



*Company
presentation*

Location



*Viale dell'Industria, 50 – 35129 - Padova
Italy*

www.minitoolscoating.com



miniToolsCoating moves in three different markets



*Spiral bevel gears
tools'
manufacturing*

*Resharpener and
PVD coating
service for gear
cutting tools*

*PVD job coating
for tools, mould
and dies, and
different
mechanical
components*

***Bevel gears cutting
tools
manufacturing***

***We produce high quality solid millers for bevel
gears
In the picture a set of various tools dimensions***





***Bevel gears cutting
tools
manufacturing***

The main qualities of our tools are:

➤ *Absolute precision*

➤ *Powder metal High Speed Steel (ASP23 – ASP30 – S390)*

➤ *Quality control of incoming steel*

➤ *Last generation of dedicated PVD coatings*



***Bevel gears cutting
tools
manufacturing***

Quality depends from:

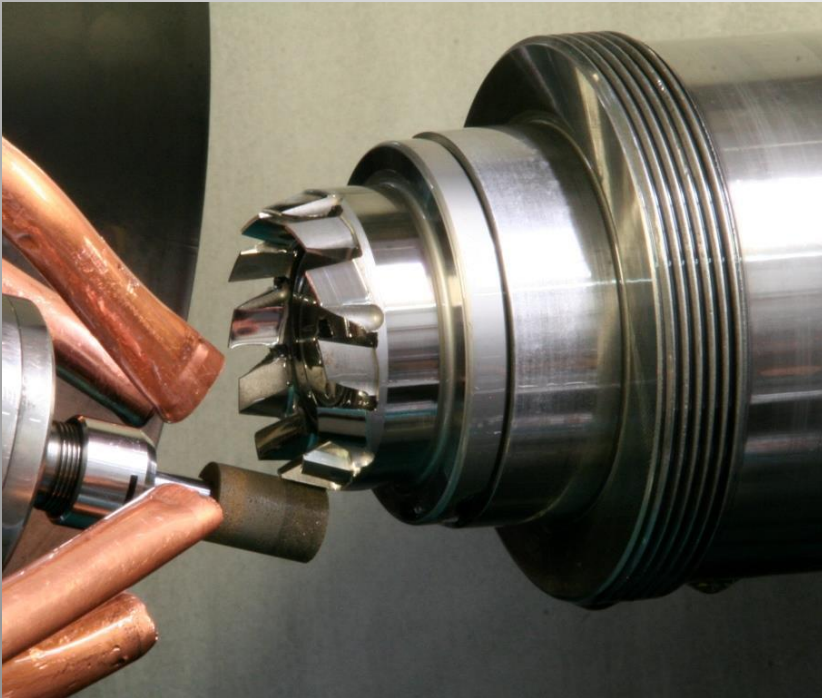
- *Use of modern updated CNC machines*
- *Dimensional controls in all main working process*
- *Heat treatment only from qualified suppliers*
- *Final inspection and quality certification*

