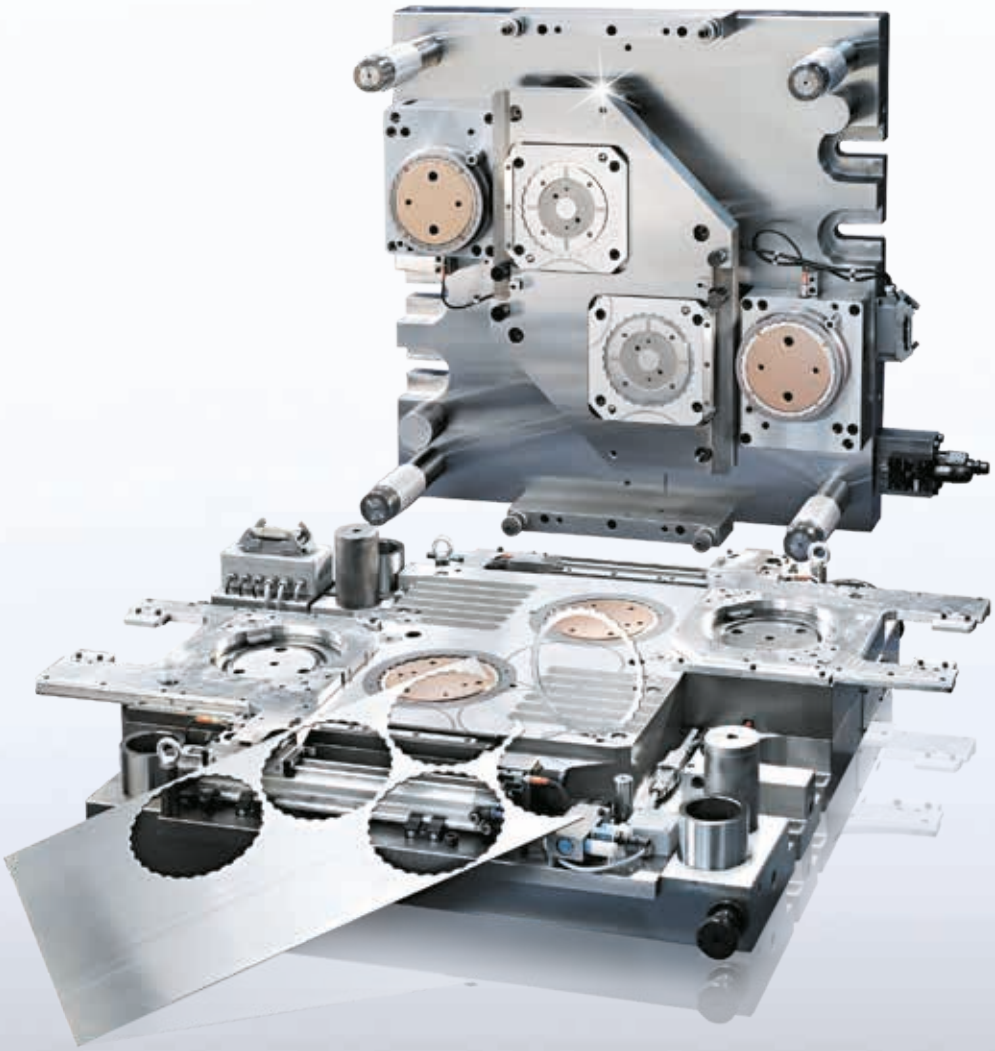
oerlikon
balzers

With BALINIT and BALITHERM, efficiency and productivity are in top form

Optimal wear protection solutions for your punching and forming tools



Metal Forming

Upgrade your tools to a new quality level – with BALINIT and BALITHERM

In production, stamping and forming tools are exposed to extreme forces and, consequently, subject to wear. You can minimise the wear of your tools, however, with BALINIT® hard coatings and BALITHERM® plasma-diffusion treatment by Oerlikon Balzers. As a global technology leader in surface solutions, we can offer you significant advantages with our coating solutions and diffusion processes that will boost the efficiency, cost-effectiveness, and ecological soundness of your applications.

