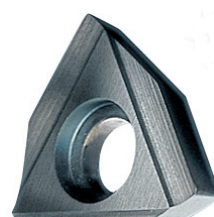
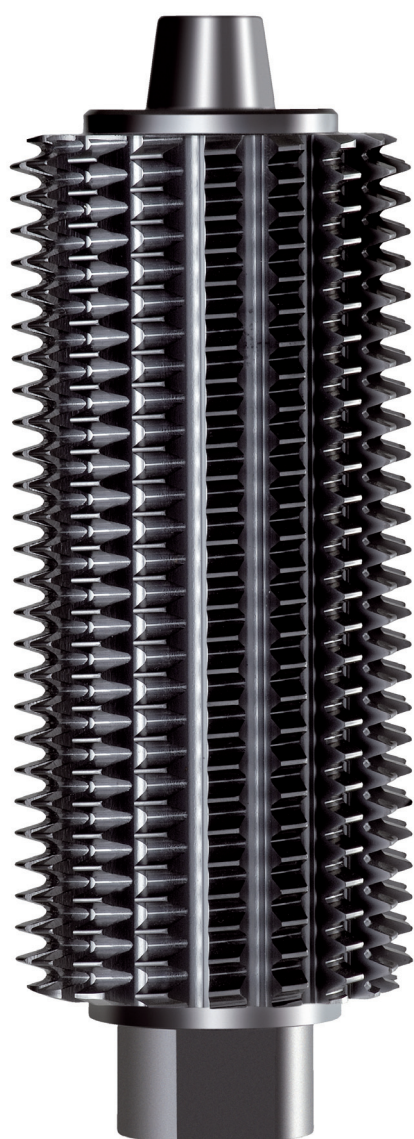


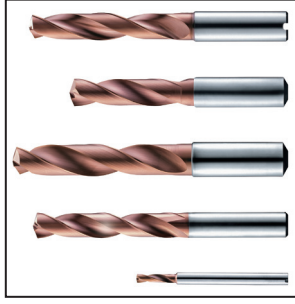
Cutting: Products and services



BALINIT® reduces costs in cutting applications

Productivity gains

Coated cutting tools can be used with substantially higher cutting speeds and feeds than uncoated tools. This reduces machining times and thus costs per piece. Longer tool life means fewer tool replacements and thus reduced setup costs.



HSC and dry machining

High-speed cutting and dry machining generate considerable heat. Thanks to the thermal stability, hot hardness and oxidation resistance of the coating, the heat is dissipated via the chip.

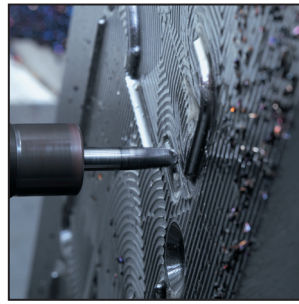
Hard machining

Hard and wear-resistant coatings make it possible to machine hardened steels up to 70 HRC. Tools with defined cutting edges allow the finishing of hard workpieces, thus eliminating the need for grinding.



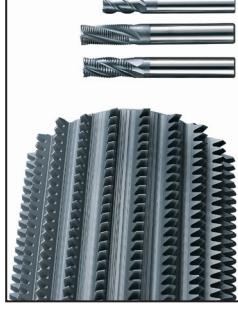
Difficult to cut materials

Titanium and nickel alloys as well as high-alloy steels are difficult to cut. Coatings with a low coefficient of friction and a low tendency of adhesion to the workpiece material make it easier to machine such materials.



Re-coating offers even greater savings

If resharpened tools are re-coated, they achieve the same performance as new coated tools and a longer total service life. Re-coating becomes a must if the service lives and cutting parameters prescribed for production lines are to be maintained.



Partners for regrounding

Regrounding and recoating must occur rapidly and efficiently. Oerlikon Balzers cooperates closely with reputable tool grinding specialists.



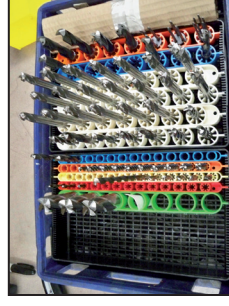
Efficient logistics

In most areas, Oerlikon Balzers offers a convenient pick-up service. Special transport containers eliminate the need to individually package the tools. Also, the order data can be transmitted digitally.



Clean & Coat System

Safe transportation adapted to your production flow.