*Bevel gears cutting
tools
manufacturing*

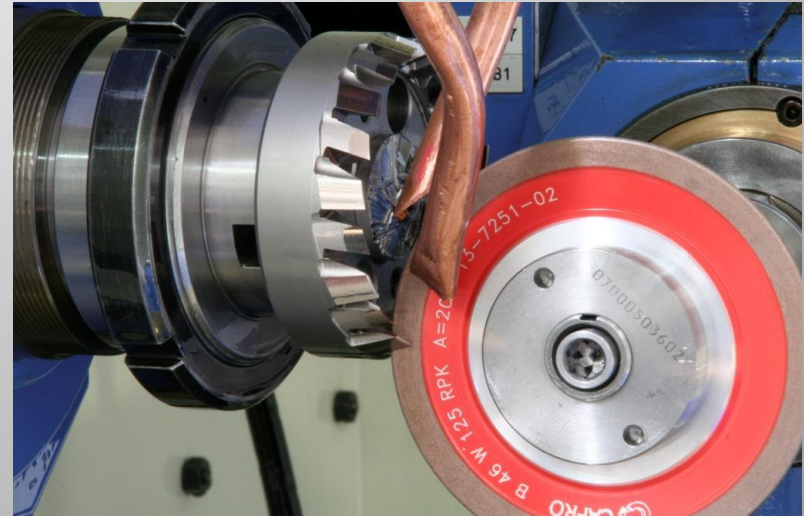


*CNC milling on 5
axes machine*

*Bevel gears cutting
tools
manufacturing*

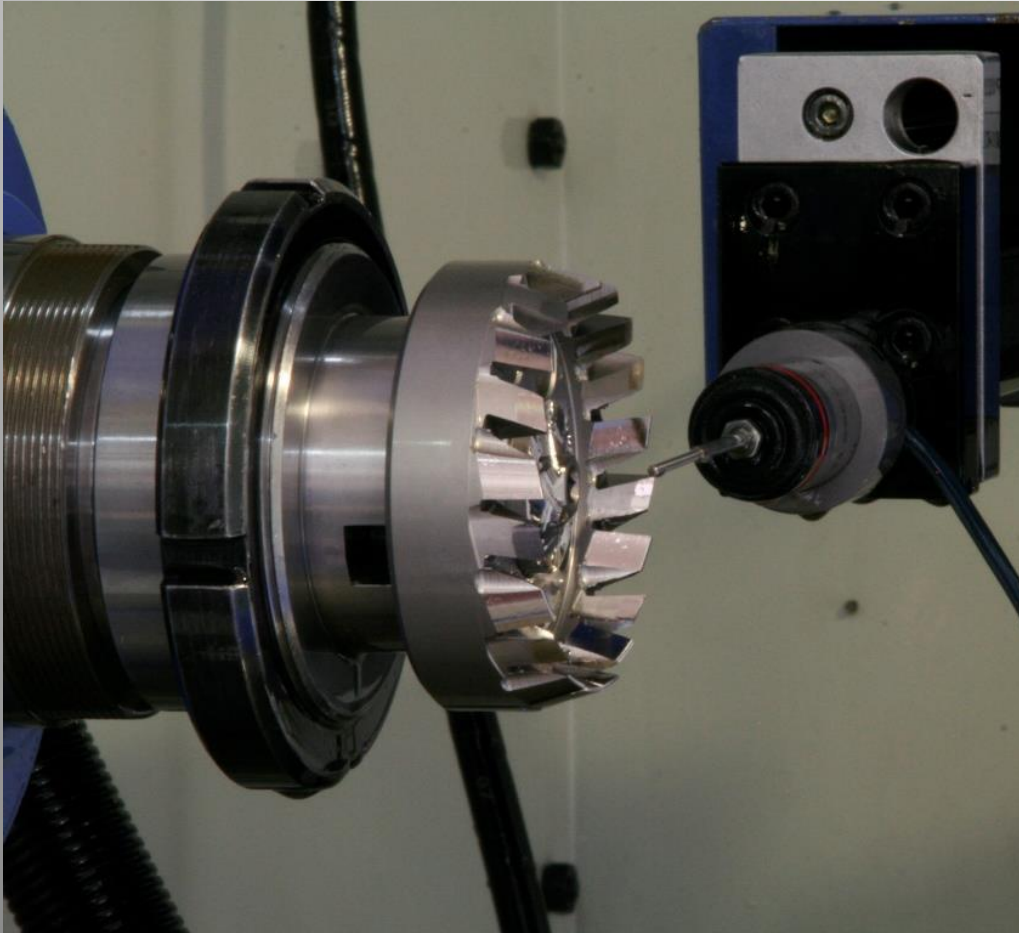


*Profile grinding on CNC
machine*



*Blade resharpening on
CNC machine, with CBN
wheel*

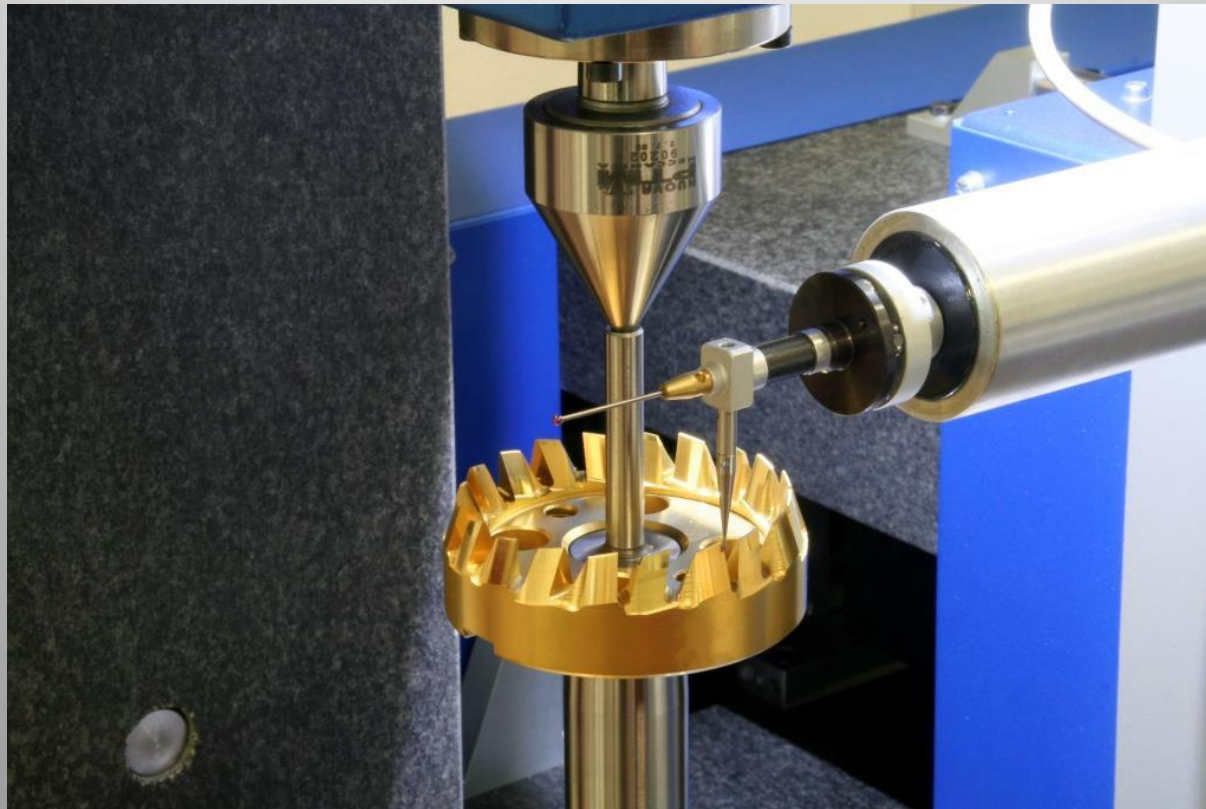
*Bevel gears cutting
tools
manufacturing*



*Precision control of cutter
height, with CNC machine*

*Bevel gears cutting
tools
manufacturing*

Final quality certification



**Bevel gears cutting
tools
manufacturing**



The software of CNC machines is developed in house

The screenshot shows the Geometry software interface for CNC tool setup. The main window displays a 3D model of a bevel gear with yellow teeth. The interface includes a menu bar (Macchina, Ausiliari, Servizio, Help), a toolbar, and a tabbed interface with 'CT' selected. A parameter table on the right lists various dimensions in millimeters and degrees. Below the table, there are input fields for feed rates, offsets, and other parameters. The bottom of the window shows the Windows taskbar with the Start button and several open applications.

| ISO Var File | | | | | |
|------------------|---------|-------|-----------------|--------|----|
| Diametro medio | 114.500 | mm PW | 1.778 | mm | |
| Angolo Pres OUT | 18.333 | ° | Angolo Pres IN | 21.667 | ° |
| Angolo Clear OUT | 17.000 | ° | Angolo Clear IN | 20.000 | ° |
| blade point [BP] | 1.039 | mm | Altezza dente | 12.000 | mm |
| Angolo Testa | 12.000 | ° | Altezza Fresa | 0.000 | mm |
| Utile PS OUT | 12.5 | mm | Utile PS IN | 13 | mm |
| Utile CS OUT | 12.000 | mm | Utile CS IN | 12.000 | mm |

