PComP™

MesoCoat
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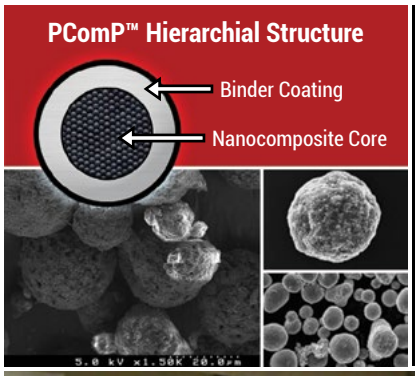
Extreme Coatings. Superior Performance.

PComP™ Thermal Spray Coating Materials

PComP™ stands for **P**articulate **Com**posite **P**owders. These materials are nano-structured ceramic-metal composites formed with a nanocomposite core and binder coating, which are made using combination of low friction, high wear resistance and excellent corrosion resistant materials. The nanocomposite core provides high wear resistance, and the binders provide corrosion resistance, toughness, ductility, resiliency, and improved deposition efficiency.

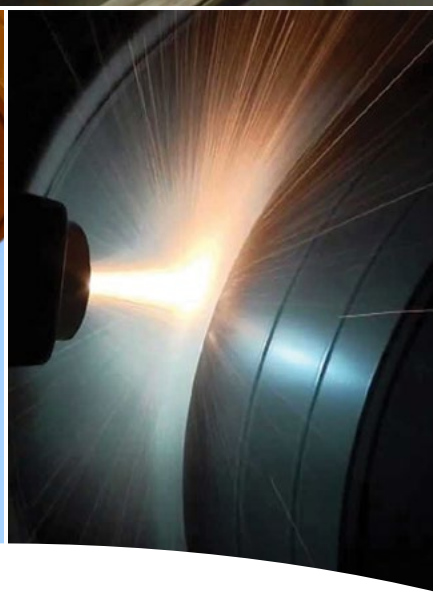
MesoCoat develops, manufactures, and sells our patented **PComP**™ materials. We also provide turnkey technical and sample coating services. Our designs have resulted in properties and characteristics that provide value-in-use for both cost and performance.

PComP™ ceramic-metallic (cermet) thermal spray coatings replace electrolytic hard chrome, electroplating, spray and fuse, and thermal spray carbides. These coatings are easy and fast to apply, finish to tight tolerances on OEM or re-worked components, and can be tailored for HVOF and HVAF systems.



Near-Nano Composite Core
- Provides hardness and wear resistance

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



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Products Overview

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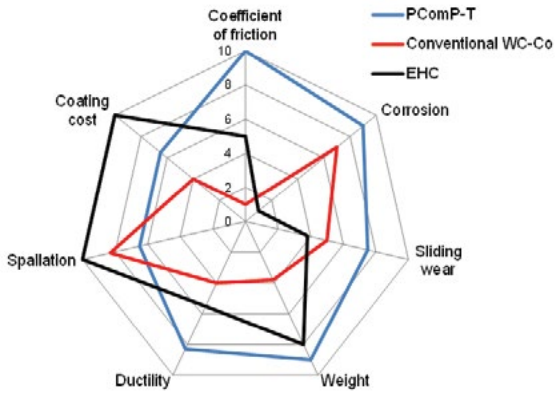
PComP™ T

High Toughness, Corrosion-Resistant Nano-Structured Titanium Cermet
Patents: (US 9,376,573)

PComP™ T uses a Titanium Nitride Cermet powder fabricated into a hierarchical structure using a patented process to engineer down to the nanoscale. The nanocomposite core contains nano and near-nano size TiN (Titanium Nitride) particles in a hard, corrosion resistant binder. This core is encased in a protective cladding that minimizes the adverse effects of the HVOF spraying process on the hard particles and assists in formation of a hierarchical coating structure and provides high wear resistance and light weight. This combination results in a high-toughness, ductile-phased toughened structure of high hardness tiles separated by ductile binder laminates. The result is a microcomposite cermet coating that offers revolutionary performance breakthroughs.

The chart below depicts the comparison of PComP™ T with the widely used competing solutions of thermally sprayed tungsten carbide (WC) and electroplated hard chrome. As can be seen in the chart below, PComP™ T outperforms the competing solutions in almost all of the seven critical parameters.



