# PVD Coatings available from Hauck Heat Treatment Ltd

Properties and Applications of coatings suitable for **Cutting**

HAUCK HEAT TREATMENT BIRMINGHAM

AALBERTS INDUSTRIES

**0121 3272020**

| | TiN | TiCN (ML) | ZrCN | EXXTRAL® *rosé* | EXXTRAL® *plus* | EXXTRAL® *Silver* | SISTRAL® | TIGRAL | SUPRAL | VARIANTIC |
|---|---|---|---|---|---|---|---|---|---|---|
| **Coating Material** | Titanium Nitride | Titanium Carbo-Nitride | Zirconium Carbo-Nitride | Aluminium Titanium Carbo-Nitride | Aluminium Titanium Nitride | Aluminium - Titanium- Chrom-Nitride | Aluminium Titanium Nitride (with additons) | Aluminium-Chromium-Titanium-Nitride | Titanium Aluminium Carbo-Nitride | Titanium Aluminium Carbo-Nitride |
| | TiN | TiCN (ML) | ZrCN | AlTiCN (stacked) | AlTiN (monolayer) AlTiN (stacked) | AlTiCrN (stacked) | AlTiN (nanostructured) | AlCrTiN (nanostructured) | TiAlCN (ML) | TiAlCN (ML) |
| **Technology** | Arc | Arc | Arc | Arc | Arc | Arc | Arc | Arc | Arc | Arc |
| **Microhardness $HV_{0.05}$** | 2300 ± 300 | 3500 ± 500 | 3100±300 | 3000 ± 300 | 3300 ± 300 | 3000 ± 300 | 3500 ± 500 | 3200 ± 500 | 3500 ± 500 | 3500 ± 500 |
| **Friction Coefficient Against Steel (Dry)** | 0.6 | 0.15 | 0.5 | 0.2 | 0.7 | 0.4 | 0.7 | 0.5 | <0.5 | 0.2 |
| **Coating Thickness [µm]** | 2 - 4 | 2 - 4 | 1 - 4 | 2-4 | 1 - 4 | 2-4 | 2 - 4 | 2 - 4 | 2 - 4 | 2 - 4 |
| **Max Working Temperature** | 500°C 900°F | 400°C 750°F | 600°C 1100°F | 800°C 1470°F | 800°C 1470°F | 800°C 1470°F | 900°C 1650°F | 950°C 1740°F | 800°C 1470°F | 800°C 1470°F |
| **Coating Colour** | gold | charcoal | pale gold | copper | anthracite | silver | anthracite | anthracite | anthracite | copper |
| **Key Characteristics** | standard, all-purpose coating, biocompatible | high hardness, good wear resistance, enhanced toughness | low tendency for cold welding, good corrosion resistance | high hardness and elasticity, low friction, high oxidation resistance | high hardness, very good oxidation resistance | high hardness, good oxidation resistance, low friction | extreme wear resistant at high temperature, excellent oxidation resistance | high hardness, very good oxidation resistance | high hardness, very good oxidation resistance low friction | low friction, high oxidation resistance |
| **Primary Applications** | • machining / cutting of iron based materials | • machining of difficult-to-machine alloy steels<br>• high performance cutting where moderate temperatures are generated at the cutting edge | • cutting of material which tends to stick, e.g. Si-containing Al-alloys or other non-ferrous metals<br>• cutting of fibers, nylon and polymer material | • excellent for stainless steel and nickel-based high temperature alloys<br>• hard and copy milling<br>• interrupted cutting operations,<br>• lubricated, semi-dry or dry machining | • machining of hardened steel work pieces<br>• for use on carbide end mills<br>• high speed operations, semi-dry or dry machining | • machining of abrasiv or sticking materials (stainless steel, cast iron, Si-rich Al-alloys)<br>• cutting of Al-alloys & non-ferrous metals | • best choice for cutting under extreme conditions (hard , abrasive materials, high speed, dry cutting)<br>• machining of hardened steel (> 55 HRc)<br>• inconel machining | • coating for milling with carbide, cermet and high speed steel tools<br>• machining under dry conditions and high feeds | • coating for a wide range of carbide, cermet and high speed steel tooling<br>• machining of cast iron and nickel based high temperature alloys<br>• excellent for drilling or reaming operations in steel (up to 45 HRC) | • coating for a wide range of carbide, cermet and high speed steel tooling<br>• machining of all types of steel under dry as well as wet machining conditions<br>• excellent for drilling in steel |

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