Corsa entrata PS OUT: 2.000 mm Corsa entrata CS OUT: 2.000 mm Corsa entrata PS IN: 2.000 mm Corsa entrata CS IN: 2.000 mm
Velocita Avvicinamen: 200.000 mm/r Corr Imp mola per CS: 2.000 mm

Hook Angle: 20.000 °
Corsa entrata Testa: 0.000 mm Corsa di lavoro testa: 13.000 mm Corr X testa per denti: 0.000 mm
Offset Y mandrino: 0.000 mm Offset Z mandrino: 0.000 mm Divisione IN-OUT: 0.000 N

Dati Fresa



***Bevel gears cutting
tools
manufacturing***

DELIVERY CONDITIONS

- *Standard delivery in 4 – 6 weeks*
- *Absolute respect of planned delivery dates*
- *Packaging on nice and solid wooden boxes*
- *Laser marking of cutter's specifications and customers code*

*Bevel gears cutting
tools
manufacturing*



Laser marking

**Bevel gears cutting
tools
manufacturing**



Standard dimensions of solid cutters

| Type | Nominal diameter | Number of teeth (Z) | Base material |
|---------------------|------------------|---------------------|---------------------|
| Solid cutter | 1,1" | 8 | ASP23 or S390 |
| | 1,5" | 12 | |
| | 2" | 16 | |
| | 2,5" | 16 | |
| | 2,75" | 20 | |
| | 3,5" | 20 | |
| | 4,5" | 20 (24) | |
| | 5" | 20 (24) | |
| | 6" | 20 (24) | |
| Larger solid cutter | 6" | 24 (28-30) | |
| | 7,5" | 32 (36) | |
| | 9" | 40 | |

***Bevel gears cutting
tools'
manufacturing***



*Larger dimension of solid
miller with fixture*

Larger tools diameters (6", 7,5" and 9") require special fixture that we also produce, to be mounted on gear cutting machines.

*Gear cutting tools
grinding and PVD
coating*



*miniToolsCoating does
grinding and PVD
coating of stick blades
for spiral bevel gears
cutting*

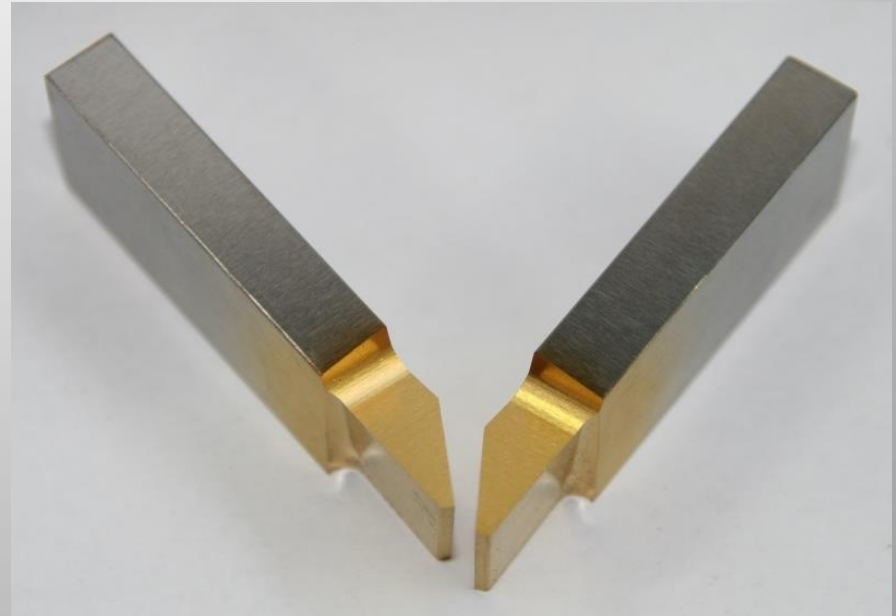
*HSS and
CARBIDE*

**We grind summary profiles of types Gleason RSR[®],
Pentac[®], and types Oerlikon FS, Arcon[®] e Spiron[®]**

*Gear cutting tools
grinding and PVD
coating*



Profile grinding



TiN coated blades

***Gear cutting tools
grinding and PVD
coating***



One of the main activity of miniToolsCoating is resharpening and PVD coating of gear cutting tools

