

Drilling deep holes up to  $40 \times D$

# Solid carbide drill reduces machining time to one-third

When setting oil holes with a very large L/D ratio, the contract manufacturer Ingold Tools has changed over to solid carbide, high-performance drills from Sphinx Werkzeuge. Exactly aligned drilled holes with high process reliability are the pay-off.

BY KONRAD MÜCKE

→ When drilling deep holes in different materials, solid carbide drills offer considerable advantages compared to HSS drills. With them deep drilled holes can be produced considerably faster, more accurately and nevertheless in an extremely controlled manner. This confirms Christoph Jenzer, who as one of the two managing directors at the contract manufacturer Ingold Tools in Inkwil, is responsible for work preparation. The company founded in 1946 by Otto Ingold as a supplier initially produced primarily punching tools, gauges, devices, injection nozzles and special bearing and machine components. Following the takeover by the Osterwalder AG (headquarters in Lyss) in 1974, the firm produced almost exclusively as a subsidiary for the parent company. Since 1992 the company has worked again independently with 16 experts for a large number of customers from the general mechanical engineering sector. In the last eight years several expansions of the business premises in Inkwil were accompanied by a very successful business development.

## Universal, flexible contract manufacturer

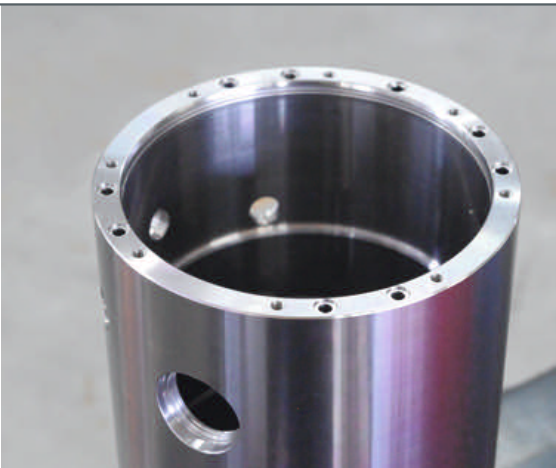
Today the company produces rotationally symmetrical and cubic parts, primarily for drive spindles of machine tools, for compressor and hydraulic system construction, for industrial print shop technology and

for general mechanical engineering. However here the company is not confined to sectors or production segments. »Our services encompass lathing, milling, drilling, inside and outside round grinding, flat grinding, honing and lapping,« reported Jenzer. »This is supplemented with sand

blasting, polishing, vibratory finishing and laser marking. We also assemble entire modules.« With comprehensive machinery, Ingold is able to manufacture complex, high-precision parts from light alloys and non-ferrous metals, steel alloys, plastics and heavy metals all the way up to ti-



**1** Reduce the machining times when producing oil and coolant ducts to one-third: VHM deep hole drills from Sphinx Werkzeuge for drilled holes up to  $40 \times D$



**2** In a 300 to 500 mm long sleeve, eight to twelve continuous axial holes with a 4.5 mm diameter must be drilled at Ingold Tools



**3** Deep and deeper: The Phoenix TC2 and TC4 VHM deep hole drills easily tackle a drilling depth of  $30 \times D$

tanium in accordance with the customer's specifications. »We round off our range of products and services with heat treatments and surface finishing, which we realise in cooperation with subcontractors,« said the managing director. In the process, drilled holes up to  $30 \times D$  and deeper must be repeatedly produced.

### Bottleneck deep hole drilling

As Jenzer emphasises, up until now only HSS twist drills were suitable for such depths with his machinery. Edgar Stich, responsible for production in the management of the contract manufacturer, reported, »We often awarded deep hole drilling to a subcontractor, because drilling with standard HSS twist drills was a very un-

certain, protracted matter on our machining centre. Even with drilled holes with shallower drilling depths up to approximately  $16 \times D$ , in-house production proved to be extremely time-consuming.« As with HSS twist drills cooling lubrication can only be supplied from the outside (they have no inner cooling ducts), the chips could hardly be transported away out of the drilled hole. Chip removal was often necessary, which took a great deal of time. In addition, the HSS tools became worn in just a short time. Consequentially, the drilled holes could run crooked and become unusable.

### Into the deep with Phoenix

In this situation, a few months ago Manuel Kummer, employed at Sphinx Werkzeuge AG in the Engineering department, presented the Phoenix TC2 and TC4 solid carbide high-performance drills developed shortly before. As an all-round tool, the Phoenix TC2 is provided with two guide chamfers and is primarily suitable for difficult to machine materials with an adhesion tendency. In contrast, the Phoenix

#### **i** USER

The contract manufacturer Ingold Tools certified since 2012 according to ISO 9001 and ISO 14001 is managed by Edgar Stich and Christoph Jenzer, who each hold a 50 percent share in the company. The firm produces small and large components as one-off parts and series, often with a repeat character, on a large number of CNC lathing, milling and grinding machines. When automated with a robot loading system, a machining centre can carry out five-sided production 24 hours a day, seven days a week (24/7). Measuring systems (Renishaw) monitor and correct the processes directly on the machines. As a speciality, Ingold Tools manufactures adhesive magnets in large series as advertising articles. They consist of high-strength aluminium and are anodised in colour and marked with lasers according to customer specifications. A high-quality Neodym magnet provides for extraordinary adhesive strength.

