FLAKKOTING

precise deburring

Speaker: Patrick Botta

DEBURRING EXPO

10 - 12 October 2023 | Trade Fair Center Karlsruhe
Leading Trade Fair for Deburring Technologies
and Precision Surfaces

PROFIN

Company

Future needs origin

- PROFIN is a family business and is in the 2nd generation
- Founded in 2003 with headquarters in Lucerne in the heart of Switzerland
- 30 highly motivated employees across all areas (service, development, production, process consulting)
- Cooperation with support workshops, detention centers and integration groups for the unemployed in the field of tool production.

Company

Strategic partners lead to success

Company

PROFIN is involved in several research working groups

Technologie-Arbeitskreis
am WZL der RWTH-Aachen

Arbeitskreis
Werkzeugtechnik (AKWT)
am WZL der RWTH-Aachen

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

PROFIN

HOCHSCHULE
LUZERN

Industrie-Arbeitskreis (IAK)
Werkzeugbeschichtungen und Schneidstoff

Fraunhofer
IST

IWF
INSTITUT
WERKZEUGMASCHINEN UND FABRIKBETRIEB
TECHNISCHE UNIVERSITÄT BERLIN

GFE - Gesellschaft für Fertigungstechnik und
Entwicklung Schmalkalden e.V.

Company

What is **PROFIN** doing?

