Swiss Quality Production

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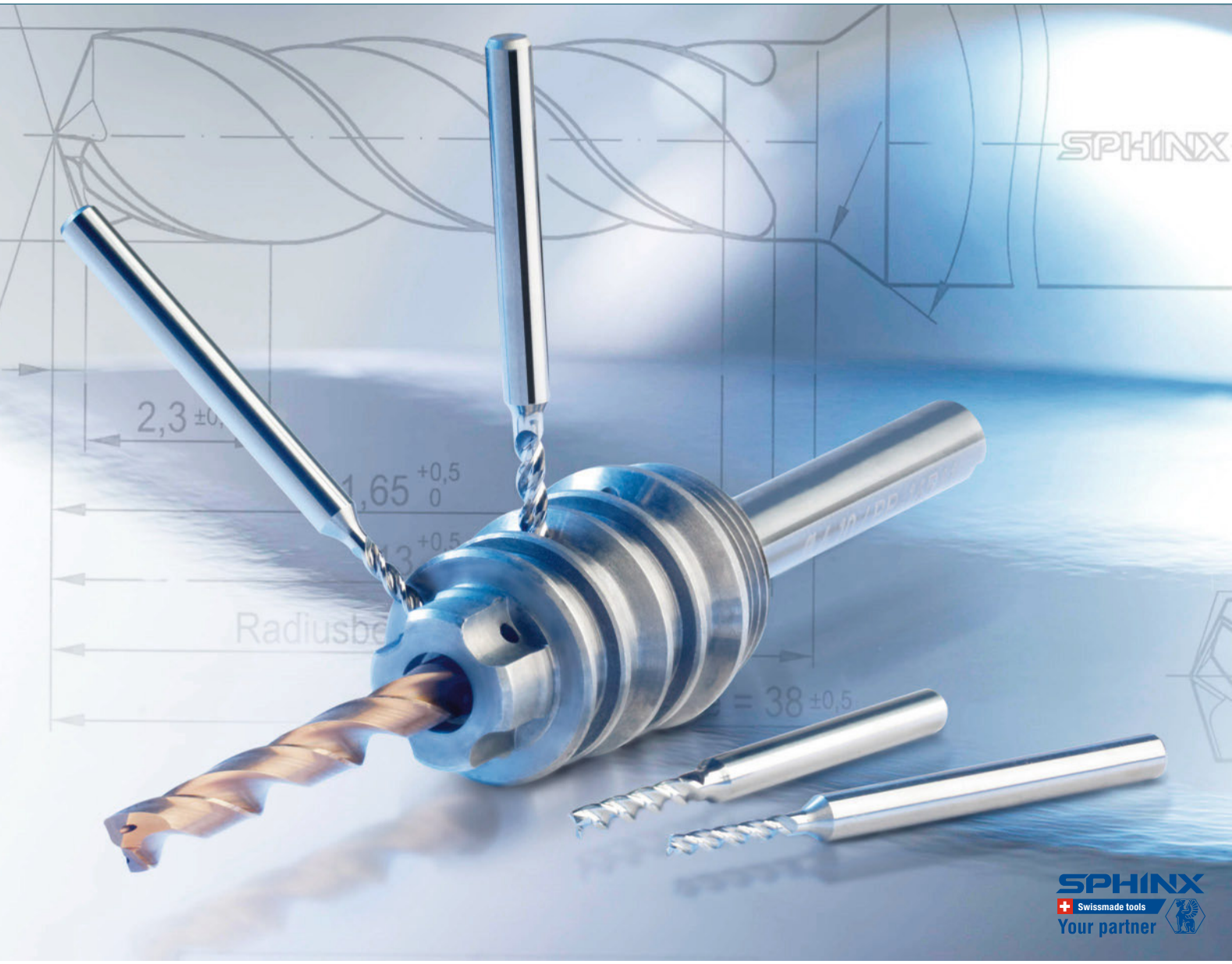

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Machining difficult materials in series production

Small drills with a big bite

The company Aeschlimann AG Décolletages in Lüsslingen, Switzerland, has excellent experience with the solid carbide drills from Sphinx when drilling small to extremely small diameters in corrosion-resistant and high-strength materials.

BY KONRAD MÜCKE

→ In the Swiss town of Lüsslingen, over 160 employees at Aeschlimann AG Décolletages currently produce turned parts with a diameter of 1 to 70 mm primarily for electronics and cars, but also for two-wheelers, for clocks and watches and for hydraulics and apparatus construction. The company, which operates internationally today, goes back to the manufactory for producing screws for clocks and watches founded in 1937. The company was already expanded after just a few years and began with a mechanised, increasingly automated series production of extremely small screws. Back then the firm's success was already based on an especially high level of quality.