Extreme coating hardness

Protection against abrasive wear

No dimensional changes of functional surfaces

Low coefficient of friction, high thermal stability

Prevention of adhesive wear

No cold welding

No heat checking

Reduced lubricant consumption

High wear resistance, very good sliding properties

Improved forming

Greater dimensional accuracy across longer runs

Fewer drawing passes

Improved surface and cut quality

No micro-welding, scoring, and rough sheared edges

Better dimensional stability despite tighter manufacturing tolerances

Lower tool costs due to extended service life

Improved ecological footprint due to environmentally friendly reduced lubricant use

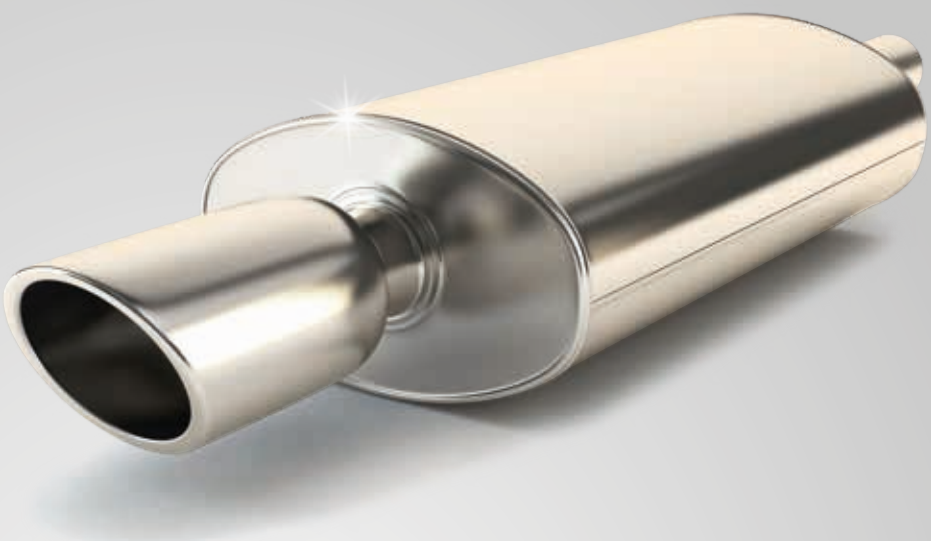
Reduced production costs due to less machine downtime and higher cycle frequencies

Perceptibly less aftermachining due to higher workpiece quality

BALINIT® and BALITHERM® for punching and forming: Greater productivity, efficiency, and process reliability with an optimised ecobalance

Cover picture: Feintool Technologie AG Lyss / CH

Save up to 86% of costs in production



When forming stainless steel, untreated tools quickly approach their limits. The series production of heat shields, for instance, will stop at about 2000 produced parts due to cracks in the tool surface. However, with BALINIT® ALCRONA PRO and BALINIT® C, you can extend the life of the forming tool as much as tenfold, which saves up to 86 % of costs.

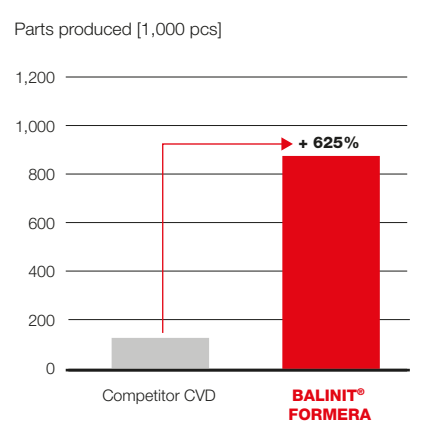
Production of Heat shields	Untreated	BALINIT® ALCRONA PRO BALINIT® C
Tool costs (EUR)	10,000	11,080
Tool life (Number of formed parts)	2,000	20,000
Tool cost per produced part (EUR)	5.00	0.55
Production per minute (No. of parts per min.)	20	20
Production costs per minute (EUR/min.)	4	4
Production costs per part (EUR)	0.20	0.20
Costs of machinery downtime	0.02	0.00
Subsequent machining costs (EUR)	0.02	0.00
Extra cost per part (EUR)	0.04	0.00
Total production costs per part (EUR)	5.24	0.75

The bars merely illustrate the correlations among the individual cost factors and do not relate directly to the bottom-line sum.

