



The new PCBN material is designed to provide significant productivity gains and reduced tooling costs.



## Increased productivity with reduced tool costs by means of a collaborative measuring system

The knowledge of wear types and wear behavior has enabled Element Six, an expert in high-performance materials, to deliver a step change in performance with a new PCBN cutting material. One decisive factor during the testing stage was the implementation of automated test series. This and the ability to measure tool and workpiece directly in the lathe has made a significant contribution to “achieving the performance increase we have set ourselves as our goal,” Element Six says.

Machining speeds of 300 m/min, predictable wear behavior and up to 50% longer tool life in hardened steel machining are the advantages that Element Six assures its customers from the automotive, aerospace and mechanical engineering industries with the latest generation of PCBN. PureCut™ is designed to provide complete control over the PCBN manufacturing process, resulting in significant productivity gains and reduced tooling costs. One of the variables that contributed to the development of the new material was the use of high-precision, automated Alicona measurement technology. The specialist in high-performance materials in the UK uses Alicona measuring systems for the analysis of various types of tool wear and wear behavior during different machining conditions. One decisive factor in the test phase for the new cutting material was the implementation of automated test series, which Element Six implemented with the collaborative measuring system CompactCobot. Tool and workpiece surface finish are measured fully automatically directly in the lathe.

### Automatic measurement and determination of wear in high measuring point density

In the development of the new PCBN generation, the focus was on the measurement of flank, crater and notch wear. The ability to automate test series has helped to make the development process as efficient as possible and ready for production. “Our productivity in the testing of cutting tools is limited by our information gathering process, primarily regular measurement of cutting tool wear”, says Dr. Wayne Leahy, Head of Applications for Cutting and Grinding. He continues: “We purchased the Alicona Cobot system so that we could start to automate the cutting process. Gathering a large number of data points on wear behavior under different machining conditions was instrumental in helping us to optimize the new technology. This in turn helped us to deliver the step change in performance we were looking for.”

### Integration into lathe

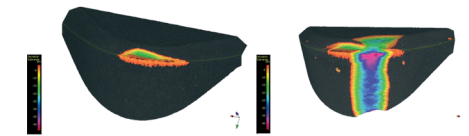
A key sector of Element Six's core business is the development and implementation of integrated production strategies in machining technology. The aim is the communication and networking of production systems, machines and measurement technology. So, the supplier of high performance materials is very precise in choosing his partners. They play an essential role in implementing fully automated production with machine-to-machine communication in the medium term. This also and especially applies to partners in measurement technology. Production suitability, automation and the ability to connect to existing production and quality management systems are basic prerequisites that production measurement systems for quality assurance must meet. For this reason, Element Six, which has already been using measuring instruments from the InfiniteFocus series, once again decided to invest in an Alicona measuring system. The CompactCobot enables this integration and networking in several ways.



“The CompactCobot has helped us to deliver a step change in performance!”

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Bruker alicona



The Alicona CompactCobot measures both the tool – here an indexable insert – and the workpiece directly in the lathe. The process is fully automated by means of a central control system:

On the one hand, the optical collaborative measuring system is so robust that also in production high-resolution measurements are achieved in a high measuring speed and in high repeatability. Automated and therefore unmanned measurements in production are realized with the software interface AutomationManager. On the other hand, the Cobot has interfaces such as TCP/IP, Modbus/TCP or Anybus and can thus be connected to existing production systems. This integration enables communication between the individual machines and thus contributes to the implementation of self-controlling, self-correcting production.

With the CompactCobot, Element Six has started to implement this modern manufacturing concept. Both the tool, an insert, and surface finish of the workpiece are measured in the lathe. Leahy describes the state of affairs as followed: “A central control system starts the testing process. At a defined point the lathe stops, the door opens and a further signal sets the Cobot in motion. The robot arm with 3D measuring sensor is automatically manipulated into the lathe and first measures predefined cutting edge parameters of the insert. The sensor then moves on to the workpiece and measures its roughness, which enables us to verify the surface quality. Then the robot arm returns into its original position. All measurements are carried out without unclamping components.” The next step in planning is the automatic correction of machine parameters based on the measurement results. The Cobot transmits measured values or an OK/not OK signal to the lathe. “If tool or workpiece do not meet the specified tolerances, the lathe automatically

changes machine parameters and testing continues. In this way, the first part is already produced as a good part”, Leahy explains steps ahead.

### Simple operation: teach-in of measurement series without programming skills

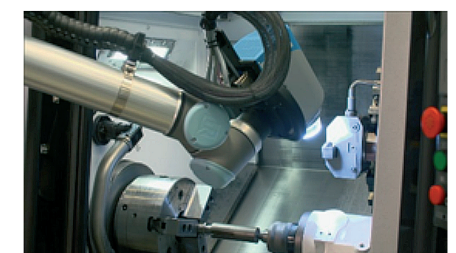
There is another aspect that is decisive for the implementation of integrated production strategies with automated measurement technology. Measuring systems must be easy to operate without programming knowledge. Alicona meets this condition. The teach-in of measurement series by an administrator is carried out in only three steps. Special programming skills are not necessary. The measurement is started at the push of a button, the measurement result is independent of the operator. As it is with other Alicona measurement systems already in use, the new CompactCobot meets the high demands of users at Element Six. “It took about a day to train an operator on the Cobot. Handling and user guidance is extremely simple and intuitive,” says Wayne Leahy.



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