

PVD COATINGS FOR
STAMPING/FORMING
APPLICATIONS

STAMPING AND FORMING PORTFOLIO



voestalpine eifeler coatings offers a large portfolio of PVD coatings to increase the life of your stamping, forming and punching tools.

Our special Duplex technology combines in one process a high quality plasma-Nitriding and a low nano-layered PVD coating, creating a unique solution for any problem associated to the stamping and forming operations.

Forming of Advanced High Strength Steels (AHSS) demands more from forming tools.

Metal forming tools require a robust surface solution to ensure and increase high productivity.



Our coatings offer a reliable wear protection through outstanding surface quality.

BENEFITS

- » Higher Productivity
- » Less Down Time
- » Lower Tooling Costs
- » Longer Tooling Life
- » Reduced Lubricant Consumption
- » Adhesive Wear

FEATURES

The reduced application temperature of our coatings ensure that the metallurgical and dimensional characteristics of the coated tools are not compromised. Our unique nano-layers composition greatly reduces stress and improves ductility under high loads preventing micro-cracks in the film thus increasing coating longevity.

In addition, our coatings offers improved lubricity, high hardness and anti-corrosive properties.

- » High Hardness
- » Wear Resistance
- » Toughness
- » Low Coefficient of Friction
- » Galling Resistance
- » Corrosion Resistance
- » High Temperature Stability

ADDITIONAL COATING SERVICES

voestalpine eifeler Coatings can service all coating requirements from new tooling programs to the refurbishment and recoating of existing tools. Our capabilities include:

- » Mechanical and Chemical Coating Removal
- » Polishing
- » Micro-Blasting
- » PVD Coating of Small to Large Tooling
- » Pick-up and delivery



PROPERTIES & APPLICATIONS GUIDE

| | TiN | TiCN | CrN/CRCN |
|---|--|---|--|
| Coating Material | Titanium Nitride | Titanium Carbo-Nitride | Chromium Nitride |
| | TiN | TiCN (ML) | CrN/Chrome Carbon-Nitride |
| Microhardness HV_{0.05} | 2300±300 | 3500±500 | 2000±200 / 2300±200 |
| Friction Coefficient Against Steel (Dry) | 0.6 | 0.2 | 0.3 - 0.4 / 0.2 - 0.3 |
| Coating Thickness ¹⁾ (µm) | 2-4 | 2-4 | 1-6 / 2-6 |
| Thermal Threshold | 500°C / 900°F | 400°C / 750°F | 600°C / 1100°F |
| Color of the Coating | gold | blue gray | slate gray/silver-gray |
| Key Characteristics | standard, all-purpose coating | high hardness, excellent abrasive and wear resistance, enhanced toughness | low stress levels, high level of adhesion, high corrosion resistance |
| Key Applications | Cutting Punching/Forming Medical | Cutting Punching/Forming Medical | Machining of copper and other non-ferrous metal, metal forming, plastic molding (improved demolding), aluminum and magnesium die casting |
| Ultrafine Available Biocompatible | ultrafine Available Biocompatible | ultrafine Available Biocompatible | Biocompatible |
| Duplex[®] Capability | No | No | Yes |

Primary Applications

- » machining/cutting of iron based materials
- » metal forming
- » plastic molding

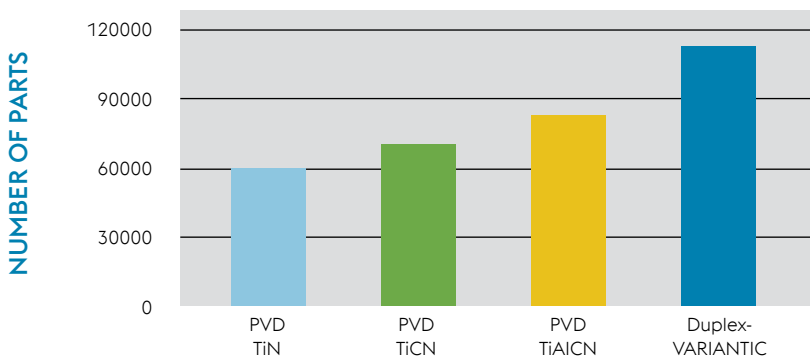
- » machining of difficult-to-machine alloy steels
- » high performance cutting where moderate temperatures are generated at the cutting edge
- » excellent for metal forming (stainless steel)

- » machining
- » Shaping
- » aluminum die casting
- » plastic molding

¹⁾ depends on size of tools, for micro tools also smaller thicknesses necessary.

EXAMPLE IN HIGH STRENGTH METAL FORMING

Nearly 50% improvement in tooling life over conventional PVD coatings.



D2 forming die, coated with Duplex-VARIANTIC work material: hot rolled 1.0335 steel.

| DUMATIC | VARIANTIC® | VARIANTIC®-1000 | ZrN | CARBON-X® |
|--|---|--|--|---|
| Titanium Carbide | Titanium Aluminum Carbo-Nitride | Aluminum Chromium Titanium Nitride | Zirconium Nitride | Titanium Aluminum |
| TiC | TiAlCN (ML) | AlCrTiN | ZrN | TiAlN (ML) |
| 3.700±500 | 3500±500 | 3300±300 | 2800±300 | 3500±500 |
| 0.25 | 0.2 | 0.6 | 0.5 | 0.7 |
| 3-5 | 2-4 | 3-5 | 1-4 | 2-4 |
| 400°C / 750°F | 800°C / 1470°F | 900°C / 1650°F | 600°C / 1100°F | 800°C / 1470°F |
| gray | old rose | old rose | pale yellow | anthracite |
| highest levels of hardness and abrasion resistance | low friction, high oxidation resistance | high oxidation resistance, high protection against abrasive wear | decorative color, good wear and corrosion resistance | high hardness, very good oxidation resistance |
| Forming | Cutting Punching/Forming Medical | Cutting Forming | Cutting Punching/Forming Medical | Cutting Forming Medical |
| N/A | Duplex Available Biocompatible | Duplex Available | Biocompatible | Biocompatible |
| Yes | Yes | Yes | No | Yes |

» drawing tools, stamping tools, pressing tools and forming tools for the working of high-alloy chrome/nickel materials and similar requirements.

» coating for a wide range of carbide, cermet and high speed steel tooling
 » machining of all types of steel under dry as well as wet machining conditions
 » drawing, stamping, punching, forming tools for processing of high and low alloy steel

» machining under dry conditions
 » hot forming sheet metals
 » die casting

» cast aluminum and generally non-ferrous materials machining
 » machining of fiberglass, nylon and most polymer materials
 » forming and punching

» coating for a wide range of carbide, cermet and high speed steel tooling
 » machining of cast iron and nickel based high temperature alloys
 » high speed operations semi-dry or dry machining



Other application specific coatings available upon request. For further information and contact details please check our website: www.eifeler.com/northamerica

This information is based upon our present state of knowledge and is intended to provide general notes on products and their uses. It should not, therefore, be construed as a warranty of specific properties of the products described, or, as a warranty of suitability for a particular purpose.

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ONE STEP AHEAD.