HSS hobs

Carbide hobs

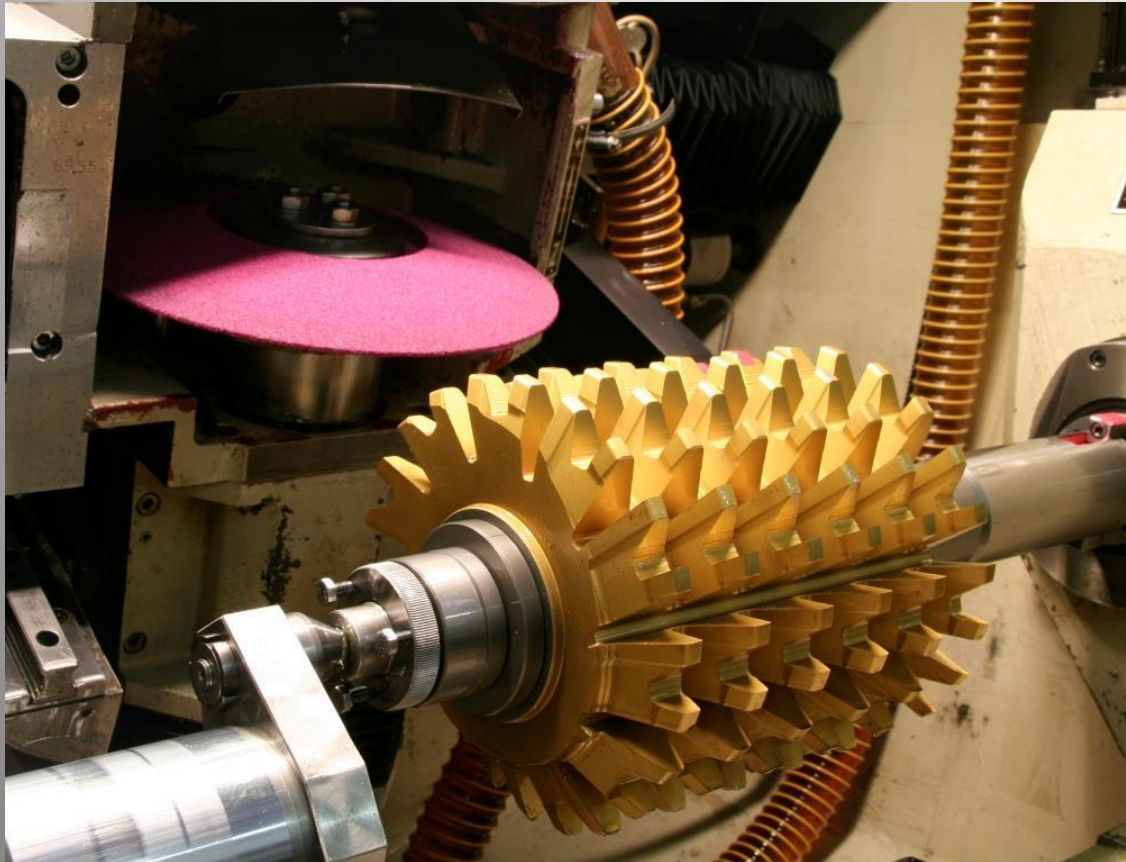
Wormgear shaft
hobs

Shaper Cutters

Shank shaper
cutters

Solid cutter and
stick blades for
spiral bevel
gears

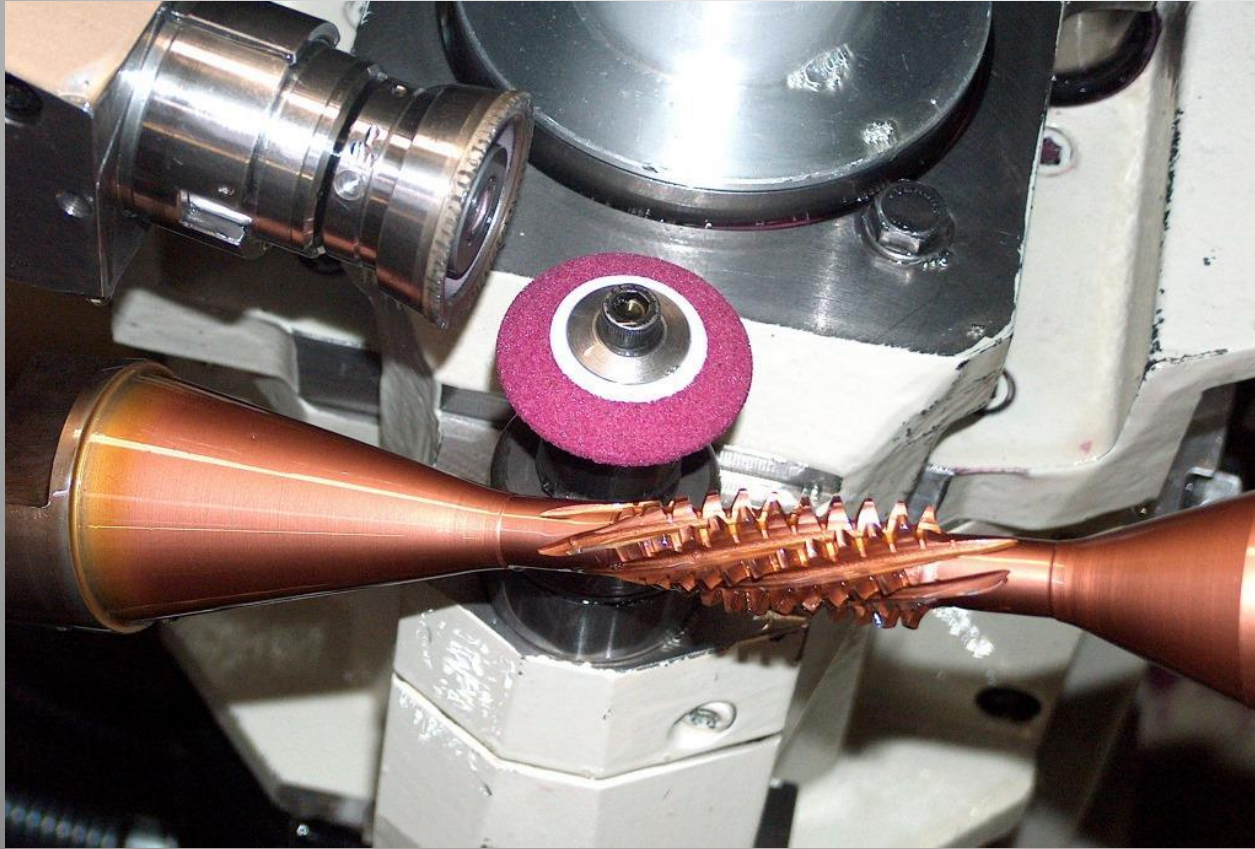
*Gear cutting tools
grinding and PVD
coating*



