Grünwald CNC-Zerspanungstechnik turns, mills and drills large quantities of VA steel and duplex parts made from the material on this 5-axis Reiden RX10 and on the Emcos 120/60 and MAXXTURN 45 with integrated bar magazine. Large batches are machined on a Grob G350.

'The perfect tool for VA steel'

Grünwald produces an ever-growing number of V2A and duplex parts at its facility in Au in der Hallertau. 'The drilled holes have to be placed with a high degree of precision. We set high quality standards as demonstrated by TÜV certification,' states Michael Grünwald, who swears by the specialised and universal drills from ZCC-CT.

HARALD KLIEBER

'As you can see from the chip, the UD drill is the perfect tool for VA steel. It produces exquisite, comma-shaped chips with a small fin-like structure.'

Uwe Lutz

The demands placed on the drills are extremely high, reports Michael Grünwald, Managing Director of Grünwald CNC-Zerspanungstechnik. The company, based out of Holzhof off of the A93 outside of Au in der Hallertau, has a staff of 12 and operates a total of 12 machines. Stainless steel is a challenging material if the task is to drill 120 4.1 mm holes to a depth of 30 mm into an oil cooler. 'Up until recently, it took us ten minutes to drill the 120 holes. The new UD drills from ZCC-CT enable us to cut this down to six minutes without any tool changes,' reports Michael Grünwald.

The holes must line up perfectly

Grünwald received the tip from Uwe Lutz, who has been working for the metal-cutting company in an advisory role for roughly seven years. 'Uwe Lutz has always given me solid advice. At one point, he recommended tools from ZCC Cutting Tools for titanium parts and helped me run

Photos: NCFertigung

the calculations, which ultimately allowed us to reduce the runtime by around one-third.' The performance and precision of the tools were what impressed Michael Grünwald most. The two properties of the solid carbide and indexable mills and drills that really stood out for him were their concentricity and linearity. 'The latter is essential for us, among other things, because we are certified by TÜV Süd, which carries out a transfer of marking accompanied with certification of material testing in order to come in compliance with Directive 97/23/EC (concerning pressure equipment) and AD2000-W2. That's why the drill holes have to line up perfectly,' explains Michael Grünwald.

Larger clearance angle for higher productivity

A highly special tap Grünwald needed for a titanium part into which an M2.5 thread at 4xD was to be sunk is a further focal point of the collaboration between Grünwald and ZCC-CT. 'While 4xD is not absolutely essential, ZCC Cutting Tools was also able to offer the matching tool for this. They can help solve any problem. The first time Uwe Lutz really saved me money was when we had to machine an oil cooler that required a total of one thousand holes to be drilled in it. Michael Grünwald ran a number of tests, also with rival products. 'It's not that the other products were necessarily poor in quality; it's just that the ZCC-CT drill was able to work roughly 30 per cent more efficiently.' Cutting speeds and feed rates during drilling were simply much higher, reports Michael Grünwald. Dennis Hollenberg, Product Manager Solid Carbide Tools at ZCC Cutting Tools Europe in Düsseldorf, explains why: 'This is down to the special geometry of the drill. The larger clearance angle facilitates significantly higher feed rates, which in turn increases productivity when working with stainless steels.'

High-performance UD drill delivers well-formed chip

According to Uwe Lutz, the UD drill is in fact the perfect tool for VA steel. 'You can see it in the chip. If the UD drill is in top condition, it makes exquisite, highly uniform comma chips with a small fin-like structure.' If performance declines, flakes tend to build up, which indicates that it is time to replace the drill. 'You can see on the

Photo: NCFertigung

You couldn't tell by looking at it, but the PVD coating allows the UD drill to achieve cutting speeds (Vc) of up to 130m/min. in VA 1.4404. According to drill specialist Dennis Hollenberg, that is more than 60 per cent higher than standard drills, which only achieve 80 m/min. at the moment.

'The special drill has allowed us to reduce process times by roughly 40%, which is a truly remarkable feat.'

