

Press Release

INDEX R200 Turning/Milling Center

Machining in a new dimension

The new R200 machine of the INDEX Group in Esslingen represents a new generation in state-of-the-art turning/milling centers. Two powerful motorized milling spindles and two movable work spindles perform extremely productive and flexible machining operations in two independent subsystems – with available 5-axis machining, as well.



The INDEX R200 represents an expansion to the RatioLine series in the form of a totally innovative turning/milling center. One motorized milling spindle and one work spindle each are assigned to one another in two subsystems located one above the other. In combination with additional tool strips, this design allows for highly productive and flexible machining operations, up to and including simultaneous and independent 5-axis machining on both spindles. A fast tool changer loads the milling spindles with tools and ensures a high degree of flexibility for machining operations. As a result, it is possible to carry out full reverse side 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 sub-spindle. The innovative design of the INDEX R200 allows it to machine equivalent workpieces almost twice as fast as commercially available turning/milling centers that use only a motorized milling spindle.

Sound and strikingly clear design

The innovative axis arrangement produces directional kinematics, which in turn enables comprehensive and complete machining. The idea: a machine design in which the main spindle moves in Z, the sub-spindle in X and Z, milling spindle 1 (top) in X/Y/B, and milling spindle 2 (bottom) in Y/B. The result: a design with two independent subsystems, exceptional stiffness, and impressive dynamic response. Consequently, the workpieces to be machined can be machined with efficiency and in parallel on the front and reverse sides. During development, emphasis was placed on achieving a high degree of thermal stability and vibration damping to enable machining of difficult-to-cut and high-strength materials under optimum basic requirements. The basis for this is a vertical cast machine bed with a heavily ribbed, enclosed modular design.

Powerful motorized milling spindles and movable work spindles

The two quill-guided motorized milling spindles were placed in the center of the machine bed. This diagonal arrangement allowed the usual cross-slide to be omitted. 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 was implemented consistently by the developers. Based on its very short lever arms, the resulting system is less vulnerable to vibrations, which in turn has a positive effect on the accuracy of the finished parts and on the tool life. Other pluses are the high accelerations and rapid traverse rates at which the INDEX R200 can be moved – aided by powerful drives and weight-optimized assemblies. Impressive key data, such as 11 kW power and 18,000 rpm, as well as 0.9 s ramp-up time (0 to 5000 rpm), make possible the high-performance machining operations. The tremendous machining flexibility and remarkable speed of the machine are explained by the generous B-axis swivel ranges of 270 and 230 degrees and the rapid traverse rate of 45 m/min. The data for the identically rated work spindles in synchronous design are also impressive: maximum power rating of 33 kW, maximum speed of 5000 rpm, and peak torque of 150 Nm.

Permanent revolver functionality in the working area

Two linear tool carriers affixed to the side of each milling spindle allow fast, high-precision access to 6 stationary tools without a tool change. The W-toothing minimizes the associated setup effort and ensures a force-locking and form-locking tool fit: this represents the optimum precondition for precise turning operations comparable to that of a turret.

Minimum chip-to-chip times

Two separate shuttle units independently load the two motorized milling spindles with the HSK-A40 tools required in each case from a common chain tool magazine. With 80 or 120 places, the INDEX R200 has an extensive tool stock. Short chip-to-chip times of approximately 4 seconds contribute significantly to the minimization of secondary processing times. While machining is performed on the main spindle, the lower milling spindle can load a new tool, protected from falling chips and coolant. The results in high productivity and improves process reliability.

New SBL bar loading magazine

The bar stock is fed by a material guide channel mounted to be moveable in the Z-direction and permanently connected to the main spindle. The INDEX SBL (Sliding Bar Loader) is designed for bar stock with a diameter of 20 to 65 mm and a length up to 3000 mm. The large material bar stock supports unmanned operation of the machine.

A control designed according to user's wishes

The current INDEX C200-4D SL control generation is used. This control is based on the field-proven Siemens Sinumerik S840D Solution Line and has been enhanced by INDEX with user-friendly functions. Specially developed cycles simplify the most complex machining operations. They support multi-axis milling and turning operations and provide maximum functional reliability.

