
BORNEMANN SIGNIERTECHNIK & MITSUBISHI MATERIALS

CASE STUDY



HIGH FEED- EXCHANGEABLE HEAD END MILLS
FOR MACHINING HARDENED STEELS



Solid and capable: The embossing device needed urgently for a customer was rough machined at Bornemann with the iMX end mill system from Mitsubishi Materials.

“We already have the solution in reserve”

It was the usual situation at Bornemann in Wermelskirchen: once again a customer was in a hurry, once again the order had to be processed quickly. This time it was a device for a die that the customer had developed in order to emboss curved surfaces. They had commissioned labelling technology specialists with the production of three prototypes along with attachment parts. The order was successfully processed and a great deal of chips have fallen onto the floor – as is usually the case at Bornemann. The fact that this order was produced so quickly this time is largely due to the competency of Mitsubishi Materials, which Bornemann had once again reached out to. Within 24 hours the tools required were on site. If the customer’s trials are also successful, Bornemann can expect a follow-up order of about 400 stamping tools. “If there’s something we don’t have, it’s time” says Michael Wisniewski, managing director of the company, summing up the overall situation. “This is why we need future-orientated solutions waiting in reserve and good partners who provide us with technological support.”

using hand stamps, which were produced for the surrounding tool industry. Once the first machines for labelling came about, stamps were also increasingly being manufactured for them. Bornemann gradually invested in the latest generation of modern machine tools in order to respond quickly and flexibly to customer requirements. With milling, engraving, turning, grinding, eroding and heat treatment, the company now has all the machining processes that are required for manufacturing its products solely in house. It is self-sufficient, flexible and independent with regard to quality and deadlines. And it is fast.

The development at Bornemann has always been driven by the products. The stamps were initially cubic in shape, then the geometries became increasingly more complex from the mid-1990s onwards, and the materials became ever more challenging to machine. The engravings had to be increasingly adapted to free-form surfaces and powder metallurgy steels such as CPM Rex M4 or Vanadis had to be machined. Currently, hardnesses up to 58 Rockwell are machined. High-alloy steels are, to date, the most popular material machined in Wermelskirchen. Production is usually undertaken in small and medium series batches and for a customer base that covers a wide range of industries.

In fact, the customer base extends from the automotive industry, where embossments on door sill panels, components such as rims, hinges, exhaust components, etc. have to be stamped, to embossing products for folding boxes or tubes in the pharmaceutical industry.

ABOUT iMX

- Profile** General machining roughing, finishing and chamfering type exchangeable heads
- Range** Ø 10 - 25 mm
- Geometry Type** 19 different types Steel and rigid carbide shanks with internal coolant supply

- Features** High repetition accuracy and rigidity due to two-face clamping

Self-sufficient, flexible, fast

Bornemann is one of the few highly specialised companies in Germany that manufactures stamping tools for industrial product labelling. Besides engraving technology, the main pillars of those from Wermelskirchen also include the production of milled and eroded parts as well as laser inscription. Managed by the owner until today, the company was founded in 1961 by Karl-Heinz Bornemann. Back then a large portion of labelling was done





The results of the collaboration are successful (from the left): Uwe Schreiber, cutting tool specialist from Mitsubishi Materials; Carsten Schäfer, head of tool manufacture at Bornemann; Karsten Grah, head of engraving technology at Bornemann; and Michael Wisniewski, managing director at Bornemann.



Additionally, the production of milling and erosion parts for general mechanical engineering customers are also supplied. "We even supply the food industry, for labelled containers, or the pulp industry with rollers for embossing sanitary products", says Wisniewski. The broad presence in the market here is only one side of the coin. The other side is the type of orders. "We often don't know what's coming our way from one day to the next", says Carsten Schäfer, head of tool manufacture at Bornemann. "Therefore we must be able to react quickly and flexibly."

