

SWITZERLAND

Hard Machining at the Limits of what's Possible

Bangerter Microtechnik AG operates production sites in Aarberg and Lyss near Lake Biel in Switzerland. Core expertise is the production of components with the highest precision, made of ceramics, carbides and other extremely hard materials, which can also be designed as hybrid components based on different joining techniques. Specialist know-how is available in the functional and aesthetic design of surfaces. The different materials are bought in as semi-finished materials. The most important applications of the components are in the watch industry, medical engineering as well as industrial sectors like mechanical and automotive engineering, textile and aviation industries. Marc Bangerter (MB) manages the company founded 50 years ago in the second generation, which now employs 130 people.

CA: For the watch industry, you have in respect of materials, component design (geometry and surface finishing and colours) an exceptionally complex range. Has that developed bit by bit historically?

MB: My parents already made bearing jewels made of synthetic rubies for mechanical watches. Today's portfolio, however, goes back to a re-entry into the segment of the watch industry, a little more than ten years ago. Ceramic had already established itself there as a high-quality material. We have, however, dared to take product designs that were significant for the character of premium brands of the watchmakers and were formally designed such that they were easily possible in e.g. stainless steel and gold, and implement these in coloured zirconia grades although the geometries were not originally regarded as "ceramic compatible". In addition, we have worked on the surface design by means of grinding, sandblasting and polishing, and given inspiration for the watch designers to optimally adapt the finishing of the materials to the product design.

We don't see ourselves as a supplier, but as a development partner for our customers, who solves technical problems for them and, on the other hand, understands what makes the fine difference in these highly aesthetic products needed to attract a high regard from their buyers. We are talking about tolerances in the micron range and absolutely flawless surfaces, but we also understand what is behind the myth of a watch in the upper bracket of the market. In this respect, the history and location of our company near to the cen-

tre of the Swiss watch industry does help.

CA: Which manufacturing competences form the basis for you to guarantee to meet these demanding requirements?

MB: These are state-of-the-art five-axis simultaneous grinding machines as well as extremely old grinding and polishing machines. Key know-how exists in the engineering of fixtures to hold the components to be machined, which sometimes measure just a few millimetres in size.

That is only possible with the special dedication of our employees as a great professionalism coupled with meticulousness and passion are needed to arrive at above-average problem solutions in this field at the very limit of what's possible.

Our processes don't just have to be optimised in respect of precision and quality, but also work very economically. We sometimes have only small batch sizes (10–50 pieces) and still have to reach a certain degree of automation to be efficient. For development work with customers and the steady improvement of our processes, around 10 % of our workforce works as an R&D team.



Fig. 1
Marc Bangerter



Fig. 2
Examples of various colours and surface qualities

CA: How far do you work on ceramic material issues?

MB: We buy in ceramics as semi-finished materials in a pre-sintered state. Ceramics based on zirconia and alumina, silicon carbide and nitride as well as mixed ceramics (ATZ/ ZTA) now make up 90 % of our materials range. On top of that come tungsten and titanium carbide as well as sapphire. We need outstanding grades near theoretical density as we absolutely have to avoid pores. In this way, we can secure the required high mechanical strength. Besides the testing certificates of our suppliers, we test the material in independent testing laboratories. That is important for us especially for medical applications where biocompatible components must exist in the human body. Medical applications are our second most important mainstay.

We have here suppliers we trust, but we are together regularly confronted with material issues. Examples include an extremely thin zirconia tube that during grinding underwent phase transformation, which led to volume growth that could no longer be offset with a very reduced wall thickness. Consequently, we had to learn to define the final dimensions differently. In the colouring of ceramic compounds, we have observed again and again that the grinding or polishing performance is influenced by the pigments. The type of colour

pigments can also cause colour changes to be triggered by wet grinding. So we shall always come across material-relevant issues that have to be resolved.

These examples explain that for us to achieve our high quality requirements, we have to address the entire value creation chain from the raw material with material certificate to final control or the performance test of the components.

CA: What are your focuses in geographic market cultivation?

MB: The D–A–CH countries are our focus. Spatial proximity often helps with difficult problems. We are also actively cultivating the US market. That has something to do with the fact that I spent part of my studies there and have learned to understand the mentality. Naturally, we have a representative office in the country. We also sell to many European countries as well as Asia. “Swiss-made” in the premium segment is generally well received abroad. In Asia, we are not currently pursuing any strategic market development as we would otherwise reach certain limits with our personnel resources.

CA: How do you assess the future of the markets that you are working in?

MB: In the last business year, we had very solid growth in all three segments – although industry segment is currently showing a slight slowdown. We are generally confident and planning to increase our manufacturing capacities. One site will remain specialised in medical applications as we have to fulfil special requirements in respect of documentation (quality/certification) for these applications, which qualified teams are working on.

CA: What is your maxim for the further development of the company?

MB: Developing new things and pushing the boundaries of possibility. In addition, it is important that we pass on our unique spirit to our employees. Both to the new employees who with their knowledge of new manufacturing technologies are very important and to those who already draw on decades of experience in our company. After all, behind every good product are dedicated and motivated people.

CA: Thank you for talking to us.

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Fig. 3
View of manufacturing facilities