

Boosting productivity

Value-adding solutions for gear cutting



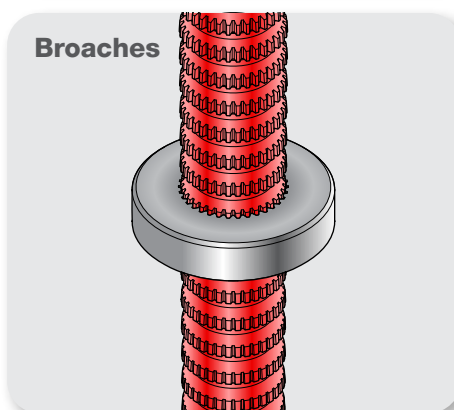
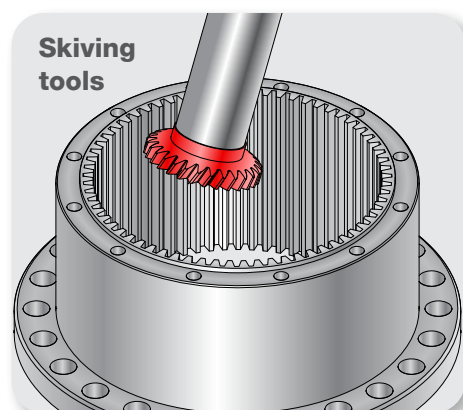
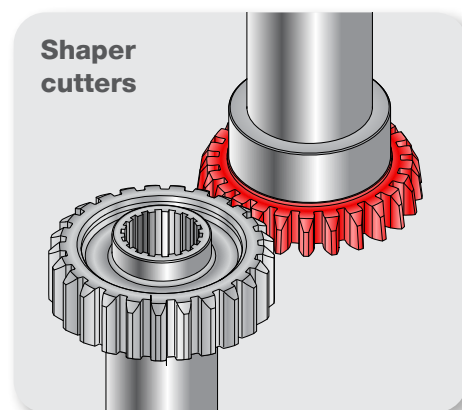
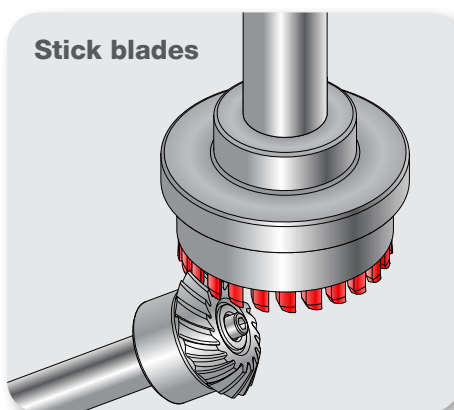
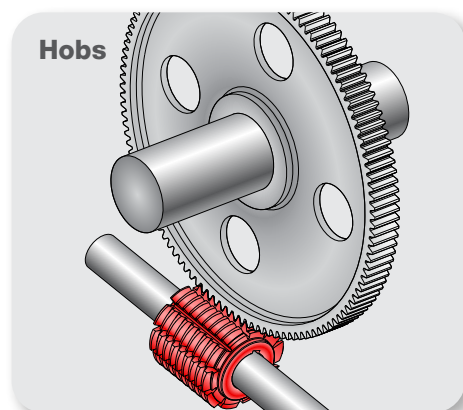
Cutting Tools



Value-adding coatings and services are the right choice for your gear cutting applications

More than ever before, gear cutting is being driven by reducing production costs per part, for which high productivity and reliability in the cutting process is key. Highperformance coatings from Oerlikon Balzers, such as BALINIT® ALTENSA, BALINIT® ALCRONA PRO and

BALINIT® DURANA, allow higher cutting speeds and feeds in order to increase productivity in gear cutting, while new services such as primeGear improve cutting process reliability and help reduce both overall tool costs and costs per part.



