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User Report

»µFocus«

Schumacher Precision Tools GmbH

Verify and Document the Cutting Edge Fillet

Fast, Simple and Reliable Measurement

Convinced that innovative measuring technology from ZOLLER drives innovation and quality in tool production: **Volker Nötzel** (r.), Managing Director of Schumacher Precision Tools GmbH, in conversation with **Norbert Cranz** (center), Head of Quality Assurance at Schumacher Precision Tools GmbH, and **Celal Yilmaz** (l.), Sales ZOLLER West.

Verify and Document the Cutting Edge Fillet

Fast, Simple and Reliable Measurement

Schumacher Precision Tools GmbH in Remscheid develops and produces tools for the manufacture of internal threads. The tool specialist measures and documents the rounding of the cutting edges defined for these precision tools quickly, easily and reliably with an optical inspection device »mµFocus« from ZOLLER. For the range of materials to be machined in the industry, these defined roundings on the cutting edges ensure process reliability during the cutting process. The cutting edge fillet is therefore an important quality feature for cutting tools.

Priority Quality Assurance

This is also confirmed by Dipl.-Ing. Volker Nötzel, Managing Director at tool manufacturer Schumacher Precision Tools GmbH in Remscheid. For more than 100 years, Schumacher has been developing and producing tools for manufacturing internal threads for the industry at its Remscheid site. The engineers in Remscheid have now fully digitalized their design and production processes. Fully parameterized models are used for optimization purposes, including for FEM solid body simulations. In an express service, individually designed tools can be produced as one-offs or in small series with a digital design within just 48 hours.

Fully Parameterized

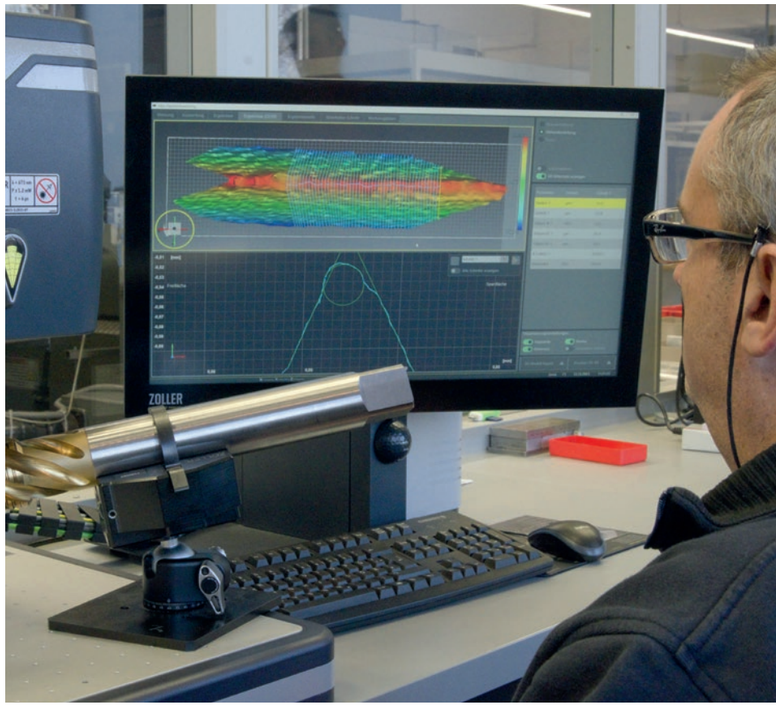
Schumacher Precision Tools GmbH, together with its sister company GAP Gesellschaft für angewandte Prozesslenkung GmbH, has been working intensively on data integration and digital steering methods at a scientific level for more than 30 years. At the beginning of the research, a CIM strategy was used to connect all areas relevant to production and processing in terms of information technology. As early as 20 years ago, deep learning approaches from the field of artificial intelligence (AI) were pursued and neural networks were used to monitor the condition of CNC machining centers in collaboration with RWTH Aachen University. Through all of its R&D activities, Schumacher now relies on its own modular engineering system for product development. The modular system comprises the ToolDesign (TD) and Tool Simulation (TS) modules, which are used to digitally design cutting tools using variant design and simulate and test them using solid-state simulation FEM before production. Accordingly, Schumacher Engineering works with fully parameterized tool models. Up to 180 parameters of the automated variant design describe each tool in 3D space – right down to the edge fillet.

