

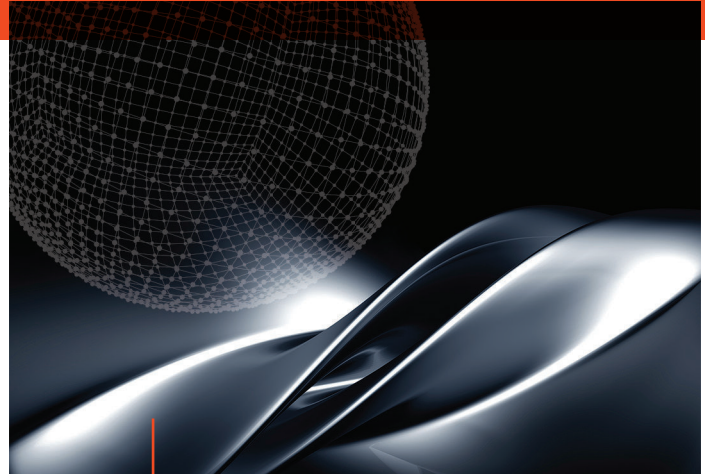
FORTIPHY™ XVD

CrN



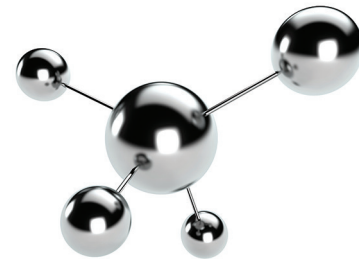
**FortiPhy XVD CrN (Chromium Nitride) is deposited through Phygen's patented XVD (Xcelerated Vapor Deposition) process.**

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.



**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

CrN

## ADVANTAGES

- Superior abrasive wear resistance
- Excellent corrosion resistance
- Unprecedented adhesion strength
- Reduces friction and prevents galling
- Thin film coating preserves critical dimensions of tight tolerance parts
- Can be stripped and re-applied multiple times

## INDUSTRIES

Automotive  
 Medical  
 Food Processing  
 Military  
 Others

## APPLICATIONS

Metal Forming Tools  
 Deep Drawing Punches and Dies  
 Aluminum Die Casting Tools  
 Plastic Injection Molds  
 Precision Machine Components  
 Out-of-the-box applications

## COATING PROPERTIES

<b>Composition</b> .....	CrN coating
<b>Crystal structure</b> .....	FCC (FACE CENTERED CUBIC)
<b>Microstructure</b> .....	Non-columnar, equiaxially grained
<b>Average grain size, nm</b> .....	16–25
<b>Modulus of Elasticity, GPa</b> .....	370–400
<b>Nano-Indentation Hardness, GPa</b> .....	22–30
<b>Adhesion strength (scratch test critical load), N</b> .....	115–120
<b>Coefficient of Friction (CoF)</b> .....	0.09–0.12 (DIESEL FUEL LUBRICATED) 0.18–0.22 (DRY NITROGEN, WC BALL) 0.28 ±0.02 (DRY AIR, ALUMINA BALL)
<b>Coating Wear Rate, mm<sup>3</sup>/Nm</b> .....	1.97 x 10 <sup>-7</sup>
<b>Coefficient of Thermal Expansion (CTE), x10<sup>-6</sup>/K</b> .....	5.5–7 (20–600°C / 68–1112°F)
<b>Oxidation Temperature (max. service temperature)</b> .....	800–850°C / 1472–1562°F
<b>Color</b> .....	Bluish grey