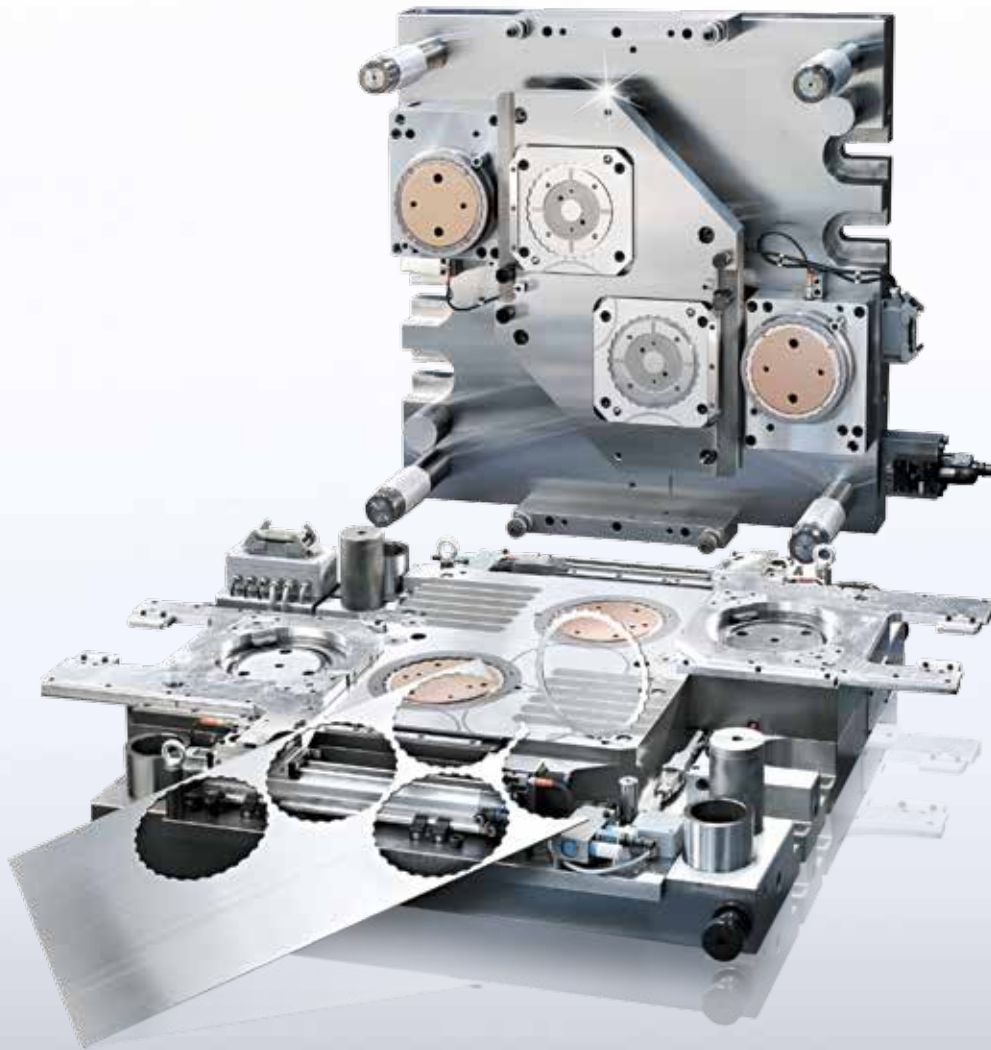


oerlikon
balzers

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 low-metered 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



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®

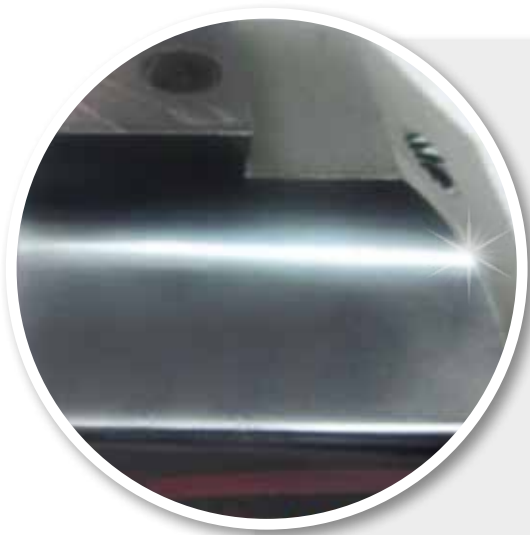
ALCRONA PRO and BALINIT® C, you can extend the life of the forming tool as much as tenfold, which saves up to 86% of costs.