*Resharpener of a
double teeth hob*

CNC grinding
machine

*Gear cutting tools
grinding and PVD
coating*



*Resharpener of a
wormgear shank hob*

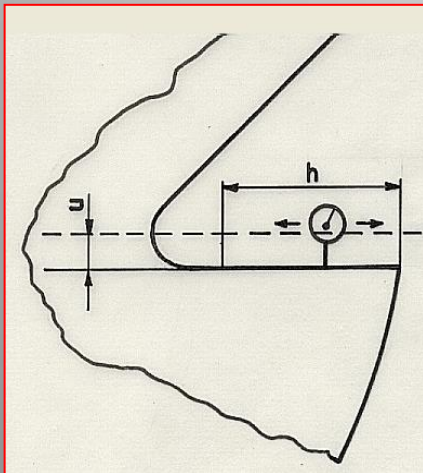
CNC grinding
machine

***Gear cutting tools
grinding and PVD
coating***

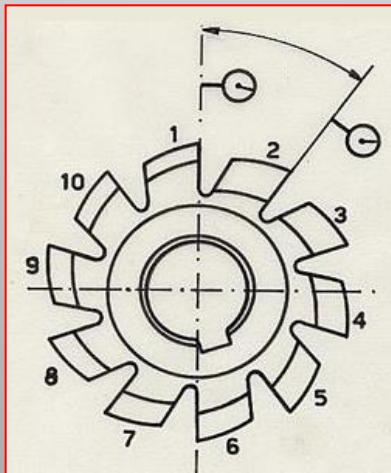


***The quality of hob resharpener is guaranteed by
controls on :***

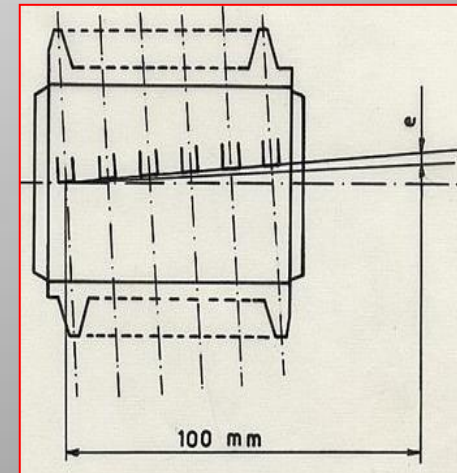
***Radiality of
cutting surface***



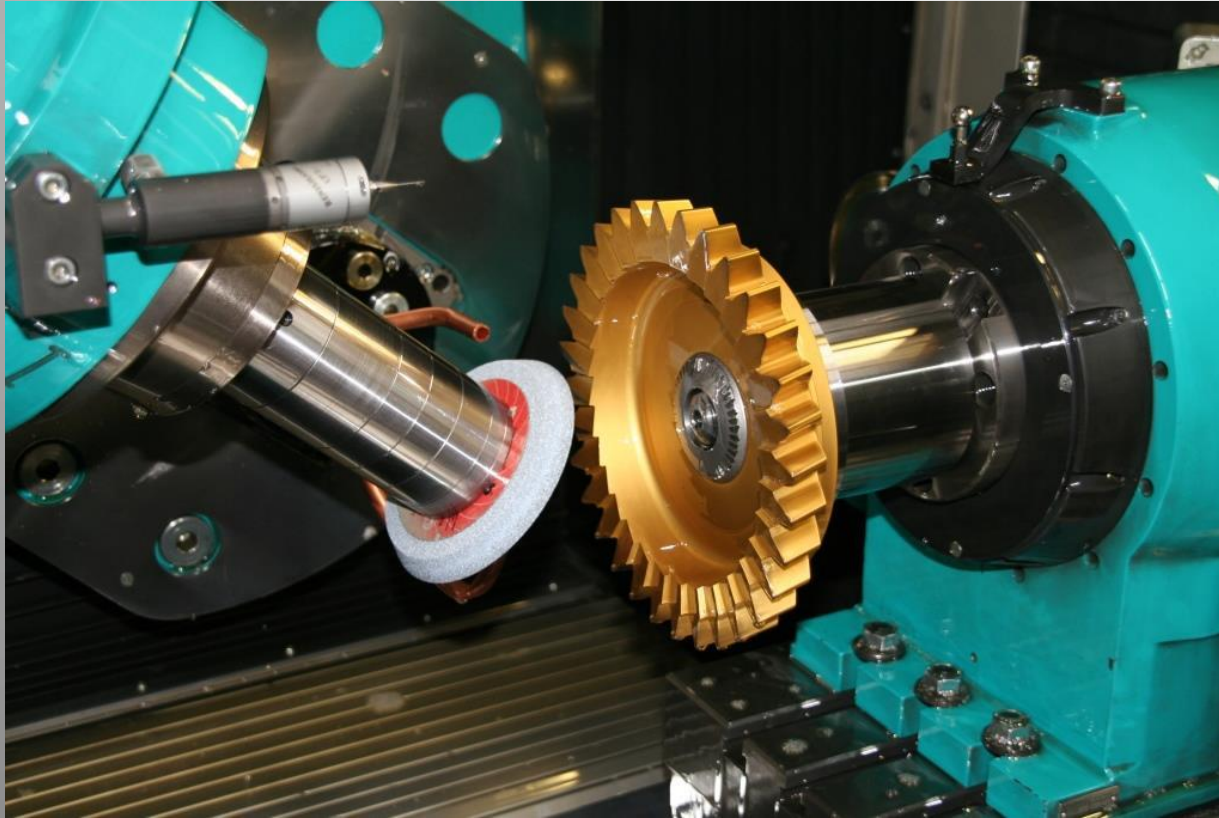
***Spacing between
flutes***



Gash lead



***Gear cutting tools
grinding and PVD
coating***



***Resharpening of an
helical shaper cutter***

*Gear cutting tools
grinding and PVD
coating*

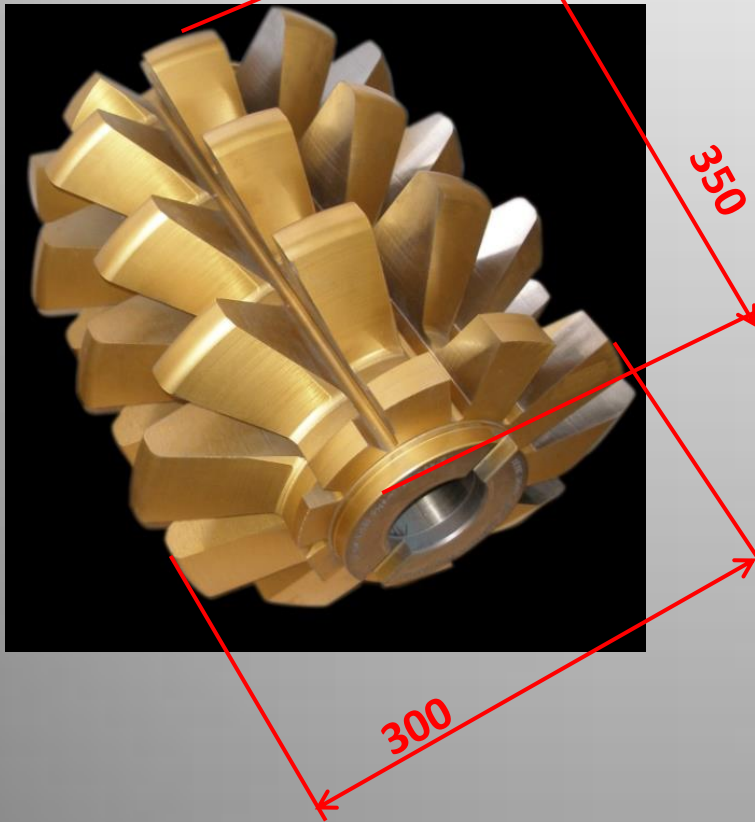


*HSS hobs and shaper
cutters TiN batch*

***Gear cutting tools
grinding and PVD
coating***



Maximum dimensions of hobs and shaper cutters that can resharpened by miniToolsCoating



