

## Properties and Applications of Various Eifeler Wear Resistant PVD Coatings supplied by Aalberts Surface Technologies in the UK

	Titanium Nitride	Titanium Carbo-Nitride	Chromium Nitride \\Carbo-Nitride	EXXTRAL® <i>EXXTRAL plus</i>	VARIANTA®	VARIANTIC® <i>nano VARIANTIC</i>
	TiN	TiCN (ML)	CrN, CrCN	Titanium Aluminium Nitride <i>TiAlN (ML)</i>	Titanium Aluminium Nitride <i>TiAlN (ML)</i>	Titanium Aluminium Carbo-Nitride <i>TiAlCN (ML) (nano structure)</i>
Coating Material	TiN	TiCN (ML)	CrN, CrCN	TiAlN <i>TiAlN (ML)</i>	TiAlN (ML)	TiAlCN (ML) <i>(nano structure)</i>
Microhardness HV0.05	2300 ± 200	3500 ± 500	1800 – 2200	3300 ± 300 <i>3000 ± 300</i>	3500 ± 500	3500 ± 500
Coefficient of friction against dry steel	0,6	0,15	0,2 – 0,3	0,7	0,7	0,15
Coating Thickness (µm)	1 – 4	1 – 4	1 – 6	2 – 3	2 – 4	2 – 4
Max. working temperature	600°C 1100°F	400°C 750°F	700°C 1300°F	800°C 1470°F	800°C 1470°F	800°C 1470°F
Color of the coating	gold	blue-gray	silver-gray	anthracite	anthracite	tan
Key characteristics	good general purpose	high hardness, good wear resistance, enhanced toughness	Low stress, good adhesion, high corrosion resistance	excellent oxidation resistance	excellent oxidation resistance	Low friction, high oxidation resistance
Primary applications	<ul style="list-style-type: none"> <li>▪ machining / cutting of iron based-materials</li> <li>▪ metal forming</li> <li>▪ plastic moulding</li> </ul>	<ul style="list-style-type: none"> <li>▪ machining difficult-to-machine steel alloys</li> <li>▪ high speed cutting - where moderate temperatures are generated at the cutting edge</li> <li>▪ excellent for metal forming (stainless steel)</li> </ul>	<ul style="list-style-type: none"> <li>▪ machining of copper and other non ferrous materials</li> <li>▪ metal forming</li> <li>▪ plastic molding</li> <li>▪ aluminium and magnesium die casting</li> </ul>	<ul style="list-style-type: none"> <li>▪ machining of hardened steel work pieces</li> <li>▪ high performance cutting operations, <i>lubricated</i>, semi-dry or dry machining</li> <li>▪ <i>excellent for stainless steel and nickel-based high temperature alloys</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ for a wide range of carbide, cermet and high speed steel tooling</li> <li>▪ excellent for machining cast iron</li> <li>▪ high speed operations, semi-dry or dry machining</li> </ul>	<ul style="list-style-type: none"> <li>▪ for a wide range of carbide, cermet and high speed steel tooling</li> <li>▪ excellent for drilling operations in steel</li> <li>▪ for machining all types of steel under dry as well as wet machining conditions</li> <li>▪ Al die casting</li> <li>▪ Metal forming</li> </ul>

ML = multi-layer coating