

Product Information**MS52C3 CNC Multi-Spindle Automatic Lathe****Innovative Rear End Machining**

With many new and improved functions, the front-opening six-spindle lathe with up to twelve cross-slides in the work area is also setting standards in rear end machining. Its innovative features include the liquid-cooled spindle drum as well as the cross-slides with hydrostatic bearing support and directly integrated motor.



The enhanced INDEX MS52C3 CNC multi-spindle automatic lathe with a spindle clearance of 52 mm is captivating due to its considerably expanded performance functions. For example, the fluid-cooled spindle drum keeps the thermal growth in the spindle carrier to a minimum. The six spindles, which are stored in a newly developed spindle drum and for which a patent application has been filed, are cooled according to need. The advantage compared to the previous air-cooled approach is the higher power density in the spindle drum and the option of energy recovery from the heated cooling fluid. In addition, the spindle bearing temperature can be kept at a low level, which also prolongs its service life and improves thermal stability. Each of the six spindles is assigned two cross-slides which can be operated both on the X as well as

on the Z-axis. Each cross-slide can be additionally equipped with a Y-axis. Tool holders with up to two stationary tools or a turret can be mounted on each cross-slide. The turret holds up to three stationary or live tools. Furthermore, drive units can be installed on the cross-slides for additional machining such as milling or cross-drilling.

Hydrostatic sliding guides for vibration-free multi-machining

The cross-slides with integrated motor have a low-mass design with hydrostatic bearing support. They are appealing due to their low moment of inertia and the resulting high dynamics, which facilitates outstanding acceleration in practical application. The advantage of a hydrostatic sliding guide in the feed axis (Z) is its outstanding damping characteristic that prevents the transfer of the machining vibrations to the adjacent slide via the headstock. This helps to mitigate vibration and rattling while workpieces are being machined – even when the most diverse machining processes are being performed concurrently by the six spindles. For example, one spindle can be used for heavy-duty roughing while high-precision finishing takes place on another spindle without the risk of chatter marks or other impaired surface quality. In addition, the hydrostatic bearing is wear-free – there is neither friction nor a stick-slip effect.

Highly dynamic swiveling synchronous spindle and new drives

Another of the machine's highlights is its workpiece rear end machining capability, which is achieved using a swiveling synchronous spindle that is locked into the end positions by means of a three-part Hirth coupling. The high level of stiffness that this achieves also guarantees that even with bar diameters up to 52 mm, rear end machining operations with very high cutting volumes and simultaneously high machining precision can be performed.

The swiveling synchronous spindle stands out due to its remarkable dynamics, for example, it swivels to the rear end position in less than 0.4 s. For rear end machining, three stationary and up to two live tools are available. The advantage of the three-part Hirth coupling is that the operator no longer has to electronically compensate the end position. The mechanical lock ensures optimal stiffness and increases the positioning accuracy. At the same time, highly complex components that require complex cut-off side machining can also be reproduced with the help of the swiveling synchronous spindle.

The INDEX engineers were able to achieve a considerable productivity boost thanks to a smart speed control system in the spindles: After each indexing operation, a three-part Hirth coupling positions the spindle drum; however, the speed of the

spindles can now be increased or decreased to the speed required in the next machining position even during drum indexing, This means that after each drum indexing operation, correct machining speed is available which once again reduces cycle times enormously. Due to the fixed electronic connection of the spindles to the transformers in the control cabinet (no wear on the slip ring), no mechanical wear develops in the energy supply system.

The newly designed, low-mass synchronous motors are impressive compared to previous synchronous spindles due to a lower moment of inertia. In addition, there is the gain in space due to the optimized geometry of the rotor, which results in higher acceleration.

Highly diverse automation and handling equipment

The modular INDEX MS52C3 CNC multi-spindle automatic lathe can be operated both as a handling machine and a classic bar lathe. In the handling version, blanks or semi-finished parts are feed into the machine by an integrated robot that picks up the parts from the external handling unit and also discharges the machined parts. But there are also options with integrated handling units without the robot – with the most diverse automation and handling equipment. Of course, the machine can also be operated as a bar lathe with fully automated bar loaders.

The advantage of the front-opening design for the operator is the excellent accessibility during setup and tooling. Moreover, there is the free chip flow down into the chip discharge chute. To save space, the INDEX engineers simply placed the machine's control cabinet "on the machine". This principle of integrating the control cabinet into the machine roof has been applied to INDEX multi-spindle machines for almost 15 years and has been very well received on the market. Along with its compact size, the machine also comes with a higher power density.