Benefit from our gear cutting expertise

Demands in gear cutting

Increase cutting parameters in gear cutting operations (e.g. for hobbing and gear skiving)

Variable chip thickness around the engaged cutting edge (e.g. for stick blades, skiving tools and hobs)

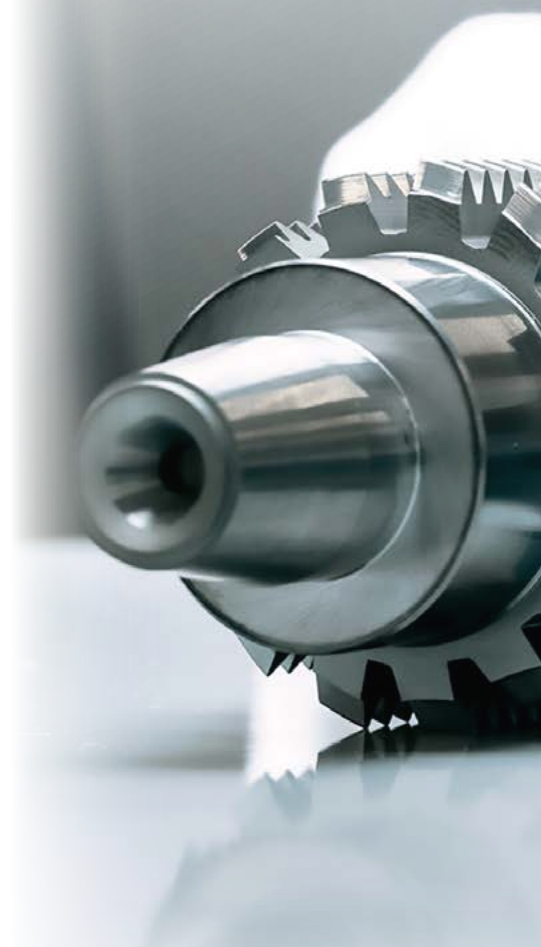
High impact stress on the cutting edge when entering the workpiece (e.g. for stick blades and shaper cutters)

Coating solutions from Oerlikon Balzers

High-performance coatings such as BALINIT® ALTENSA and BALINIT® ALCRONA PRO and dedicated post-treatment

Tailored cutting edge radius and profiles with primeGear for different areas of the cutting edge

