

Contact Information



Add: No.6 Rongchuan First Branch Road, Zigong High-Tech Zone, Zigong, Sichuan, China

Tel.: (0813)5516356

Web: <http://www.zgcc.com>



扫一扫二维码
关注公司微信平台

Scan the QR Code and Follow
the Company's Wechat Platform



ZGCC

Hard-facing Material



Customer Service

Professional marketing team and technical service team, to provide personalized professional products and complete solutions.

Domestic Sales Tel.: 0086-0813-5517957 5516536 5517977 5517968

International Sales Tel.: 0086-0813-5516209 0086-0813-5516952



CMT 自贡硬质合金有限责任公司
ZIGONG CEMENTED CARBIDE CORP., LTD



APPLICATION
SCENARIO



CMT 自贡硬质合金有限责任公司
ZIGONG CEMENTED CARBIDE CORP., LTD



ISO9001:
CN-CQC08Q10970
ISO14001:
CN-CQC08E22096



体系认证
CNAS C001-Q

品质成就未来

QUALITY ACCOMPLISHES THE FUTURE

自贡硬质合金有限责任公司

- 世界500强企业中国五矿的核心成员
- 中国第一家自主设计建设的大型硬质合金企业
- 国内领先的硬质合金及配套工具制造商
- 世界先进水平的表面工程技术服务提供者
- 国内领先的钨钼制品制造商

ZIGONG CEMENTED CARBIDE CO., LTD.

- Zigong Cemented Carbide Co., Ltd (ZGCC) is a core member of China Minmetals which is one of the world 500 top companies.
- It is the first home-designed and built large scale cemented carbide manufacturing enterprise in China.
- It is one of the leading manufacturers of cemented carbides and related tools at home.
- It's a reliable supplier of the surface engineering technology with advanced world levels and their application services.
- It holds the leadership position in the tungsten and molybdenum product manufacture in China.



硬面材料的优势 Our superiority

- ☐ 专业的材质设计研发
- ☐ 完整的生产链—从原材料到喷涂加工服务
- ☐ 二十年与国际油服公司的合作经验
- ☐ 先进装备和强大的系统保障能力
- ☐ 全过程质量控制
- ☐ Special design and development of materials
- ☐ Complete production procedure—from manufacturing of materials to Coating Service
- ☐ Over twenty years cooperation experience with international oil service companies
- ☐ Advanced equipments and powerful systematic secure capability
- ☐ Quality control in wide range

目录 Contents

01

COMPANY PROFILE

04

HARD-FACING PRODUCTS

07

TUNGSTEN CARBIDE MATERIAL

12

THERMAL SPRAY MATERIAL

24

SURFACING/SPRAY&FUSE MATERIAL

33

METAL ALLOY MATERIAL

36

MATRIX POWDER FOR PDC BITS

39

HARD-FACING TECHNOLOGY

42

CONTACT US

COMPANY PROFILE



Zigong Tungsten Carbide Co., Ltd.(ZTC) is located in Zigong National High-tech Zone. It was established as a joint venture between Zigong Cemented Carbide Co.,Ltd.(ZGCC) and Swiss HF Technologies AG in 2009. ZTC is affiliated to China Minmetals, and it is one of the seven business sectors of the group's tungsten industry layout. ZTC has inherited ZGCC' s semi-centennial R&D and production technology of hard-facing material. Up to introducing and absorbing international advanced production technology and management concepts of hard-facing material, ZTC has developed into an integrated high-tech enterprise with collection of R&D, production and application services of hard-facing material.

The production lines for tungsten carbide, carbide-based thermal spray material, premixed material for PDC bits, surfacing(spray&fuse) material has been built. The products include carbide/ metal alloy thermal spray powder, metal alloy powder for AM, surfacing(spray&fuse) powder, premixed powder for PDC bits, cemented carbide wear-resistant electrodes/wire/rope, (spherical) cast tungsten carbide, macrocrystalline tungsten carbide and cemented carbide pellet etc.

ZTC has a integrated manufacturing system which is supported by advanced equipment, technology and high-quality professionals. The provincial technology center of ZTC is equipped with international advanced high velocity oxygen fuel, plasma spray and PTA system etc. application platforms. It has a first-class physical, chemical, metallographic, and material performance test and analysis system. ZTC adheres to the quality policy of "leading technology, scientific management, first-class quality". It has successively passed ISO9001, ISO14001, OHSAS18001, AS9100 Aerospace Quality Management System and CNAS laboratory certification. And company is committed to providing customers with stable and reliable products and services.

After years hard work, the company has established a core team of technical talents with the recipient of State Council Government Allowance, professor-level senior engineer, senior engineers and PhDs etc. Recent years, ZTC undertook a number of key projects at the Ministry of Science and Technology, provincial and municipal levels. Meanwhile, ZTC leaded or participated in the preparation for multiple national and industry standards, and possessed a number of independent intellectual property rights for processes, technologies and equipment.

