



NEWSLETTER DTI TRIBOLOGY CENTRE

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Tribology Centre releases a new all-round HiPIMS coating (Versal-HP) for hardened steel, stainless steel and other hard-to-machine materials

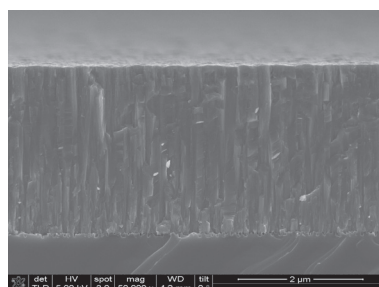
The Versal-HP coating is an all-round wear-resistant coating for machining in a wide variety of difficult-to-machine metals with hardnesses up to 70 HRC.

Versal-HP is a TiAlSiN coating developed on the newest coating technology: **H**igh **P**ower **I**mpulse **M**agnetron **S**puttering (HiPIMS). Due to the highly energetic electric pulses, the coating becomes more dense, smoother, and is characterized by having fewer defects as well as better coverage of edges and corners as compared to more conventional ARC- and DC-sputtered TiAlN coatings. Furthermore, the addition of silicon (Si) increases the hardness and improves the stability at higher temperatures.

Versal-HP is highly suitable for machining of cast iron, soft steel, hardened steel, stainless steel, titanium- and nickel-based alloys such as various Inconel alloys. Increased tool life of 60% or even up to 100% has been observed when machining Inconel, stainless steel and cast iron compared to conventional coatings.

Versal HP is very wear-resistant, even at elevated temperatures, due to the high hardness and the content of silicon. This implies that wear on chip surface of cutting tools is reduced significantly

even at high cutting speeds in abrasive materials. Versal-HP also eliminates adhesion of e.g. stainless steel and titanium to the tool surface, giving excellent surface finishing of the machined parts.



SEM image of the new Versal-HP coating containing Si, Ti, Al, and N.

In forming operations, Versal-HP has an extremely high ability to reduce or eliminate the sticking of metal to the tool surface, when forming in e.g. stainless steel or other materials with high tendency of adhering or "surface welding" to the forming tool.

Due to the very smooth and dense structure of the HiPIMS-produced PVD coatings, Versal HP is very suited for fine-ground and highly polished stamping and forming tools.

In addition to the new Versal-HP coating for cutting and forming applications, primarily in steel alloys, the Tribology Centre will release yet two new HiPIMS coatings: CrN-HP – a chromium nitride coating for increased performance of injection moulds and prevention of wear and release problems, and TiBto-HP – a titanium-diboride-based coating for machining aluminium and titanium alloys and other non-ferrous metals.

TiAlN family	TiAlN-LT ²	TiAlN	Versal-HP
Composition	Ti, Al, N	Ti, Al, N	Si, Ti, Al, N
Microhardness [HV]	Ca. 2600	Ca. 3000	Ca. 3300
Process temperature [°C]	< 150	450	450
Application temperature [°C]	800	850	1100
PVD process	Pulsed DC	DC	HiPIMS (HP)
Thickness [µm]	1-3	3-5	1-5

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