Fraunhofer IPA

FRAUNHOFER INSTITUTE FOR MANUFACTURING ENGINEERING AND AUTOMATION IPA

PRESS RELEASE

New clamping device to protect the shape of semi-finished products

Joint venture develops contour precision grinding machine

Unbalanced tension comes into being on thin semi-finished products during the manufacturing process. Milling and hardening processes in particular can result in crooked or warped workpieces. As many component parts, such as grinding racks or guide rails, are subject to strict straightness requirements, time and cost-intensive methods are often necessary to ensure they are the right shape. Fraunhofer IPA has collaborated with Habrama to develop a contour precision grinding machine (KPSM) which corrects deformation while also reducing the cycle time.

Standard grinding machines do not ensure torsion-free clamping of the semi-finished products, leading to deformation. One criticism, according to Uwe Schleinkofer, Project Manager at Fraunhofer IPA, is that "although the components will be grinded, they may then be crooked." In this case, it is consequently necessary to carry out a further process to straighten out the workpiece, which is both time-consuming and expensive. »Another option is to grind a component repeatedly until it is straight, but this also costs,« adds the expert.

Device enables torsion-free clamping

The innovative KPSM conceived by Habrama and Fraunhofer IPA offers a decisive advantage: thin semi-finished products can be clamped without torsion. This is permitted by a special magnetic clamping device with both fixed and moving supports. Schleinkofer: "The fixed components are at the end of the device and center long, prismatic workpieces. The middle section comprises a flexible clamping system with different degrees of freedom that automatically adjusts to the contours of the object being clamped." This special construction means that the height, lateral displacement or torsions of a workpiece can be balanced out to ensure it is held without torsion. "Because the tolerance range is now greater, alignment before grinding becomes less crucial. This reduces costs," explains the Project Manager.

Press and Public Relations
Jörg-Dieter Walz | Phone +49 711 970-1667 | presse@ipa.fraunhofer.de
Fraunhofer Institute for Manufacturing Engineering and Automation IPA | Nobelstrasse 12 | 70569 Stuttgart | www.ipa.fraunhofer.de

Cycle time reduced through double-sided grinding

This innovation not only straightens out workpieces, it also shortens the grinding process. The piece is held in a V-block by the magnetic clamping system, which means the two top surfaces are exposed, allowing simultaneous grinding of both at a right angle. Schleinkofer: "This reduction in production time represents a further cost saving." The system is modular so it can be used for workpieces with square or rectangular cross sections in a range of lengths up to 4,000 mm. A patent has been filed for the clamping devices.

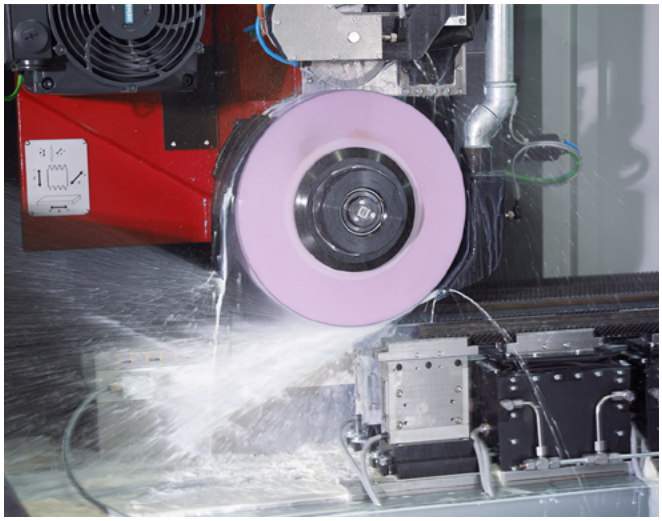
Increased grinding quality with less downtime

The KPSM is capable of both flat and profile grinding. By enabling freely programmable truing of the various contours, this machine offers considerably greater flexibility than conventional models. Josef Braunsteffer, Managing Director of Habrama GmbH, explains this represents significant added value in the age of the internet of things. The fully automatic balancing system guarantees a high quality of the workpiece surfaces. "Imbalances are recognized at an early stage and can be eliminated." In addition, the grinding disk is simultaneously dressed with a diamond wheel during production, which not only ensures consistently high quality, but also reduces downtime.