**Ingold Tools AG**  
 CH-3375 Inkwil BE  
 Phone +41 62 9615656  
[www.ingoldtools.ch](http://www.ingoldtools.ch)

**i MANUFACTURER**

**Sphinx Werkzeuge AG**  
 CH-4552 Derendingen  
 Phone +41 32 6712100  
[www.sphinx-tools.ch](http://www.sphinx-tools.ch)

» TC4 is equipped with four guide chambers, which is why it aligns very well and realises excellent surface qualities. Its polished clamping grooves provide for outstanding chip transport.

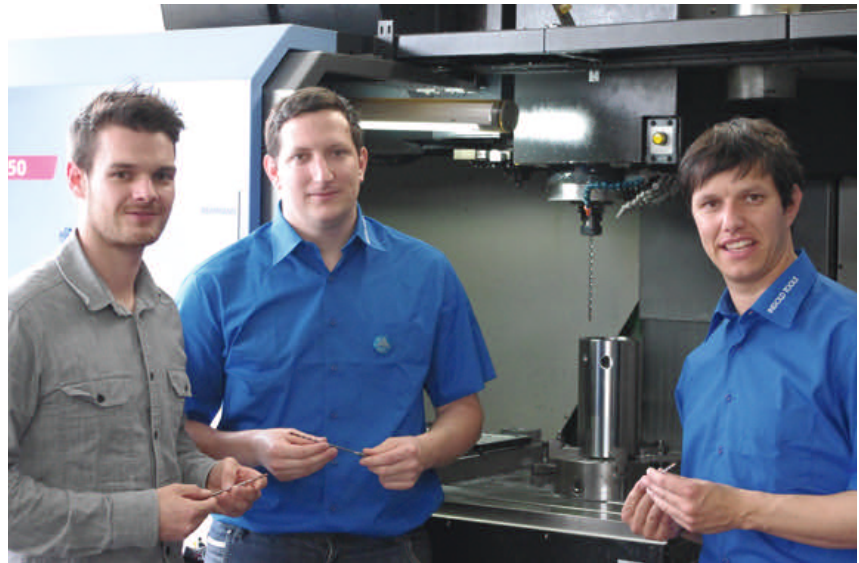
The head-coated solid carbide drills from Derendingen are characterised by an especially tough, fine-grained carbide and a very smooth, hard AlCrTiN coating. At the same time, they are extremely resistant to bending fracture and wear. Together with the tip, chamfer and groove geometries optimised especially for deep hole drilling, they are provided with a high edge stability, torsion strength and large chip spaces. As a result, they easily drill up to  $40 \times D$  deep even in tough materials.

The presentation of the VHM high-performance drill in Inkwil already confirmed its outstanding properties. Exactly aligned drilled holes with a drilling depth up to  $35 \times D$  were easily achieved. A particular advantage is the machine time reduced to approximately one-third. In conjunction with high process reliability and simple use on common machining centres, the solid carbide drills realise significant rationalisation measures.

### More precise, more reliable and simpler

The manufacturers in Inkwil meanwhile also tackle drilled holes up to  $40 \times D$  with the VHM drills from Sphinx Werkzeuge. First drilling is carried out with a VHM pilot drill with plus tolerance. Then the high-performance drill produces the drilled hole in a continuous process without ventilation at cutting speeds up to 150 m/min and up to 0.25 mm feed rate per rotation. When drilling from two sides, the exact alignment of the solid carbide drills guarantees that the drilled holes meet in the middle. As a result, high-quality drill holes up to  $80 \times D$  can be produced.

As Kummer emphasised, the quality characteristics of the tool in interaction with suitable process parameters provide for high process reliability during deep



5 Are convinced of the performance of the solid carbide deep-hole drills: Manuel Kummer of Sphinx Werkzeuge and Christoph Jenzer and Edgar Stich of Ingold Tools (from left to right)



4 The solid carbide high-performance drills from Sphinx Werkzeuge enable reliable production on machining centres at a coolant pressure of just 20 bar

hole drilling. The decisive parameters include a continuous coolant supply. However, a pressure of approximately 20 bar is sufficient for deep hole drills from Sphinx. »Compared to deep hole drills from competitors, our solid carbide tools already operate in a controlled manner at a low coolant pressure. That's why they can also be used efficiently on proven machining centres

and milling machines,« added Kummer. That eliminates the need for chucking and rechucking on special machines for deep hole drilling. In addition, complicated spot and pre-drilling, which is unavoidable with HSS drills for aligned drilled holes, can be omitted. As Stich pointed out, the special machining behaviour of the solid carbide drills also provides for short machining times. For with suitable higher feeding speeds compared to HSS drills, the drilled holes align, as the drills then produce defined chips.

### Significant rationalisation

Due to the high resistance to wear of the coating, the high-performance drills from Sphinx Werkzeuge achieve a long tool life. As a result, the contract manufacturer in Inkwil can produce an entire series of sleeves with twelve drilled holes per face without a tool change. Jenzer summarised his experience with the high-performance drills as follows: »We have considerably shortened our machining and processing time with the solid carbide tools. While we used to require several hours for one sleeve with HSS drills, we can do that today in just under an hour. In addition, the solid carbide drills also considerably simplify the machining process.« ■ → SE110052

Dipl.-Ing. Konrad Mücke is a specialist journalist in Schluchsee/Germany  
[info@machpr.de](mailto:info@machpr.de)