

Press Release

Turning/milling center INDEX R300

Two 5-Axis Systems in One Machine

Esslingen-based machine manufacturer INDEX has combined two complete 5-axis machining systems in its new R300 turning/milling center. In two independent sub-systems, one motorized milling spindle and one assigned work spindle are able to completely machine complex parts, in particular short bars and chuck parts with clamping device diameters up to 315 mm, simultaneously, providing extreme productivity and flexibility, including 5-axis machining. This new development will be introduced for the first time at the EMO Hannover 2011 trade show.



The new INDEX R300 turning/milling center is the most recent addition to the RatioLine series and introduces a highly productive version for machining short bars up to 102 mm and chuck parts up to 315 mm in diameter. Its little sister, R200, which enjoyed a very well received market launch, covers the range for bar diameters up to 65 mm. The main feature of this machine – and of the new R300 – is the integration of two 5-axis systems in one machine. Supported by the addition of more tool strips, this allows for highly productive and flexible parts machining, including simultaneous and independent 5-axis machining both on the main spindle with tool carrier 1 as well as on the counter spindle with tool carrier 2.

With both linear tool carriers attached to both sides of each milling spindle, the user has quick access to six stationary tools per spindle with high precision. This means that the developers have succeeded in combining the functionality of a turret with a milling spindle. This new development means that tool changes are no longer necessary, thus reducing the secondary processing time during turning. It also makes the production of highly precise fits easier.

Minimal setup times and short secondary processing times

A faster tool change ensures chip-to-chip times under 6 s and greater flexibility. As a result, it is possible to carry out full rear end machining as well as parallel machining with identical sequences. Both heavy-duty roughing operations and highly accurate fine-turning operations can be performed simultaneously on the main spindle and counter spindle. A large number of tools (up to 140 tools in the double chain magazine) ensure short setup times even for small batches. Added to that are the twelve stationary tools on the tool strips of both milling spindles so that with a total of up to 152 tools available, the possibilities are almost endless for flexible machining. Both milling spindles can perform tool changes completely independently of one another, even at the same time. The use of HSK tool holders reduces the tool costs due to live tool holders no longer being necessary.

With the "Setup during main time" option, the user has an additional cost benefit. The option of operating the machine with a short bar loader with few personnel is only one of the feasible and intended automation solutions. For handling heavy chuck parts, an integrated workpiece handling unit is available.

Short lever arms and travels for greater stiffness

The two quill-guided motorized milling spindles were placed in the center of the machine bed. Due to the reliable arrangement of the axes, the otherwise conventional cross-slides used with tool carriers are no longer necessary. When combined with the play-free and wear-free hydrostatic circular guide, an overall system with exceptional stiffness is produced. Optimum force transmission is one of the premises that were implemented consistently by the developers. Based on its very short lever arms and travels, the resulting system is very stiff and less susceptible to vibrations, which, in turn, has a positive effect on the precision of the finished parts and on the tool life. Another plus are the high accelerations and rapid traverses supported by powerful drives and weight-optimized assemblies. The generous B-axis swivel ranges of 270 and 230 degrees and the rapid traverse rate of 45 m/min provide tremendous machining flexibility and remarkable speed of the machine. The turning spindles with

the same synchronous technology design are impressive due to a maximum power rating of 47 kW, a maximum speed of 3500 rpm, and a peak torque of 690 Nm.

Controller and software packages with user-friendly functions

The latest INDEX control generation C200-4D SL is the brain of the machine. This controller is based on the powerful Siemens Sinumerik S840D solution line and was enhanced by INDEX with user-friendly features. Specially developed cycles simplify even the most complex machining operations. They support multi-axis milling and turning operations and provide maximum functional reliability.

The INDEX VirtualLine software packages make the new turning/milling center efficient to operate right from the very first workpiece. Ideally coordinated with one another, these packages complement one another in terms of their features and guide the NC programmer and operator in a targeted manner to the right solution for the machining task – both on the PC during the preparation stage and directly at the machine in the factory. In conjunction with the 3D simulation of the INDEX Virtual Machine, machining programs can be created, verified, and optimized on the PC. The CNC Programming Studio provides more advanced support for programming and operating the INDEX R300.