Complex workpieces made easy

The INDEX VirtualLine software packages support economical use of the new turning/milling center from the very first workpiece. Ideally coordinated with one another, these packages complement each other in terms of their functions 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, checked, and optimized on the PC. The CNC Programming Studio provides more advanced support for programming and operating the INDEX R200.

Energy efficiency

For years all INDEX machines have obeyed the demand for reduced consumption. Of course, the INDEX R200 is also designed with all the essential and advanced technologies needed to not only meet but surpass the energy requirements. The definitive design elements in this regard are: Weight-optimized components for reduction of energy consumption and for increasing the 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, or climate-neutral heat discharge from the production hall. The cooling concept of INDEX ensures that the spindles, hydraulics, and control cabinet are cooled constantly and that the heat can be fed to another useful application via a "water interface", e.g., for service water heating or as process heat for other manufacturing steps.

Performance redefined

Enormous productivity benefits in milling and turning combined with maximum flexibility are the winning arguments for the new INDEX R200 turning/milling center. This is achieved by means of unrivaled kinematics with two motorized milling spindles, two work spindles, four linear tool carriers, and a large tool stock with fast access. The innovative design and arrangement of proven components provide for maximum stiffness and optimum vibration damping as well as for optimum thermal and dynamic stability. This enables the INDEX R200 to deliver impressive machining results for challenging materials and machining tasks, up to and including 5-axis machining.

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Figure 1:
The INDEX R200
turning/milling center – a
new dimension in machining

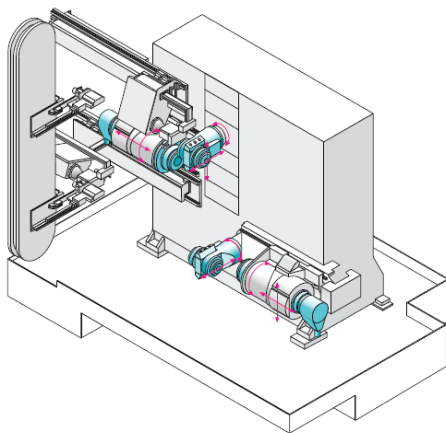


Figure 2:
The R200 modular system:
Clearly structured design
and innovative arrangement
of proven components



Figure 3:
Two work spindles and two
motorized milling spindles
perform high-productivity
machining operations in two
independent subsystems



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

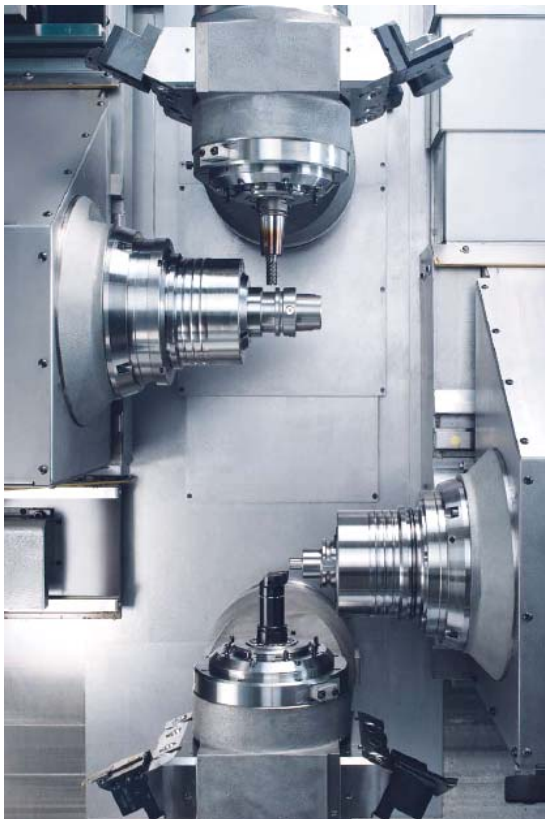


Figure 5:
Full reverse side machining:
Powerful milling operation
(top) and fine-turning
operation (bottom)



Figure 6:
Optimum support via
VirtualLine products:
3D operation simulation
directly next to the control
(VPC-Box)

