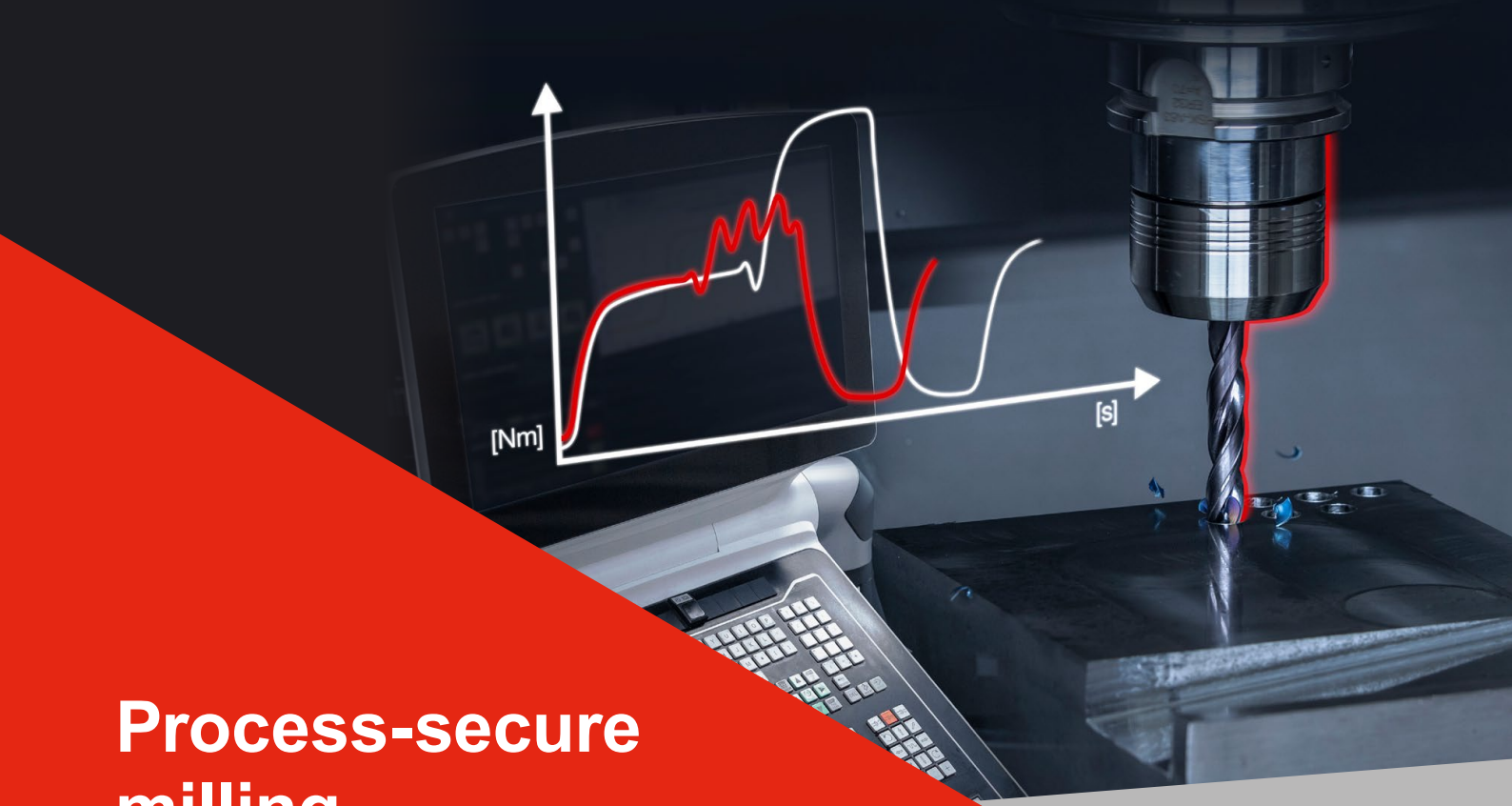


Process-secure milling

using the latest tool technologies, innovative CAM solutions and reliable process monitoring

Process-secure milling ils always a hit in terms of efficiency, often achieved via a combination of the latest tool technology, programming and reliable process monitoring

The MonsterMill PCR Uni for trochoidal milling during roughing on the machine can be used for this purpose, together with the special programming for this provided by OPEN MIND on its hyperMILL® system. For the subsequent finishing, the two project partners rely on circle segment milling with the 3D Finish – including impressively short process times. In line with the motto ‘Connected Machining’, the processes are monitored with CERATIZIT’s ToolScope monitoring and control system. The spike®_mobile sensor system from pro-micron GmbH, among others, delivers excellent performance in this area. It measures even the smallest forces directly on the tool and therefore ensures detailed process monitoring and control.