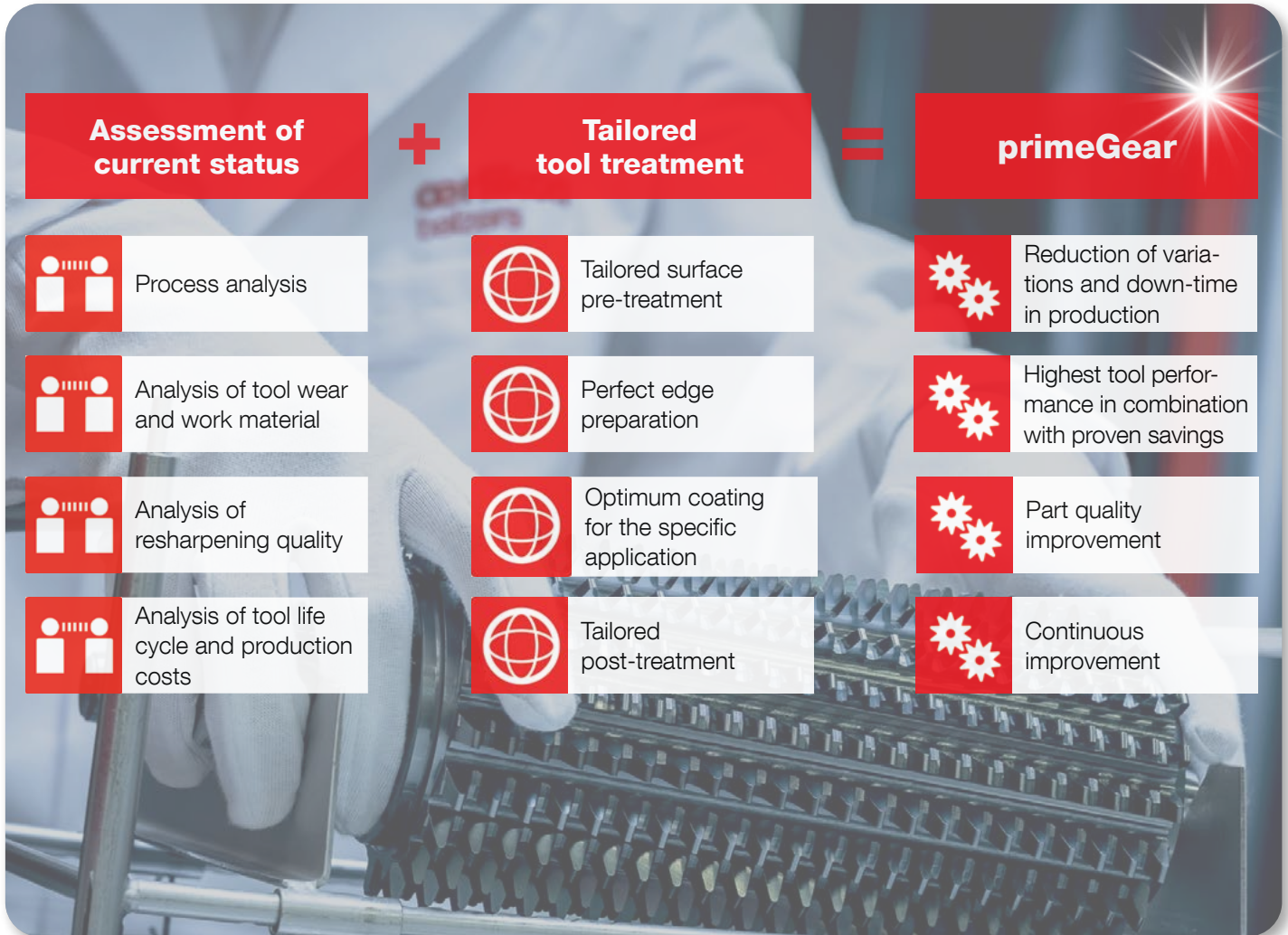
Stabilised cutting edges by dedicated cutting edge profiles and coatings like BALINIT® DURANA for specific processes and cutting parameters



primeGear – adding value to your gear production

primeGear gives you higher process reliability, reduced tool wear, extended tool life, shorter cycle times and cuts production costs. Together with you we will eliminate the weak links in tool life by analysing all phases in the tool life cycle:

- Surface treatment
- Cutting process
- Tool handling
- Resharpener



Example of tool cost reduction

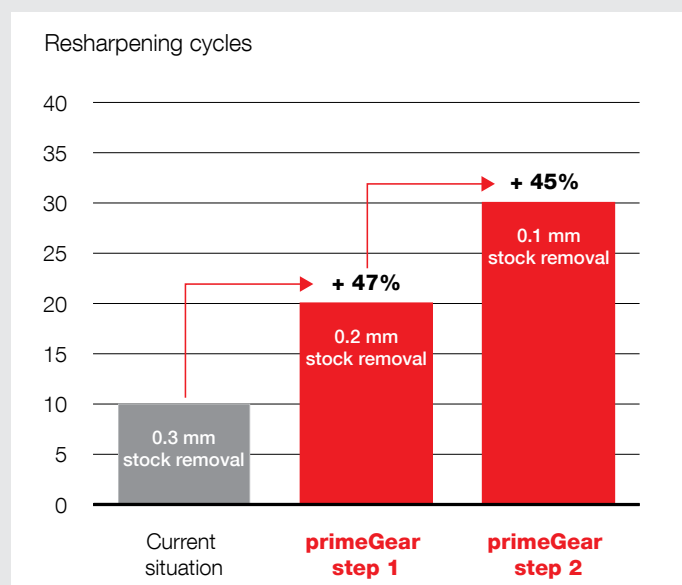
The results of a customer example show a higher process stability, improved tool wear and reduced regrinding stock lead. Reducing the resharpener variations in two steps and an optimum tool coating enabled longer reconditioning cycles, resulting in a total tool cost saving of 90% per year.

