

# Measuring means knowledge

**BERND BALLE**

Bernd Balle (bernd.balle@zeiss.com), Carl Zeiss Industrielle Messtechnik GmbH, Oberkochen, Germany

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## Abstract

Optical designers, physicists and engineers at FISBA develop, analyze and optimize optical components on behalf of their customers. Thanks to its innovative production techniques, the Swiss company is widely renowned as a manufacturer of high-quality optical components and systems. A ZEISS MICURA coordinate measuring machine is among the tools used by the company to ensure the quality that is valued around the globe.

**KEYWORDS:** measuring machine, geometric features, precision, scans

With a bit more than 70,000 inhabitants, St. Gallen, Switzerland, is an idyllic town on Lake Constance. But as beautiful as the town may be for tourists, the globally renowned companies headquartered here – such as FISBA OPTIK AG and its 350 employees – do not have the time to sit back and enjoy the scenery. “We cannot simply rest on our laurels if we are to keep pace with the industry,” emphasizes Managing Director Werner Krüsi. FISBA OPTIK does its utmost to continue impressing its customers with innovations, quality and service. As Managing Director Werner Krüsi stresses, the company focuses on three key activities: shaping glass, optical design and micro-optics.



**Fig. 1.** “For development and production, it is vital for us to measure precisely,” emphasizes Werner Krüsi

Founded in 1957 in St. Gallen, the company is both a development partner for optical and mechanical design and optoelectronic integration, as well as a supplier of quality components and systems. FISBA OPTIK is known the world over for its high-quality micro-optics that are used in endoscopes. According to Krüsi, the company relies on its measuring technology to reach its ambitious goals: “Measuring technology is an interdisciplinary technology in optics. The one with the most precise tools and efficient strategies will out pace the competition, both in research and development, as well as in production.” And, because FISBA OPTIK always strives to remain at least one step ahead of the rest, management and engineers overturned a procurement decision of the Supervisory Board and instead acquired the more expensive, but considerably more accurate and functional ZEISS MICURA coordinate measuring machine.

## Non-stop measuring tasks

“If we don’t measure, then we don’t really know what we are doing,” states the Managing Director, underscoring the value of measurements in optics. This refers to both the development and production of optical components and systems. The latter is broken down into multiple aspects: precision grinding, polishing, centering, coating and mounting. And FISBA OPTIK checks the quality after each step: visually and with the help of various measuring equipment such as interferometers, autocollimators and coordinate measuring machines such as the ZEISS MICURA.



*Fig. 2. The head of pre-machining and mechanical engineering is proud to support the development department with the MICURA*

In use at FISBA OPTIK since summer 2013, this measuring machine is particularly vital to monitoring the narrow production tolerances of small and complex parts such as those common in optics. FISBA OPTIK acquired the ZEISS MICURA to meet its need for a very accurate measuring machine to ensure the quality of the company’s highly precise CNC machine for lens manufacture.



*Fig. 3. Robert Huber and his colleague Manuel Loepfe discuss the most efficient measurement strategy*



*Fig. 4. Form and location tolerances must be checked on this part for assembly*

“The machining process can only be precise if the measuring process is very accurate,” emphasizes Robert Huber, Head of Pre-machining and Mechanical Engineering at FISBA OPTIK. The measuring accuracy of this compact measuring machine is just  $0.7 \mu\text{m} + L/400$ . Another benefit: ZEISS MICURA not only uses single-point probing, but also scans at up to 200 points per second. As a result, form and location parameters such as roundness and flatness can be precisely captured, in addition to geometric features, in a short time.



*Fig. 5. In order to grind the lens elements, they must first be mounted with pitch*

Although FISBA OPTIK originally purchased the measuring machine to monitor processes of the CNC machine used to manufacture optical components, it is now primarily utilized to measure mechanical parts and prototypes. “With the MICURA, we can now obtain information about the quality of the glass so quickly that it opens up capacity to complete many additional measuring tasks,” states Huber. This has considerably increased the satisfaction and motivation of machine operators outside lens production in recent months. Now they receive feedback much sooner, e.g. if the quality requirements of the tools they manufacture are met or not. If problems arise, they also identify which error sources can be ruled out and where they can make adjustments. “As a result, they achieve the desired quality much sooner.”



*Fig. 6. Huber demonstrates the measurement of a housing on the MICURA*



*Fig. 7. FISBA Optik uses the ZEISS MICURA to also measure mechanical parts and prototypes with the utmost accuracy*

However, FISBA OPTIK uses the ZEISS MICURA to monitor more than just production. Because this measuring machine can be reconfigured more quickly than existing systems, developers are also seen more frequently in the measuring lab where “their designs are double-checked on the fly.” Measuring technicians work for the 35 employee-strong research and development department at least once a week, now much more often than in the past. Back then, the department occupied the machine for two full weeks every year. Because of the long they had to look for other ways or contract the measurements externally the rest of the year. According to Huber, the “highly reliable measuring machine” is now in operation the entire shift. This is due in no small part to the measuring technicians checking the quality of the delivered parts almost exclusively on this coordinate measuring machine.



*Fig. 8. In addition to lens elements, FISBA also manufactures prisms whose form and location quality is also inspected on the MICURA by Huber and his colleagues*

## No more dead ends

FISBA OPTIK more or less decided on the ZEISS MICURA at the last minute. The company already had one measuring machine in operation that was intended to replace the old one. However, engineers, the research and development department and Huber voiced their opinion to reverse the purchase of the rented machine, although it had already been approved by the supervisory board, remembers Krüsi. "The other measuring machine would have taken us down a dead end road," emphasizes the Managing Director and explains that his company will only "reach the absolute leading position with this stable and highly accurate machine." However, it was more than the precision of the system that impressed them. They were also impressed by the ease of use which enables the company to complete any measuring tasks much faster. The analysis at the push of a button has also been well received by everyone involved. The measuring results no longer need to be manually entered, but can simply be compared with the CAD model which allows personnel to identify any problems much sooner. As the head of the company had determined, the investment in the more expensive, and in his opinion clearly better measuring machine, has more than paid for itself. "Today, we are much more aware of what we are doing than in the past."

### References

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