Smooth, sleek, reliable

"Mr Schäfer sent me a drawing for the embossing tool and he asked me to drop by as soon as possible to discuss machining. I was on-site the next day", recalled Uwe Schreiber, the tooling expert from Mitsubishi Materials in Germany. In order to rough machine the material as quickly as possible, Schäfer originally wanted to use a Mitsubishi AJX indexable insert cutter with a negative geometry, which has been used successfully at the company for a long time. "As an alternative, I proposed our new iMX system, a series of exchangeable head end mills. iMX also includes a type with a Duplex high-feed geometry, which is designed for machining hardened steels", said Schreiber. Bornemann is always open to using new technologies and this was also the case with the Duplex type iMX head and especially since the CAD simulations had shown that this saved one hour per component. The tools that Schreiber then ordered – a 25 mm Duplex geometry end mill for roughing, a 25 mm end mill with a 1 mm corner radius for finishing, and holders in both steel and solid carbide – were delivered the next day. "Saving one hour can be explained

by the increased cutting depth", says Schäfer. "With the iMX we were able to run at a depth of cut of 1.25 mm." At the same time, the iMX's smooth cutting action was impressive and the chips were ejected easily and evenly. "Because the iMX ran very smoothly, we increased the feed rate to 4.5 m/min. Even this ran reliably and cutting continued to be smooth."

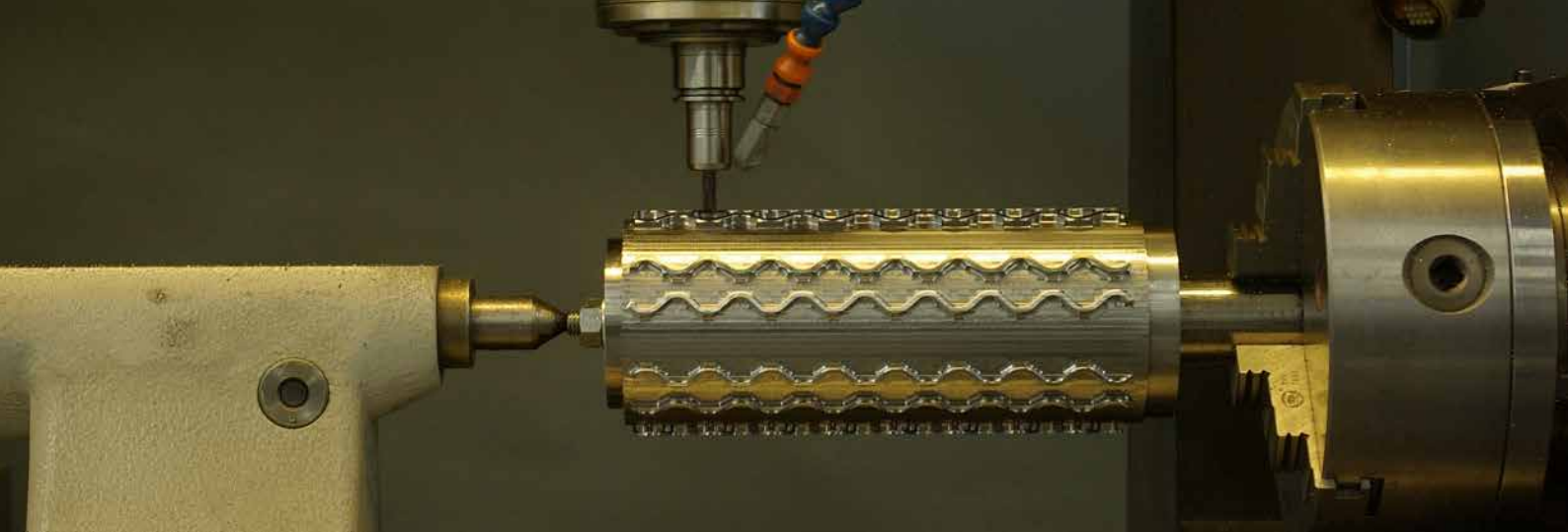
The finish milling operation was also reduced to four hours when finishing with the iMX. Since a mirror-like surface was not required for the component, only a single finishing path was required at a 0.5mm step over. "Nevertheless I found that the surface created was excellent", says Schäfer. Especially since it could finish machine the entire component with just one tool. The wide range of the iMX system which includes a variety of heads and holders has also been essential for Schäfer. "Because we simply don't know the applications that will arrive tomorrow", he states. "As soon as we know the requirements of a component, we can then quickly use the iMX system." The



advantages of the iMX system include the accuracy when exchanging heads and of course the price compared to a solid end mill.

