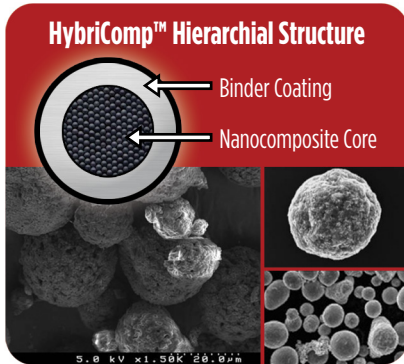


TiN - 30%Co - 11%Cr - 10%Ni - 3%Mo

HybriComp™'s are cermets fabricated into a hierarchical structure, developed with microstructures engineered at the nano-, micro- and meso- scale to offer revolutionary performance and cost breakthroughs. These materials are formed with a nanocomposite core and binder coating, which are made using a combination of low friction, high wear resistance and excellent corrosion resistant materials. The nano-composite core provides high wear resistance, low friction and light weight; and the binders provide corrosion resistance, toughness, ductility, resiliency, and improved deposition efficiency. This combination results in a high toughness, ductile-phased toughened structure of high hardness tiles separated by ductile binder laminates.



Near-Nano Composite Core

- High hardness and wear resistance
- Contains nano-dispersed friction modifiers
- Provides for fast machining

Binder Coating

- Improves adhesion and efficiency
- Provides toughness and resiliency
- Provides corrosion resistance
- Prevents compositional changes



HybriComp™ cermet coatings can replace electrolytic hard chrome, electroplating, spray and fuse and thermal spray carbides; to impart wear and corrosion resistance, and reduce friction in sliding wear applications. Cermet coatings are easy and fast to apply, and machine to tight tolerances for dimensional restoration of OEM or worn E&P components. The HybriComp™ family of coating materials has been designed to act as drop-in replacements for thermal spray powders and will work with today's existing application systems.

HybriComp Product Family

- **HybriComp™ T**
Low friction, high corrosion and wear resistance
- **HybriComp™ W**
High toughness, nano-composite carbide for extreme wear
- **HybriComp™ M**
High resistance to liquid metal corrosion
- **HybriComp™ S**
Low density, corrosion and spallation resistance

Value Proposition

Performance

- 3-20X+ extended life of components
- Unique: Provides both hardness and toughness
- Environmentally friendly

Cost

- Reduces downtime saving up to 10X the coating cost
- Significant capital cost savings due to reduced inventory needs
- Lowest life cycle cost solution

Time

- Higher spray efficiency, easier to grind and finish - saves approximately 30% in coating and finishing time
- Drop in replacement for current thermal spray powders



Typical Applications

Oilfield, Mining, Industrial, Automotive

- Low friction, high corrosion and wear resistance
- 3-15X extended life compared to Hard Chrome
- Half the cost of tungsten carbide

Mining, Oilfield, Industrial, Aerospace

- High toughness for extreme wear resistance
- 20X+ extended life
- Lowest life cycle cost solution

Galvanizing, Metal Processing

- High resistance to liquid / molten metal corrosion
- 5X+ extended life
- Lowest life cycle cost solution

Aerospace

- Low density, corrosion and spallation resistant
- 2-5X extended life compared to Hard Chrome
- 40% the weight of carbides

Introduction

HybriComp™ T48 is high hardness wear-resistant nano-composite cermet with cobalt based matrix that provides higher wear resistance than HybriComp™ T45 when in contact with drilling mud. HybriComp™ T48 also provides good corrosion resistance. These materials are primarily used in sliding wear applications, especially in environments that contain suspended solids.

These powders are nano-structured ceramic-metal composites formed with a nanocomposite core and binder coating, utilizing a combination of high hardness, high wear resistance and excellent corrosion resistant materials. The nanocomposite core contains nano and near-nano size TiN (Titanium Nitride) particles in a hard, corrosion resistant binder. This core is incased in a protective cladding that minimizes the adverse effects of the HVOF straying process on the hard particles and helps form the coating's hierarchical structure. This combination results in a high-toughness, ductile-phased toughened structure of high hardness tiles separated by ductile binder laminates.

HybriComp™ T48 has been shown to perform nearly identically to diamond-like carbon ceramic coatings, but can be applied much thicker (longer life), and cheaper (lower cost) than vapor-deposited materials, while also providing a toughness and resiliency (spallation and cracking resistance) that cannot be matched by ceramic coatings.

Snapshot

Characteristic	Data
Classification	Titanium nitride-cobalt-nickel-chromium-molybdenum
Chemistry	46TiN-30Co-11Cr-10Ni-3Mo
Manufacture	Agglomerated and sintered
Morphology	Spheroidal
Purpose	Corrosion and wear resistance
Density	6.6 g/cm ³
Service Temperature	Up to 750 °C
Process	HVOF

Typical Applications

HybriComp™ T48 HVOF coatings replaces electroplate hard chrome (EHC) and a less expensive alternative to conventional WC coatings such as Sulzer-Metco Diamalloy®/Woka®, Praxair LW/SDG 2000 series coatings and Diamond-Like-Coatings (DLC) in many industries including Automotive, industrial equipment, Oil & Gas down-hole and pump components.

HybriComp™ T48 is an ideal replacement for EHC plating's, especially where additional wear resistance is required or DLC where higher ductility is required.

Material Information

Chemical Composition						
	Weight Percent (Nominal)					
	TiN	Co	Cr	Ni	Mo	Fe (max)
HybriComp T48	44-48	28-32	10-12	9-11	2.5-3.5	0.1

Particle Size Distribution and Apparent Density			
	Nominal Range (µm)	Primary Nitride Grain Size	Density (g/cm ³)
HybriComp T48	-45 + 10	100-400 nm	6.6

Coating Information

Key Thermal Spray Coating Information	
Specification	Typical Data
Recommended Process	HVOF
Microhardness (HV0.3)	550 - 750
Wear Rate (ASTM G65 B)	Less than 0.017 cc
Porosity	Less than 1 %
Corrosion Resistance	No corrosion after 1000 hrs in salt fog test
Maximum Service Temperature	750 °C

Coating Parameter Sheets
Please contact us at sales@hybridmaterialsllc.com to receive coating parameters for HVOF and HVOF spray guns.

Safety and Handling

Handling Recommendations

- Store in the original container in a dry location.
- Tumble contents prior to use to prevent segregation.
- Open containers should be stored in a drying oven to prevent moisture pickup.

Safety Recommendations

- Please contact us at sales@hybridmaterialsllc.com to receive the MSDS for this specific product for your country.