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## **Innovation for tool manufacturers starts in the metallurgy centre**

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Boehlerit – the independent development partner for toolmakers

Boehlerit has been one of the pioneers in carbide production since 1932. The standard portfolio now comprises more than 60 state-of-the-art carbide varieties, drawn upon by almost all well-known tool manufacturers for a very wide range of applications. In addition to this, the Kapfenberg based specialists, with their decades of experience, develop individual carbide varieties, coatings, and geometries as a development partner for toolmakers. Real machining innovation often already begins in Boehlerit's own powder production.

The special sinter product carbide now plays a central role in the cutting and non-cutting machining of a wide variety of materials. The story of its origin is closely connected with the introduction of Wolfram into light bulb production, when the American Coolidge managed to make wolfram ductile and to manufacture wire out of it in 1907/08. A few years went by, however, before the first "WIDIA" panels caused a sensation on a high-performance lathe at the Leipzig spring fair in 1927. Boehlerit has been a pioneer in carbide development since 1932, when it was still part of Böhler AG.

In comparison to early alloys, modern carbides are distinguished by more even microstructures. This is primarily due to the greater purity of the raw materials, and especially the more even sintering conditions in modern production plants. Milestones have included developments in fine and ultra-fine grain alloys, which allow favourable combinations of hardness and toughness. Ultra-fine grain carbides break through the rule according to which an increase in hardness, in carbides, entails a decrease in bending strength. Hardness, edge strength, toughness, and a low tendency to stick and to wear through diffusion are characteristics that are especially valued in high-performance cutting.

### **High metallurgical flexibility for individual tool developments**

For decades, Boehlerit's metallurgy centre has been the crucial hub for the development of innovative cutting materials, with its own powder production. More than 2,000 m<sup>2</sup> of production offer the greatest metallurgical flexibility for customer-specific designs for the production of indexable inserts and/or blanks, but also for the provision of carbide granulate for toolmakers. Boehlerit here acts as an independent carbide specialist in the tool industry and a close development partner for tool makers. This family-run company guarantees direct collaboration of the technologists with discretion and product protection during the cooperation with tool manufacturers. "When you cooperate with almost all big-name tool manufacturers as a long-term partner then trust is absolutely essential," emphasises Christian Kolbeck, Segment Manager Tool Makers at Boehlerit.

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However, it is not only technologically that Boehlerit is one of the pioneers and globally leading manufacturers of cutting materials made of carbide for tools for metal, wood and plastic machining, but also ethically. Only carbides from exclusively conflict-free raw materials are produced. This ethically acceptable procurement of materials and/or raw materials has for many years already been part of the pioneering content of the company's compliance culture.

### **The latest production processes**

An essential part of carbide expertise is the continual development of the production procedures using the latest production plant. This also includes, among other things, the latest, servo-electric powder presses which offer the greatest reproducibilities and size accuracies, and make it possible to manufacture extremely complex geometries. Particularly noteworthy among Boehlerit's presses is the world's most powerful carbide press, with a pressing force of 650 tonnes. Cubic and round parts with an area of up to 250 cm<sup>2</sup> are pressed on this, economically and in series production. All together, the production palette ranges from the smallest carbide part weighing less than a gram up to large parts of more than 100 kilograms. The tools for this are created in our own press tool production. This guarantees tools accurate to within  $\mu\text{m}$  with which complex indexable inserts are precision-produced. "Very special know-how is necessary for our manual shaping, with which we produce more than 20,000 different types of carbide parts a year," adds Kolbeck. The design of aspect of shaping, taking into account so-called sinter shrinkage, here requires a great deal of experience.

### **An in-house coating centre**

As well as sintering, Boehlerit's know-how is based on its own in-house coating centre. All coating technologies (PVD, HT-CVD, MT-CVD and diamond coating) for the hard coating of indexable inserts are available. TERAspeed 2.0 is a prime example of the latest innovations. As well as a tough TiN bonding layer, this is based largely upon on a sequence of nanolayers made of cubic Al(Ti)N and Ti(Al)N layers. This sequence of layers possesses a unique fishbone or spring-like nanostructure. By means of optimisations of the process parameters in the chemical gas-phase vapour deposition, it is possible to influence the nanolayer structure in such a way that a high wear resistance is achieved with at the same time optimal toughness. The combination of actually contrary characteristics make this modern coating a highlight in milling among other things.

### **From powder to rapid prototyping to cutting test**

The development tasks of the carbide pioneers at Boehlerit are defined by the performance requirements of the tool manufacturers or users. Process-optimised production technologies from the in-house powder production, combined with the latest press and grinding technologies, to the latest coating technologies, guarantee toolmakers an edge in the productivity of their tools, time after time. A particular advantage in product development for tool manufacturers is the production of prototypes using the latest laser-based rapid prototyping. Boehlerit here helps the customer to save time and money in tool development. This also includes cutting tests, with analysis and consulting. Finally, the high quality standard is contributed to by one of the industry's most modern testing and packaging plants for indexable inserts. It guarantees 100 % quality

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assurance in the  $\mu\text{m}$  range. With especially strict dimensional checks and the monitoring of all metallurgical parameters, Boehlerit guarantees to toolmakers that the quality of their tools will remain consistently high.

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### The company

Boehlerit, headquartered in the Austrian town of Kapfenberg, sets global standards with carbides and tools for the processing of metal, wood, plastics and composites. With cutting materials, semi-finished products, precision tools and tool systems for milling, turning, drilling and forming, Boehlerit ensures process safety and efficiency on a global scale. The company's extensive product portfolio includes highly specialised tools for the machining of crankshafts as well as for the mining industry, for bar peeling, tube and sheet metal processing and heavy-duty machining. The Boehlerit product range also features carbides for construction components and wear protection. When it comes to coating technology, Boehlerit holds a global monopoly, ranging from the first-ever nano-CVD bonding layer to the hardest diamond layer worldwide. With its many years' experience in metallurgy, coating technology and state-of-the-art press technology, Boehlerit is a highly competent development partner for toolmakers.

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Pictures

Abb. 1: Toolmaker Image