86 %
cost savings

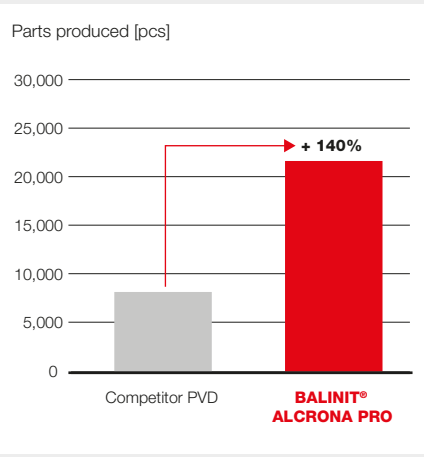
Rely on outstanding performance

BALINIT® FORMERA
Deep drawing of automotive structural part



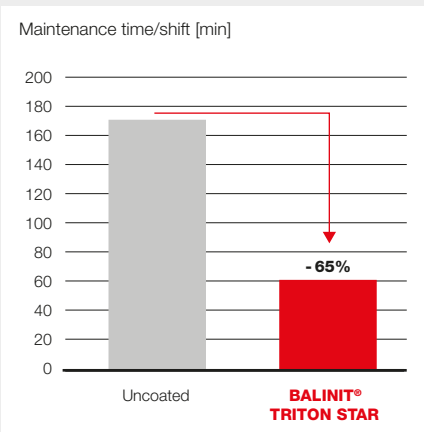
Tool	Draw die segment DIN 1.2379 (~ AISI D2)
Workpiece	Longitudinal beam UHSS (960 MPa) Tailor welded blanks 1.6 mm + 2 mm
Challenge	Short tool life due to wear Large reject rate after 100,000 strokes with CVD coated die
Solution: BALINIT® FORMERA	– Tool life significantly improved – Cleaning intervals and effort reduced

BALINIT® ALCRONA PRO
Fineblanking of refrigerator hinge



Tool	Fineblanking die HSS
Workpiece	Refrigerator hinge SCP1 - Cold rolled carbon steel 4.5 mm
Challenge	Tool life not satisfying
Solution: BALINIT® ALCRONA PRO	– Tool life increased by 140% – Product quality improved

BALINIT® TRITON STAR
Aluminium trimming and flanging



Tool	Trimming and flanging steels DIN 1.2333 / DIN 1.2358
Workpiece	Fender / bonnet / door / trunk lid AlMg and AlMgSi alloys
Challenge	Aluminium sticking and high scrap rate
Solution: BALINIT® TRITON STAR	– Aluminium sticking and scrap rate significantly decreased – Maintenance time per shift cut to one third

Coating properties at a glance

	BALINIT®						BALIQ®
	ALCRONA PRO	FORMERA	C	CROMA	TRITON	MAYURA	ALCRONOS
Coating material	AlCrN-based	CrAlN-based	a-C:H:Me (WC/C)	CrN	a-C:H	ta-C	AlCrN-based
Coating hardness H_{IT} [GPa]	36 +/- 3	28 +/- 2	12 – 15	25 +/- 3	~15 – 25	> 65	37 +/- 3
Coefficient of friction (dry) vs. steel	0.35	0.35	0.1 – 0.2	~ 0.5	0.1 – 0.2	< 0.10	0.35
Typical coating thickness [µm]	2 – 6	6 – 12	1 – 4	4 – 10	1 – 3	0.3 – 1.5	1 – 4
Intrinsic stress [GPa]	-3 +/- 1	-2 +/- 0.5		< -1		-3.5 +/- 0.5	-3.5 +/- 1
Max. service temp. [°C]	1,100	900+	300	700	300	> 500	1,100
Coating temp. [°C]	< 500	480	< 250	250 – 450	< 250	< 150	< 500
Coating colour	bright grey	silver-light grey	anthracite	silver-grey	black	rainbow / rainbow black	bright grey
Coating structure	monolayer	multilayer	nanolayer	monolayer	multilayer	multilayer	monolayer
Available as STAR version*			X		X		
Available in BALINIT® DUPLEX Series**	X	X	X	X	X		
Available in BALINIT® ADVANCED Series***	X	X	X	X			

* The STAR version delivers better load-bearing capabilities.

** The DUPLEX Series includes a separate diffusion process allowing deeper diffusion depths.

*** The ADVANCED Series includes an integrated diffusion process.

The data given are approximate values, they depend on application, environment and test condition.