PComP™ T45

Nominal Chemistry (wt%): TiN -42%Ni-7%Cr

Higher toughness, corrosion-resistant nano-structured titanium cermet materials are highly resilient, machine quickly, have very low friction, and can replace chrome plating and carbides coatings in shaft, seal, plunger, and valve applications. PComP™ T45 can be machined with a standard grinding process, eliminating the need for the expensive diamond grinding process, with buildup rates 2-3 times that of carbides (reducing spray time up to 30%). High build rates and low stress attributes also allow the refurbishment of worn components.

PComP™ T45 coatings replace electroplate hard chrome (EHC) and a less expensive alternative to conventional WC coatings such as Sulzer-Metco Diamalloy®/Woka® and Praxair LW/SDG-2000 series coatings in many industries including aerospace actuators, industrial Equipment, oil & gas down-hole and pump components; and also where EHC plating is being used but requires additional wear resistance or corrosion resistance.

PComP™ T48

Nominal Chemistry (wt%): TiN - 30%Co-11%Cr-10%Ni-3%Mo

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

PComP™ T48 coatings replace 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 and gas down-hole and pump components; and also where EHC plating is being used but requires additional wear resistance and where DLC coating is being used but requires higher ductility.

PComP™ M144

High Resistance to Liquid Metal Corrosion
(Patent Pending)

PComP™ M product is a self-lubricating nanocomposite material with high toughness, corrosion- and wear-resistant nanoengineered boride-based ternary and binary ceramic with an adjusted thermal expansion coefficient. This combination provides chemical stability, superior thermal shock resistance, extraordinary high-temperature molten-metal corrosion resistance, and solid lubrication in applications like zinc pot rolls, metal production, metal processing, metal forming, die casting, stamping, forging, etc.

Corrosion- and wear-resistant nano-engineered metal-boride based cermets that also incorporate solid lubricants and surface tension modifiers to provide ultimate wear and corrosion resistance in metal processing applications for both new coatings and repair of existing components in applications like zinc pot (galvanizing) rolls, metal production (die casting, metal forming), metal processing equipment (casting, pumping, flow control) and metal forming equipment (stamping, forging).

The chart at the top of the next page depicts the performance of PComP™ M liquid metal corrosion coating solution with the currently used solutions. As can be seen in the chart PComP™ M coatings offer at least 6X extended life for coatings, and thus for the components used with liquid metals leading to significant reductions (~70%) in downtime costs.

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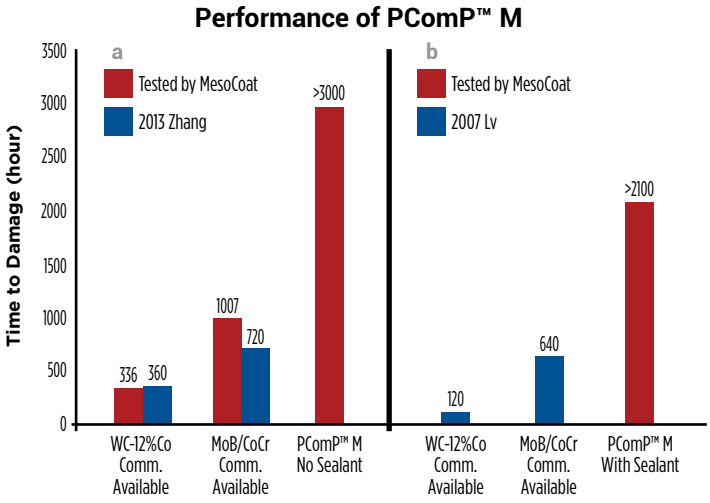
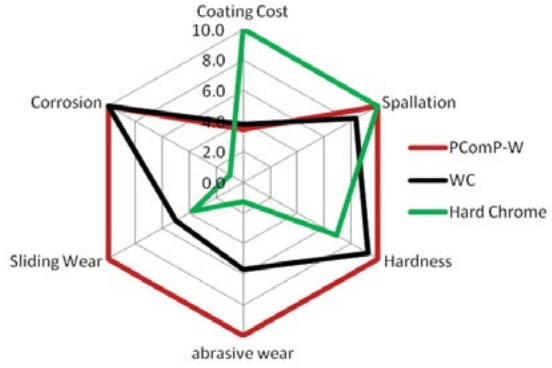


PComP™ W

High Toughness, Nanocomposite Carbide for Extreme Wear
Patents: (US 7,681,622)

PComP™ W is a cermet powder fabricated into a hierarchical structure using a patented process to engineer down to the nanoscale. The nanocomposite core contains nano and near-nano size WC (Tungsten Carbide) particles in a hard, corrosion resistant binder. This core is encased in a protective cladding that minimizes the adverse effects of the HVOF spraying process on the hard particles and assists in formation of a hierarchical coating structure.