Direct effect:

- Step 1: Tool cost reduced by 47%
- Step 2: Tool cost reduced by additional 45%

Indirect effects:

- Predictability in tool life increases milling machine uptime
- Quality of machined gears improved (the difference between the first and last gear is reduced)



Our coating solutions for high-end gear cutting

Material	Hobs	Stick blades	Shaper cutters	Skiving tools	Broaches
Unalloyed steel	AT / AP	DR / AT / AP	AT / AP	AT / AP	AP
Steel < 1000 N/mm ²	AT / AP	DR / AT / AP	AT / AP	AT / AP	AP
Steel > 1000 N/mm ²	AT / AP	DR / AT / AP	AT / AP	AT / AP	AP
Steel 45 – 56 HRC	AT / AP	DR / AT / AP	AT / AP	AT / AP	AP
Steel 56 – 72 HRC	AT / AP / LM	DR / AT / AP	AT / AP / LM	AT / AP / LM	AP / LM
Cast iron (GG, GGG)	AT / AP	DR / AT / AP	AT / AP	AT / AP	AP

AP = BALINIT® ALCRONA PRO

AT = BALINIT® ALTENSA

DR = BALINIT® DURANA

LM = BALINIT® LATUMA

Coating properties at a glance

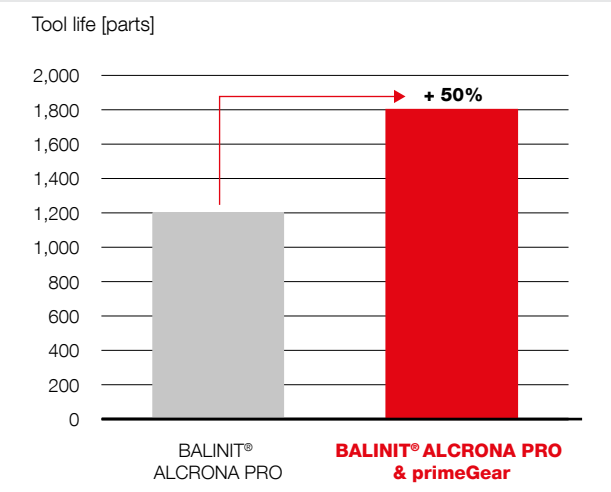
BALINIT®	Coating material	Coating hardness H _{IT} (GPa)	Compressive stress (GPa)	Max. service temperature (°C)	Coating temperature (°C)	Coating colour
ALCRONA PRO	AlCrN-based	36 +/-3	-3 +/-1	1,100	< 500	bright grey
ALTENSA	AlCrN-based	40 +/-3	-2 +/-1	1,100	< 500	light grey
DURANA	AlTiN/TiSiXN-based	37 +/-3	-3.5 +/-1	1,000	< 500	bronze
LATUMA	AlTiN-based	35 +/-3	-3 +/-1	1,000	< 500	grey

All given data are approximate values and dependent on application, environment and test conditions.