Good Cooperation

The fully digitized tool construction kit from the Schumacher and GAP developments provides an excellent basis for intensive cooperation with E. ZOLLER GmbH & Co. KG. As the owner and Managing Director of Schumacher and GAP, Dr.-Ing. Bernd Schniering, reports,

Trusting cooperation between the companies involved: **Christoph Zoller,** Managing Director E. ZOLLER GmbH & Co. KG (2nd from left) with the specialists from Schumacher Precision Tools GmbH: **Christoph Schniering,** Managing Director (left), **Norbert Cranz,** Head of Quality Assurance (2nd from right) and **Volker Nötzel,** Managing Director (right).

it is in particular the personal contact with Mr. Christoph Zoller, which enables the development engineers of the companies involved to work together in a very trusting manner. Bernd Schniering and Volker Nötzel consider ZOLLER's expertise and competence in the high-precision measurement of all relevant tool parameters to be remarkably high. In particular, they emphasize that the specialists in Pleidelsheim take up the recom-



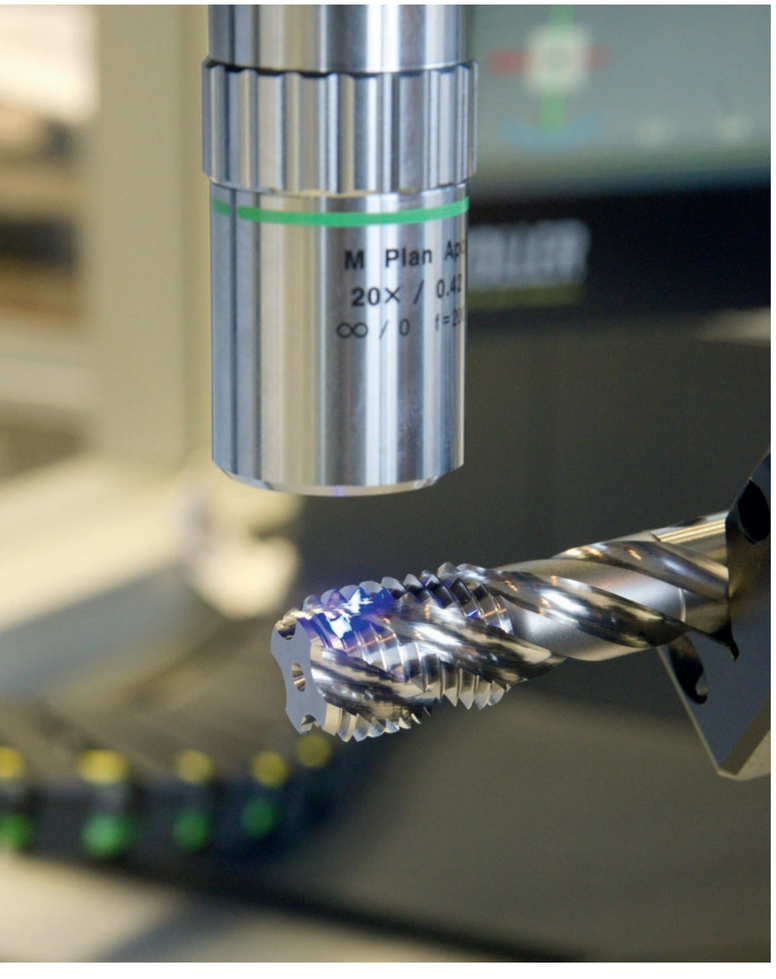
Reliably analyzing cutting edges on threading tools: The optical measuring devices »mµFocus« from ZOLLER quickly and reliably detect complex geometries to an accuracy of less than 1 µm on the smallest and large threading tools (from M1 to over M50).

mendations from the measuring technology practice. “They then optimize their measuring devices and software within a short space of time,” explains Bernd Schniering.

