Grinding

Grinding machine with standardized drive and control technology

More Efficiency for Smooth Finish

Supfina's new Planet V series grinding machines illustrates that great increases in quality are possible during face grinding by utilizing standard automation and drive technology. It is also possible to increase the productivity of the machine by around 500 percent by using the Sinumerik 840D.

Double-ended face grinding affords companies a further viable market and a potential for innovative developments. In order to expand its established super-finish product range and to open new market segments, Supfina Grieshaber GmbH of Remscheid, Germany developed a new series of machines which were first presented at EMO 2005 under the name of Planet V.

All pictures: Supfina

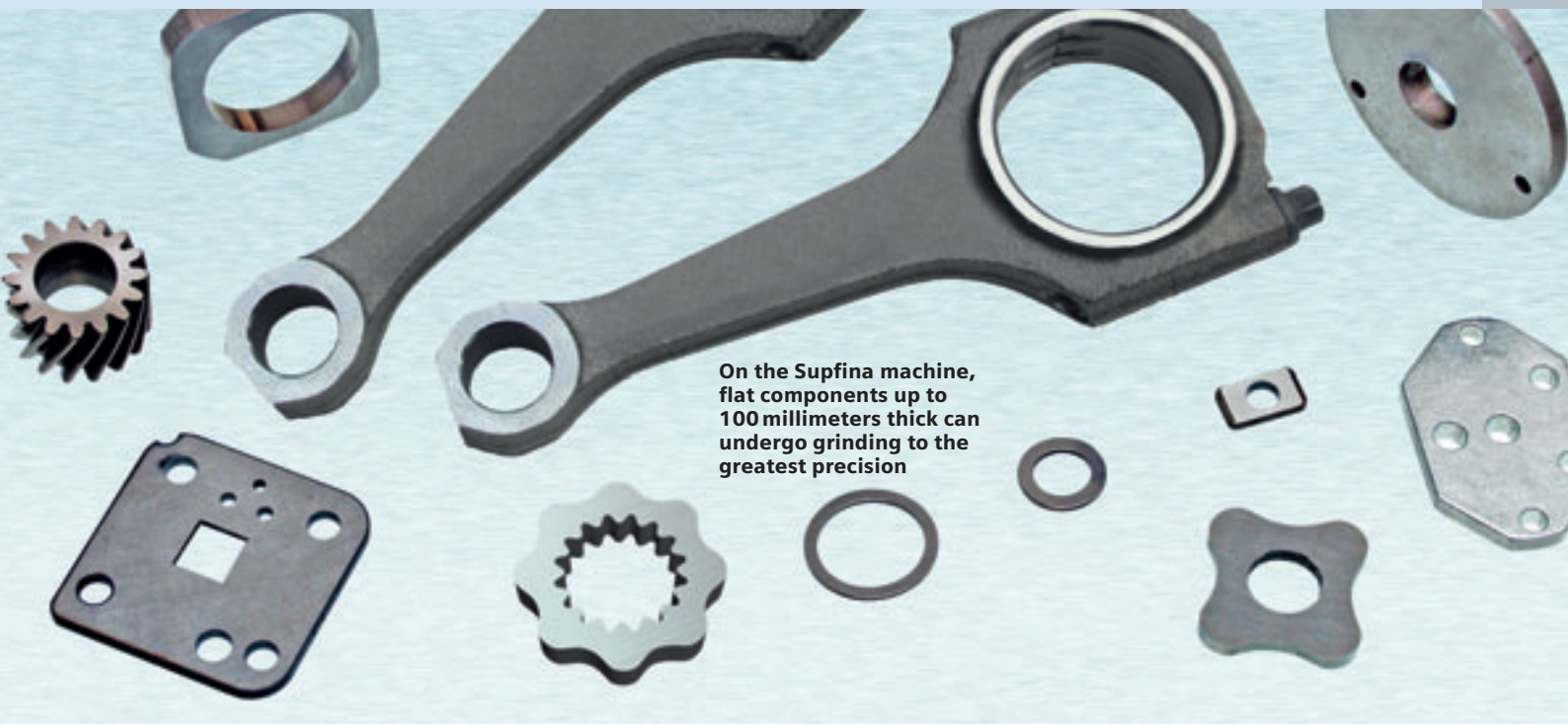
The double-ended grinding machine Planet V combines stable machine design with state-of-the-art automation technology

The machine is employed for the surface finishing of flat components That are 3 to 250 millimeters in diameter and up to 100 millimeters thick. They are machined with conventional or super-abrasive grinding disks and ground flat on both sides in a single pass. In this process, an accuracy of 2 to 3 micrometers and a roughness depth of less than 2 micrometers are achieved.

Massive Construction with Integrated Dressing System

A machine with grinding disks with a diameter of up to 762 millimeters requires a sturdy design to absorb the high grinding forces and to prevent vibrations. "We built the machine frame as a welded structure which is lined with concrete to reduce vibrations," explained designer Joachim Schulte.

Interesting here is the division of the machine frame in two. The top half is carried on three points and can be shifted in



On the Supfina machine, flat components up to 100 millimeters thick can undergo grinding to the greatest precision

The Planet V with Sinumerik 840D is unique due to its high operator friendliness

three axes to set the grinding disk at an angle. This tilt is measured and enables a speedy machine setup at a high rate of repeatability.

The dressing system works on both sides simultaneously and is completely integrated into the machine. It features CNC axis which enables the exact shaping of the grinding disk sides. To ensure the required accuracy, the workpieces are measured by an integrated measurement system with an accuracy of 0.1 micrometer.

Drives and control from a single source

The new double-sided grinding machine has a total of four controlled axes and two grinding spindles. The drives of the grinding disk accelerate the spindles up to 3000 RPM and develop a torque of 248 Newton meters during this process.

Such a highly developed drive technology also requires tremendous power. The Simodrive 611D drive system is used in conjunction with 1FT6 servomotors, which were selected in particular because of their extremely high concentricity, which is very especially important during grinding.

The control for the machine is also from Siemens. The electronic backbone of the Planet V series is a Sinumerik 840D which is designed in accordance with the required standard Solutions for Powertrains in the automotive industry. A Windows XP computer functions as an operator interface; with its standard architecture it enables a trouble-free connection to existing system environments. Joachim Zech, head of design, explains: “We have decided in favor of Siemens as an automation partner because of good experience with the Sinumerik 840D control in the past. The openness of this control is significant for our machine as well its integrated safety concept.”

Functions for perfect grinding

The control itself possesses everything necessary for a highly productive grinding machine, e.g., travel with no contouring error and the integration of internal measurement systems. In addition there is the safety system of the Sinumerik 840D, “Safety Integrated”, which contains functions such as safe standstill safe acceleration, safe position and safety reduced spindle speed. These are properties that are indispensable to ensure the safety of the operator and the machine, particularly when grinding with large grinding disks.

“It was not difficult to integrate into the control system the external measurement systems which is used for the in-process and post-process measurement of the workpieces and grinding disks monitoring,” reports Joachim Zech. He also praises the openness of the control which allows, e.g., the system for measurement and compensation of the grinding disk tilt to be integrated fully.

The entire machine control is based on an open concept which also incorporates the communication with prior and later processes. For example, handling systems can be coordinated with the machine sequences via Profibus DP. All in all, Siemens has created an excellently-attuned solution. The 500 percent increase in productivity documents the benefits for a machine builder when designers and control specialists form an interdisciplinary team. ■

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