TRAUB has developed new milling functions.



Project partners in the research project:



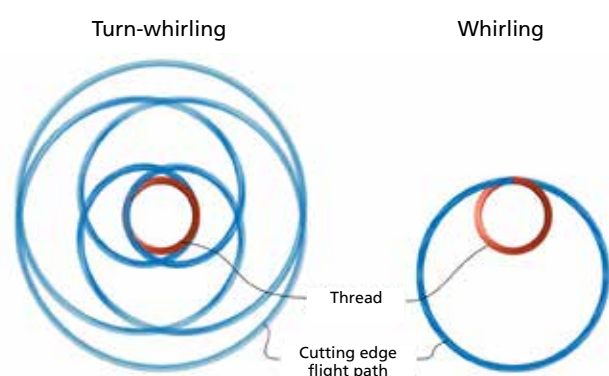
The collaboration between the partners outside the project is characterized by a longtime customer-supplier relationship. For example, Smith&Nephew uses numerous INDEX machine tools that are equipped with whirl heads and indexable inserts by Horn. To meet current market requirements and ensure efficiency in the production of bone screws, close ties exist also outside the project.

Due to new alloys with higher tensile strengths and increasingly complex machining processes, the demands on machining strategies, especially on milling strategies, have soared. To enable more economical production, the new milling strategies by TRAUB have increased the time-chip volume significantly. In addition, tool life is increased by better utilization of the tool edge and less load on the tool.

The new milling functions are an optional extension available for the WinFlexIPS / WinFlex IPS<sup>PLUS</sup> programming system, allowing the user to create NC programs quickly and easily both on a PC and directly on the machine.

The following two milling packages are available:

## Comparison of the cutting edge trajectories



## Milling package

### Helical contour milling



Benefits: better cutting performance with vibration-prone applications, cutter constantly engaged

### Trochoidal milling



Benefits: Higher tool life, reduced machining times & cutting force

## Streamline Milling Package

### Torx Milling Pro



Benefits: Reduced machining times through the use of innovative milling strategies

### Streamline Milling

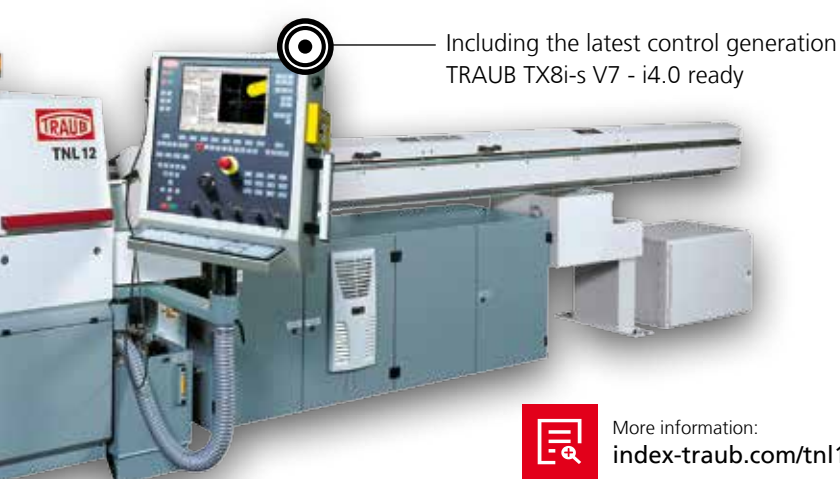


Benefits: Increased tool life & superior surface finish as well as constant tool load

Other milling functions in the Milling add-on package:

- Thread milling G19 with MRC (cutter radius correction)
- Torx milling

Applicable for both available milling packages:  
- No CAD/CAM required  
- Process optimization directly on the machine.

