



# EIFELER coatings

## characteristics & applications

	material	microhardness HV 0.05	friction coefficient against 100Cr6 steel	layer thickness [µm]	max. working temperature	coating temperature	colour	delivery time	general characteristics	preferred applications	special*	
	TiN	titaniumnitride	2300 ± 300	0.6	2 - 4	500°C	~ 450°C	gold	2-3 WD	allround-coating, biocompatible	<ul style="list-style-type: none"><li>processing and machining of iron-based materials</li><li>metal forming</li><li>plastic molding</li><li>decoration - visual refinement</li><li>medical technology</li><li>food industry</li></ul>	<div>D</div> <div>N</div>
	TiCN	titaniumcarbon- nitride (multi layers)	3500 ± 500	0.2	2 - 4	400°C	~ 450°C	blue-grey	2-3 WD	high degrees of hardness, excellent wear resistance, improved toughness	<ul style="list-style-type: none"><li>machining of hard to steel alloys</li><li>high-performance machining - if moderate temperatures arise at the cutting edges</li><li>excellent for metal forming (e.g. stainless steel)</li></ul>	
	VARIANTIC	titanium- aluminium- carboinnitride (multi layers)	3500 ± 500	0.2	2 - 4	800°C	~ 450°C	antique-pink	2-3 WD	high oxidation resistance	<ul style="list-style-type: none"><li>all types of steel for dry, lubricated, MQL or wet processing conditions</li><li>excellent for drilling into steel</li><li>drawing, punching/stamping, pressing and forming tools for the machining of high and low alloy steels</li></ul>	<div>D</div>
	CrCN CrN	chromium- carbonnitride chromiumnitride	2000 ± 200	0.3 - 0.4 0.2 - 0.3	2 - 6	600°C	~ 450°C	silver-grey	2-5 WD	low tension, high adhesive quality, high corrosion resistance	<ul style="list-style-type: none"><li>metal forming</li><li>plastic processing (improved demolding)</li><li>die-cast aluminum and magnesium</li><li>machining of non-ferrous metals</li></ul>	<div>N</div>
	WCC	tungstencarbide- carbon a-C : Me	1000 - 2200	0.2 - 0.25	2 - 5	400°C	350 - 450°C	anthracite	2-5 WD	high gliding properties, low adhesive wear	<ul style="list-style-type: none"><li>precision components</li><li>punching &amp; forming, MQL or dry machining</li><li>plastic injection moulding</li><li>very well suited for parts sliding against each other (e.g. slides)</li><li>machining of galvanised sheet metal</li></ul>	<div>N</div>
	ZrN	zirconiumnitride	2800 ± 300	0.5	2 - 4	600°C	~ 450°C	light yellow	2-3 WD	high degrees of hardness, pleasing color, excellent corrosion & wear resistance, very smooth, biocompatible	<ul style="list-style-type: none"><li>machining of Al alloys &amp; non-ferrous metals</li><li>machining of aluminum with &lt;10% Si content</li><li>titanium machining</li><li>machining of fibreglass, nylon &amp; polymer materials</li><li>medical applications</li><li>reduced galling</li></ul>	
	SUPRAL	titaniumaluminium- nitride	3500 ± 500	<0.5	2 - 4	800°C	~ 450°C	black	2-3 WD	universal multilayer coat, high degrees of hardness, high ox- idation resistance, low friction	<ul style="list-style-type: none"><li>excellent for die-cast machining</li><li>drilling (with poor cooling, without interior cooling)</li><li>very well suited for drilling &amp; milling of steel up to 54 HRC</li></ul>	
	SISTRAL	aluminium- titaniumnitride based AITiXN	3500 ± 500	0.7	2 - 4	900°C	~ 450°C	anthracite	2-3 WD	high-performance coating, extremely high oxidation resistance, high warm hardness & wear resistance	<ul style="list-style-type: none"><li>milling under extreme conditions</li><li>dry high-speed machining</li><li>high-performance cutting of very abrasive or hard materials (steel &gt;54 to &gt;62 HRC)</li><li>non-corrosive steels</li><li>suited for punches &amp; inserts</li></ul>	