Inherent energy efficiency optimizes energy consumption

For years all INDEX machines have obeyed the demand for reduced consumption. The INDEX R300 is no exception here and rates high with the following benefits: Weight-optimized components for reducing energy consumption and for increasing dynamic response; energy recovery by means of regenerative drives; energy shutdown of units that consume large amounts of energy after a user-defined time (standby mode); minimized friction based on optimally paired materials and low-friction bearings (hydrostatic circular guide); intelligent cooling principles, for targeted cooling of the machine, economical use of waste heat. The INDEX cooling concept ensures that the spindles, hydraulics, and control cabinet are cooled constantly and that the heat can be supplied to a different application via a “cold water interface,” e.g., for service water heating or as process heat for other manufacturing steps.

The new INDEX ECO fluid pump controller for cooling lubricant systems, which considerably reduces energy consumption, has basically set a “green milestone”. Its pressure- and consumption-dependent control for low and high pressure cooling lubricant volumes results in energy-optimized cooling lubricant supply. Due to frequency-controlled, permanent, and automatic adjustment of the pump speed, only the cooling lubricant volume that is actually consumed is transported – in contrast to the current constant pump that allows up to 50 % of the transported cooling lubricant

not used to return to the tank. The ECO fluid pump controller considerably reduces the electric energy consumed and therefore results in significant cost savings, especially in multi-shift operations. The energy and cost benefits are noticeable even with consumer valves fully closed, because the demand-driven controller limits the cooling lubricant amount transported to almost zero.

User benefits in hard cash

The innovative concept of the new INDEX R300 turning/milling center opens up many areas of application to the user, from very simple to highly complex components. The main benefit is that the complex machining operations are possible simultaneously on the front and rear side – and, at the same time, are highly productive with two motorized milling spindles. The use of HSK tools instead of live tool holders on turrets reduces tool costs.

The demand from users for complete machining is taken into account through uncompromising process integration: The INDEX R300 offers the best requirements for difficult milling operations, but also for hobbing or deep-hole drilling with single-lip tools. For this purpose, cooling lubricant pressures of up to 80 bar can be applied directly on the tool edge through the motorized milling spindle. Grinding operations with a grinding point or an external grinding wheel up to 150 mm complete the spectrum of complete machining options.

The target user group of the new INDEX R300 is the entire machine and plant manufacturing industry: Anywhere where primarily larger chuck parts are produced that require a large amount of milling and drilling work. These include typical workpieces required in machine and farm machinery construction, in tool and mold making or in the aerospace industry.

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Figure 1:
The INDEX R300
turning/milling center – two
5-axis systems in one
machine



Figure 2:
Two work spindles and two
motorized milling spindles
perform high-productivity
machining operations in two
independent sub-systems

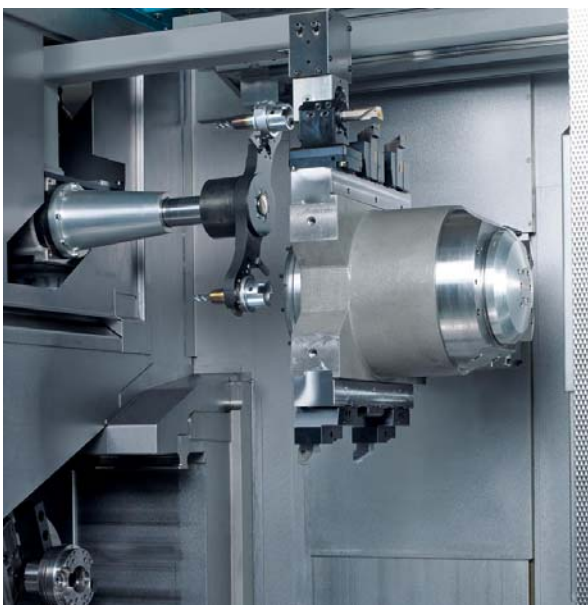


Figure 3:
Reducing secondary
processing time:
While machining is done on
the counter spindle, the top
milling spindle changes to a
new tool (the reverse is also
possible).



Figure 4:
Precise turning operations
with stationary tools in the
tool strips on the motorized
milling spindles



Figure 5:
A separate loading strip
allows setting up the
machine during main time.