

Solid carbide drills in production of individual parts and small series

# Controlled production in touch and hard materials

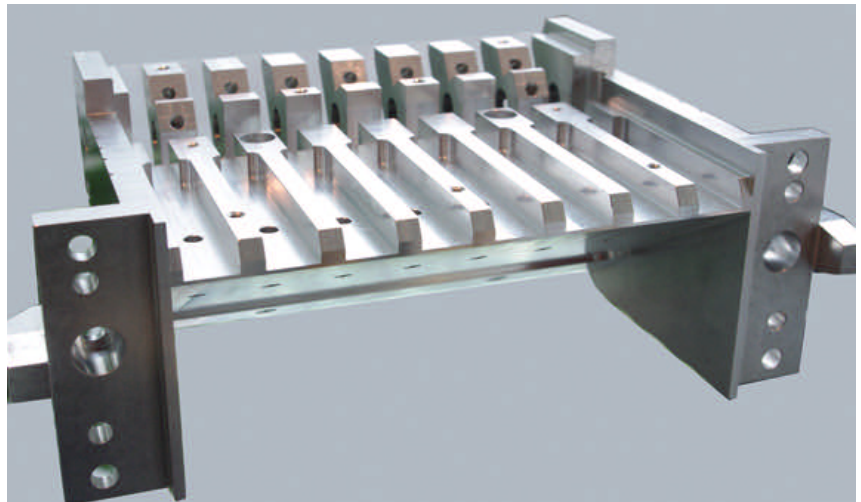
Vuilleumier Technology manufactures complex components from exotic materials. Here decisive criteria are flexibility and process reliability. That's why the contract manufacturer machines small drilled holes with solid carbide tools from Sphinx.

BY KONRAD MÜCKE

→ Contract manufacturing of the brothers Patrick and Michel Vuilleumier in Lyss, Switzerland specialises in high-precision machining of complex workpieces made of exotic materials (figure 1). As a result, the company's meanwhile 13 employees product components for the aerospace sector, motor sports, mechanical engineering and automation. The company today, with twelve primarily 5-axis machining centres (Hermle, Mazak), three eroding machines (Sodick) and several coordinate measuring machines (Wenzel, Tesa) has arisen from the subcontracting firm of the previous founding generation. About this Michel Vuilleumier said: »With the relocation of the company to a new building in the industrial area near Lyss, we have more than doubled our production area. In addition, we concentrate on pioneering production technology. This primarily includes consistent CAD/CAM programming and 5-axis machining centres in order to carry out complete machining in one chucking device whenever possible.

## Complete machining in one chucking device

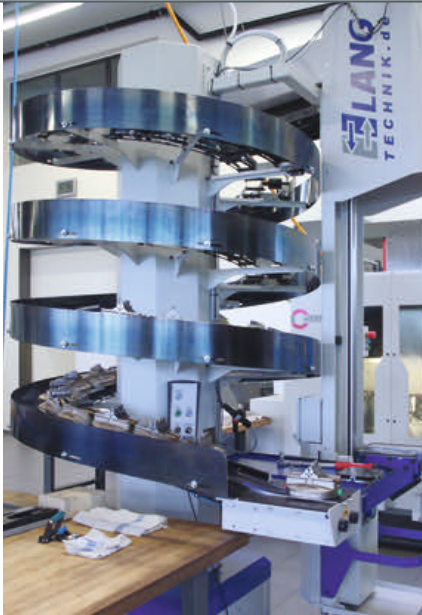
Within just a few years the Vuilleumier brothers have qualified themselves as recognized contract manufacturers in Switzerland and the neighbouring countries. As they report, this is only possible with high-



**1** Complex geometries in exotic materials: Vuilleumier Technology manufactures individual parts and small series for the aerospace sector, medical and automation technology



**2** Completely in one chucking device: Five axes enable drilling and milling on five sides at any desired angle



**3** Economical for small series: Vuilleumier equips some 3 and 5-axis machining centres with pallet storage units and automatic loading and unloading systems

quality machines and tools and with extremely well-trained personnel. For only then can the required accuracies be complied with reliably. In addition, customers also increasingly require the machining of highly complex components. »With the specified high level of accuracy and the required short delivery times, this can only be realised with complete machining in one chucking device on 5-axis machines,« emphasised Michel Vuilleumier. In order to be able to also produce in series under the given conditions, he meanwhile invests in pioneering automations of his 3 and 5-axis machining centres with flexible, economical pallet loaders (figure 3).

### Process reliability is the top criterion

In addition, Vuilleumier considers the safety and reliability of the machining processes to be decisive. »When manufacturing individual parts from high-quality, very

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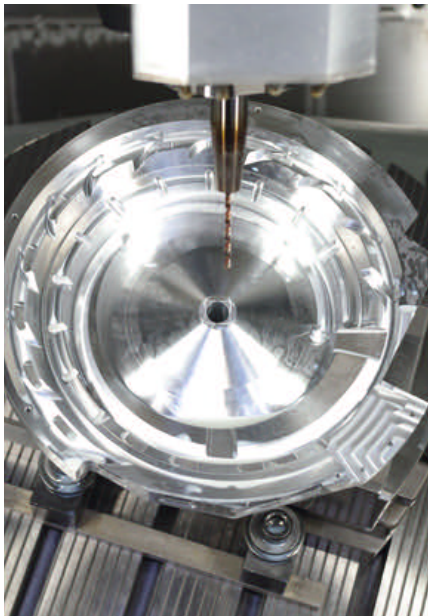


**4** Proven, controlled production in difficult materials: Solid carbide drills for diameters from 0.5 to 10 mm from Sphinx Werkzeuge

cost-intensive materials, a malfunction on the tool machine and the premature wearing or failure of a tool can have fatal consequences. Blanks must be procured and machined again. This causes both high costs and unnecessarily delays the delivery times. As a recognised partner to our customers, we cannot afford that,« he added.