	SILVER	aluminiumtitanium- chromiumnitride AITiCrN	3000 ± 300	0.4	2 - 4	800°C	~ 450°C	silver	2-3 WD	high degrees of hardness and wear resistance, excellent oxidation resistance, low coefficient of friction	<ul style="list-style-type: none"><li>machining of aluminium, Al alloys with Si content &gt;10% &amp; non-ferrous metals</li><li>machining of abrasive materials or materials that tend to agglutinate (stainless steel, gray cast)</li><li>universally usable for milling, drilling</li><li>MQL or dry machining</li><li>magnesium injection molding</li><li>very well suited for inserts</li></ul>	
	PLATINUM	aluminiumtitanium- zirconium- carbonnitride nano structure	3500 ± 500	0.7	2 - 4	900°C	~ 450°C	orange	2-5 WD	high-performance coat, composite of Sistral and ZrCN, excellent tribological properties	<ul style="list-style-type: none"><li>machining under extreme conditions</li><li>high-performance machining of very abrasive materials</li><li>inconel machining</li><li>very well suited for inserts</li></ul>	
TRONIX SERIES	BLUE	aluminium- chromium AlCr based	3400	0.3	2 - 4	1000°C	~ 450°C	blue-purple	2-5 WD	very high degrees of hardness & wear resistance, excellent adhesion & stability	<ul style="list-style-type: none"><li>resistant all-round coat in interference colors</li><li>new high-performance coat for multi-applications</li><li>machining of steels 35 to &gt;54 HRC</li><li>stainless steel</li></ul>	
	ALLTRON	aluminium- chromium AlCr nanocomposite	3400	0.3	2 - 4	1000°C	~ 450°C	grey	2-3 WD	all-round high-performance coat, for use at extremely high temperatures, very high degree of hardness, excellent oxidation resistance and adhesive quality	<ul style="list-style-type: none"><li>general high-performance machining</li><li>universally applicable from 35 to &gt;54 HRC</li><li>milling, drilling</li><li>dry machining</li><li>punching/stamping &amp; forming, cutting</li><li>stainless steel</li><li>titanium, super alloys</li><li>die-cast, Al pressure die-cast</li></ul>	<div>D</div> <div>M</div>
	TISITRON	aluminium- titaniumsilicon AITiSi nanocomposite	3500	0.5	2 - 4	> 1200°C	~ 450°C	brown	2-5 WD	high-performance coat, extreme high operating temperature & coating adhesion, extreme hardness & stability, minimized internal stress & crack formation	<ul style="list-style-type: none"><li>high-performance machining</li><li>hard milling</li><li>hardened steels 54 HRC to &gt;66 HRC</li></ul>	<div>M</div>
	DLC SLICOS	diamond- like-carbon CrDLC	2200 - 3500	0.08-0.1	1 - 3	350°C	max. 200°C	black- anthracite	2-5 WD	high micro-hardness, low coating temperature, low coefficient of sliding friction, excellent abrasive wear resistance, lowest tendency to adhesion	<ul style="list-style-type: none"><li>tribological applications (sliding layers)</li><li>anti-corrosion &amp; chemical resistance</li><li>plastic injection molding, extrusion</li><li>metal processing with soft materials (aluminium, brass, copper...)</li><li>medical technology, food industry</li><li>components, Motorsport &amp; Aerospace Industry</li><li>optical refinement</li></ul>	<div>N</div>
	Ta:C	ta-C (tetra amorphous carbon thin film) hard carbon	6.000 – 8.000	0.1	0.2 – 2	550°C	< 200°C	black to rainbow	10 WD	high coat hardness, very smooth layer surface, low tendency to cold welding, low coefficient of friction, optimized layer thickness, high thermal stability	<ul style="list-style-type: none"><li>dry machining to MQL</li><li>milling, drilling</li><li>forming, punching/stamping</li><li>emboss</li></ul>	<div>M</div> <div>N</div>
		DRAWTRON	chromiumwolfram- nitride CrWN	3000 ± 300	0.4	6-10	800°C	~ 450°C	silver	2-10 WD	high performance coat, protection against corrosive and abrasive attack by molten aluminum	<ul style="list-style-type: none"><li>for aluminum die casting, plastic injection molding and warm forming</li><li>processing of corrosive or fiber-filled plastic melt</li></ul>