Turned parts in medium and large series

The company quickly developed in the 1980's and 1990's to a supplier for the electronics industry and vehicle manufacturing valued the world over. With over 260 conventional and CNC machines (multi-spindle systems, automatic sliding headstock lathes and automatic rotary transfer machines), today it specializes in the complete machining of complex, difficult turned parts. To supply ready-to-install components, the company also offers a comprehensive range of remachining work, including honing, grinding, roller burnishing and, if required, coating. With annual sales of just under 32 million Swiss francs, high-quality precision parts are produced every year in Lüsslingen from more than 1,100 tons of steel, approximately 40 tons of aluminium and almost 150 tons of other materials (for example, plastics and heavy metals). Depending on orders, Aeschlimann produces in lot sizes between 10,000 and 100,000 workpieces on demand.

The range of components includes valve parts for modern diesel injection systems. These consist of high-alloy, corrosion-resistant steel. They are produced in series of up to 1.5 million workpieces annually on six-spindle automatic lathes from an indexing system (Figure 1). To

The three-bladed Mikrotricut bores extremely small lateral holes in high-alloy steel with controlled production on automatic lathes

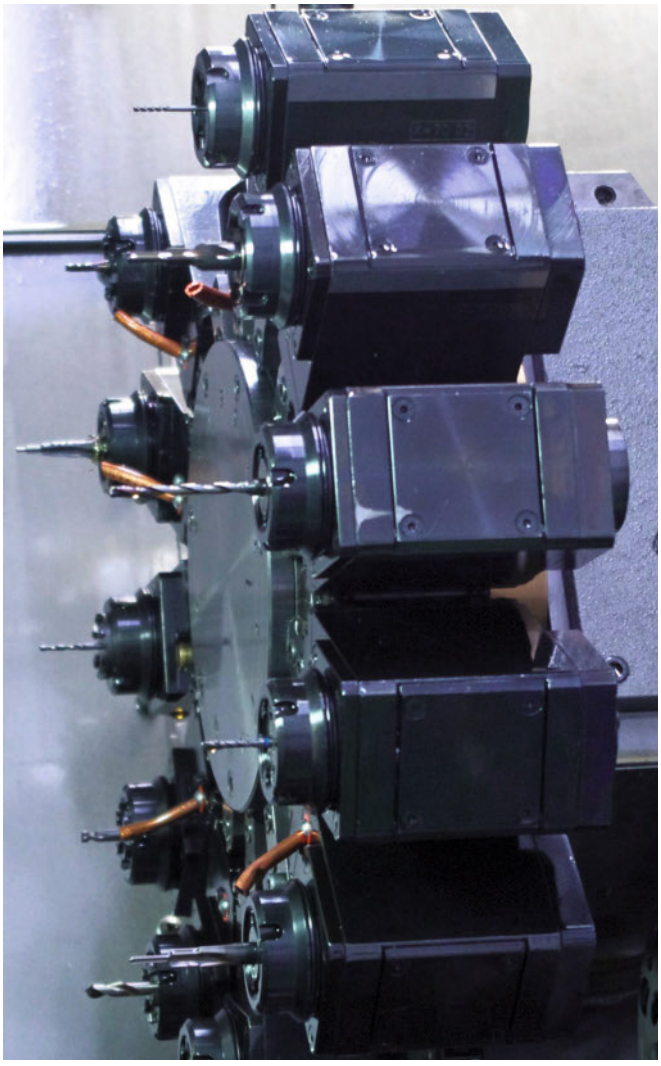
Figures: Sphinx (Titel), Konrad Mücke (1-4)

meet the delivery deadlines and the quality specifications of the automotive industry, a large number of parameters must be complied with within narrow limits. As Michael Kunz, Head of CNC Turning Production, explained, this especially requires a high degree of process reliability. »However, this must be achieved in conjunction with exhaustive technology data, i.e. with optimized cutting and feed speeds. Only then can we work efficiently as contract manufacturers,« he explained.

Process-reliable drilling and milling tools

In addition to reliable machines, Kunz and his employees especially also require high quality tools for this purpose. When purchasing small drilling and milling tools, he found the right partner in Sphinx from the neighbouring town of Derendingen (Figure 2). The manufacturer and user have already cooperated closely for over 20 years now. On this Daniel Jaberg, responsible for the precision mechanics application segment at Sphinx, reported: »Due to the geographical proximity, a very positive and productive cooperation has developed for both sides. As tool manufacturers we can quickly check the quality of our innovative tools in the application. For this purpose we are provided with trustworthy, open feedback on the behaviour of these tools in practice. And that enables us to quickly optimize the tools and as a result to considerably shorten the period from the development and design to practical tools carried in our catalogue. On the other hand, Aeschlimann benefits as the first user from the advantages of these tools and can therefore generate a competitive advantage for itself with them.«

2 Standard and special tools from Sphinx Werkzeuge AG in a shop floor storage



1 Three-bladed cutters, deep-hole drills and special step drills of solid carbide optimize series production on automatic lathes