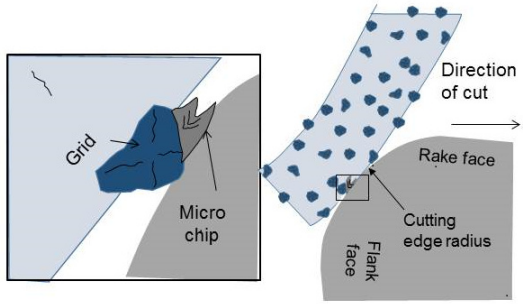
Machine tools & Engineering

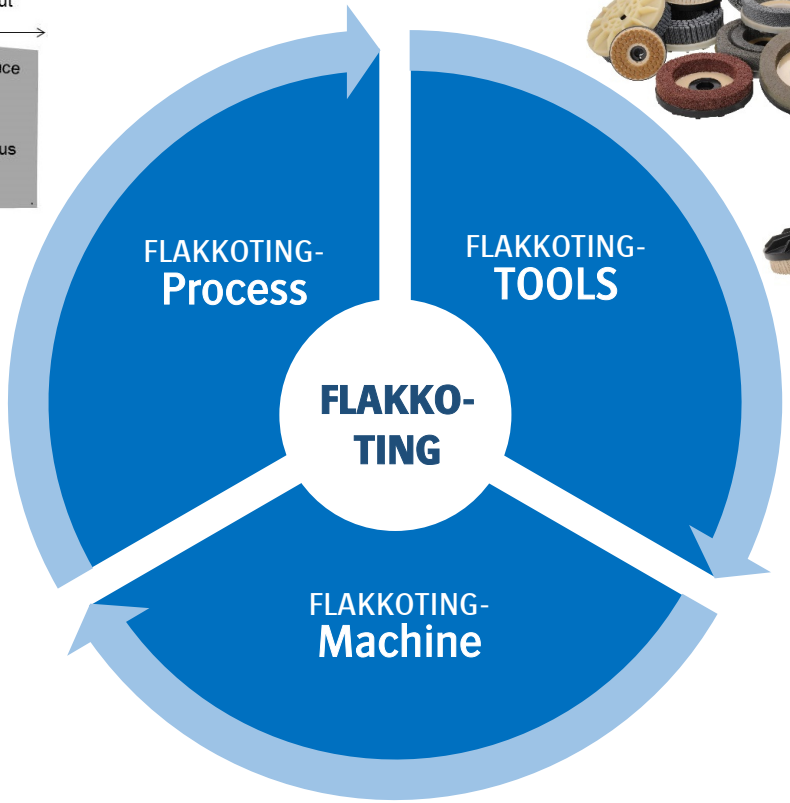
Tools & Development

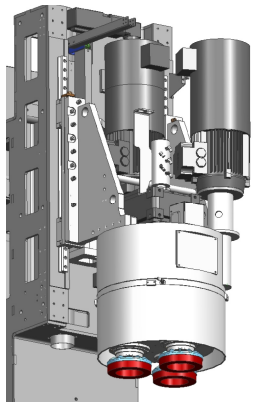
Process technology & Complete solution

FLAKKOTING is a grinding process

Interaction of process - tool - machine

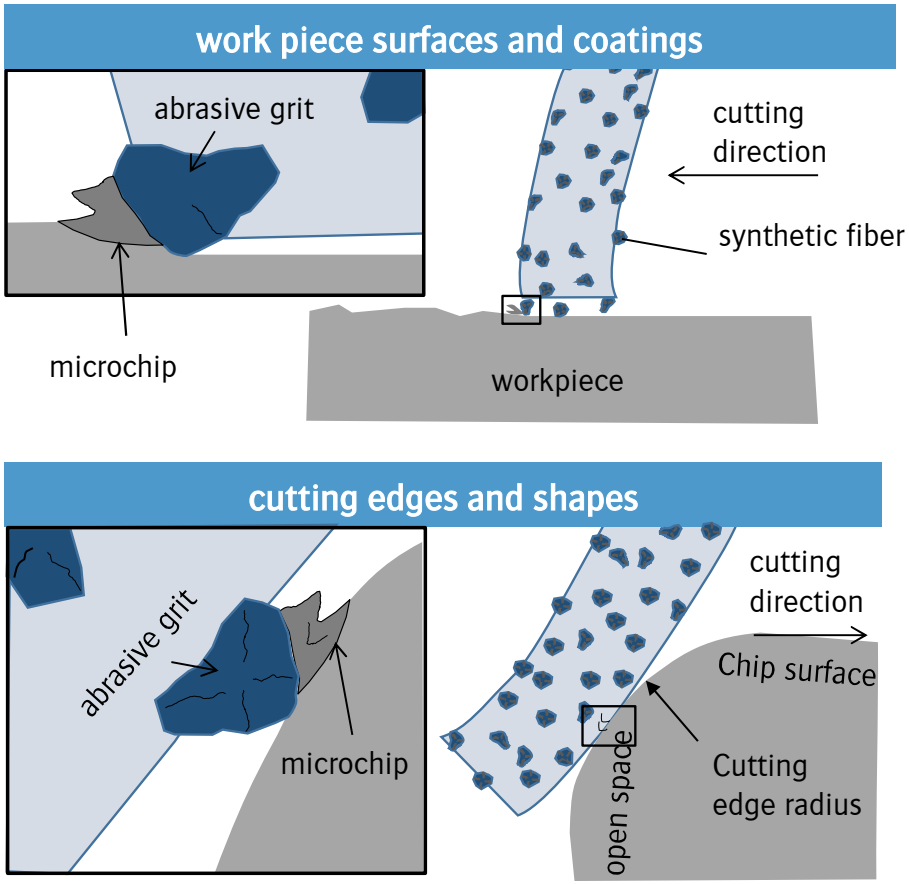






FLAKKO-
HEAD

Precision grinding process



- Surface finish in the nano range
- **FLAKKOTING** is the sum of the abrasive grains in the mesh
- Automatic tool readjustment
- Automatic re-sharpening of tools
- Automatic adaptation to the bending behavior of the filaments when they wear
- Abrasive grit: Diamond, CBN or SIC

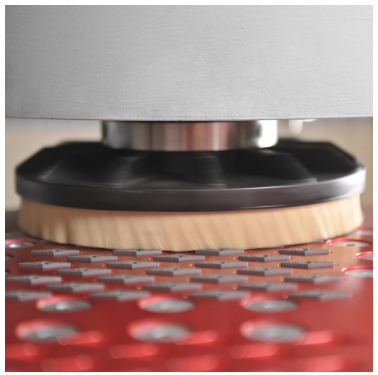
Precision tools

Highly accurate and temperature resistant

- High axial and radial runout accuracy
- Various tool combinations and composition possible
- Fast tool change system
- Combination with filament diameter and setting (patented)
- Filament material, grain size and grain distribution
- Grit: Diamond, CBN or SiC
- Temperature resistant up to 400°C
- Important for hard coatings:
  No filament application due to melted brush material,
  even in dry operation!

Precision machine

Highly stable and universal



- 3-stage **FLAKKOTING** PROCESS by «Multi-Aggregate»
- Plane parallelism from table to **FLAKKO**-Aggregate
- Precise linear guides with preload
- Servo drive for infeed in 1/100
- Tool measurement with structure-borne sound signal
- Tool compensation control by power consumption or acoustic emission
- Head and spindle speed variably adjustable

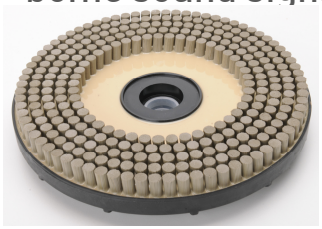
FLAKKOTING yes or no?

Highly differentiated and insightful

- Stamped parts
- It must be simply deburred
- Punched tools with a lot of space in between
- Different trim heights due to manufacturing
- Roughing and planing with the tools
- Manual feed of the brush wear
- No definition on edge, simply burr-free
- No constant quality

Source: KEM Industrie mit Lessmann-Bürste
Oberflächen bearbeiten mit Tellerbürsten von Lessmann (industrie.de)

- Precision part
- Production of premium products
- Molded and precisely manufactured tools
- Tools matched in sets on 5/100
- Defined immersion depths with algorithms
- Automatic compensation control
- Defined edge rounding and Ra specification
- Quality inspection by means of structure -borne sound signal during process



