

# Optical Metrology User Case Study:

## In production measurement of Micro Geometry on cutting tools



Bruker alicona

Bruker Alicona is a leading global supplier of optical metrology solutions based on the principle of Focus Variation.

Focus Variation works on the basis of moving a focal plane over a surface and collecting robust 3D data which can then be used to measure geometric form and surface finish from a single optical sensor.

Measurement processes can be fully automated and provide GD&T measurement capabilities across all industrial & medical sectors.

The systems are in use in Industry, Industrial Research, Universities and production facilities globally.

[www.alicon.com](http://www.alicon.com)



## **“Simple handling is as important as measurement accuracy”**

**IMCO, a US based manufacturer of Carbide Tools, uses the Bruker Alicona EdgeMaster to verify the micro geometry of its milling cutters, which is a high priority in the research and development work of the company. With the experience of the high accuracy and repeatability the easy use of the unit persuaded them to purchase an additional system for production.**

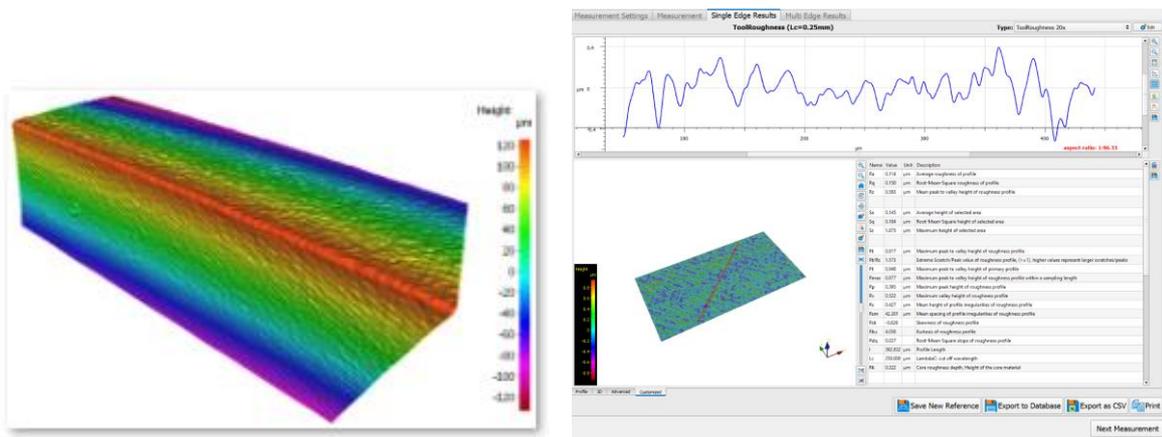
The four features that determine the service life and machining result of modern-day cutting tools are substrate material, coating, plus macro and micro geometry. Milling cutters with multiple flutes have complex geometries and the measuring technology used for verification is very important. The micro geometry of the cutting edge is the part of the tool that wears out, and it is that feature which needs to be critically measured.

IMCO is known for its high level of research and development activities, and the accuracy and repeatability of edge preparation/honing is important.

Using the EdgeMaster has also provided many additional measurement capabilities that were previously not available such as shape, contour accuracy, rake angle, undercuts, chipping and roughness on the chip surface. As IMCO offers milling cutters with up to thirteen flutes that achieve above-average surface finish, these features are critical to performance. With the EdgeMaster, and its ease of use, they now routinely measure many more attributes than before, and do it quicker and with more confidence in the measurement results. **Shortened prototype development time of carbide tools.**

IMCO's tool design offers greater productivity results for very small to very large operations. The higher productivity is due to increased chip flow and elimination of chip packing allowing higher metal removal rates and fewer tool changes. The ability to accurately measure the surface finish on the chipping surface and flute allows this to be optimized to achieve the increased chip flow.

Development and testing takes place in the internal research and development center, where IMCO can grind, hone, inspect and machine with prototype cutting tools. All tools in prototype development are measured and documented with Alicona allowing optimized performance with traceable and repeatable measurements. With a second system now installed in production, the measurements from research and development can be transferred and used in production.



With Alicona, IMCO verifies cutting edge parameters such as radius, contour accuracy, rake angle, undercuts and chipping of end mills. Roughness measurements are performed to verify surface finish of the flute.

## Shop floor swears by easy handling

The R&D center develops exact specifications for the edge treatment on the high-performance cutting tools which are incorporated in production requirements. In production, the EdgeMaster is used to verify that the precise edge treatment developed in the R&D is applied to the tools going to our customers. Because of the device's ease of use, shop floor personnel with no experience in metrology have been trained to use the system.

A set of clamping tools for easy mounting, user-friendly controls and one-button solutions for performing measurements create this simple user guidance. All data from the measurements are stored in an inbuilt database allowing easy retrieval for quality questions and for future reference.

*One of two EdgeMasters in use at IMCO. The edge measuring system is used in the R&D center where grinding, honing and inspection of prototypes is developed and then used in production for quality control.*



IMCO was able to reduce the time required for measurements on the factory floor by 75%, resulting in a rapid ROI.



*We would like to thank Matthew S. Osburn, Vice President & Technical Director of IMCO for his assistance in preparing this application note, he says "Particularly on the shop floor, simple handling is just as important as measuring accuracy. Alicona understood that 100%."*

## Summary:

It can be clearly seen that optical 3D metrology can offer a versatile tool in the tooling industry.

In a simple to use package, and not requiring any metrology knowledge to operate, users can easily scan a surface or edge and measure the features required.

## Equipment Available

These measurements can be made using one of the products shown below from Bruker Alicona. Product information at <https://tinyurl.com/kjs7333s>



*EdgemasterG4 as used by IMCO*



*InfiniteFocusSL System*



*InfiniteFocusG5 plus system*