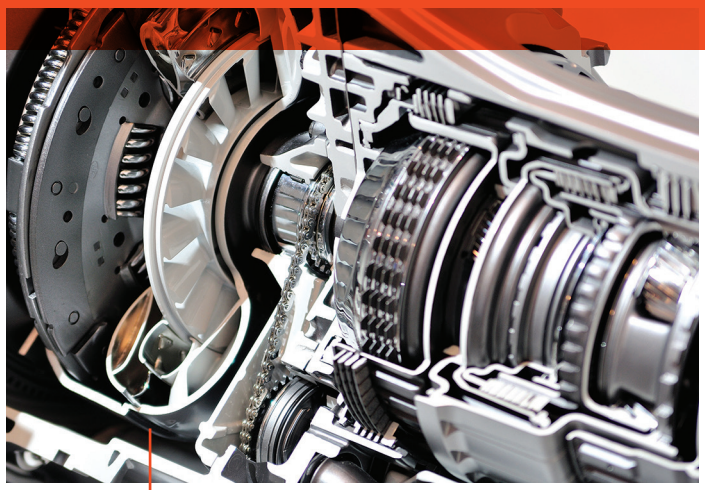
FORTIPHY™ XVD AlCrN+



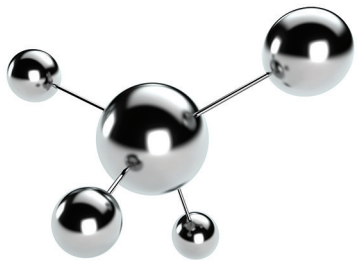
FortiPhy XVD AlCrN+ consists of a proprietary Plasma ion Nitride support layer beneath our Aluminum Chromium Nitride which is deposited through Phygen's patented XVD (Xcelerated Vapor Deposition) process.

FortiPhy XVD goes beyond conventional cathodic arc technologies by utilizing magnetic fields to increase ionization efficiency. This increases plasma density while accelerating the enhanced plasma collectively by means of an electromagnetic force. Phygen's accelerated plasma process results in a large number of ions with a velocity within a specific range bombarding the substrate during coating deposition. Intense bombardment by ions of moderate energy ensures that crystalline configurations with weaker bonding can be minimized while preserving stronger bonds. As a result, Phygen coatings feature stronger adhesion, superb crystalline structure, denser coating with fewer defects and exceptional mechanical properties. Plasma ion Nitriding plus coating increases substrate material surface hardness, resistance to thermal fatigue and provides better mechanical support for the coating to resist higher contact loads.

FEATURING PATENTED

NANOPERFECTION™ TECHNOLOGY

Phygen's FortiPhy™ XVD process is based on our patented Nanoperfection™ technology, a revolutionary breakthrough in plasma acceleration science. FortiPhy™ XVD delivers smaller, more consistent nanoparticles while eliminating 90% of the macroparticle flaws and surface defects common to conventional PVD surface coatings.



FORTIPHY™ XVD AlCrN+

ADVANTAGES

- → Superior abrasive wear resistance at elevated temperature
- → Excellent thermal fatigue and corrosion resistance
- → Unprecedented adhesion strength
- → Reduces friction and prevents galling
- → Thin film coating preserves critical dimensions
- → Coating can be stripped and re-applied multiple times

INDUSTRIES

Automotive
Aluminum Die Casting
Military
And others

APPLICATIONS

Hot Metal Forming Tools
Piercing Punches and Dies
Aluminum Die Casting Tools
Precision Machine Components

COATING PROPERTIES

Composition	Plasma ion Nitride + AlCrN coating
Crystal structure	FCC (FACE CENTERED CUBIC)
Microstructure	Non-columnar, equiaxially grained
Modulus of Elasticity, GPa	580–620
Nano-Indentation Hardness, GPa	31–35
Adhesion strength (scratch test critical load), N	115–130
Coefficient of Friction (CoF)	0.11–0.12 (LUBRICATED)
	0.51–0.56 (DRY AIR)
Coating Wear Rate, mm^3/Nm	3.1×10^{-7}–1.1×10^{-6}
Coefficient of Thermal Expansion (CTE), $x10^{-6}/K$	7-11 (20–600°C / 68–1112°F)
Oxidation Temperature (max. service temperature)	950°C / 1742°F
Color	Metallic grey