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Honing Machine Redesigned for Precision, Speed, Efficiency

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More than five years ago, Kadia Produktion GmbH + Co. introduced a compact rotary index table for its U6 honing machine, with an integrated electrical cabinet. The objective was to offer a machine for processing small- to medium-size components, and to combine cost-effectiveness and precision with individual configuration capacity. Now, that design has been updated.

Continuing development is necessary, even unavoidable, to ensure that successful machines remain in high demand. The suppliers also must deal with continuous demands: On one hand, production costs rise constantly, while on the other hand, customers require suppliers to provide precision work that improves at an exponential rate. High-precision machining — such as honing — is particularly affected by these requirements. So, after five years, Kadia decided to proceed with a complete overhaul of its successful model U6.

U Line machine data

Rotary index table (up to six stations), with integrated electrical cabinet and HMC100 control system	
Dimensions:	2,100 x 2,450 x 2,800 mm (W x D x H)
Weight:	Max. 3.5 t
Stroke length:	Max. 250 mm
Stroke speed:	Max. 50 m/min
Spindle speed:	Max. 8,000 RPM
Material removal rate:	Max. 18 mm^3/s

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However, the spatial requirements of the U line remain the same: a little more than 5 square meters. The housing was modified, which increases considerably the system's accessibility for maintenance. Also, the entire working area is now completely enclosed: exhaust air connections are available to promote a safer and cleaner working environment.

Redesign can mean design improvement - including cost-saving improvement. The new U6 design applies to the main components that affect productivity, in particular the honing spindles. The U line uses LH2 spindles that have been subject to further development and are protected by patents.

Highly dynamic direct drives for stroke and rotational movements, as well as precision tool -feed motors,

guarantee uniform positioning with precise stroke reversal. The stroke drive has been optimized; the ratio of the lifting output compared to the moving mass is significantly more favorable.

"The new honing spindles of the U line make it possible to increase the output by approximately 20%," stated Henning Klein, general manager of Kadia Produktion GmbH + Co. The developers adopted a new spindle assembly for the LH2. The drive is state-of-the-art technology and much more powerful than its predecessor model. The concentric run-out of the machine is at its optimum.

Not only are the honing spindles extremely precise and powerful, they also minimize maintenance and/or service costs. Wearing parts are kept to a minimum, so maintenance efforts also are minimized. Electrical power and braking energy that is not required is recycled. "The energy costs for each component is dependent on the cost of electricity, the workpiece, and the cycle time," explained Henning Klein, "however we have calculated a mean value for the honing process alone to be < 0.01 kWh per part produced."

In addition to the honing spindles, there are optional workstations available. Those are pneumatic measuring stations with up to 16 gaging levels as well as a deburring station.

Mechanical deburring on the U line is a unique feature. Kadia has developed a fully automated brush changer and tool magazine using 12 inserts. When approaching the wear limit, the changer reaches for a new tool – all in the interest of cycle-time savings.

The rotary index table is available with three, four, five, or six stations, and buyers may select the number of stations: For instance, the U line can be equipped with one or two honing spindles, depending whether a single or dual step process must be accomplished.

Another important equipment feature is the HMC100 control system. This is an in-house development by Kadia's machine designers and software specialists working together, and it has been available for the last two years.

To keep the production process transparent, graphical displays dominate the monitor of the control panel. Therefore, the HMC100 is a significant element of the overall machine design, and it contributes to finished-part quality and process cost-effectiveness.

The U line is suitable for machining through bores, blind bores or interrupted bores in soft as well as hardened materials. Typical workpieces are precision components for injection pumps, sleeves and other pieces for the hydraulic sector or drive technology branch. These components are manufactured in small or medium or large production quantities, but regardless the number of manufactured pieces, the U line provides an exceptional cost/benefit ratio for an economical and precise honing process, Kadia emphasized.

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