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

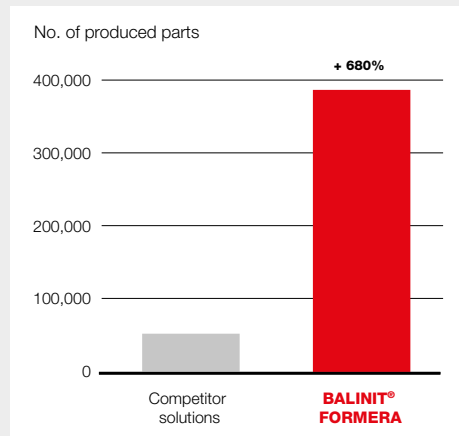
The bars merely illustrate the correlations among the individual cost factors and do not relate directly to the bottom-line sum.

86%
cost savings

Rely on outstanding performance



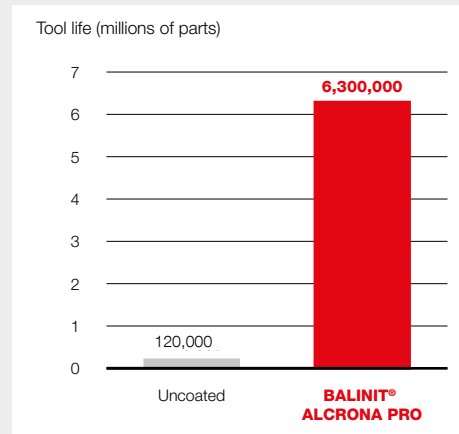
BALINIT® FORMERA performance in 4mm high strength drawing application



Tool	Draw operation seat bracket
Workpiece	4 mm HSLA
Process type	400t progressive press 30mm draw depth
Challenge	High wear in the draw die due to the use of 4 mm HSLA material
Solution BALINIT® FORMERA	<ul style="list-style-type: none"> - 6 fold increase in tool life - production process stabilised



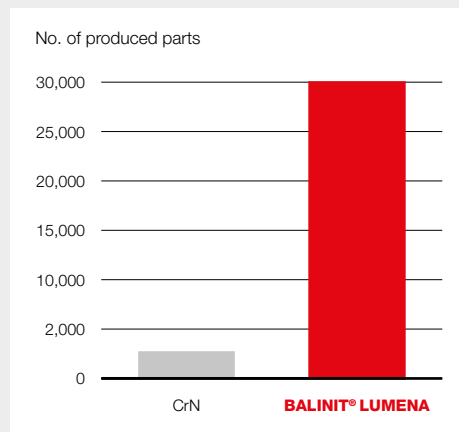
BALINIT® ALCRONA PRO: Fine blanking of safety parts



Tool	Punch and die
Workpiece	Latch part for seat belts, Steel 1.7225 (42 CrMo4)
Challenge	Untreated: Microwelds, scoring, rough cut surfaces; requires much more frequent regrinding of the tool
Solution BALINIT® ALCRONA PRO	<ul style="list-style-type: none"> - More than 50-fold increase of tool life - Perceptibly better surface and cut quality - Clearly lower need for aftermachining



BALINIT® LUMENA: Deep drawing of tubes



Tool	Deep drawing tool DIN 1.2379 (~AISI D2) 61 HRC
Workpiece	Tubes DIN 1.4401 (~AISI 316) thickness 1.5 - 1.75 mm
Challenge	Untreated: High abrasive wear, cold welding, short tool lifetime
Solution BALINIT® LUMENA	<ul style="list-style-type: none"> - 10-fold increase in parts production - clear reduction of cold welding

Coating properties at a glance

	BALINIT® ALCRONA PRO	BALINIT® B	BALINIT® C	BALINIT® D	BALINIT® FORMERA	BALINIT® FORMERA PLUS	BALINIT® FUTURA NANO	BALINIT® LUMENA	BALINIT® TRITON
Coating material	AlCrN based	TiCN	a-C:H:Me (WC/C)	CrN	CrAlN based	CrTiN based	TiAlN	TiAlN	a-C:H
Coating hardness H _T [GPa]	36 +/- 3	7 +/- 3	12 - 15	18 +/- 3	28 +/- 2	42 +/- 2	33 +/- 3	33 +/- 3	~15 - 25
Coefficient of friction (dry) vs. steel	0.35	0.4	0.1 - 0.2	~ 0.5	0.35	0.35	0.3 - 0.35	0.3 - 0.35	0.1 - 0.2
Typical coating thickness [µm]	2 - 6	2 - 4	1 - 4	2 - 4	6 - 12	6 - 12	3 - 4	8 - 12	1 - 3
Intrinsic stress [GPa]	-3 +/- 1	-3 +/- 1			-2 +/- 0.5	-2 +/- 0.5	-2 +/- 1	-2 +/- 1	
Max. service temp. (°C)	1,100	400	300	700	900+	900+	900	900	300
Coating temp. (°C)	< 500	450	< 250	200 - 450	480	450	200 - 450	450	< 250
Coating colour	bright grey	blue-grey	anthracite	silver-grey	silver-light grey	silver-light grey	violet-grey	violet-grey	black
Coating structure	mono layer	multi layer	nano layers	mono layer	nano layer	multi layer	mono layer	mono layer	mono layer
Available as STAR version*									X
Available in BALINIT® DUPLEX Series**	X	X	X	X	X	X	X	X	X
Available in BALINIT® ADVANCED Series***	X	X	X	X	X	X	X	X	

* The STAR version delivers better load-bearing capabilities.