Reliable Optical Measurement

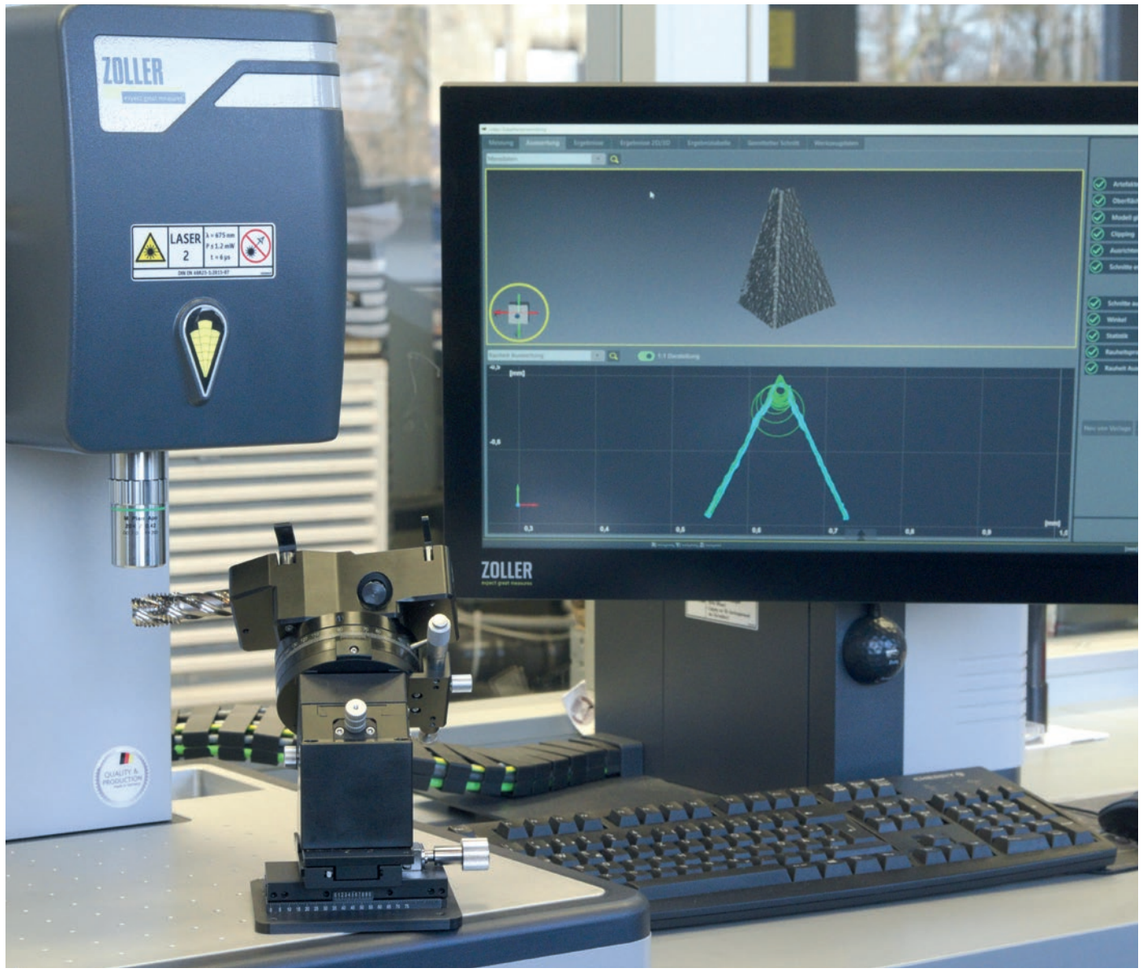
As emphasized, cutting tool manufacturers have needed tools with specifically rounded cutting edges for many years. At Schumacher in Remscheid, the process planners therefore have the appropriate production equipment – for example vibratory grinding systems. As a result, they have a certified quality assurance system with documentation of the cutting edge parameters. They work with an inspection device »mµFocus« from ZOLLER. “After extensive comparisons of the currently available measuring methods and measuring devices, we were convinced that the »mµFocus« from ZOLLER meets our reproducible requirements,” explains Volker Nötzel. It is compact and robust. This makes it suitable for measuring both during production and as part of the final inspection. It works optically without contact using laser light and a measuring microscope. The measuring spot measures just 10 x 10 mm. Even the smallest contours and geometries can be measured with an accuracy of less than 1 µm. In addition, the Inspection device »mµFocus« measures complex geometries, such as cutting edges and thread flanks on cutting segments on highly twisted taps. Thanks to its large vertical working or positioning range (Z-axis), the »mµFocus« flexibly measures very small and also large tools with repeatable accuracy. “This makes »mµFocus« particularly suitable for consistent quality assurance of threading tools. Thanks to the very short set-up and adjustment times, our measurement technicians can fully measure all tools when manufacturing for example special tools in small series. Roundings with design-specific dimensional ranges between 2 and 5 µm can be measured reliably and with repeat accuracy. This allows us to ensure that the manufactured threading tools correspond exactly to the specifications,” reports Volker Nötzel. He is convinced that the optical measurement technology of the inspection devices »mµFocus« is now indispensable in order to further optimize threading tools.