The major advantage of all INDEX multi-spindle machine is the fact that two slides can complete one independent external and internal machining operation on the assigned spindle – this means that the production sequence is not determined by the machine concept, but by the user. As usual with INDEX multi-spindle machines, the new MS52C3 can also handle all technologies for turning centers, such as turning, drilling, milling, multi-edge turning, tooth milling, hobbing, or slotting.

For shaft machining, the benefits of this machine are evident in that any spindle position with two tool carriers arranged in a V shape can be achieved so that one tool carrier can be equipped with a tailstock center in order to support the workpiece and the other tool carrier can simultaneously perform any type of machining operation.

The enhanced INDEX MS52C3 CNC multi-spindle automatic lathe has many areas of application throughout all industries, ranging from the automobile industry to medical

technology. It also produces small batches efficiently and economically. Another benefit for the user is that all standard tool holders and tool holder system interfaces can be used with the appropriate adapters (Capto, HSK, VDI, INDEX systems).

Catering to current market demands, which dictate that workpieces be discharged damage-free from the work area and at the same time have to be placed on pallets in the right position for later treatment, the Esslingen multi-spindle specialists offer elegant solutions: For example, machine-integrated handling with external stacking unit that ensures both destruction-free removal of parts from the machine – with connected measuring operations for the workpieces if needed. The current workpiece data can be reported back via the relevant interfaces without any time loss so that the machine control can automatically correct its machining parameters.

Inherent energy efficiency optimizes energy consumption

For years, all INDEX machines have met the demand for reduced energy consumption. The INDEX MS52C3 is no exception here and rates high with the following benefits: Weight-optimized components for reducing 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. 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.

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Figure 1:
The INDEX MS52C

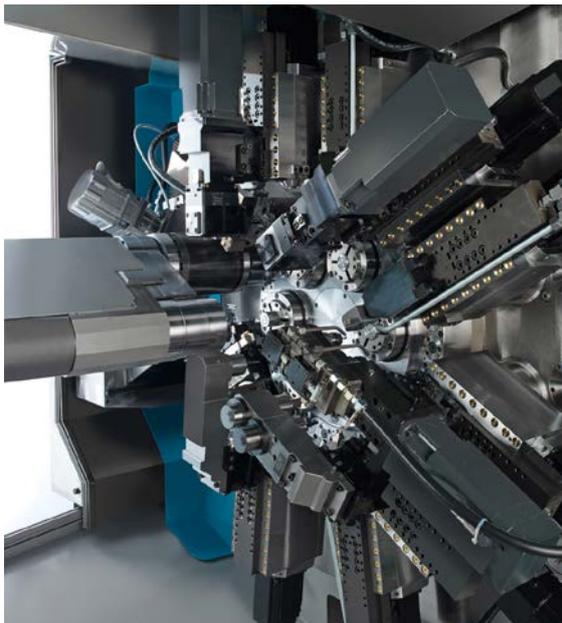


Figure 2:
Flexibility with system:
Different tools for different
machining operations per
spindle position can be
installed on the cross-
slides.

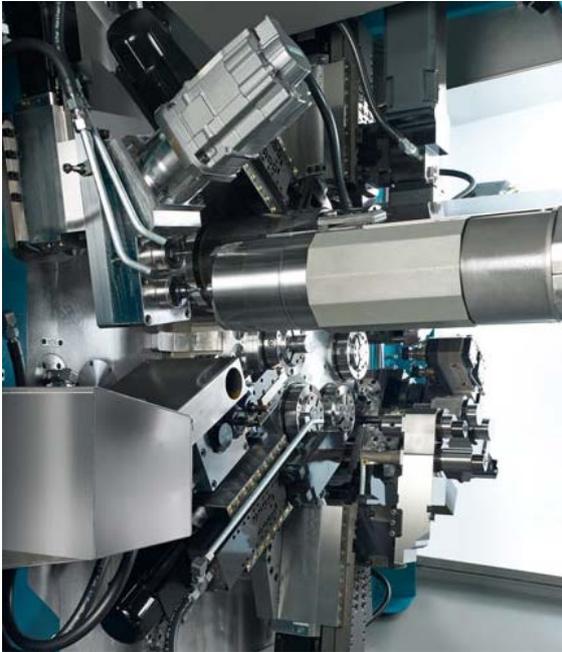


Figure 3:
Comprehensive rear end
machining on the back-
boring slide with the
swiveling synchronous
spindle