Test use-case

The new MonsterMill PCR Uni from CERATIZIT, with a Ø 20 mm and 60 mm cutter length, was mainly used for the rough machining and the trochoidal milling programming was provided by OPEN MIND on the hyperMILL® system. The uneven division and the uneven twisting of the MonsterMill cutting edges, among other things, ensure a stable and precise machining process. In addition, the processes were monitored and controlled with the adaptive feed control TS-AFC in ToolScope. In this case, the feed is adjusted between 80 and 120 % of the previously calculated optimum torque. During the process there is adaptive control based on varying cutting depths, different material qualities as well as the measurements of the pre-machining. This makes it possible to achieve an optimum balance between tool protection and cycle time reduction.

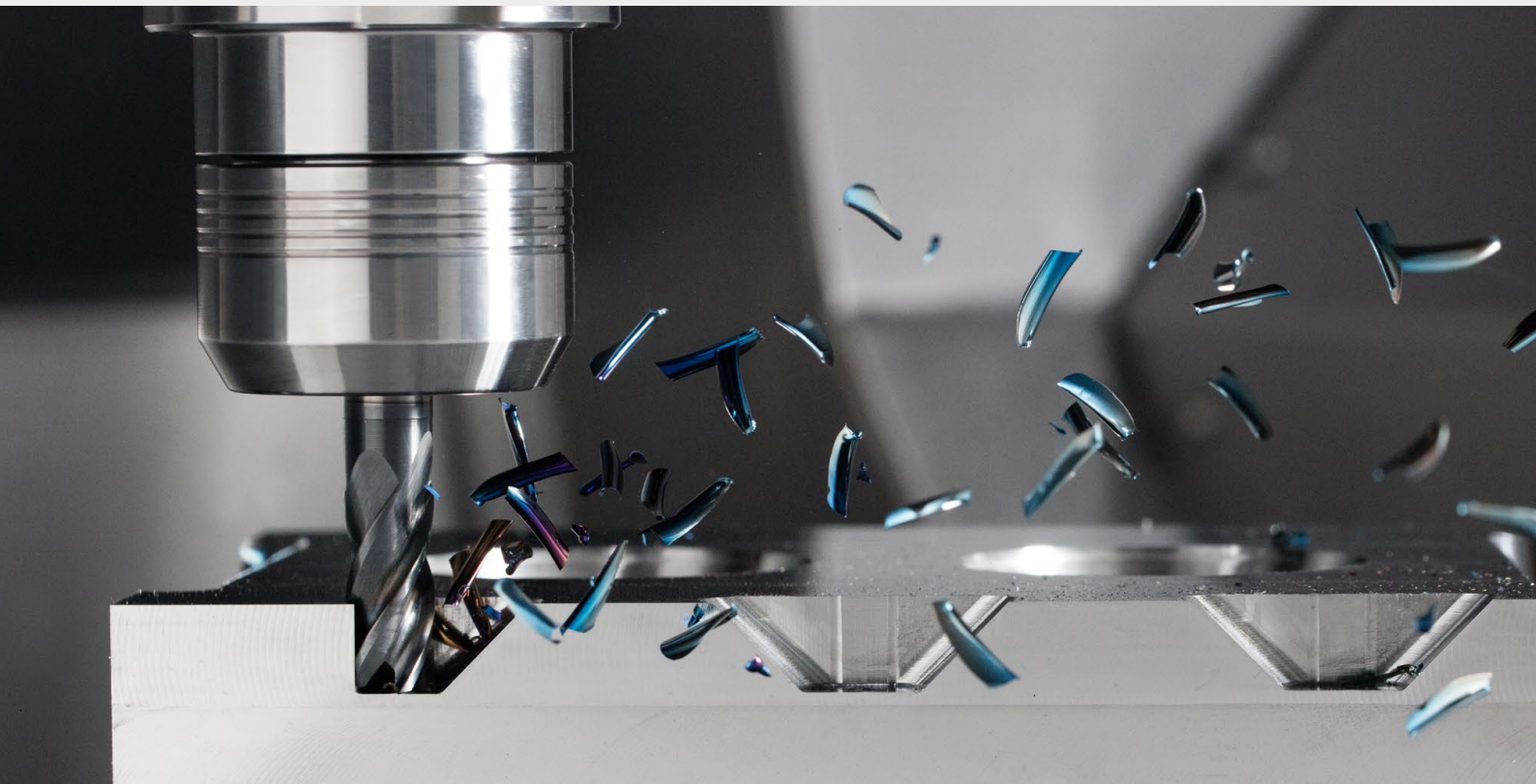
Tool service lives extend by up to 5 %, while the cycle times reduce by between 5 and 15 %. In addition, with the ‘Connected Machining’, OPEN MIND offers a high-performance option for accessing the machine even from the programming workstation.

Advantages MonsterMill PCR Uni

- **Optimum chip clearance during ramping and drilling**
  The special core geometry ensures optimum chip evacuation and
  prevents chip jams.
- **Extremely quiet running during HPC milling**
  The irregular pitch of the cutting edges and irregular helix angle counteract vibrations to ensure a stable and precise machining process.
- **High feed rates thanks to four cutting edges**
  Delivers maximum performance and reduces machining times.
- **Vibration-free ramping and drilling**
  The special, patented centring tip ensures maximum precision.