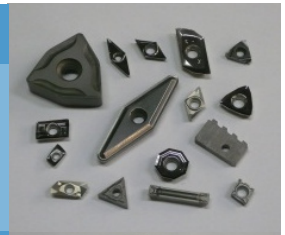
Source: PROFIN

Examples of use

Examples from different industries

Cutting tools

Inserts
Rotary tools
Saw bands
Broaching tools



Sintered & PM parts

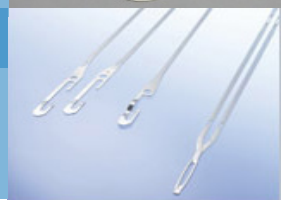
As functional components,
e.g. in gearboxes

Engine parts

As functional components
with high surface qualities

Textile

Healds
Intermediate bars
Tunnel leaf blades



Fineblanked & pressed parts

Primary deburring
& Surface finish

Automotive parts

Engine-, gearboxes-,
steering- and safety parts

Injection systems pump parts

Magnet core
Anchor plate
Nozzle body
Nozzle

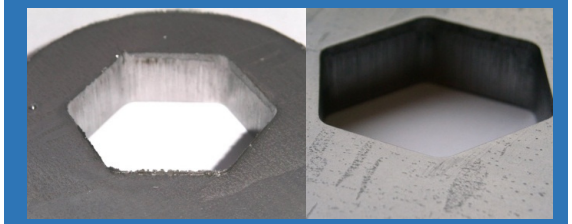
} Highest precision on edge/surface

Process technology - main applications

Deburring

- Precision parts (Common Rail Injector)
- Sintered parts
- Stamped parts
- HSS-tools
- Carbide tools

before after

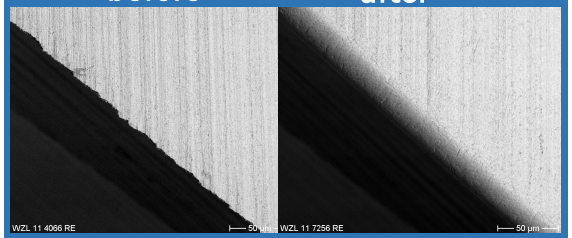


Picture: Fine- blanked/ punched parts

Rounding edges & contoures

- Carbide tools
- HSS-tools
- Punched tools
- Precision parts
- Sintered parts

before after



Picture: VHM-shaft milling cutter

Surface polishing

- Precision parts (Common Rail Injector)
- Sintered parts
- Stamped parts
- Cutting tools
- Pre- and post treatment of layers