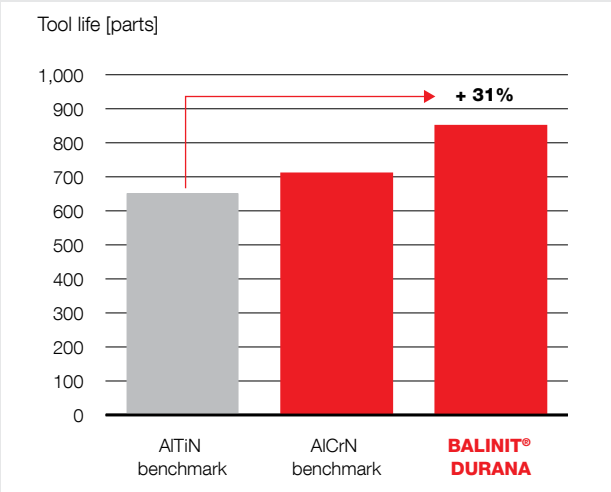
Outstanding results in challenging gear cutting applications

Gear hobbing with primeGear



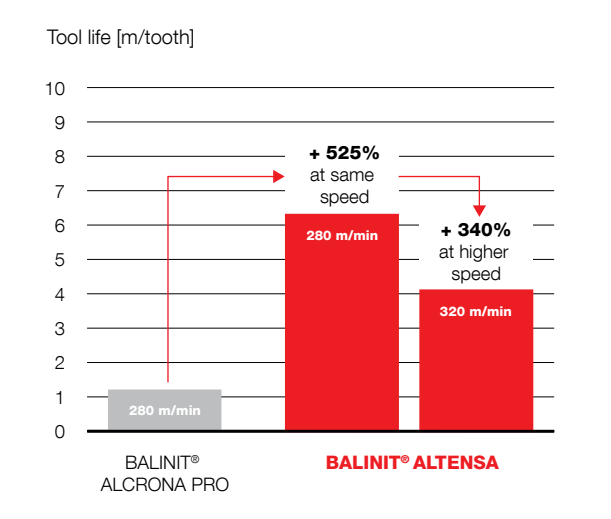
Tool	PM-HSS hob, Ø 100 x 300, module: 2.25	
Workpiece	Crown gear	
Cutting parameters	1st cut:	2nd cut:
	f = 3.7 mm/rev v _c = 190 m/min	f = 4.4 mm/rev v _c = 320 m/min
	dry	dry
Source	Automotive end user	

Bevel gear cutting with BALINIT DURANA



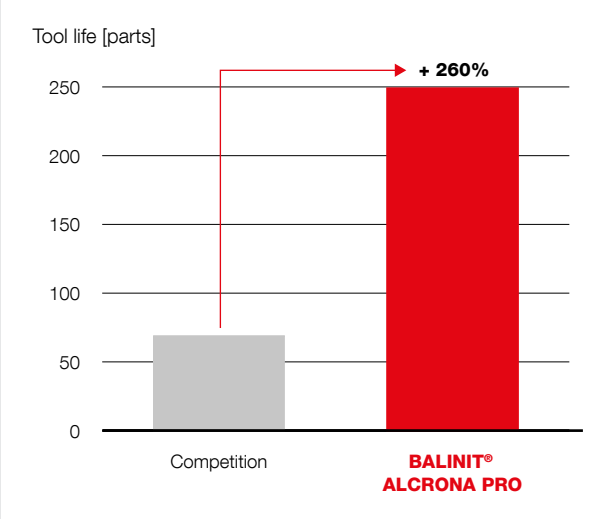
Tool	Carbide stick blade
Workpiece	Pinion gear
Cutting parameters	v _c = 170 m/min f _z = 0.05 mm
Source	Axle manufacturer

Gear hobbing with BALINIT ALTENSA



Tool	PM-HSS hob (S390), Ø 80 mm	
Workpiece	Steel 1.7174, AISI 4820, 20MnCr5 570N/mm ²	
Cutting parameters	Test 1: v _c = 280 m/min	Test 2: v _c = 320 m/min
	m = 2	dry
Source	Automotive end user	

Face hobbing with BALINIT ALCRONA PRO



Tool	Carbide stick blade
Workpiece	Crown gear
Cutting parameters	v _c = 162 m/min a _v = 4 m/min cycle time: 5.44 min
	wet
Source	Automotive supplier, Brazil

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