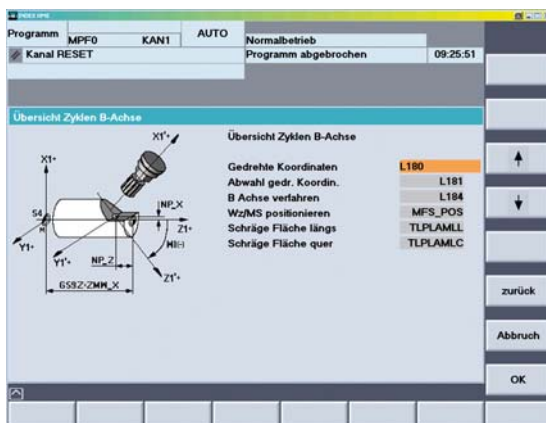


Figure 7:
Practical experience in
action – special cycles
simplify multi-axis milling and
turning operations

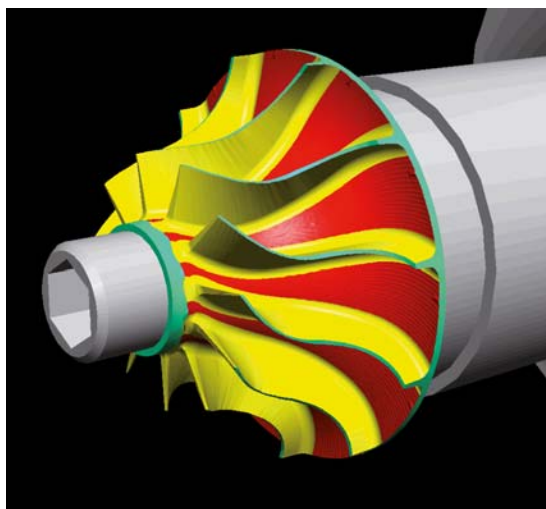


Figure 8:
Turning and milling in 5-axis
machining, as well (impeller)

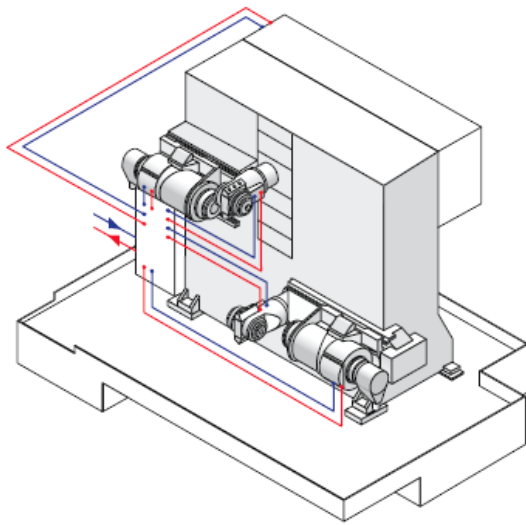


Figure 9:
All mechanical equipment, hydraulics and control cabinet are fluid-cooled. The INDEX water interface enables reuse or recycling of heat.

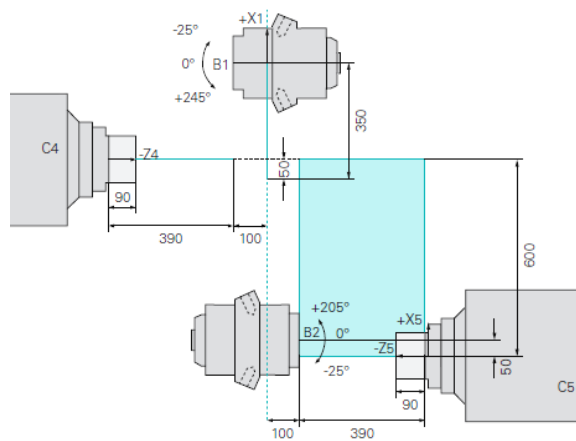


Figure 10:
Work distribution in the working area: main spindle moves in Z, sub-spindle in X and Z, top milling spindle in X/Y/B and bottom milling spindle in Y/B