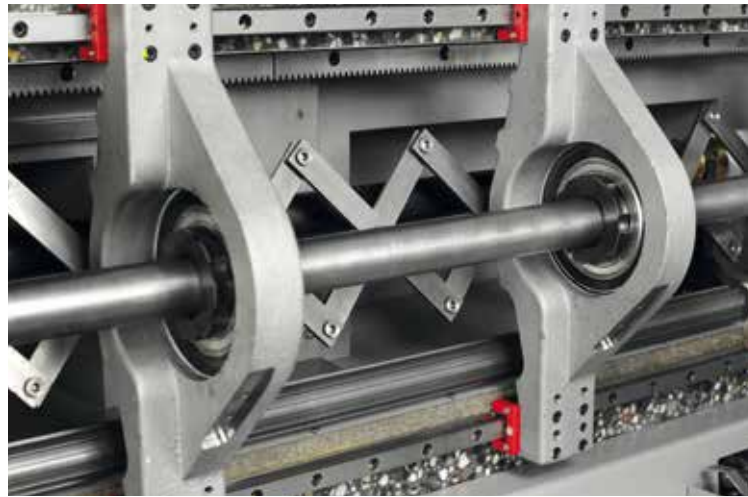


More information:  
[index-traub.com/tn12](http://index-traub.com/tn12)

The new INDEX TRAUB MBL65 bar loader

# ALWAYS WELL LOADED

The newly designed and enhanced bar loader makes the user's heart beat faster. The machine-independent loading magazine MBL65 is driven purely electrically and is based on a vertical mineral cast support. Benefits for the user: excellent damping characteristics, less space requirement, fast setup, and reduced cycle times.



**Backlash-free bar guide by rolling bearing**  
Bearing plates connected via slidable lattice grates as bar feeder guided in rolling bearings to hold a bar of material.



More information:  
[index-traub.com/mbl65](http://index-traub.com/mbl65)



Download brochure  
> Scan QR-Code



## INDEX TRAUB MBL65 – the bar loading magazine for best turning results

- > Mineral cast bed for a very high degree of stiffness and damping
- > Large dimensioned linear guides – outstanding smoothness and accuracy
- > Energy-efficient and fast by purely electrical drives
- > Precise alignment of the bar stock to the spindle center
- > Backlash-free guidance of the bar in rolling bearings, diameter-specific plastic sleeves
- > High surface quality, also for profile materials
- > High speed for short machining time per piece
- > Fast bar change – minimal setup times by few, easily accessible change parts
- > Shorter design than comparable magazines
- > Automated measurement of bar length



INDEX ABC now even more dynamic

# UNMATCHED PERFORMANCE DENSITY

The INDEX ABC CNC lathe is a synonym for modern automatic turning with high productivity and precision. The result of a targeted revision of the ABC, which retains the essential features of its predecessor, is more power, especially on the drive and control side. This makes the machine much more productive.

The design of the INDEX CNC lathe ABC with two tool turrets, of which the upper carries the synchronous spindle for rear end machining, has proven itself many times. The ABC has been sold over three thousand times since its market introduction. Since then, users have created countless programs and workpiece-specific setups that are still in use for production – an asset that INDEX wants to preserve for its customers also in the revised ABC. Therefore, little was changed on the original concept, and the developers focused instead on critical factors for productivity such as the control and the spindle and tool drives.

A major modification of the new ABC was made to the main spindle. It now offers a bar capacity of up to 65 mm and is driven by a synchronous motor instead of the previous asynchronous motor. This makes it more fast-

er and more efficient. Its maximum speed is 6000 rpm, providing 27 kW of power (40% DC) and 145 Nm of torque (40% DC).

The uncompromisingly small footprint of the ABC remains. By this, INDEX responds to all those customers who have already several ABC machines – partly located in a tight line – who want to replace their machines with the new, considerably more productive ABC.

Existing users were also kept in mind with regard to tool carriers and tool holder systems, which can continue to be used. But the possibilities of the upper turret have been extended: besides the traditional VDI25 tool holders, it now can accommodate also W-serrated holders. This proven tool mounting developed by INDEX allows high changing accuracy during setup and is used especially for

angled tools. The dovetail mountings in the lower turret have been retained as well. This allows the user to use even tooling systems that come from the ABC's predecessors, the INDEX cam-controlled machines.

Optionally, the INDEX ABC is equipped with a gantry-type removal unit for the removal of finished parts and remnants. Furthermore, a thread milling and polygon turning unit is available with a separate drive (6000 rpm, 5 kW power). Thanks to the vibration-free running of the polygon turning cutter head made of heavy metal, a hexagon with excellent surfaces can be produced in a few seconds even in steel, for which milling tools require a multiple of the time.

