

Duplex-TIGRAL® Coating



eifeler
COATINGS TECHNOLOGY



The Duplex-TIGRAL® Benefit

Leifeler Coatings Technology developed this high performance Physical Vapor Deposition coating for very high resistance against oxidation and abrasion. This two stage process is comprised of a specially developed Plasma Nitride followed by a mono layered matrix coating. Duplex-TIGRAL was created to eliminate the drawbacks associated with high temperature coatings like Thermoreactive Diffusion and Chemical Vapor Deposition. Duplex-TIGRAL will easily match the performance levels of these hot treatments and can be stripped and recoated multiple times.

Benefits of Duplex-TIGRAL:

- ▶ Increased Tool Life
- ▶ Lower Tool Maintenance
- ▶ Reduced Down Time
- ▶ Higher Productivity
- ▶ Improved Part Quality

Features

The low application temperature of Duplex-TIGRAL ensures the metallurgical characteristics of your BÖHLER-UDDEHOLM steel are maintained. Tooling dimensions will remain unchanged to expedite tool assembly at reduced costs. The mono-layered matrix composition of Duplex-TIGRAL creates a very ductile film ideal for abrasive environments such as die casting and hot forging. The high oxidation temperature provides coating stability and long life in higher temperature applications.

The unique chemistry of Duplex-TIGRAL offers protection from materials that corrosively attack the tool steel. This results in reduced adhesive wear and alloying between work material and tool steel which results in enhanced part release and greater productivity.

- ▶ High Hardness and Wear Resistance
- ▶ Superior Abrasion and Erosion Resistance
- ▶ Corrosion Resistance from Alloying Attack
- ▶ High Oxidation Temperature and Thermal Stability
- ▶ Improved Coefficient of Friction



Applications

Duplex-TIGRAL clearly provides performance improvements to tools in the most severe applications. Increased tooling life and reduced maintenance costs have been demonstrated in the following applications:

- ▶ High Pressure Aluminum Die Casting
- ▶ Forming of Abrasive Stainless Steel and Ferrous Alloys
- ▶ Hot and Cold Forging
- ▶ Hot Stamping
- ▶ Non Ferrous Extrusion

Duplex-TIGRAL offers excellent adhesion and performance on all common and advanced tool steels including properly welded substrates. It can be applied to:

- ▶ Uddeholm Orvar® Supreme and Uddeholm Orvar® Superior
- ▶ BÖHLER W403 VMR®
- ▶ BÖHLER W400 VMR®
- ▶ Uddeholm Dievar®
- ▶ BÖHLER W360 ISOBLOC®
- ▶ H13, H11 and other hot work tool steel
- ▶ Uddeholm Caldie®
- ▶ BÖHLER K340 ECOSTAR®/ISODUR® (8 percent Chromium tool steel)
- ▶ High Temperature Tempered D2 and other cold work tool steels

Properties

Material: Aluminum Chromium Titanium Nitride

Micro-hardness HV 0.05: 3300 ± 300

Coefficient of friction: 0.6

Layer thickness: 3-5 µm

Maximum service temperature: 900°C/1650°F

Color: Dark Gray

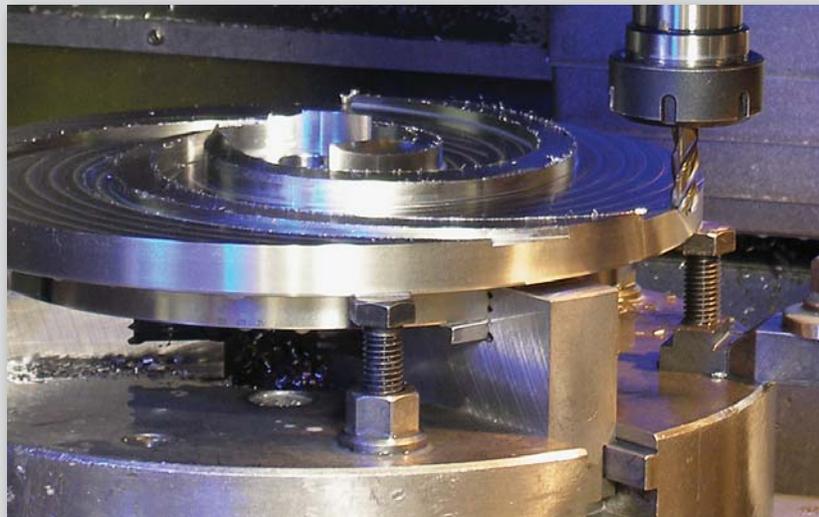
Plasma nitriding: .002" case depth, zero white layer

Process temperature: 500°C (925°F) maximum (with Duplex process)



TIGRAL: Additional Applications

TIGRAL can also be applied using a non-duplex process. Applications include coated cutting tools for dry machining, and tools that machine at high feed rates. Ideal for tools that specialize in interrupted cuts. TIGRAL can also be used in the reaming of medium and highly alloyed steels. Additionally, it can be used in warm and cold forming, and hot stamping processes where high ductility and low tendency to cold weld to the steel are required.



We take perfection personally.

Additional Coating Services

eifeler Coatings Technology 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

The Duplex Advantage

Our proprietary Duplex system provides increased PVD performance using in-situ Plasma Nitriding prior to coating. The resulting surface preparation provides improved coating adhesion and support while improving wear resistance. The Duplex Advantage provides process and cost improvements you can rely on! Call us to arrange a visit from one of our Technical Sales Representatives.

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