

A close-up photograph of three men smiling. The man on the left is partially visible, looking towards the center. The man in the middle is older, with a mustache, and is looking directly at the camera. The man on the right is younger and is looking towards the center. They are all smiling warmly.

## *More complex and more economical*

Deep hole drilling is continuously further developing.

Deep hole drilling experts are loyal to their subject. Typical niche technology. Once a deep driller, always a deep driller - that creates experts. When asked about "their topic" they quickly start to wax lyrical. As in the case for Prof. Dr.-Ing. Dirk Biermann, Head of the ISF institute for machining technology at Dortmund Technical University (TU Dortmund). Dirk Biermann has been heavily involved in deep hole drilling for more than twenty years. He has been in contact with TBT for a long time. Joint projects constantly take deep hole drilling one step further. As a result ISF, along with TBT and Trumpr GmbH & Co. KG, Ditzingen, implemented a globally unique machine that allows drilling with both single-lip tools and a laser. The laser does not reach the drilling depth of the mechanical machining technology but it does offer the possibility of precisely positioning pilot holes on inclined surfaces or in hard surface layers. "We have managed to do this for very small holes of up to 0.5 mm diameter. A practical approach in difficult processing situations and a real highlight", the head of the institute enthuses.

Another cooperative project is the use of minimum lubrication (MQL) for single-lip drilling. Typical applications are found in the area of fuel supply systems on combustion engines. There, small hole diameters of up to 2 mm are common. "Drilling such small holes in steel under MMS conditions was not even conceivable 20 years ago. Today we have practical solutions for it", said Prof. Biermann. Environmental aspects, occupational safety and the desire to use energy more efficiently are making minimum lubrication even more important for deep hole drilling, too.

For the experts, classical deep hole drilling is an indispensable technology for a whole series of highly demanding applications, in the automotive industry, in medical technology and in the aerospace industry. But even in more exotic sectors such as the oil and gas industry, there are tasks that would could not be solved without deep hole drilling, as these sectors use their own "deep hole drilling tools" to pierce the ground. They are complex tooling systems with sophisticated inner workings made from sensors and control

elements. In order to be able to supply these components, deep hole drilling is required in their tool bodies.

In common with all high tech sectors: materials are becoming harder to process and quality demands are increasing. For this reason alone, the development of high-performance deep hole drilling tools cannot stand still. "It's always about the intricacies", explained Dr. Tobias Heymann, responsible for technology and tool development at TBT. "Geometries, cutting edges and coatings are precisely adjusted to suit the applications; that's why many tools are custom-made today."

One driver of increasing quality requirements and the use of high quality materials is the trend towards size and weight reduction, which means the walls of housing are getting thinner. Processes or surface grooves bring with them impermissible weakening of the workpiece. Hence there will always be drilling tasks that can only be reliably solved with classical deep hole drilling processes.

These technological tendencies are overlapped by rising cost pressure in the producing companies. One answer for this is multi-stage tools that combine two or more operations. This reduces the number of single processes, and above all the changeover times. In short, diversity will increase, both for tools made from solid carbide as well as for those with indexable inserts. "We will expand our range of drilling tools in all directions in order to be able to offer a suitable solution for every application case" says Dr. Tobias Heymann.

In the final analysis, the machine concept is dependent on application or quality requirements on the one hand and on the other on the planned costs. Users with tasks that change frequently and with smaller production runs value a flexible machine with different options. One good example is the new ML300 ELB/STS. For the first time this machine now offers an efficient changeover concept for drilling with both single-lip tools and the single-tube system. Other concepts bring deep hole drilling together with conventional drilling and milling. With the BW 200-H,

TBT has already developed an "all-purpose" machine. Flexibility and machining performance are comparable with a machining center. "We are pursuing the concept further", explained Managing Director Hermann Randecker. "One particular challenge is the tool changer design, in order to be able to switch fully automatically between the technologies. Not just from one deep hole drilling tool to another one, but also from deep hole drilling to milling or conventional drilling and vice versa." The ultimate aim is unmanned production of cubic workpieces with long run times. This is already the case with conventional processing technologies. Integrating deep hole drilling into such concepts will be one of the big tasks for the future.

Above all for users with high volumes, another will be designing the machine precisely for the application. "Where flexibility is not the focus, in future we will concentrate even more on the task to be solved, so that the customer does not pay for features he doesn't need", assured Managing Director Wolfgang Klein.