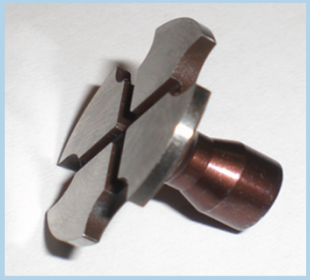
before after

Picture: precision part

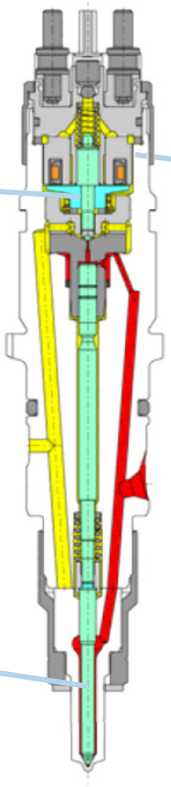
Examples of use

Deburring: FLAKKOTED components in the Engine Common Rail Injector

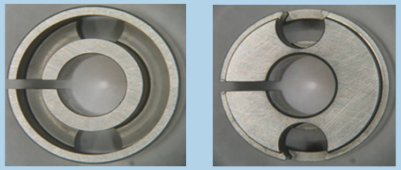
Anchor platte



Nozzle



Magnet core



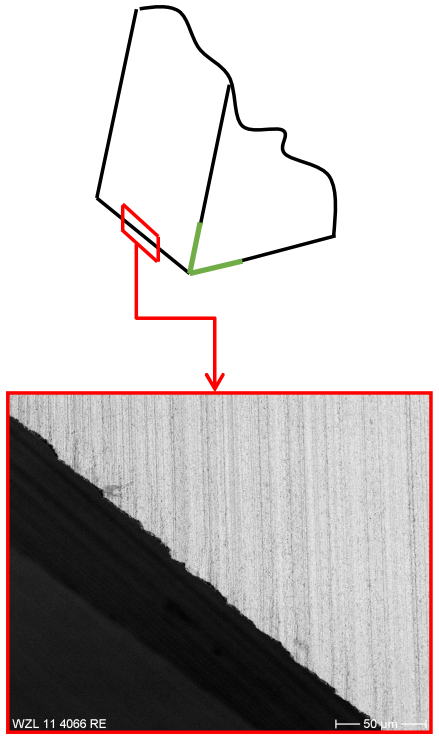
Nozzle body

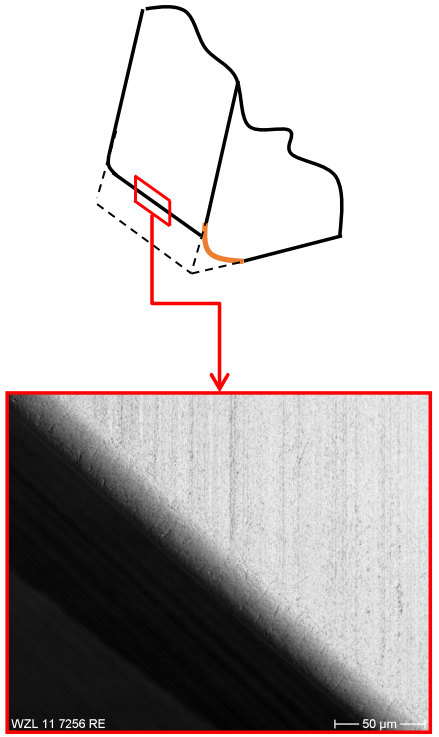
PROFIN

Influences and improves sustainably

Chip removing machining with shank tools

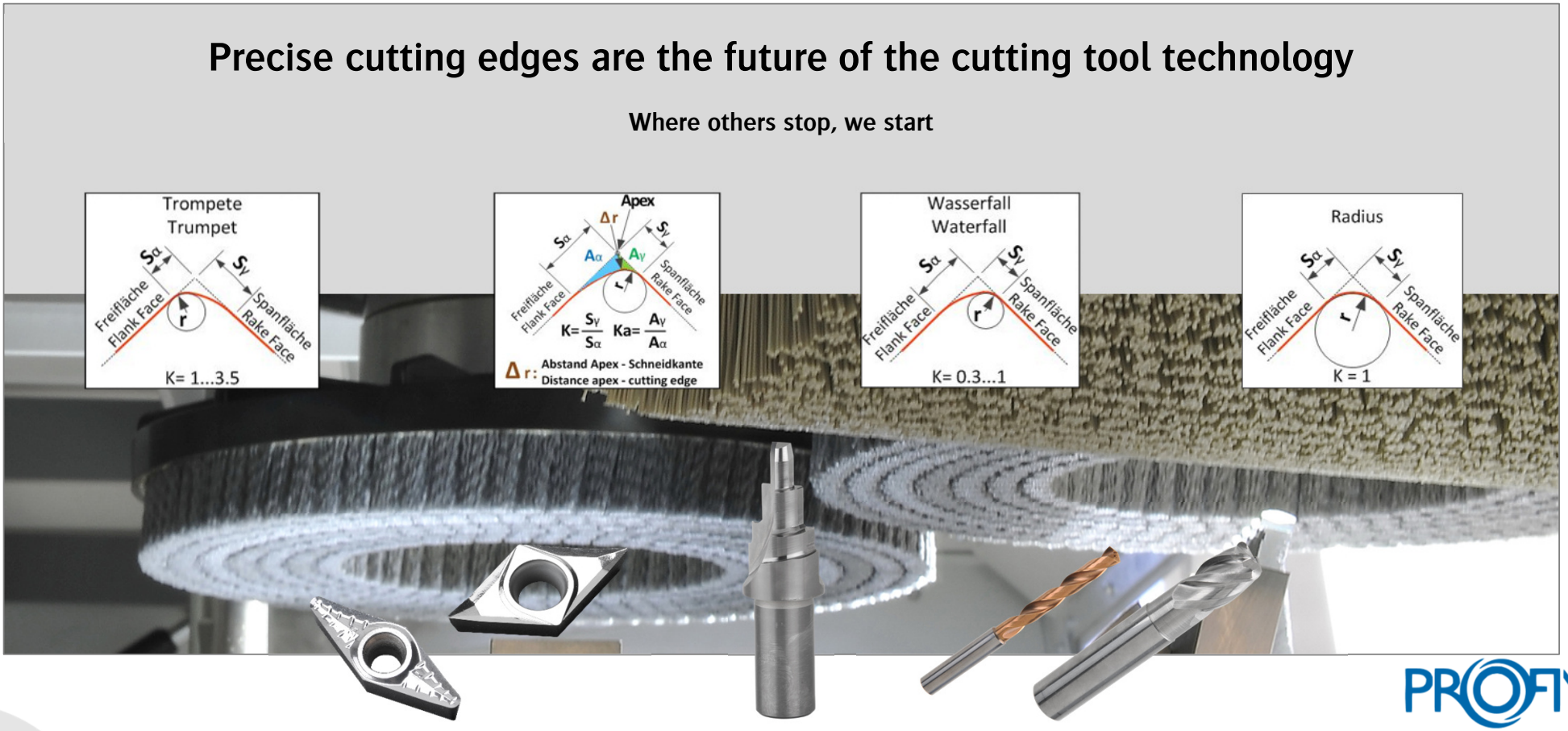
- Reduces the probability of cutting edge breakage
- Homogenization of the cutting edge -> cutting forces
- Increase in process reliability
- Extends tool life by a factor of 2 to 4 compared to unmachined edges
- Improvement of the workpiece surface as well as the chip flow by means of chipping reduction