Benefits for roughing:

- Reduced machining times
- High chip removal rate
- Higher cutting speeds and feed rates than in conventional machining processes
- Longer tool lives
- Machining that protects the tool and machine



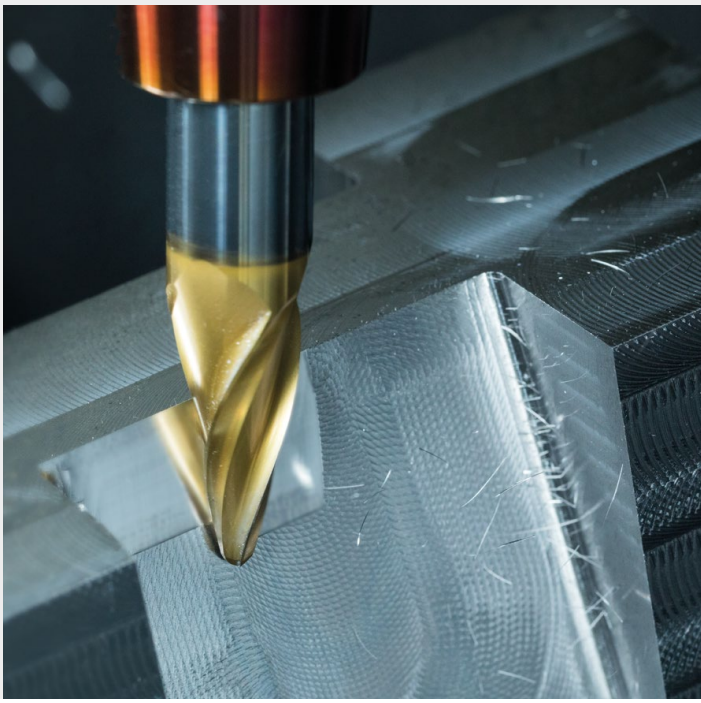
In the concluding finishing process, the final quality needs to be achieved. If process errors such as wear, imbalance or vibrations occur there, then in some circumstances considerable retouching will be required. ToolScope makes it possible to react automatically and directly to any such sporadic ‘outliers’. However, as only small forces are used during finishing, very sensitive sensors need to be used directly on the tool holder – such as the spike®_mobile from pro-micron GmbH. It measures the axial forces, the torsion and, in particular, the bending moment and transmits them wirelessly. Via the patented spike®_polar visualisation, the bending moment is not only displayed as a distribution of forces, is it actually possible to show the forces for each individual cutting edge.

Benefits for finishing:

- 3D Finish: 90% time reduction
- CAM: easy programming of the latest tools
- Process monitoring: ToolScope implements any monitoring strategies
- Combination with spike_mobile: recording and assessment of the smallest forces
- Cooperation of three strong partners: CERATIZIT, OPEN MIND and pro-micron

Advantages of the 3D Finish high-performance milling cutter

- **Highly cost effective**
  The large radii make higher widths of cut possible, which significantly reduces processing times
- **Better surfaces**
  Despite shorter machining times, improved surface qualities are achieved thanks to the large radii
- **HA shank**
  Ideal runout and balance quality due to the cylindrical shank
- **Universal application**
  The 3D Finish solid carbide milling cutter is suitable for use on steel, stainless steels, cast iron, non-ferrous metals, heat-resistant steels and hardened steel



Summary:

In the case of roughing, it has become apparent that the combination of the appropriate tool selection with the MonsterMill PCR Uni and machining strategies such as trochoidal milling, HPC and 5-axis helical drilling in hyperMILL® ensure reliable processes. This is supported by ToolScope, which quickly detects in-process measurements and deviations from the reference process and reacts to these measurements. This means that tool service lives are up to 5 % longer and cycle times can be reduced by 5 to 15 %.

The finishing process with the circle segment miller 3D Finish and the specific hyperMILL® programming also achieves impressive results, such as very good surfaces even with large infeeds, longer tool service lives and phenomenal, up to 90 % shorter machining times. Thanks to the process and wear monitoring in ToolScope, combined with the fine sensor of spike®_mobile, finishing can be pushed to its optimum in terms of tool use and workpiece quality.

CERATIZIT GROUP
toolscope@ceratizit.com

promicron wireless solutions
Lennart Riehle
Head of Sales – Tool Control
inquiry@pro-micron.de

OPEN MIND THE CAM FORCE
Claudio Jorio
Sales Director DACH and Global Reseller
Claudio.Jorio@openmind-tech.com

CERATIZIT UK & IRELAND LTD
Europa Link \ UK-Sheffield S9 1XU
Tel.: +44 114 242 8 820
info.uk@ceratizit.com \ www.ceratizit.com

CERATIZIT GROUP