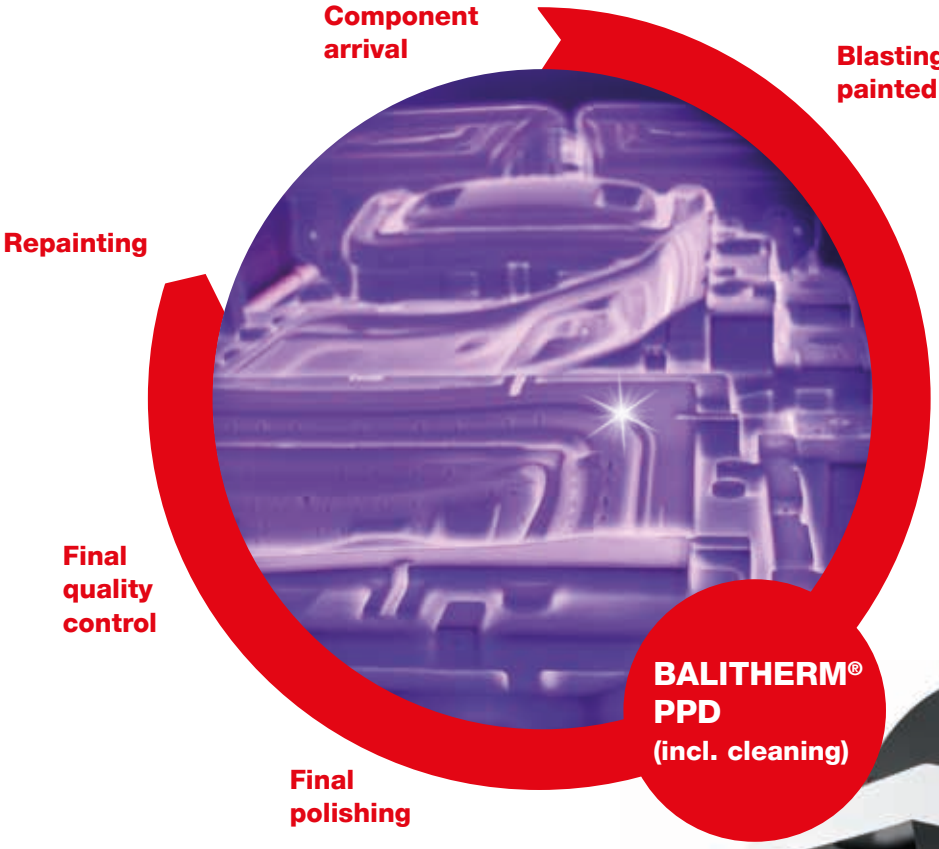
Application recommendations

	FORMING					TRIMMING
	Drawing Flanging Punching	Cold Forging	Hot Forging	Hot Forming	Cast Iron Tooling	Piercing Trimming Fineblanking
Non-alloyed steel*	FO	FO / AP	FO / AP		PPD	AP
Steel < 250 MPa*	FO				PPD	AP
Steel < 400 MPa*	FO				PPD	AP
Steel > 400 MPa*	FO			Δ / FO	PPD	AP
Aluminium	T Star / MY	T Star / MY	AP	Δ / FO	PPD	T Star / MY
Stainless steel*	FO / AP	FO	FO		PPD	AP
Brass, bronze*	AP / MY	AP	FO / AP		PPD	AP / MY
Copper	T Star / MY	AP	FO / AP		PPD	AP / MY

*An additonal layer of BALINIT® C can aid with release and avoid sticking of these materials.

AP BALINIT® ALCRONA PRO
CR BALINIT® CROMA
FO BALINIT® FORMERA
MY BALINIT® MAYURA
PPD BALITHERM® PPD
T Star BALINIT® TRITON STAR
Δ In Testing

The decisive advantage for more efficiency: BALITHERM PPD for large stamping dies



Our future-oriented plasma-based diffusion process PPD (Pulsed-Plasma Diffusion) is applied in our INAURA systems. They provide a loading capacity of 10 x 3 metres and 40 tonnes. The fully automated process ensures a stable and controlled wear-protection coating procedure. The combination of hydrogen, nitrogen and electricity means that INAURA operates entirely without the use of poisonous gases and chemicals.

Benefit from optimised wear-protection solutions for punching and forming tools. Contact us now!

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