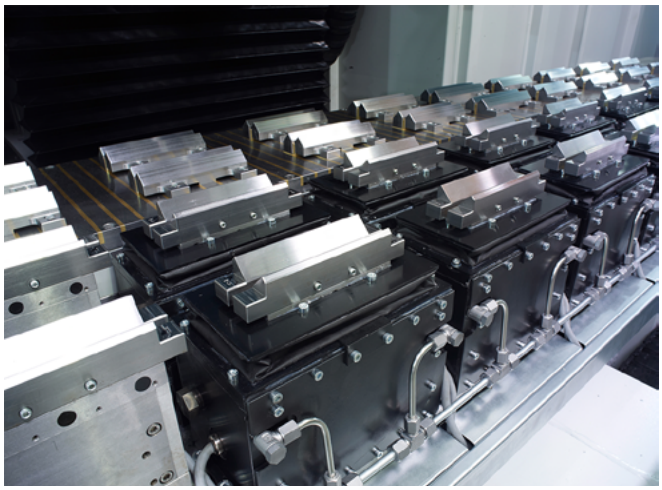
Intuitive operation and ergonomic handling

An essential component of all grinding machines, coolant fluids are supplied through a cooling unit with an integrated deep-bed filter. Another option is the automatic adjustment of cooling agent supply to ensure in the case of wear that the nozzle automatically adjusts to the diameter of the grinding wheel. The developers also integrated state-of-the-art linear drive technology and a fully automatic single flank. Braunsteffer: "Productivity is further improved through this excellent dynamic." In addition, it was important to the experts at Habrama and Fraunhofer IPA that the operating concept is intuitive. "As a result, lengthy training sessions are no longer necessary." Ergonomic considerations were also taken into account in the design.

This joint venture received support from the German Federal Ministry for Economic Affairs and Energy (BMWi). The clamping devices of this system are particularly suitable for grinding rack manufacturers, but the KPSM itself can also be used by any machine or tool manufacturer without the add-on. The innovation was presented for the first time at the EMO 2015 in Milan, Italy, in October. The first machines will be delivered to customers in the near future.



The grinding disk is simultaneously dressed by a diamond wheel during grinding processes. This reduces downtime. (Source: Jochen Frank, lichtblick-gmbh.com)



Workpieces can be fixed in place without torsion using the innovative clamping devices. The machine also reduces production time. (Source: Jochen Frank, lichtblick-gmbh.com)

The contour precision grinding machine – seen here being presented for the first time at the EMO 2015 in Milan– allows for the free programming of contours. (Source: Waltraut Braunsteffer, Habrama GmbH)

Contact Partners
Uwe Schleinkofer | Phone +49 711 970-1553 | uwe.schleinkofer@ipa.fraunhofer.de | Fraunhofer Institute for Manufacturing Engineering and Automation IPA | www.ipa.fraunhofer.de

Editorial team
Ramona Hönl | Phone +49 711 970-1638 | ramona.hoenl@ipa.fraunhofer.de

With nearly 1 000 employees, the **Fraunhofer Institute for Manufacturing Engineering and Automation IPA**, Fraunhofer IPA, is one of the largest institutes in the Fraunhofer-Gesellschaft. It has an annual budget of approximately 60 million euros, of which more than one third derives from industrial projects. The institute's research focus is on organizational and technological aspects of production. We develop, test and implement not only components, devices and methods, but also entire machines and manufacturing plants. Our 13 departments are coordinated via six business units, which together conduct interdisciplinary work with the following industries: automotive, machinery and equipment industry, electronics and microsystems, power industry, medical engineering and biotechnology as well as process industry. The research activities of Fraunhofer IPA aim at the economic production of sustainable and personalized products. We regard cyber-physical production processes as topics of the future.