That's why the manufacturing specialists Lyss also choose the tools for drilling, milling, reaming and threading very carefully. As Michel Vuilleumier reported, he prefers to work with universal, reliable solid carbide tools. And that creates a high level of flexibility. This then enables the employees to manufacture components from different materials in rapid sequence on the machining centres without a tool change. However, the tools must be extremely impervious to wear and achieve a long tool life for machining the often tough, warm-hardened or corrosion-proof materials. In Lyss, components are frequently produced from cobalt-chrome alloys, titanium or high-alloy steel, such as X38CrMo16.

As Vuilleumier emphasised, for him the focus is on process reliability with individual part and small series production. On the other hand, he largely dispenses with the optimisation of technology data, such as cutting and feed speeds. »The security of being able to supply highly precisely machined workpieces in accordance with the drawing specifications clearly has priority over the minimisation of the machining times in individual work steps,« he added. >>>



**5** Go in deep: High-performance solid carbide drills from the Power-Phoenix series with twisted grooves and inner tool cooling from 1.00 mm diameter are suitable for drilling depths up to  $30 \times D$



**6** Daniel Jaberg of Sphinx Werkzeuge AG (on left), and Michel Vuilleumier are convinced of the process reliability of the small solid carbide drills for machining exotic materials

»» When drilling small diameters, above all the high-quality solid carbide tools of Sphinx Werkzeuge AG have proven themselves in Lyss. As a result, the experts always have a large selection of solid carbide drills from the series Phoenix (figure 4) and Power-Phoenix to choose from for drilling diameters from 0.5 to 10 mm. If there are no drills for seldom required diameters in the storage warehouse, the tool manufacturer can make them available in just a few hours from its central warehouse in Dendingen. Sphinx also manufactures solid carbide special tools like step drills or reamers with two and three steps within short delivery times.

### Up to $10 \times D$ reliable without inner cooling ducts

With its tough solid carbide and the specially ground face geometries and guiding sections, the solid carbide drills are suitable depending on the design for drilling depths up to  $30 \times D$ . The speciality of these tools is that they already work reliably and in a controlled manner at a pressure of 15 bar of the inner coolant feed. Daniel Jaberg, regional sales consultant at Sphinx Werkzeuge, describes the advantages of the drills: »With smaller drilling depths, our solid carbide tools work extremely efficiently even in tough materials without in-

ner coolant feed. Especially your stable core geometries and negative chamfers contribute to this process reliability. With deeper drilled holes from  $10 \times D$  to  $30 \times D$ , it is advantageous to use tools with inner cooling ducts. The advantage of our drilling tools is that low coolant pressures around 15 bar are sufficient for reliable chip removal. This saves cost-intensive high-pressure pumps and avoids the related expense. In addition, it is also possible with Sphinx drills to produce reliably on proven machines on which the coolant is usually available at a pressure of only approximately 15 bar.«

Vuilleumier added that he prefers solid carbide drills without inner cooling ducts for diameters of less than three millimetres. The reason is the much lower costs incurred. He has no problem accepting the in some cases longer machining times. »With especially complex components with a large number of machining steps, among other things the frequent tool changes result in correspondingly long machining times. In addition, alone the programming on the CAD/CAM system often requires more time than the machining itself. The desire to compensate this with minimally shorter times during drilling would be disproportionate to the total costs,« said Vuilleumier. »In individual and small series production, above all we have to be able to depend on the process reliability. And this is always the case with the solid carbide drills from Sphinx Werkzeuge.« That's why the contract manufacturer in Lyss also uses pilot and centre drills and the Mikrotri-

cut 3-blade solid carbide drills. The latter have especially proven themselves when drilling on uneven, for example convex, surfaces. And that's because the drilling tip of the 3-blade drill can also reliably centre in those cases. This enables these solid carbide drills to reliably drill straight, aligned holes in one work step without previous spot drilling and centring.

### In future also unsupervised production

As Michel Vuilleumier summarised, the solid carbide drills from Sphinx Werkzeuge primarily offer convincing arguments due to their universal, flexible use in a broad range of materials. Furthermore, Vuilleumier is extremely satisfied with the high process reliability of the tools. »Even when drilling deep holes up to  $20 \times D$  in martensitic, corrosion-resistant steels with a 1.8 mm drilling diameter, no tool breakages have occurred on our 5-axis machining centres up until now. This means we can assume that these tools offer high process reliability. That enables us to also manufacture these kinds of components in small series for medical or automation technology on automated systems with pallet loaders in unsupervised shifts in future. As a result, we work economically even at a cost-intensive production site and can hold our own against competitors from less expensive regions.« ■

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