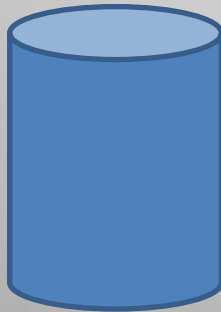
***Gear cutting tools
grinding and PVD
coating***



miniToolsCoating offer PVD coating service on tools, mould and dies and a lot of different mechanical parts.

PVD COATING LIMITS

Height 800 mm



Diameter 500 mm

Weight 500 kg



***Gear cutting tools
grinding and PVD
coating***



All below listed parts can be coated

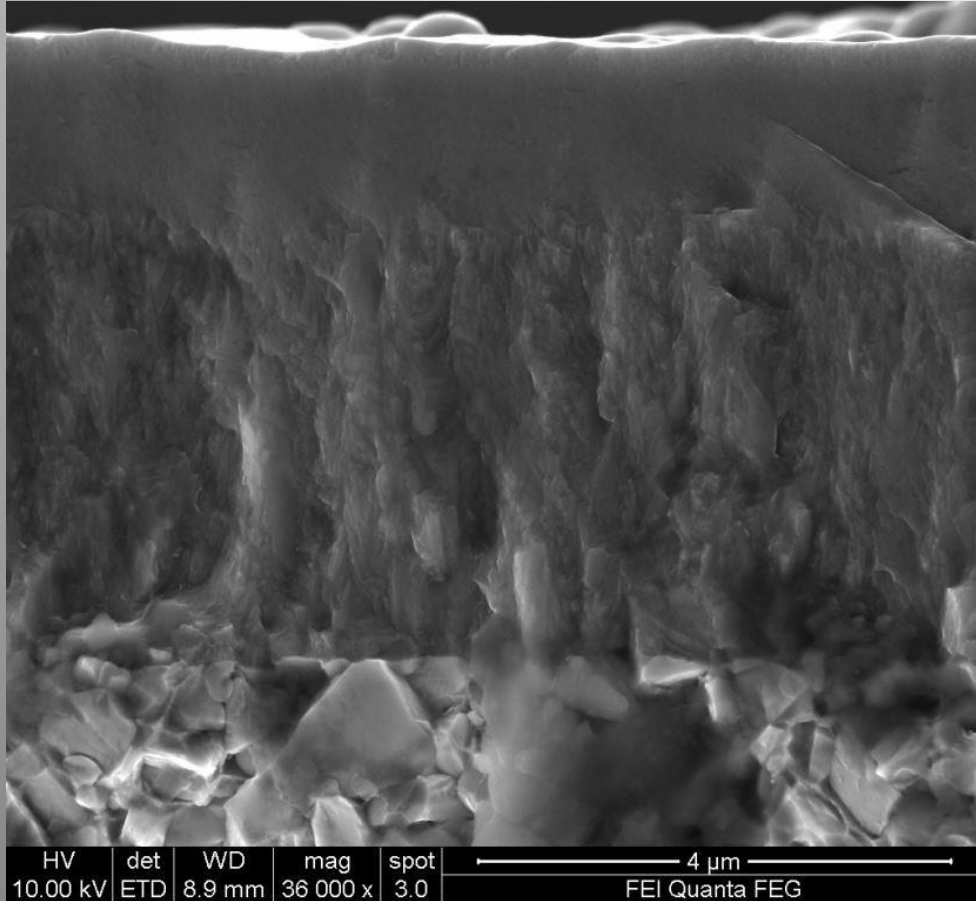
- *Gear cutting tools*
- *HSS and carbide shaft tools, like mills, drills, taps and other*
- *Carbide high performance tools*
- *Punches and dies*
- *Mould and dies for plastic injection*
- *Mould and dies for die casting*
- *Sintering tools and stamps*
- *Different mechanical components .*

***Gear cutting tools
grinding and PVD
coating***



| Type | Hardness HV _{0,05} | Thickness (micron) | Coating Temp. | Max usage Temp. | Friction coefficient |
|-----------|-----------------------------|--------------------|---------------|-----------------|----------------------|
| TiN | 2900 | 0,5 – 7 | 300-480 °C | 600 °C | 0,4 |
| TiCN | 3200 | 0,5 – 3 | 450 °C | 420 °C | 0,4 |
| AlTi nano | 3200 | 0,5 – 4 | 300-480 °C | 900 °C | 0,4 |
| ComposAl | 3200 | 2 – 6 | 450 °C | 900 °C | 0,6 |
| ALTICROME | 3400 | 0,5 – 5 | 480 °C | 1100 °C | 0,35 |
| SILICUT | 3200 | 0,5 – 2 | 480 °C | > 1100 °C | 0,4 |
| CrN | 2000 | 0,5 – 15 | 250-450 °C | 700 °C | 0,3 |
| CBC | 3200 | 0,5 – 5 | 480 °C | 400 °C | 0,25 |
| CROMVIC | 2000 | 1 - 3 | 250 °C | 400 °C | 0,15 |