Examples of use

Modern edge shapes with high K factor up to 3,5



Examples of use

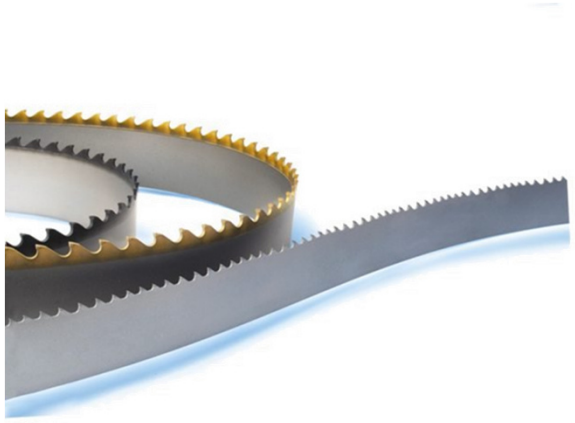
Contours and edges Rounding: from small to large tools

Inserts

End mill / Drill

Source: Dormer

Saw bands



Source: Lenox

Examples of use

Contours and edges Rounding: from small to large tools

Broaching tools	Gear hob	Circular saw

Source: Berghaus

Source: Kaindl

Examples of use

Surface polishing: Hard coatings aftertreatment 1/4

Inserts

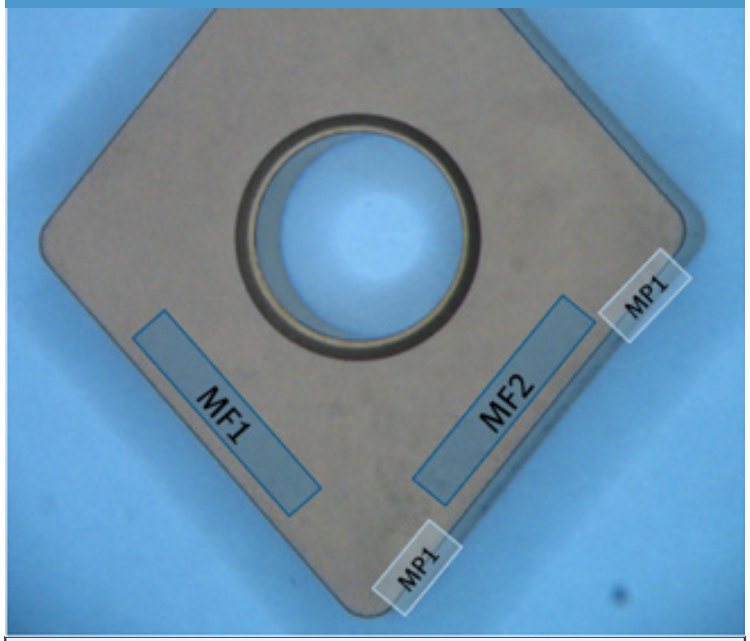
Process: Rotate
Number of inserts: 2
Cutting material: HW
Coating: TiN-Al2O3

Customer requirements

The rake faces of the indexable inserts are to be posttreated as follows:

- Polishing of the coated chip surface by means of dry blasting
- Polishing of the coated rake face with the help of the **FLAKKOTINGS**

Measuring positions or surfaces on inserts



MF: Measuring area for surface measurement

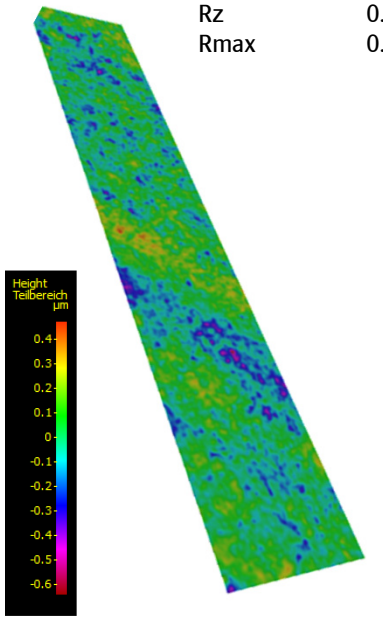
MP: Measuring position for radius measurement

Examples of use

Surface polishing: Post-treatment of hard coatings 2 /4

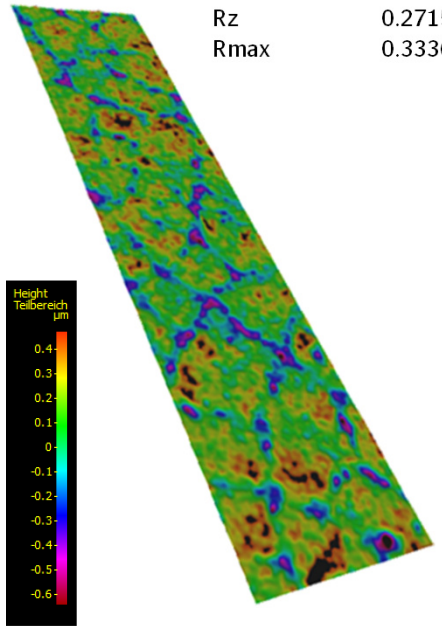
Untreated (MF1)