The chart below depicts the comparison of PComP™ W with the widely used competing solutions of thermally sprayed tungsten carbide (WC) and electroplated hard chrome. As can be seen in the chart below, PComP™ W outperforms the competing solutions in almost all of the six critical parameters.



PComP™ W104

Nominal Chemistry (wt%): WC - 10%Co - 4%Cr

Premium high toughness nano-engineered tungsten carbide-cobalt-chrome materials; have high deposition efficiency, and 5-7 times the ductility and toughness of conventional, micro-grain carbides. These materials are ideal for use in valve trim and seats on gate valves, sand erosion, and three body wear environments. PComP™ W104 test results from our customers have shown 3-7 times the life in downhole applications over conventional materials; leading to the lowest coating life cycle cost in this segment.

PComP™ W104 coatings replace electroplate hard chrome (EHC) and conventional WC-CoCr coatings such as Sulzer- Metco®5847, Stellite® JK-120 and Praxair LW-45® in many industries including aerospace landing gear, industrial, and oil and gas down-hole and pump components. These coatings have application where WC coatings are being used and additional wear resistance or ductility is required.

PComP™ W333

Nominal Chemistry (wt%): WC-13%Ni – 3%Cr – 3%Co

Premium high toughness nano-engineered tungsten carbide-nickel-chrome (WC-NiCr) materials; have high deposition efficiency and 5-7 times the ductility and toughness of conventional, micro-grain carbides. These materials are ideal for use in downhole and pump components and three “body wear environments”. Because of its high corrosion resistant matrix, PComP™ W333 is an excellent coating in harsh environments and has shown 3-7X life in downhole applications.

PComP™ W 333 coatings replace electroplate hard chrome (EHC) and conventional WC coatings such as SulzerMetco Woka 3500 in many industries including chemical processing, oil and gas down-hole and pump components. These coatings have application where WC coatings and additional wear resistance or ductility is required.

PComP™ W611

Nominal Chemistry (wt%): WC - 17%Co

Premium high toughness nano-engineered tungsten-carbide cobalt (WC-Co) materials; have a high deposition efficiency (better yields, lower cost), and 5-7 times the ductility and toughness of conventional, micro-grain carbides. These materials are ideal for use in valve trim and seats on gate valves, sand erosion, and three body wear environments. PComP™ W611 test results from our customers have shown 3-7 times the life in downhole applications over conventional materials; leading to the lowest coating life cycle cost in this segment.

PComP™ W611 coatings replace electroplate hard chrome(EHC) and conventional WC –Co coatings such as Sulzer-Metco Diamalloy® 2005 and Praxair LW-1N40® in many industries including aerospace landing gear, Oil & Gas downhole and pump components. These coatings have application where WC coatings and additional wear resistance or ductility is required.

PComP™ Application Snapshot

Product	Properties	Availability	Application and Use
PComP™ W	High toughness, nanocomposite carbide for extreme wear	Commercial Sales since 2012	**Mining, Oilfield, Industrial, Aerospace** ▪ Up to 80X extended life in sliding wear applications ▪ Lowest life cycle cost solution
PComP™ T	Low friction, high corrosion and wear resistance	Commercial Sales since 2014	**Oilfield, Mining, Industrial, Automotive** ▪ 3-15X extended life ▪ Half the cost of tungsten carbide
PComP™ M	High resistance to liquid metal corrosion	Field Testing	**Galvanizing, Metal Production** ▪ 6-10X extended life ▪ Lowest life cycle cost solution

Our Value Proposition

- Improved spray efficiency (less material use)
- Easy and precise grind and finish
- Sealant system designed for faster turnaround of equipment
- Tailored application guidelines for specific spray systems
- Resulting surfaces which combine hardness, wear resistance, thermal stability, and corrosion resistance in the most challenging applications
- Distinctive extensions of component life
- Lower overall lifecycle costs

Technical Services

MesoCoat maintains a technical center equipped with thermal spray apparatus for the purposes of tailoring solutions and coating components for trials and demonstrations. Our technical staff is always prepared to assist and train in conjunction with first articles.

A New Level of Possibility in Surface Coating Performance

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