Michael Grünwald

drill itself that performance declines due to flank wear that occurs slowly and steadily, typically after several hundred or even well in excess of 1,000 holes,' says Uwe Lutz. The key factors here are of course the material and drilling depth. In this specific instance, a 4.1 mm UD drill (type: VA 1.4404) was used to make holes in 30 mm thick VA 1.4404, a food grade material.

Break-in every batch of VA steel – SU universal drills for a wide array of materials

'We often see major variations between batches in terms of material quality, especially with VA. This means that we had to inspect and break in every batch of material in the past. Using the UD drill lets us skip these steps.' Making the switch to UD drills was well worth it, states Michael Grünwald, because the quality of the boreholes and life span of the drill have improved markedly. ZCC Cutting Tools offers UD drills in diameters of 3 to 20 mm and lengths of 3xD and 5xD. 'By the way, a great alternative to the UD drill is our classic universal drill from the SU series.' According to ZCC-CT application engineer Ercan Cinar, it can be used by contract manufacturers to produce individual parts made from everything from plastic to Inconel. 'The SU series is the perfect choice if you work with a wide range of materials. Although the UD drill can also be used to machine tough steels, it has been developed and optimised for stainless steels, superalloys and titanium,' states Ercan Cinar, explaining the various applications for the tool series.

Photo: NCFertigung

Long tool life thanks to new PVD coating

Dennis Hollenberg explains how a long tool life is achieved thanks to the optimised coating and geometry: 'The coating made from our new KDG305 grade with its multilayer structure is a true technical milestone. The ultra-thin PVD layer really stands out because of the hardness of the coating and its thermal stability. In combination with the micro-chamfered cutting edge and fine grain substrate, it is possible to optimise wear as well as the cutting force, reports Dennis Hollenberg. Superalloys and stainless steels are relatively similar in terms of their requirements profile, which is also why the advantages offered by the modified point relief and tip can be fully utilised with both materials. For example, the special tip on the point

Photo: NCFertigung

Michael Grünwald, Dennis Hollenberg, Uwe Lutz and Ercan Cinar (from left to right) are extremely satisfied with the UD drill – and that's not just because the special drill can make 120 holes in VA steel in only six minutes working at a cutting speed of 130 m/min.

'The SU series is the perfect choice if you work with a wide range of materials. The UD series can also handle tough steels, though it was originally developed specifically for stainless steels, superalloys, titanium.'

Ercan Cinar

relief minimises cutting forces in the centre, explains Dennis Hollenberg. A 140° point angle is standard.

Special micro-geometry – top value for your money

The drills are reground exclusively by ZCC Cutting Tools. 'The micro-geometry, the rounded cutting edges and the nose radii at the tip are what make UD drills unique.' According to Uwe Lutz, the drill has to be reground to its original state in order to achieve the same level of performance. 'After regrinding, the drill is top in its class,' says Dennis Hollenberg. He then goes on to explain that the UD drill has tremendous potential based on its cutting parameters: 'Most drills are able to achieve around 80 m/min. Vc. Our drills can deliver even higher cutting speeds. The UD drill allows us to achieve well over 100 – up to 130 m/min. in fact – in established processes. That's a roughly 60 per cent faster than an 80 m/min. Vc, 62.5 per cent to be precise.' To make 120 30-mm deep holes, the total machining time is six minutes, allowing Michael Grünwald to reduce the time per flange by around four minutes: 'The special drill has allowed us to reduce process times by roughly 40 per cent, which is a truly remarkable feat. At the end of the day, the drill delivers top value for your money.' ZCC Cutting Tools Europe GmbH is the European subsidiary of the Zhuzhou Cemented Carbide Cutting Tools Co., Ltd, headquartered in Zhuzhou, Hunan, China, a member of the Minmetals Group. With more than 2,000 employees worldwide, ZCC Cutting Tools develops and manufactures high-end tooling solutions. Since 2003, all European markets' activities are being managed by the European headquarters in Düsseldorf, Germany.

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