

# Superior Wear and Corrosion Protection for Functional Applications



**Nanovate**™ **CoP**

In commercial production with over 1,000,000 amp-hours plated. Service parts in continuous use since 2008.

## Superior Protection

Nanovate™ CoP achieves superior wear and corrosion resistance, and is especially suited for applications involving sliding wear and exposure to chloride rich environments. The excellent deposition rate and high process efficiency of Nanovate™ CoP makes it economical to apply. Unlike other functional coatings, Nanovate™ CoP is applied with a hexavalent chrome free process.

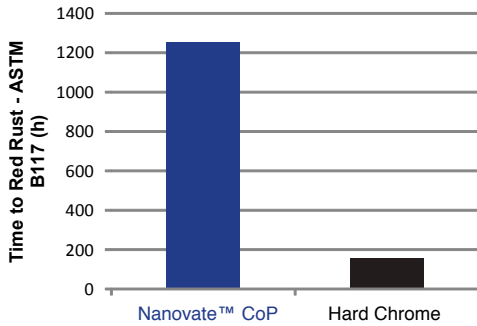


Tel: 416.675.6266

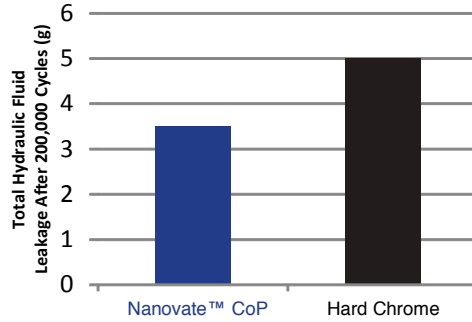
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THE NEXT GENERATION OF HIGH PERFORMANCE MATERIALS

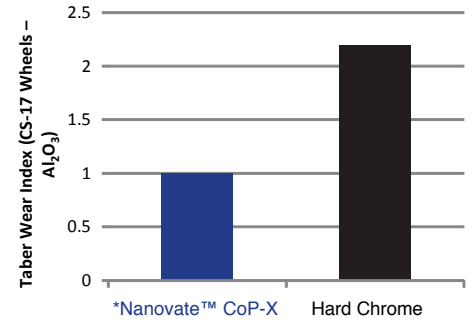
### Improved Corrosion Protection



### Reduced Seal Wear



### Reduced Abrasive Wear Loss



## Process Details

- Hexavalent Chrome Free Process
- Line/Non-Line of Sight Application
- Applied To: Metallic/Non Metallic; Ferrous/Non Ferrous Substrates
- Cost Effective
- Plating Rate: 100 - 150 microns/hour (0.004 - 0.006 in/hour)
- Thickness Range: 5 - 2000 microns (0.0002 - .079 in)
- High Cathodic Efficiency (>90%)

## Material Properties

Property	Test Method (Standard)	Nanovate™ CoP	Hard Chrome
Microstructure	Microscopy	Full Dense; Non Microcracked or Porous	Microcracked
Density - g/cm <sup>3</sup>	-	8.70	7.18
Ultimate Tensile Strength - MPa (ksi)	Tensile Test (ASTM E8)	2000 (290)	200
Hardness - VHN	Vickers Microhardness (ASTM B578)	550 – 750	Min. 600
Ductility - %	Bend Test (ASTM B489)	2–7	<1
Coefficient of Friction		0.4 – 0.5	0.7
Coefficient of Thermal Expansion - 10 <sup>-6</sup> /K	Linear Thermal Expansion Test (ASTM E 228)	12.9	4.9
Hydrogen Embrittlement	Mechanical Hydrogen Embrittlement (ASTM F519)	Pass with Bake	Pass with Bake
Fatigue	Axial Fatigue Test (ASTM E466)	Maintains or Increases Fatigue Life of Steel Substrates	Debit
Fluid Compatibility	Immersion Test	HCL, Hydraulic Fluids, Cleaners	Hydraulic Fluids, Cleaners

\*Nanovate™ CoP-X is a Compositional Variant of Nanovate™ CoP

## Example Applications



Hydraulic Cylinders



Pistons



Actuators



Valves (Engine, Etc.)