Multilayer coating with nanocomposite structure

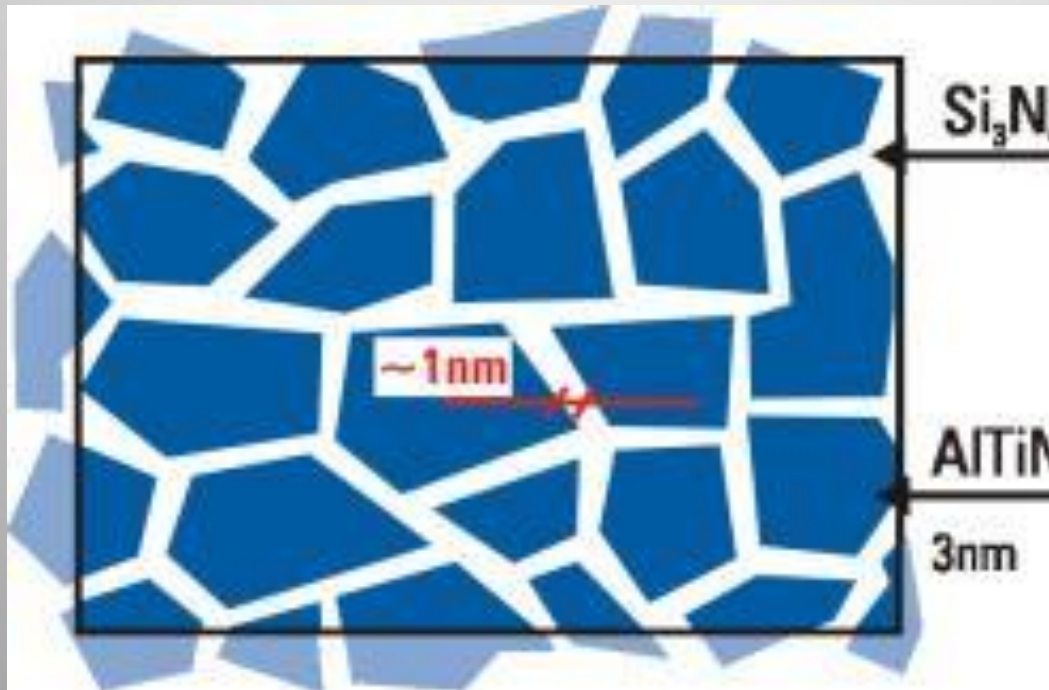


← Nanolayer extremely hard

← TiAlN

← Substrate

Structure of nanocomposite coating

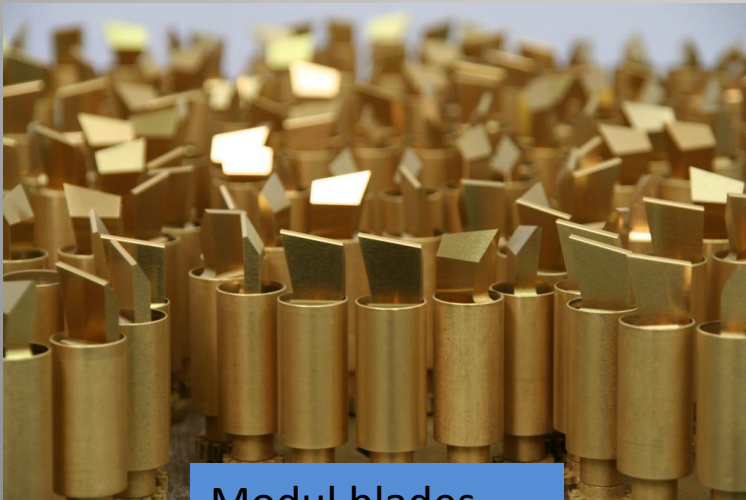
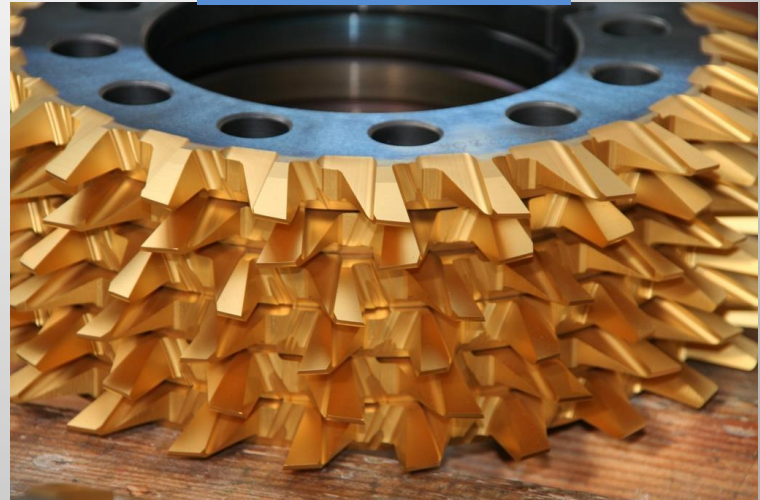


The layer is composed of nanograins of AlTiN in a matrix of SiN. The structure is typical of composite materials.

