DANISH TECHNOLOGICAL INSTITUTE

# NEWSLETTER DTI TRIBOLOGY CENTRE

April 2019

## The Tribology Centre releases new HiPIMS $TiB_2$ coating (TiBto-HP)

The Tribology Centre at Danish Technological institute launches a new titanium diboride ($TiB_2$) coating optimized for tooling and machining of non-ferrous materials as e.g.:

- Aluminium alloys
- Titanium alloys
- Magnesium alloys
- Copper alloys

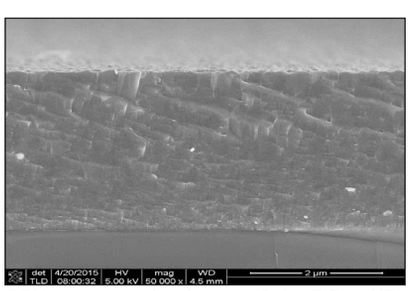
*Tools coated with the new TiBto-HP coating.*

Among the benefits of the new coating, our initial tests have revealed low affinity to aluminum, improved chip control, reduced build-up at the cutting edge combined with excellent wear resistance.

The high hardness of the TiBto-HP coating, its good oxidation resistance and thermal stability, as well as its chemical inertness are attributed to the crystal structure and atomic bonding in the coating.

The hardness of the coating is 3800-4800 HV depending on process conditions. This is approximately 50% of the hardness of diamond and 30-50% harder than many conventional wear-resistant coatings.

The internal stress in the film has been optimized using the newest **H**igh **P**ower **I**mpulse **M**agnetron **S**puttering (HiPIMS) technology, which enables stress minimization and ensures good adhesion to the underlying substrate without compromising its superior hardness.



*SEM cross-section image of the TiBto-HP coating.*

| Properties of the $TiB_2$ coating | |
|---|---|
| Hardness [HV] | 3800 |
| Process temperature [°C] | 550 |
| Application temperature [°C] | < 1000 |
| Milling and tooling of | Aluminium alloys<br>Titanium alloys<br>Magnesium alloys<br>Copper alloys |

The Tribology Centre will release three new HiPIMS coatings; chromium nitride (CrN-HP), titanium diboride under the name TiBto-HP for machining in aluminium, titanium alloys and non-ferrous metals, and an all-round wear-resistant coating for machining in hard steel, stainless steel, titanium and nickel-based alloys with the name Versal-HP, based on a Si-doped TiAlN developed on the HiPIMS platform.

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