



## DUPLEX-VARIANTIC<sup>®</sup> COATING





# THE DUPLEX-VARIANTIC® ADVANTAGE

**voestalpine eifeler Coatings** offers this high performance coating comprised of a specially developed plasma-nitriding process combined with a low temperature nano-layered PVD coating. Duplex-VARIANTIC was created to eliminate the drawbacks associated with high temperature treatments like Thermoreactive Diffusion and Chemical Vapour Deposition processes while providing equivalent performance. Tools can be easily coated and stripped many times to maximize tool life without damage to the substrate.



The unique composition of Duplex-VARIANTIC is ideal for high pressure applications. Adhesive and abrasive wear is significantly reduced providing impressive production enhancements.

## BENEFITS OF DUPLEX-VARIANTIC:

- » Improved Part Quality
- » Higher Productivity
- » Less Down Time
- » Lower Tooling Costs
- » Longer Tooling Life
- » Reduced Lubricant Consumption

## FEATURES

The reduced application temperature of Duplex-VARIANTIC ensures that the metallurgical and dimensional characteristics of the coated tool are not compromised. The nano-layer composition greatly reduces stress and improves ductility under high loads. This prevents micro-cracks in the film thus increasing coating longevity.

Combined with a dense, fine grain structure Duplex-VARIANTIC offers improved lubricity, high hardness and anti-corrosive properties. The plasma-nitride layer improves the compressive strength of the substrate which results in improved coating support and associated production improvements.

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

## APPLICATIONS

Duplex-VARIANTIC has been proven to enhance tool performance in many demanding applications. This coating can be applied to all tooling materials including:

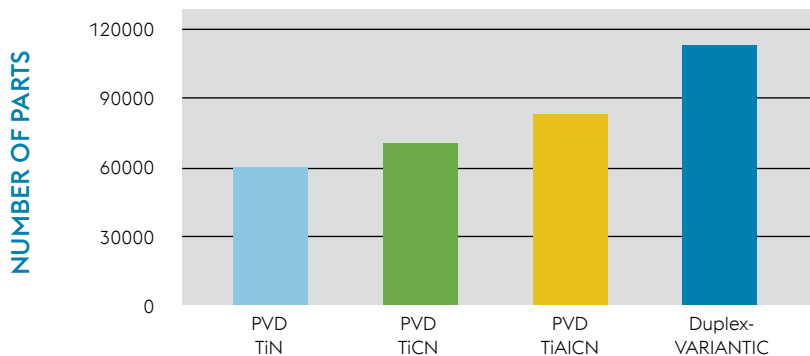
- » High Temperature Tempered D2
- » UDDEHOLM Caldie®
- » BÖHLER K340 ECOSTAR®/ISODUR®  
(8 percent Chromium tool steel)
- » UDDEHOLM SuperClean P/M tool steels
- » BÖHLER MICROCLEAN® tool steels and high speed steels
- » Stainless and Carbide

Duplex-VARIANTIC offers excellent performance and protection to welded substrates, and has been proven to perform in the following applications:

- » High strength metal forming
- » Non-ferrous metal forming
- » Cold forging
- » Powder compaction
- » Blanking and trimming
- » Piercing
- » Precision stamping and fine blanking
- » Plastic injection molding and extrusion

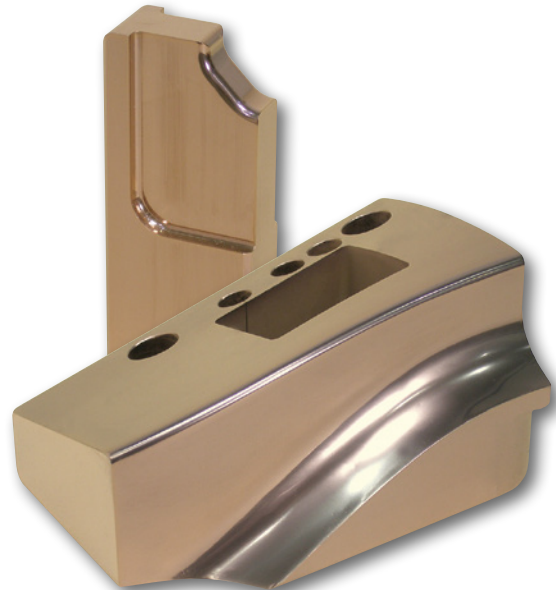
## EXAMPLE IN HIGH STRENGTH METAL FORMING

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



## PROPERTIES

Material: Titanium-Aluminum Carbo Nitride, TiAlCN (multi-layers)
Micro-hardness HV 0.05: 3500 ± 500
Coefficient of friction against steel 100Cr6: 0.2
Layer thickness: "with Duplex" 4-6 µm
Maximum service temperature: 800°C/1470°F
Color: Old Rose
Plasma nitriding with zero white layer
Process temperature: 500°C/925°F) maximum (with Duplex process)



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

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**voestalpine**

ONE STEP AHEAD.