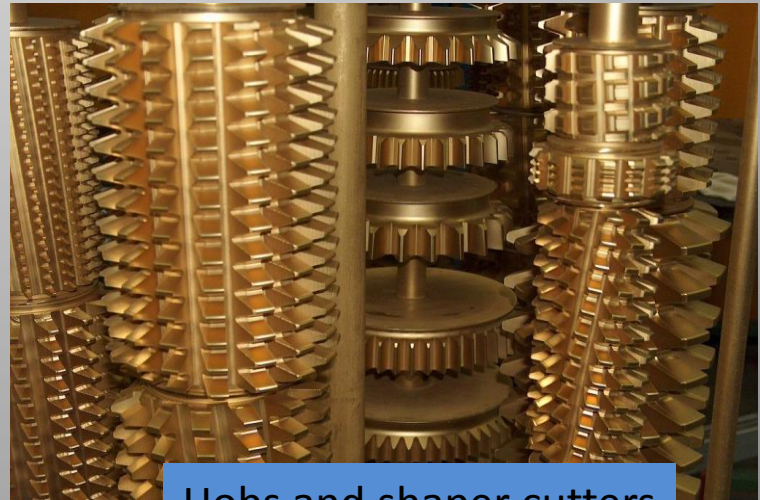
Solid cutters



Coniflex blades



Modul blades

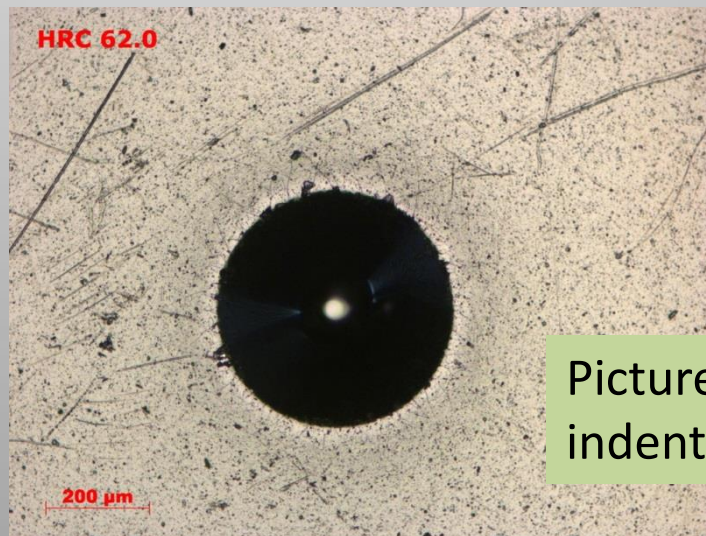
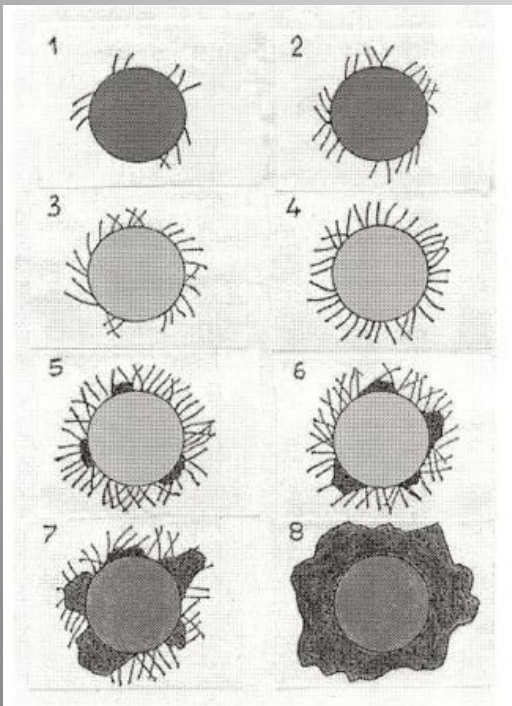


Hobs and shaper cutters

Quality control of the coating adhesion: Mercedes test

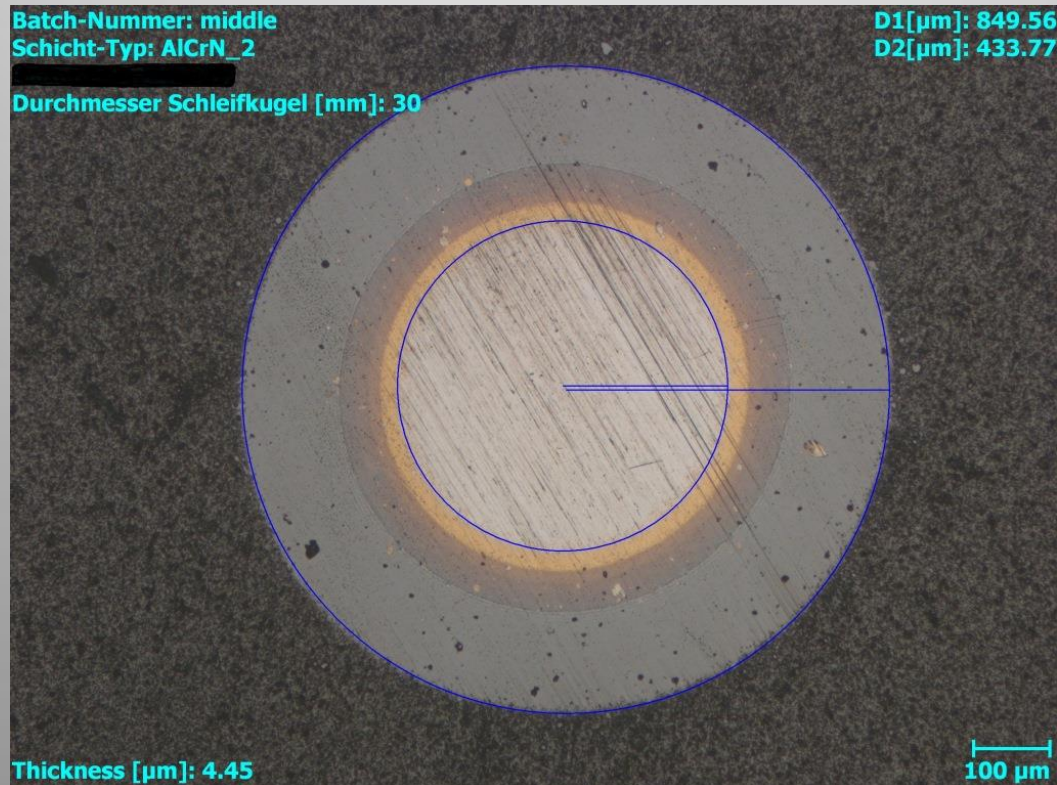
On each coating batch we put a sample; after the coating an HRC indentation shows the quality of adhesion, on a comparison scale.

Quality is decreasing from 1 to 8



Quality control of coating thickness: *Calo Test*

For each batch the thickness is measured on the coating sample. An abrasive ball is put in rotation touching the sample, the layer is eroded up to the substrate. Thickness is measured with a formula, basing on ball's and print diameters.





Special coatings

ALTICROME

AlTiCrN - Specific for HSS hobs and shaper cutters

Very hard: 3400 HV_{0,05}

High heat resistance: 1000 °C

Indicated for hard cutting conditions, with lot of heat generation



Special coatings

SILICUT

AlTiSi_xN - Specific for carbide tools

High hardness: 3200 HV_{0,05}

Very high heat resistance: >1100 °C

Indicated for application on carbide hobs



Special coatings

CROMVIC

Specific for friction reduction application, plastic injection mould and dies, and tools coating for machining aluminum based alloys.

Low deposition temperature: 250 °C

Very low friction coefficient: 0,15

DLC (Diamond Like Coating) arc coating. Carbon in amorphous structure, between graphite and diamond.



Many thanks for
your attention!