"We use it for everything"

Another high-feed end mill from Mitsubishi Materials used by Bornemann is the VFFDRB mill. Also equipped with a Duplex geometry, this robust corner radius end mill is also designed for machining hardened steels. When the solid carbide tool came onto the market last year, Schreiber introduced it straight away at Bornemann. But to begin with it had no usage. Daily operations had other priorities. "But six weeks later I got a phone call" explains Schreiber. "The basic message: the thing is taking off: smooth running, speed, everything." Since then, the VFFDRB has been used on an HSC milling application with a minimal amount of lubrication to manufacture rollers. There was all-round satisfaction, especially for Karsten Grah, the head of engraving technology at Bornemann. "I always need extremely smooth running since the spindles of our HSC milling machines are very sensitive" he stresses. Previously Grah had to use mills over and over again that could not be driven at high speeds. "You could hear it. What's more, the spindle had to be repaired every year", says Grah. "Then Mitsubishi came. Since then it has been working perfectly. Even when milling slots."



The VFFDRB high-feed end mill is also equipped with Duplex geometry. In the picture: Production of a roller for manufacturing pulp products.

ÜBER BORNEMANN GMBH

Bornemann GmbH is an owner-managed, medium-sized company in the labelling and special tool industry. The stamping tools and products from the milling and erosion technology sector are used in a wide variety of industries such as the mould tool and automotive industry, the chemical and pharmaceutical industries as well as in the general mechanical engineering industry.

With more than 50 years of experience, the company offers a comprehensive and diverse range of services thanks to its further specialisation in the business area of laser inscription and laser engraving. Bornemann marking technology stands for first-class quality: engraving technology, laser technology, milling & erosion technology and labelling technology.

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ABOUT MITSUBISHI MATERIALS

Mitsubishi Materials Corporation is a leading Japanese company, specialising amongst others, in the production of cutting materials, coatings and precision tools for the metal working industry. Mitsubishi Materials Corporation operates Head Offices in Europe, India, Brazil, China, USA, Japan and Thailand, a modern Research and Development Centre in Japan and several production facilities throughout the world. The Corporation employs over 23,000 people in more than 77 countries.

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Since the end mills offer extremely smooth running, surfaces can also be machined reliably without an operator present. Facts that Schäfer also took advantage of. "I had a problem here with a punch insert for manufacturing sheet metal parts. A pocket 8 mm in depth had to be rough machined on 20 pre-hardened parts. The strategy was to remove all material except the 0.3 mm finishing allowance, then a final finish cut with a ball nose end mill. We manufactured all 20 parts with a single VFFDRB end mill in this way." Since then, the VFFDRB has been used everywhere where that requires a lot of material to be removed, even if the component isn't already hardened. "Our bread-and-butter end mill here is an 8 mm type." says Schäfer, smiling at the thought. "We use it for everything". And Grah adds: "Therefore, when a new machining task is lined up, we don't have to think twice as to how to go about it. We already have the solution in reserve."

Welcome input

Until now, timely processing of an order at Bornemann has never been unsuccessful in terms of waiting for a tool. This still remains the case and allows Schreiber to provide the labelling specialists with competent support and lots of ideas. "In particular, I also regularly present the latest tools from Mitsubishi Materials", he says. The fact that the results of the collaboration are successful is shown by how Bornemann has also completely converted to Mitsubishi tools for drilling and indeaxble insert cutters. "We are open to new ideas", stresses Michael Wisniewski, the managing director. "Why? Because we need the input in order to make quick progress and continually advance in terms of technology."