Special Print 01/2019

Measuring in minutes

Production-related quality assurence of complicated mold inserts

Werth Messtechnik GmbH

www.werth.de

QUALITY ENGINEERING
Special Edition
Issue P1.19

Production-accompanying measuring at Mauth: The machine operator is responsible for grinding the form cutting plates. This also includes measuring on the Werth Scope Check S.
pictures: Werth

Production-related quality assurance of complicated mold inserts

Measuring in minutes

For years, toolmaker Mauth had to calculate more time for measuring complicated form cutters than for their grinding process. With the new 3D coordinate measuring machine Scope Check S from Werth Messtechnik, the relationship has changed. The production-related measurement system makes a significant contribution to increasing productivity.

Form cutting in metalworking has fallen somewhat behind. Some users argue that CNC-controlled lathes and multi-spindle machines are capable of producing any contour with a standard plate. This is undoubtedly true. But is it also more economical? "It is more advantageous if the tool delivers the complex contour in one operation. Because then the operator only has to set and check one dimension and not a whole sequence of dimensions," says Michael Mauth, Managing Director of Mauth Werkzeug-Schleiftechnik in Oberndorf am Neckar. This is how he sees a growing demand for form cutters.

His company – founded in 1996, grown to 50 employees and annual sales of around 6 million euros – specializes in the manufacture of high-quality special and standard tools for internal and external machining of metallic materials, including the aforementioned form cutters. The tools, all of which have been developed to customer specifications, are used in the automotive industry, but also in mechanical engineering, electrical engineering, and medical technology. Mauth even develops and produces tools for wood and plastics processing.

For high-quality machining results, the forming inserts must offer high quality. "We are in the range of a few micrometers for form and position tolerances. A changeover precision of less than 0.01 mm and consistent repeatability are also crucial," says Mauth. To achieve these values, the team grinds the mold plates in one clamping. A 3D CNC coordinate measuring machine Scope Check S from Werth performs the dimensional check. In addition to its high mechanical accuracy, it scores points with a customized software solution. "The fact that we can measure the complete form plate and the contact surface to the profile in a single measuring sequence is a key unique selling point," argues Michael Mauth. "This results in clear measurement results that give us security in production."

Mauth discovered the Scope Check S during a visit to a trade show. The comparison with previous measuring processes was clear: The repeatability of the Scope Check S, at just a few tenths of a micrometer, was many times better than the previous measuring method. "The speed of the measurement also prompted us to change over as quickly as possible," explains Thilo Leicht, master craftsman in production. "Today we measure in two minutes, which used to take us 20 minutes, and get meaningful results – automatically logged. I only know this from this measuring device."

The Scope Check S offers a particularly fast scanning process with a maximum permissible length measurement deviation of 1.9 µm and reproducibility in the submicrometer range. At Mauth, it is equipped with the patented Werth Zoom – with an image free of distortion in the entire image field. Distortion errors are detected and corrected so that the position of contours can be

The author

Wolfgang Klingauf
k+k-PR
on behalf of
Werth Messtechnik
www.werth.de

determined with high accuracy. “This is the trick for very accurate scanning, which we need to measure a form plate everywhere with high accuracy,” explains Christopher Morcom, Managing Director of Tool MT, a Werth Group company. He also points out that the Scope Check can be supplemented with tactile sensors if undercuts need to be probed, or with non-contact distance sensors that can be used, for example, to digitize complex topographies.

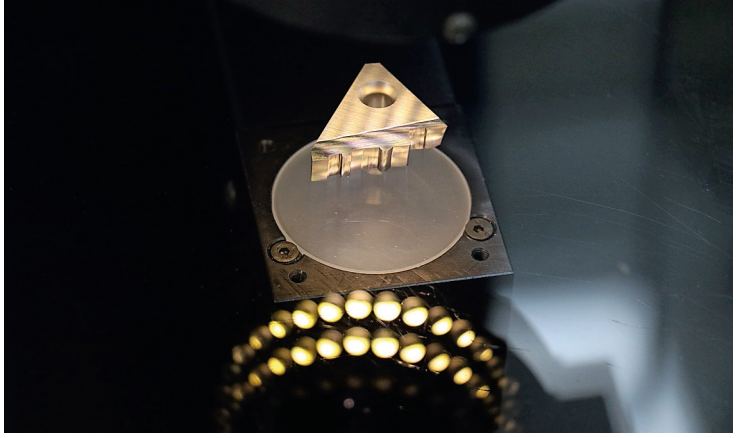
Lightning fast to reliable measurement results

For the production of a form plate, Stephan Felde, the skilled worker responsible for insert grinding at Mauth, receives the corresponding CAD data in DXF format from the design department and uses it to program his grinding machine. He then grinds a sample part and measures it on the Scope Check S. To do this, he also reads in the DXF data, places the workpiece on the measuring table, and starts the software, which consists of a scanning and best fit module. “We reference on the system surfaces of the plate, which are standardized by us“, explains the skilled worker. “So the software finds

Michael Mauth is enthusiastic about the simple, fast, and repeatable measurement of his form plates with the Werth Scope Check S.

the contact surfaces, measures them, and starts the scanning process. Turning and flipping the test sample is required.“ A measuring program must be created. The Best Fit Module compares the actual profile after the scan process with the nominal profile and the form deviation vectorized and color-coded. Also key dimensions like angles, lengths, and radii are displayed.

Felde detects necessary displacements at a glance and transfers the necessary corrections 1:1 to the grinding machine. This is how series production in the green area is guaranteed. “We can put multiple workpieces on the measuring table,” says Felde. “They are then measured automatically, which reduces the effort even further.”



Forming plates are placed on the measuring table of the Werth Scope Check S without a fixture. The fast optical measurement provides clear measurement results – the basis for economical production.

By measuring during production, Mauth saves the final inspection. Michael Mauth is also enthusiastic about the cooperation with Werth: “With Mr. Morcom, we have a contact person who knows the needs of tool production exactly and who gives us optimal advice regarding the relevant measuring technology.” So Mauth came to Werth with another request – the reconditioning of worn tools, which is another mainstay of the company. If necessary, Mauth takes over the complete process of decoating, regrinding, cutting edge preparation, coating, and finishing.

Michael Mauth: “We have developed coatings for various materials and tools in order to provide the customer with a completely renewed tool that meets all requirements and has a much longer service life.” This offer also includes gear-cutting tools. Hobs must first be measured, especially the positional errors of the flutes and the relief area. Only then can it be determined whether the reconditioning effort is worthwhile and whether a high-quality tool can be expected.

Measuring technology for resharpening hobs

In close cooperation with the tool specialists at Mauth, Werth developed a relatively simple and cost-effective solution: The Scope Check S measuring device is equipped with an additional rotary axis and tailstock, so that the hobs can be clamped between centers. For multi-sensor measurement, the image processing sensor is supplemented by a scanning probe.

Of essential importance here is the software that Werth offers for tool applications. It adopts the parameter set used to describe a hobbing cutter and automatically creates the measuring sequence from it. This is usually several thousand lines long and calls up more than 25 different measuring routines to probe all relevant edges and surfaces. This reduces the effort required to enter the parameter set and start the measuring process. The result allows an evaluation of the entire hob and serves to log the high quality of the resharpening and recoating process. ■