

Cooling for Deep Drilling Tool shanks have become complex workpieces because the coolant must be optimally fed to the edges of drilling or milling tool.

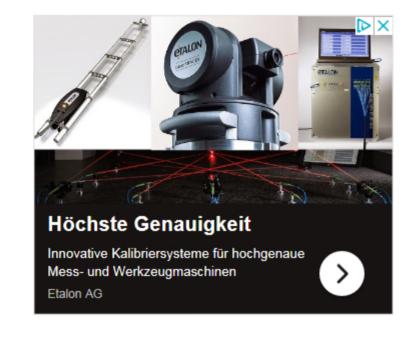
AM Staff | May 10, 2018

## **AMERICAN** MACHINIST

spindle ML200 for drilling workpiece shanks. From left to right: Device, drill bush carrier with immersion sleeves, spindle head. For drilling depths >200 mm. the user retrofits the drill bush carrier to the sealing case process. In this case, a steady can be mounted as well.

A view into a TBT two-

Cutting tools increasingly work with an interior cooling system. Manufacturing tool shanks for these systems is difficult because cooling channels with a high length-to-diameter ratio have to be drilled. For some variants, the tool designers even call for drilling of inclined holes. TBT Tiefbohrtechnik, a developer of "deep drilling" technology, reported it has devised a special tool to drill with single lip drills.



If the task were to drill centric cooling channels, this would be simple. But, tool shanks have become complex workpieces because the cooling lubricant must be optimally fed to the edges of the drilling or milling tool. Therefore, a centric cooling hole is not sufficient.



for workpiece adjustment. The photo shows the scale for the 360° rotation of the workpiece and the counter for height

adjustment.

several variants with different shank lengths and diameters, as well as versions with eccentric holes, sometimes running inclined to the workpiece middle axis and in various distances to the middle axis. The diameters of the coolant holes vary with each

One manufacturer of such shanks was confronted

with increasing requirements: It had to produce

tool for which they are intended, ranging mostly from 1.5 to 6 mm. This results in rather large lengthto-diameter ratios. The technology for deep-hole drilling with single-lip drills is best suited to this task, as single-lip drills are much better than conventional spiral drills regarding deviation and straightness — and hence offer more process reliability. Because the tool-shank manufacturer was already

using several TBT ML 200 deep-hole-drilling machines, those machines were preferred for the new assignment. The ML 200 machine is

well suited for tool shank applications, offering one or more spindles for drilling diameters of 0.8 to 12 mm. This provides flexibility in both directions if the diameter range from 1.5 to 6 mm is not sufficient. TBT Tiefbohrtechnik also provides consultation

machine choices and set-ups. The tool shank manufacturer requested a solution that could be adapted to the new, different workpiece versions and fit accurately with the intended ML200 in a two-spindle variant. Deriving a highly flexible solution in this instance was challenging: The drilling device had to

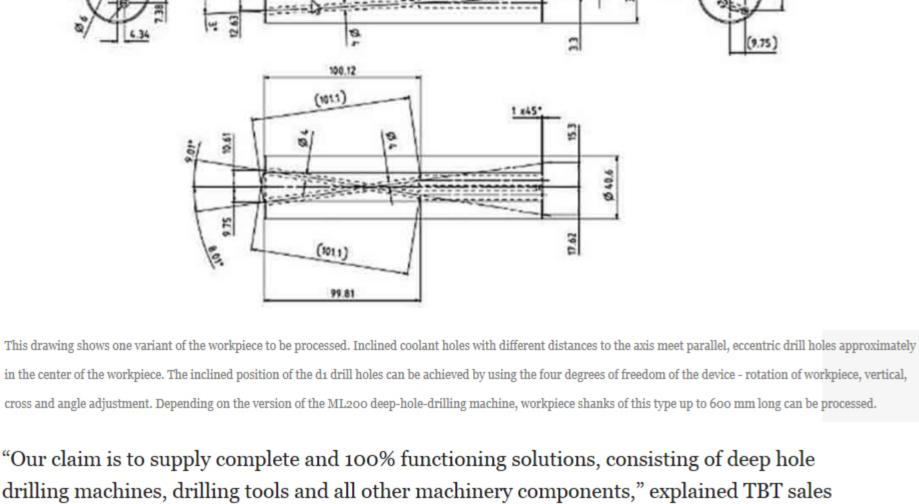
for questions about deep-hole drilling, including



height adjustment, cross adjustment and angle adjustment for the inclined holes in

horizontal direction. Cross and angle adjustment could be synchronous for both spindles. However, the rotation and height adjustment for both workpieces had to be adjustable separately for each spindle.

provide four degrees of freedom: 360° rotation of the workpiece around the middle axis,



manager Andreas Schlegel. "Beside this, devices that may include components for automatized production. In this case, the customer decided against an automatized solution due to cost reasons and commissioned us to install a manual device." Frequently, the diameters of coolant holes in a tool shank differ. For drilling from both sides,

the cylindrical shanks, which are equipped with a milled groove for this purpose. In the variant shown here, the drilled hole with d1 proceeds inclined and outside of the middle axis. In the mid of the workpiece, it meets the drill hole with d2, which also is eccentrically positioned but parallel to the middle axis. The difficulty is that the slanted d1 drill hole must meet the d2 drill hole exactly at this

the user embraces the workpiece. A stop ensures exact positioning. A clamping screw fixes

AMERICAN MACHINIST Due to significant variance of drilling depths for

different workpieces, the manufacturer uses the drill bush carrier in two ways: For depths up to approximately 200 mm, immersion sleeves are used to achieve the contacting movement of the drill bushes to the workpiece by using springs. For higher drilling depths, the user disassembles the immersion sleeves and uses a sealing case. In this case, there is also the possibility of installing a tool steady for the support of the deep hole drilling tools.

position to prevent improper cross-sectional constriction.



"Our solution includes a lot of ingenious details," Schlegel said. "All deflections can be adjusted quite simply and with the sufficient precision in using either scales or digital displays."

Since even small angle deflections will cause a large transverse offset in long workpieces, the available space in the ML200 was initially a topic of discussion. However, the engineers were able to combine all the requirements, quality, and available space. The customer didn't have to invest in a larger machine - which was one of his main concerns. "And for all drilling processes, the standard safety guard can still be closed," Andreas Schlegel added.