

# New Abrasive Powder for Microtools

With the Magnetfinish process, a method for surface treatment of microtools has been available for some time. Now, Magnetfinish has announced innovations that significantly improve process reliability and enable the application to even the smallest geometries.

## Producing Without Breakage Using Magnetfinish

The Magnetfinish process is ideally suited to minimize the constant risk of breakage in microtools. In conventional finishing methods, abrasive material impacts the tool axis frontally, creating maximum bending moments. With small enough diameters, this inevitably leads to breakage.

Magnetfinish works differently. Here, the abrasive stream is aligned to move in the same direction as the rotating flute of the tool. This minimizes bending moments.

Another adjustable process parameter is the distance between the tool and the rotating magnetic disc, to which the magnetic abrasive powder adheres. Increasing this distance reduces the contact pressure of the abrasive against the tool axis. By combining these process adjustments, breakage of the microtool can be avoided, even under production conditions.



*New Machine Generation MF 66 /76*

## New Machine Generation with Options for Microtools

In the new MF 66 machine generation, the above process parameters —geometric positioning of the tool axis and working distance— can be controlled over a wide range. The basis for this is guiding the tool with a 6-axis robot. The tool can be positioned in all three spatial dimensions.

Additionally, two orthogonal tilt angles are available, allowing the tool axis to be inclined at varying degrees relative to the plane of the rotating magnetic disc. This enables uniform cutting-edge rounding as well as adjustment of the K-factor.

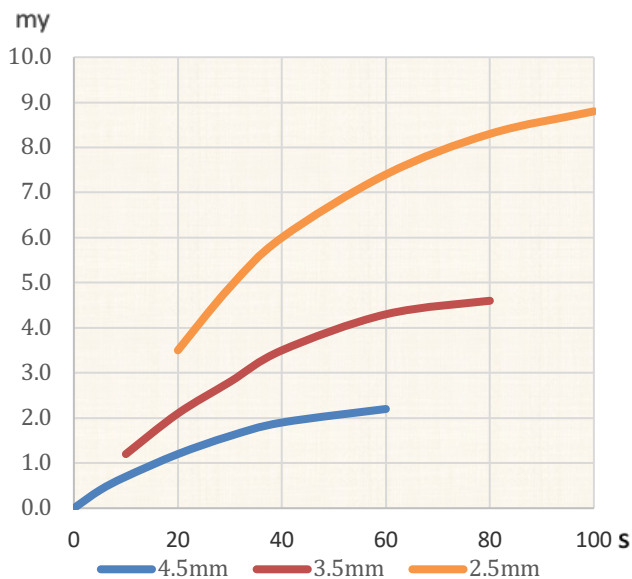
The setup process for a tool type does not take place in free space; instead, the operator is guided through a dialog on the HMI. Tool-specific data —such as tool type (drill, corner radius end mill, etc.) and geometry (diameter, cutting length, etc.)— is entered. Based on this data, the machine suggests a set of process parameters, which in most cases already leads to the desired result but can be further optimized.

Once the final settings are determined, they are stored under the tool type's name code. For ongoing production, the operator only needs to call up this name, and the machine will automatically set all previously stored values. No special expertise is required.

Before processing, each tool passes through a laser micrometer that checks whether diameter and length match the database values. This prevents the wrong tool type from being processed. After processing, the measurement can be repeated to detect any breakage. In both cases, the tool is visually marked in the “workpiece track.”

## Processing the Smallest Structures with the new Abrasive Powder

To reach the smallest structures, the grain size of the abrasive must be significantly smaller. This required developing a new type of abrasive. Simply scaling down the existing abrasive to smaller diameters was insufficient to maintain the proven process characteristics.



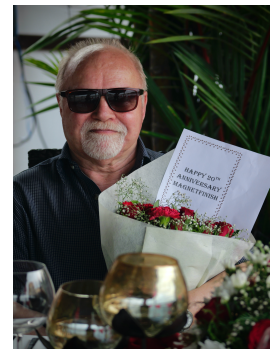
*Spezial Abrasive for Microtools, Tiphoning at 0.5mm Drill*

It was necessary to ensure that the new abrasive remained magnetizable so it could still adhere to the rotating magnetic discs. At the same time, the abrasiveness had to be preserved to avoid reducing the productivity of the process.

The results speak for themselves. The diagram shows the relationship between edge rounding and process time with the new abrasive. The process parameter working distance results in three distinctly different curves.

Choosing a large working distance—such as 4.5 mm—results in an especially soft working action because the magnetic attraction on the outer abrasive layers is weaker, making the abrasive softer.

The blue curve shows the ability to change the edge rounding by 0.3  $\mu\text{m}$  in 5-second steps—precisely and reproducibly. This fine control is especially valuable for the smallest tool geometries.



*Dr. Wolfgang Thiel, founder and CEO  
at 20<sup>th</sup> year anniversary celebration*

Magnetfinish GmbH will present the new MF 66 machine generation at EMO in Hanover at the booth of its partner company Wick AG: Hall 11, Booth E89.  
[www.magnetfinish.com](http://www.magnetfinish.com)