More information:  
[index-traub.com/abc](http://index-traub.com/abc)



## HIGHLIGHTS

- > Unrivaled small footprint
- > Highly advanced control and drive technology
- > Simultaneous machining with up to 3 tools
- > Live tools can be used
- > Up to 5 rear machining stations (2 are live)
- > Compatible with existing tool holders
- > INDEX W serration & V-gib in the upper turret
- > Spindle clearance: up to 65 mm
- > Main spindle: 6,000 rpm speed max. / 27 kW power max. / 145 Nm torque max.
- > Including Xpanel - i4.0 ready operating system
- > Optional: ECO-Fluid system for advanced manufacturing tasks and higher thermal stability



### Ring

D 42 x 15 mm  
Material: 11SMnPb30  
Tools in use: 6  
New cycle time: 31 s

**Your benefit: 12%**



### Aluminum housing

D 25 x 44 mm  
Material: Al alloy  
Tools in use: 12  
New cycle time: 28 s

**Your benefit: 12%**



### Fitting

D 49 x 33 mm  
Material: CuZn39Pb3 37  
Tools in use: 12  
New cycle time: 87 s

**Your benefit: 15%**



### Shaft

D 10 x 48 mm  
Material: X8CrNiS 18 8  
Tools in use: 13  
New cycle time: 58 s

**Your benefit: 11%**



## The value package.

The INDEX ABC is also available with selected full equipment at an attractive price as a value package.

You choose:  
INDEX ABC with  
SIEMENS or  
FANUC control



Webspecial: The Value Package.  
[www.index-traub.com/valuepackage](http://www.index-traub.com/valuepackage)



Versatile applications of a fluid spindle

# WITH HIGH PRESSURE TO MORE SPEED

The fact that cooling lubricant has additional uses at enormous pressure is demonstrated by the concept of the fluid spindle. The spindle unit powered by a turbine wheel works extremely precisely and efficiently.



The fluid spindle in an automatic lathe or turn-mill center allows both conventional machining operations as well as micro and HPC machining operations at up to 50,000 rpm. Applications are in prototyping, tool and mold making, but also medical or aeronautical engineering where very high cutting speeds are required.

The coolant (emulsion or oil) of the machine is used to drive the tool. It drives a turbine inside the spindle at high pressure. And depending on the model and working pressure, the tool rotates at up to 50,000 rpm, with the speed directly depending on the pressure of the coolant pump. At a pressure of 20 bar, 20,000 to 30,000 rpm can be reached depending on the model, and at 40 bar even the maximum speed of 50,000 rpm can be achieved. Precondition for this use is a coolant pressure of at least 20 bar and a flow of greater than 12 l/min.

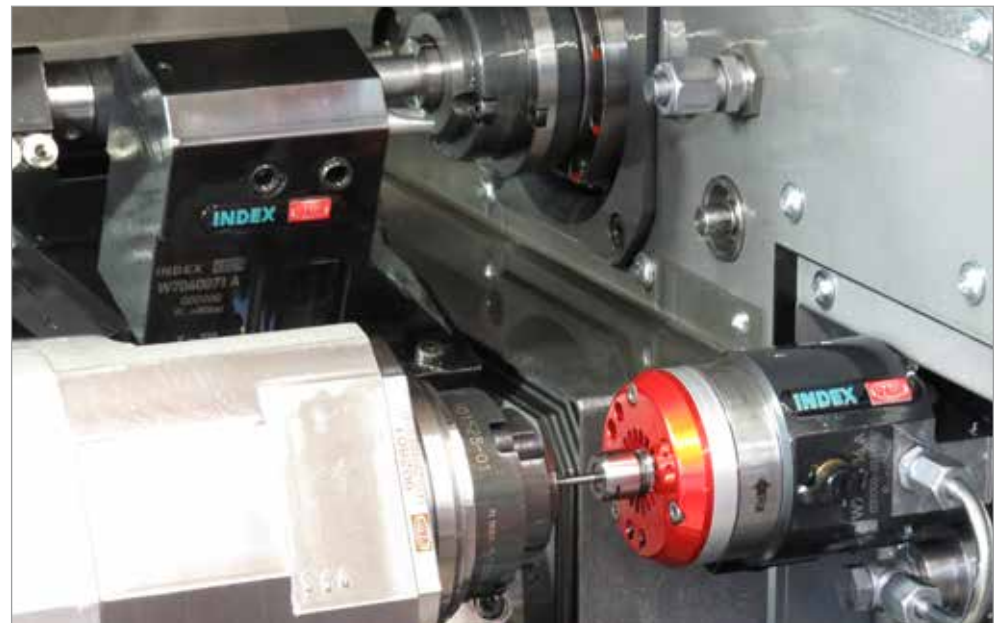
The current speed of the cutting tool is transmitted via Bluetooth to an external digital display. Ideal applications of this "fast runner" include small hole diameters (up to 3 mm) or light milling operations, the production of high surface quality (finishing), free-form machining with small spherical cutters, as well as the marking/engraving and deburring of workpieces. But the tool is also suited perfectly for milling of small threads or for slotting. This requires