Properties of BALINIT® coatings

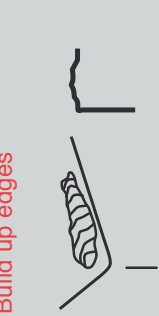
	BALINIT® A	BALINIT® B	BALINIT® FUTURA NANO	BALINIT® ALCRONA PRO	BALINIT® ALNOVA
Coating Material	TiN	TiCN	TiAlN	AlCrN-based	AlCrN-based
Microhardness (HV 0.05)*	2300	3000	3300	3200	3200
Coefficient of friction against steel (dry)*	0.4	0.4	0.30 - 0.35	0.35	0.3
Coating thickness (µm)	As appropriate to application				
Residual compressive stress (GPa)	-2.5	-4.0	-2.0	-3.0	-3.0
Maximum Service Temperature (°C)	600	400	900	1100	1100
Coating temperature (°C)	< 500	< 500	< 500	< 500	< 500
Coating color	Gold-yellow	Blue-grey	Violet-grey	Bright grey	Bright grey
Coating structure	Monolayer	Multilayer, graded	Nanostructured	Monolayer	Multilayer
	Versatile Standard Coating	High hardness, good toughness	High hot hardness, high oxidation resistance	Very high oxidation resistance and hot hardness	High wear and oxidation resistance as well as outstanding hot hardness

* Depends on application and test conditions

1) Relative to TiAlN

Wear and success factors

Forms of tool wear

Form of wear	Wear mechanisms	Protection by coating
Flank wear 	Abrasion	Hardness and high wear resistance
Crater wear 	Diffusion and abrasion	Hardness, hot hardness, and oxidation resistance, low affinity to workpiece materials
Crest crack formation 	Thermal shocks due to temperature change	Thermal resistance, protection against thermal overload
Build up edges 	Adhesion, welding-on of "sticky" substrates	Oxidation resistance, good sliding properties, chemical stability, low affinity to workpiece materials

Success factors for coating

Coatable materials

Metallic materials such as high-speed steels, hot - and cold - working steels, stainless steels, heat-treatable steels, carbides and cermets can be coated.

Heat treatment of tools

The temperature in the final heat-treatment step (most commonly the tempering temperature in the case of steels) must be higher than the coating temperature.

Surface conditions of tools

Surfaces must be in the bright condition. Tools must not be chrome-plated, burnished, steam tempered or bath-nitrided. Ground surfaces must not display grinding cracks, oxide films or rehardening burns. Cutting edges must not have burrs. Polished surfaces must be free of polishing residues. Surfaces must be free of rust, chips, wax, adhesive tape, and paint. Tools must be demagnetised.

Brazed tools

Brazed tools can be coated provided the filler metal has a melting point higher than 600 °C and contains no cadmium.

Packaging for shipment

Tools are to be packaged in such a way that they will not be damaged by other objects or each other. The packaging has to be suitable for return shipment. On request, shipment can occur in coating fixtures. The use of transport grids for shank tools facilitates safe and cost-effective handling without the need for expensive individual packaging.

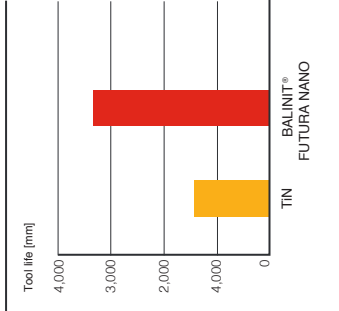
Rust protection

Tools should be coated lightly with water-displacing oil in order to safeguard them against rusting

BALINIT® Coatings Applications

BALINIT® FUTURA NANO

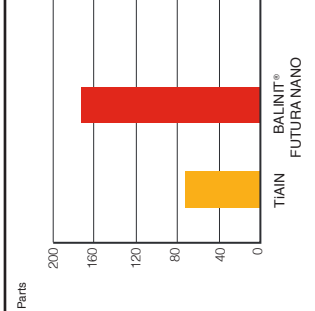
Boring



Tool: Multi-insert boring head
diam. 20 mm, 4xD
Workpiece: Drop-forged die
DIN 1.2336 (CrV), tempered
Material: 1,450 N/mm²
Cutting data: V_c = 120 m/min
TIN
FUTURA NANO
V_f = 140 mm/min
f = 0.05 - 0.10 mm/rev
hole depth = 80 mm, wet
G. Schmidt GmbH, Germany

Source:

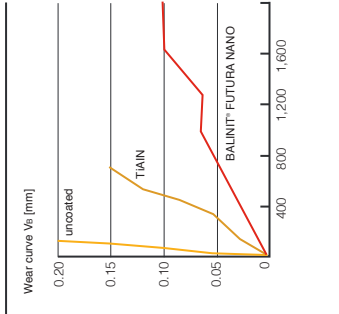
Milling



Tool: End mill diam. 13 mm, SC K10
Canshaft
Workpiece: DIN 1.1213 (~AISI 1055)
Material: V_c = 80 m/min
Cutting data: f = 0.2 mm/rev
cutting depth a_p = 18 mm
dry
Automobile industry

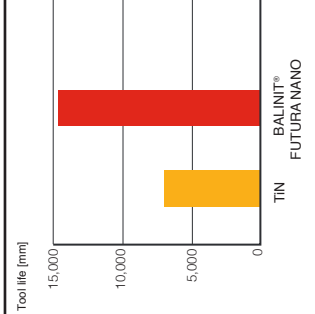
Source:

Drilling



Tool: Multi-insert boring head
diam. 20 mm, 4xD
Material: DIN 1.1191 (~AISI 1045)
Cutting data: Into solid material
34 mm deep (blind hole)
V_c = 120 m/min
n = 5,617 rpm
f = 0.2 mm/rev
V_f = 1,123 mm/min
External cooling without lifting

Milling

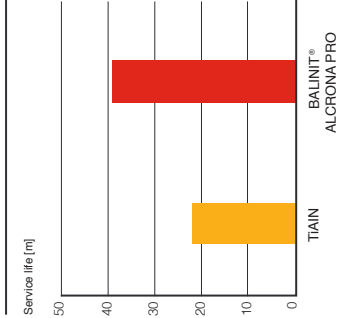


Tool: Carbide inserted face mill
diam 125 mm
Workpiece: Tool steel plate, 800x400 mm
DIN 1.2379 (~AISI D2),
Material: tempered 1,050 N/mm²
Cutting data: V_c = 180 m/min
f_z = 0.35 mm/tooth
cutting depth a_p = 5.0 mm
cutting width a_e = 100 mm
climb milling, dry
G. Schmidt GmbH, Germany

Source:

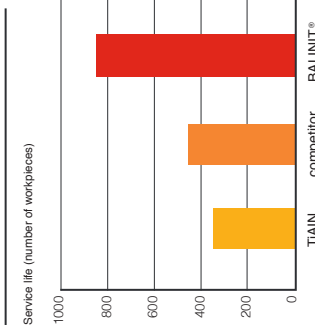
BALINIT® ALCRONA PRO

Rough milling, wet



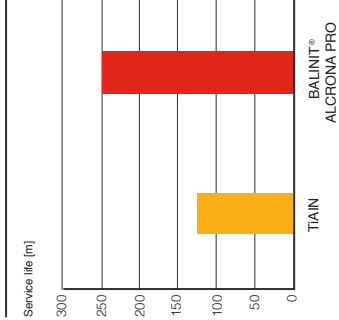
Tool: Carbide end mill, ø 10 mm
Workpiece: DIN 1.2344 (~ AISI H13)
1200 N/mm²
Cutting data: V_c = 175 m/min
Source: Oerlikon Balzers
Cutting Laboratory

Single thooth lathe machining



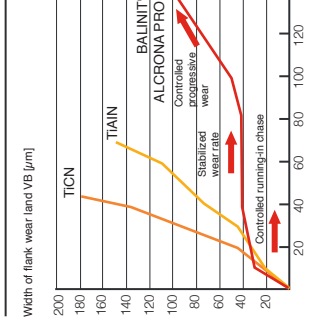
Tool: Insert
Workpiece: Steel DIN 1.7131
(~ AISI 5115), 550 N/mm²
Machining: Dry
Source: Automotive supplier
Germany

Finish milling, dry



Tool: Carbide end mill, ø 10 mm
Workpiece: DIN 1.2344 (~ AISI H13)
45 HRC
Cutting data: V_c = 250 m/min
Source: Oerlikon Balzers
Cutting Laboratory

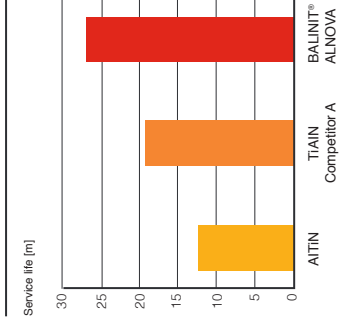
Finishing



Tool: Carbide end mill, ø 8 mm
Workpiece: Steel DIN 1.1191
(~ AISI 1045)
Cutting speed: V_c = 400 m/min
Machining: Cooled
Source: Oerlikon Balzers
Cutting Laboratory

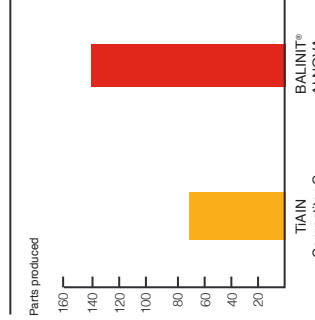
BALINIT® ALNOVA

Rough milling, wet



Tool: Carbide end mill, ø 16 mm
Workpiece: DIN 1.2344 (~ AISI H13)
1200 N/mm²
Cutting data: V_c = 150 m/min
Source: Tool manufacturer
Germany

Rough milling, wet



Tool: Carbide end mill, ø 16 mm
Workpiece: DIN 1.7131 (~AISI 5115)
Cutting speed: V_c = 181 m/min
f = 0.03 mm
Emulsion 5%
Source: Klenk GmbH & Co. KG
Germany

We are at your service in North America



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Russia, Singapore, Sweden,
United Kingdom

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