Ra	0.018 µm
Rz	0.0898 µm
Rmax	0.1041 µm



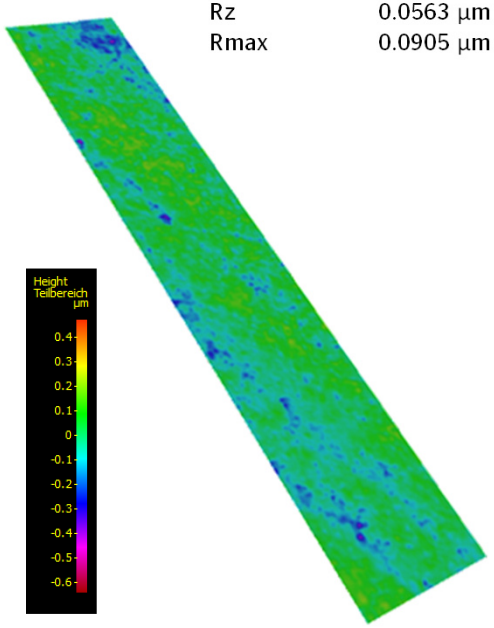
Dry-blasted (MF1)

Ra	0.0527 µm
Rz	0.2715 µm
Rmax	0.3336 µm



FLAKKOTED (MF1)