adequately high cutting speeds, which can, however, easily be realized at rotational speeds up to 50,000 rpm.

One major advantage of these high speeds is that the cutting tools can be used optimally and at higher feed rates, resulting in reduced machining times/cycle times. In addition, the CNC machine's tool drive is not needed in the highest speed range and therefore saved. This results in less wear and hence in longer life. Another important aspect is the reduced heat generation in the tool drive. In contrast to elaborate gear spindles, the fluid spindle undergoes almost no wear even at high speeds.

Installation and commissioning of the fluid spindle is very simple. No retrofits are necessary. All that's necessary is the required pressure (sufficient coolant supply) at the tool station. Due to its compact design, the fluid spindle can be installed in almost any work area. Special tool holders are available for the most common interfaces of INDEX and TRAUB machines: VDI, compact shank, and HSK.



Of course, the HSK version can be used also through an automatic tool changer. Two spindle versions with 30,000 to 50,000 rpm and, for higher torques, with 20,000 to 40,000 rpm are available. The fluid spindle can be used virtually anywhere where there is a corresponding cooling lubricant supply.

For more information about the fluid spindle and machine accessories, see also our Infoshop.



**Infoshop** –  
the equipment portal for turning machines

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Web: [infoshop.index-werke.de](http://infoshop.index-werke.de)



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### IMTS // USA

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### AMB // GER

Sep. 13 - 17, 2016 Stuttgart

### MICRONORA // FRA

Sep. 27 - 30, 2016, Besançon

### BI-MU // ITA

Oct. 4 - 8, 2016, Milan

### MAKTEK // TUR

Oct. 11 - 16, 2016, Istanbul

### PRODEX // SUI

Nov. 15 - 18, 2016, Basel

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Nov. 17 - 22, 2016, Tokyo

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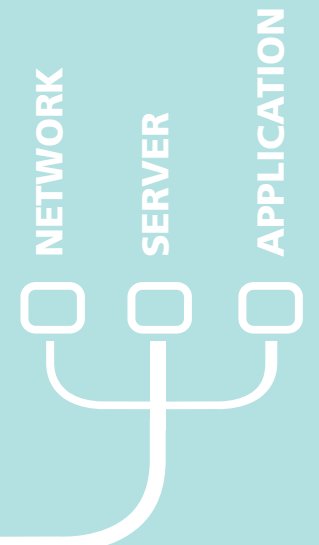


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# X PANEL

i4.0  
READY

The cockpit for easy integration of the machine in your business organization.



CUSTOMER

18,5" TOUCH-SCREEN

## Information & data network for paperless manufacturing

**STANDARD**  
included as standard –  
at no extra charge



## Open system & custom applications



**OPTION**

## FOCUSING ON PRODUCTION & CONTROL INCLUDING INDUSTRY 4.0

The Xpanel® operating concept provides access to networked production. With Xpanel® your staff always has all relevant information for efficient production right at the machine.

XPanel® is already included in the standard on each INDEX machine and can be individually extended.

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