TRONIX SERIES

\* special: **D** DUPLEX possible  
**M** MICRO possible, <1 µm  
**N** low-temperature possible

# PVD coatings

## application recommendation

### by material groups

### for machining



	<b>non-alloyed steels</b> Steels < 35 HRC	<b>steels</b> 35 to 54 HRC	<b>cast iron</b>	<b>high-alloyed steels</b> steels < 54 HRC	<b>hard milling</b> up to > 66 HRC	<b>rustproof steels / stainless steel</b>	<b>titanium</b>	<b>super alloys</b>	<b>non-ferrous metals</b> (copper, zinc, bronze, brass)	<b>Inconel</b>	<b>aluminium</b> with Si content < 10%	<b>aluminium</b> with Si content > 10%
<b>1.</b>	SUPRAL [b,f]	SUPRAL [b,f]	SUPRAL [b]	SISTRAL [f]	TISITRON [f]	SISTRAL [f]	ZrN [f]	ALLTRON [b,f]	ZrN [f]	PLATINUM [f]	ZrN [f,b]	SILVER [f,b]
<b>2.</b>	VARIANTIC [b,f]	ALLTRON [f,b]	ALLTRON [b,f]	ALLTRON [b,f]	SISTRAL [f]	ALLTRON [b,f]	ALLTRON [b,f]		SILVER [f,b]	ALLTRON [b, ]	Ta:C	Ta:C
<b>3.</b>	ALLTRON [f,b]	VARIANTIC [b,f]	SILVER [f]	SILVER [f]		TISITRON [f]	TISITRON [f]		Ta:C			

**Focus:** [b] ... drilling  
[f] ... milling

Pos.1: main recommendation  
Pos. 2 & 3: alternatives



# PVD coatings

## application suggestions

### by material groups

### for punching and forming

	non-alloy sheet steel	low-alloy sheet steel < 1000N/mm	high-alloy sheet steel < 1000N/mm	galvanised sheet steel	corrosion free sheet steel / stainless steel	aluminium	aluminium alloys	titanium alloys	non-ferrous metals (copper, brass)	plastics
<b>punching</b>	TiN TiCN	TiCN ALLTRON SISTRAL	ALLTRON SISTRAL	CrWCC	ALLTRON TiCN SISTRAL	CrCN	CrCN ZrN	CrWCC CrCN	CrCN ZrN	ZrN CrCN Ta:C <small>(high glass fibre content &gt;6µ)</small>
<b>(fine) cutting</b>	TiN TiCN	TiCN VARIANTIC ALLTRON SISTRAL	ALLTRON SISTRAL	CrWCC	ALLTRON TiCN SISTRAL	CrCN PLATINUM	CrCN ZrN	ZrN	CrCN ZrN	ZrN CrCN Ta:C <small>(high glass fibre content &gt;6µ)</small>
<b>sheet metal/ cold forming</b>	TiN TiCN	TiCN VARIANTIC ALLTRON	ALLTRON VARIANTIC DUMATIC	CrWCC	ALLTRON TiCN DUMATIC	CrCN CrWCC	CrWCC ALLTRON	CrWCC ALLTRON	CrCN CrWCC	
<b>massive forming</b>	TiCN VARIANTIC	VARIANTIC ALLTRON	ALLTRON DUMATIC	CrWCC	ALLTRON TiCN DUMATIC	CrCN CrWCC	CrWCC ALLTRON	CrWCC ALLTRON	CrCN CrWCC	
<b>hot forming</b>	TiAlN	ALLTRON	ALLTRON	-	ALLTRON	ALLTRON	ALLTRON	ALLTRON	CrCN ALLTRON	

\* DUPLEX - in consultation with the customer!

We recommend DUPLEX coating from a processed material thickness of 1.2 mm!