** The DUPLEX Series includes a nitriding process with the possibility of higher nitriding depths.

*** The ADVANCED Series includes a one step in process diffusion.

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

Application recommendations

	FORMING				TRIMMING	
	Drawing Flanging Punching	Cold / Hot Forging	Hot Forming	Cast Iron Tooling	Piercing / Trimming	Fine blanking
Non-alloyed steel	FN / LU	LU Du / AP Du	Mod AP Du*	PPD	FN / AP	B / AP
Steel < 250 Mpa	LU Ad		Mod AP Du*	PPD	B / AP	B / AP
Steel < 400 Mpa	LU Du / FO		Mod AP Du*	PPD	FN / AP Ad	FN / AP
Steel > 400 Mpa	FO		Mod AP Du*	PPD	FN / AP Ad	FN / AP
Aluminium*	T Star / HC	AP Du	Δ	PPD	T / HC	T / HC
Stainless steels*	FO / AP	FO / AP Du		PPD	B / AP	B / AP
Titanium alloys	LU	LU Du		PPD	FN	FN
Brass, bronze*	FN / AP	AP Du		PPD	FN / AP	FN / AP
Copper	D / T Star	AP Du		PPD	D / AP	D / AP

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

Ad
AP
D
Du

ADVANCED
BALINIT® ALCRONA PRO
BALINIT® D
DUPLEX

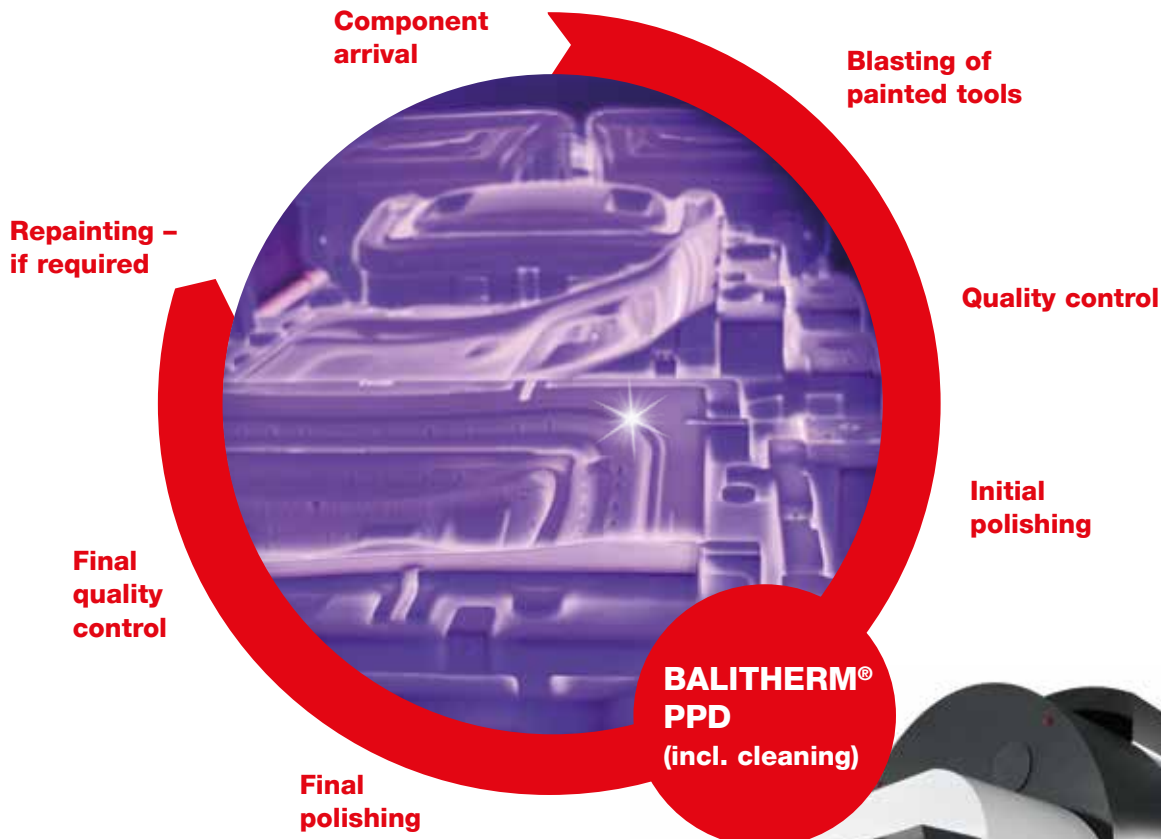
FO
HC
LU
PPD

BALINIT® FORMERA
BALINIT® HARD CARBON
BALINIT® LUMENA
BALITHERM® PPD

T
T Star
Δ

BALINIT® TRITON
BALINIT® TRITON STAR
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 on 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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