Microscopic details: Thanks to the just 10 x 10 mm measuring spot, cutting edges and surfaces on thread flanks can be reliably measured and assessed even on the smallest threading tools.



Convenient Operation

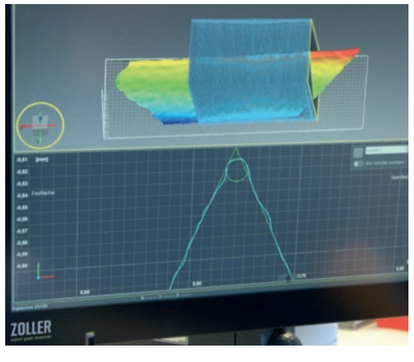
Measuring the surfaces and the cutting edge is completely automatic. Thanks to the software »pilot« you need just a few keystrokes on the large touch screen to view, evaluate and save measurement data. Colored graphics show the surfaces and contours of cutting edges as 3D models. In addition, the respective rounding can be viewed in any number of cross-sections over the measuring range using a 2D graphic and can be compared with a superimposed arc. This simplifies and speeds up the evaluation of the measurement data considerably.



Surfaces and edge fillet at a glance: On the large color screen, ZOLLER’s measuring machine »mµFocus« displays 2D and 3D graphics for various features of the measured tools.

Fast Evaluation

Norbert Cranz, Head of Quality Assurance at Schumacher, confirms: “The processes of the ZOLLER »mµFocus« measuring machine alone convinced us. They are significantly simpler, more flexible, faster and more convenient than with other measuring devices.” The close cooperation with the manufacturer ZOLLER also resulted in further benefits. “For documentation purposes, we need individualized and standardized forms for our quality assurance. The specialists in Pleidelsheim have mapped our specifications in an exemplary manner and implemented them flexibly,” reports Norbert Cranz. In addition, the ZOLLER software »pilot« enables the measurement results to be transferred to other software in the company, such as an ERP system, via standardized interfaces. This



Individual evaluation: A variable number of cross-sections (top) can be specified in the measuring range for each of which the software displays the measured contour for cutting edge fillet (bottom).

Quick and convenient: With just a few manual settings in conjunction with the large display on the screen, the operator can quickly find the desired geometry area on which the measuring device automatically focuses.

considerably simplifies and accelerates the processes involved in documenting the measurement data.

Evaluating Surfaces

One version of »mµFocus« from ZOLLER is available with a confocal measuring microscope. This ensures that the surface roughness can be quantitatively recorded and assessed in addition to the cutting edge geometry. Accuracies of up to 1 µm can be achieved. This allows tool manufacturers, for example, to record and analyze the quality of their ground tools before and after coating not only qualitatively, but also quantitatively in detail. This makes a significant contribution to further optimizing cutting tools, for example with regard to the correlation between the surface quality on the tool on the one hand and the tool life or the surface quality to be achieved on the workpieces on the other. The tool specialists in Remscheid also benefit from this function.

Precision Tools from Remscheid

Schumacher Precision Tools GmbH has been developing and manufacturing precision tools for the production of internal threads since it was founded in 1918.

The product range includes a comprehensive standard program as well as special tools for leading industries worldwide. In the area of R&D, the company maintains research cooperations with several German and international universities.

Company headquarters of Schumacher Precision Tools GmbH in Remscheid.

ZOLLER

Solutions

More speed, higher quality, safe processes – with ZOLLER, you increase the efficiency of your production. ZOLLER offers you outstandingly precise devices for adjusting, measuring and testing cutting tools, software, interfaces, cloud services and solutions for the automation of tool processes. You can combine all of this to create your individual system solution – on your way to the smart factory.

- Presetting & Measuring
- Tool Management
- Inspection & Measuring
- Automation

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