Jaberg sees the outstanding advantages of Sphinx in the far-reaching specialization in the precision drilling niche. This means the company in Derendingen can manufacture optimized standard or special tools that meet the unusual requirements resulting in production practice considerably faster than other tool manufacturers (Figure 3). In Derendingen the company not only has tool design at its disposal, but also a production system for grinding a extensive range of micro-drills. And Aeschlimann also benefits from this corporate strategy. To drill lateral bores with a diameter of just 1.5 and 2 mm in valve parts of high-alloy steel on the multi-spindle automatic lathes, Kunz requires stable, reliable drills. To comply with the »»»

3 Specialists at Sphinx in Derendingen produce optimized special and micro-tools for special customer requirements on high-precision grinding machines

4 Daniel Jaberg of Sphinx und Michael Kunz of Aeschlimann have found the solution to reliable lateral drilling of bores with a diameter of just 1.5 and 2 mm on multi-spindle automatic lathes

»» required short cycle times, the bores should be drilled directly without complex cantering holes.

In cooperation with the tool specialist Jaberg he found the best suited drilling tool, the Mikrotricut (Figure 4), on the comprehensive product range from Sphinx. This drill has three cutting edges. Jaberg explained the advantages compared to a drill with just two cutting edges: »On the one hand, with its three cutting edges the drill can operate at considerably higher feed speeds and achieves a longer tool life in the process. That shortens the machining and non-productive times.« As he added, this special advantage of modern drilling and milling tools of solid carbide is frequently still neglected, »The specialists in the workshop usually choose insufficient cutting and feed speeds. As a result, they not only give away time and cost advantages, they also often cause premature, avoidable tool wear. So that solid carbide tools can fully utilize their high potential, it is necessary to work at the upper limits of the cutting data with them.«

Reliable and efficient with special geometries

Jaberg names the centring tip in place of the lateral cutting edge on two-bladed cutters as another advantage of the Mikrotricut three-bladed drill. »With this the three-bladed drill ensures exact centring during tapping. That not only provides for a higher accuracy, but also for improved process reliability. For a carbide drill with a diameter of just 1.5 mm already breaks off when it runs slightly untrue on the workpiece surface.« Michael Kunz confirmed the outstanding advantages of this drill, »Due to its high degree of precision and process reliability, we not only repeatedly use the Mikrotricut on the multi-spindle machines from an indexing system, but also on other CNC automatic lathes. Especially for lateral drilling on curved surfaces, it clearly utilizes its advantages.«

These innovative drills are meanwhile part of the standard product range at Sphinx. It is available with a diameter of 0.2 to 3.0 mm increasing in steps of 0.01 mm. Sphinx has realized the small diameter steps to enable users to product a bore which exactly corresponds to the specified drawing diameter despite inaccuracies of the machine. As Jaberg explained, even the smallest alignment errors of the chuck or tool mounts can cause inacceptable diameter tolerances. This can often be corrected with a drill that is one or two hundredths of a millimetre smaller.

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In addition to these micro-drills, Kunz also works with a broad range of other tools from Sphinx at Aeschlimann. These include the high-performance Phoenix 3 x D, 6 x D, 9 x D and 12 x D for deep bores from the standard product range. And the new Power Phoenix high-performance drills for the depths 16 x D, 20 x D, 25 x D and 30 x D with highly polished grooves are also offered. The advantages of these drills are – depending on the drilling diameter – shafts ground to a diameter of 3, 6, 8 or 10 mm with the h6 tolerance. As Jaberg reported, these reinforced shafts provide for stiff, highly damping chucking of the drills in collets, shrink- and in hydro-expansion chucks. This results in improved surface qualities and higher process reliability. Of course, from a diameter of 1 mm the deep-hole drills have an inner coolant feed to quickly and reliably rinse the chips out of the area of the cutting edges. There are different coatings depending on the materials to be machined, however there are also versions with a high-gloss ground groove base to facilitate reliable chip removal also at low coolant pressure (15 bar).

In addition, the specialists at Aeschlimann repeatedly use special tools from Sphinx. As Jaberg explained, Sphinx has extensive know-how and many years of practical experience for their design and production. As a result, special tools suitable for series production can be realized in an extremely short time in cooperation with production firms. These are used to combine several work steps in a single work cycle, for example drilling, reaming and cutting a chamfer or a recess. In the same way, bores with up to four different diameters can be produced in a single step. And unusual tip geometries, for example considerably smaller tip angles or adjusted cutting and clearance angles, frequently prove to be especially favourable for a higher process reliability and accuracy. As Kunz emphasized at Aeschlimann, special tools make a particular contribution to shortening the throughput times. »These kinds of optimizations help us – in combination with further measures on the machines or in logistics – to also drastically reduce the machining and throughput times. This repeatedly enables us to meet the often very strict requirements of the automotive industry for low costs and short delivery deadlines. That puts us ahead of the competition. And the good cooperation with the neighbouring tool manufacturer Sphinx also contributes to these achievements.« Daniel Jaberg added, »Our daily motto is to repeatedly be better than the others. With this we can create a particularly positive image as a niche manufacturer. The fact that this philosophy is especially beneficial for the users of our drilling and milling tools is impressively proven by the example of Aeschlimann.« ▮

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