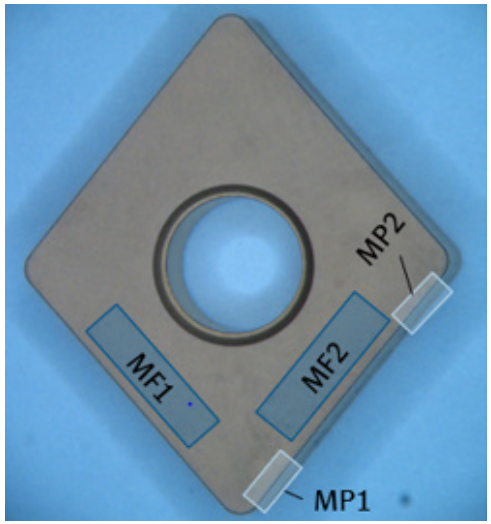
Ra	0.01 µm
Rz	0.0563 µm
Rmax	0.0905 µm



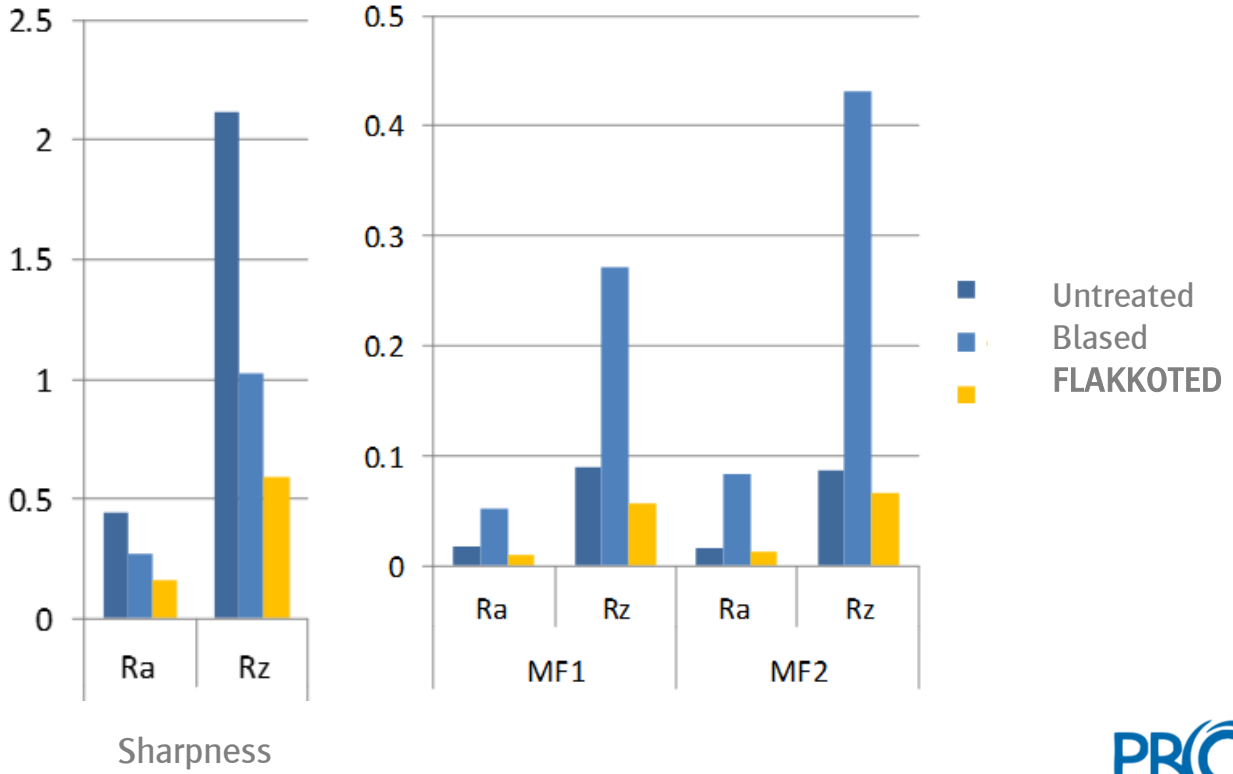
Examples of use

Surface polishing: Post-treatment of hard coatings 3 /4

Measuring sites



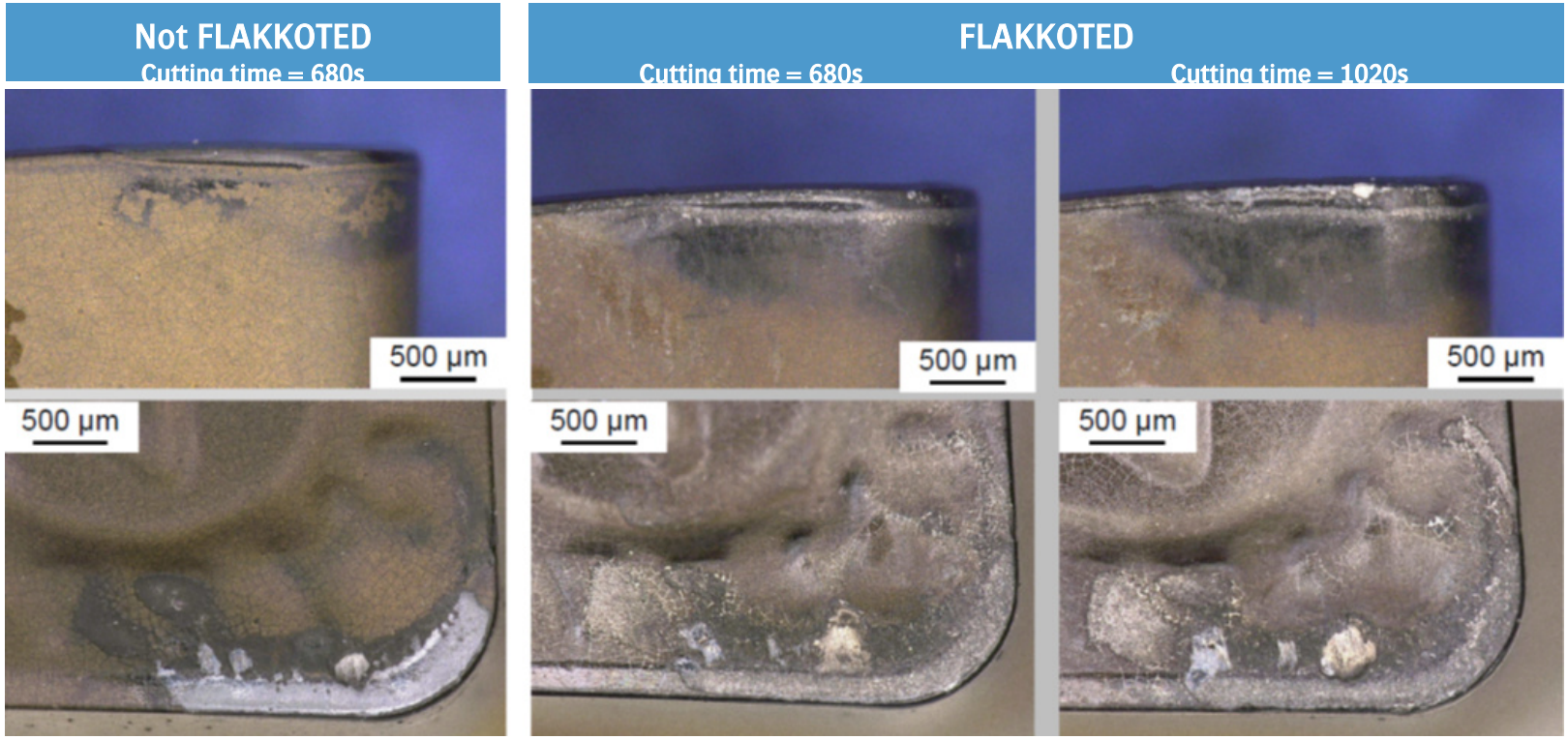
Comparison of the roughness values



Sharpness

Examples of use

Surface polishing: Post-treatment of hard coatings 4 /4



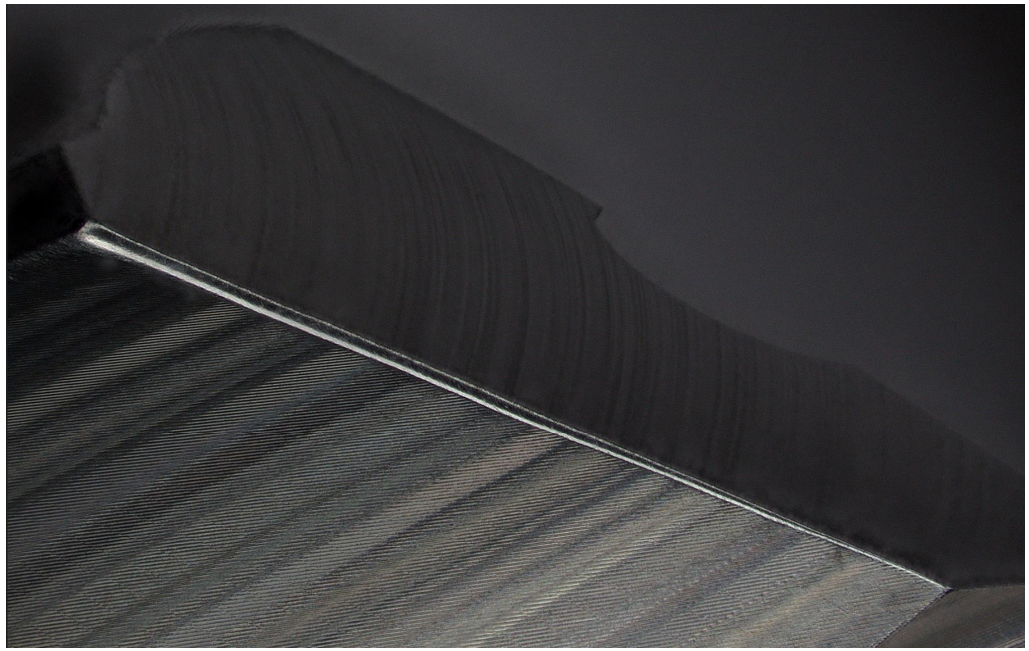
Cutting conditions: 200m/min; a_p = 2 mm; f=0,4 mm; Emulsion (8%) Plate geometry: LNMX 110408-HAT
Cutting material: IC5005 Material: ADI 900

Source: WZL der RWTH Aachen

Influences and improves sustainably

Progressive edge shape: from center cutting edge to corner cutting edge

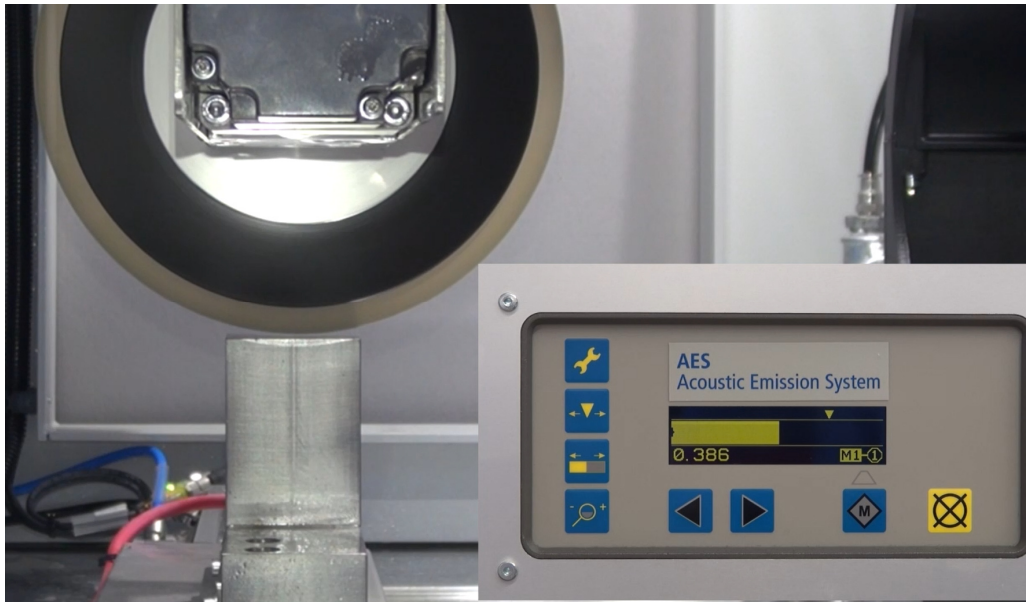
- Rounding in the center with very small radius
- Fillet in the center with larger radius
- Rounding against the corner cutting edge with large radius and K-factor
- Progressive edge preparation from the center cutting edge to the corner cutting edge
- Corner cutting edge is not damaged and remains intact



Summary

What is FLAKKOTING?

- **FLAKKOTING** is a brushing process
- **FLAKKOTING** is a grinding process
- **FLAKKOTING** needs a solid machine with accuracy
- **FLAKKOTING** needs precise disc brushing tools
- **FLAKKOTING** is a process map of the requirements
- **FLAKKOTING** is a further developed brush deburring at a high level



END

FLAKKOTING is the solution!

THANK YOU VERY MUCH FOR YOUR ATTENTION!

Neue Technologien für Plan-, Fein- und Feinstbearbeitungen » Technik (fachzeitungen.de)