Company's products are widely used for the protection and repair of petrochemical, power equipment, aerospace, mining and agricultural machinery, as well as the preparation of the PDC bits for oil drilling. It can improve the wear, corrosion, heat and impact resistance for the material surface greatly, which is one of the main materials and technologies for additive manufacturing, green re-manufacturing, energy saving (material), environmental protection and longevity. More than 70% of the company's products are exported to developed countries such as Europe and United States, with strong competitiveness.

ZTC is committed to designing and developing of hard-facing materials for high-end equipment industry such as aviation, gas turbines and clean energy, and developing premixed powder for PDC bits, thermal spray powder, surfacing powder and 3D printing powder in the field of hard-facing materials and growth as a leader in application services; ZTC devotes to becoming the best choice for customers and high-quality strategic corporate partners, and providing customers with the best products and services in the field of hard-facing materials and related new materials.



Vacuum Sintering Furnace



Carbon & Sulfur Analyzer



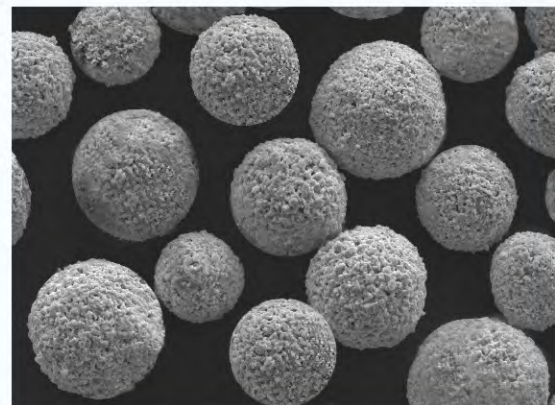
Atomic Absorption Spectroscopy



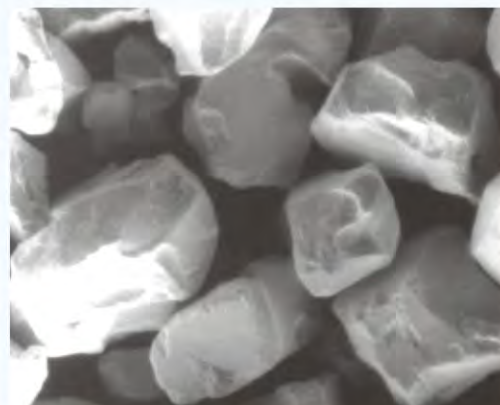
Sieve Shaker



Spray Drying Tower



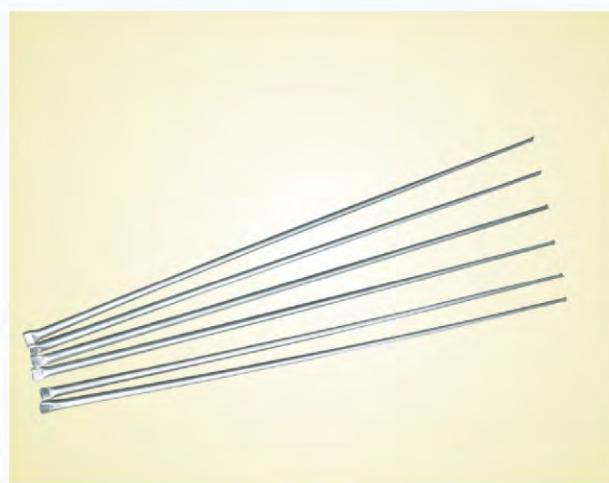
Thermal Spray Powder



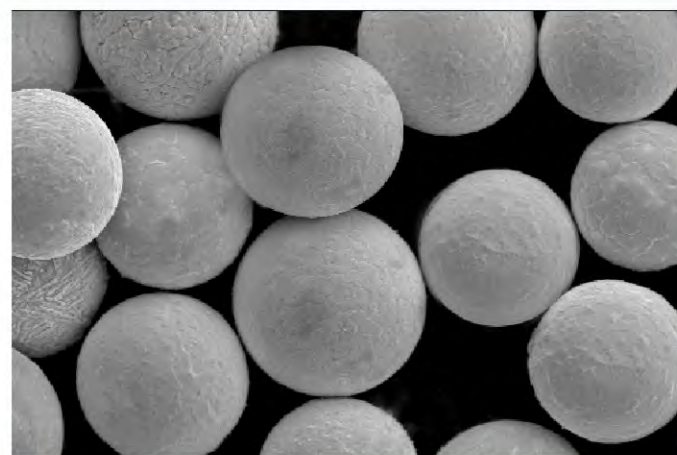
Macrocryalline Tungsten Carbide



Cast Tungsten Carbide



Tube Wear-resistant Welding Rod

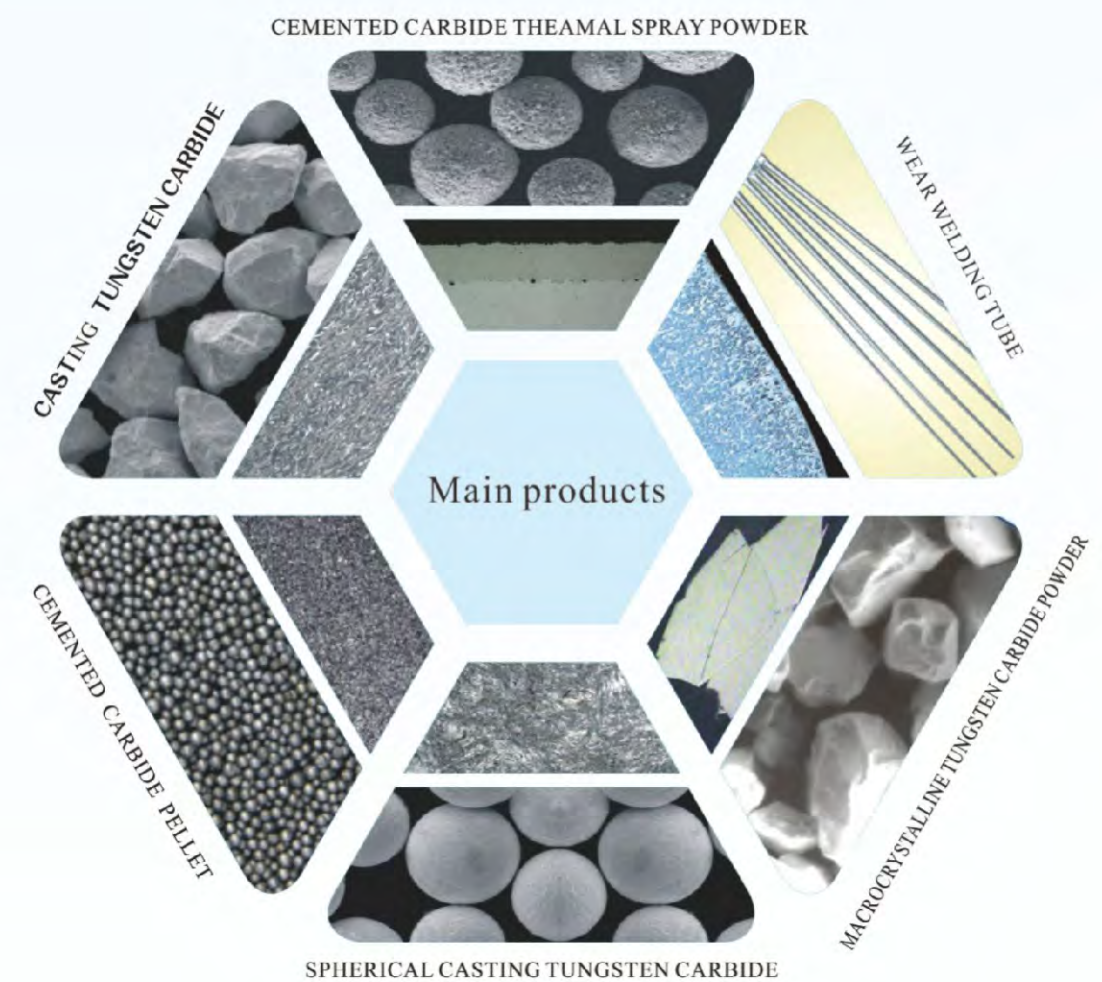


Spherical Cast Tungsten Carbide



Cemented Carbide Pellet

HARD-FACING PRODUCTS



Main Hard-facing Material Products

- ◆ Cast Tungsten Carbide, Spherical Cast Tungsten Carbide, Thermal Spray Material, Surfacing /Spray&Fuse Material, Tube Wear-resistant Welding Rod, Matrix Powder for PDC bits, Flexible Welding Rope, Cemented Carbide Pellet, Metal Alloy Powder

Spherical Cast Tungsten Carbide



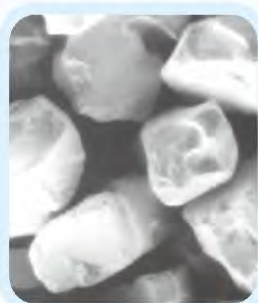
Cemented Carbide Pellet



Tube Wear-resistant Welding Rod



Macrocrystalline Tungsten Carbide



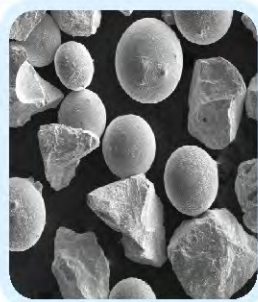
Thermal Spray Powder



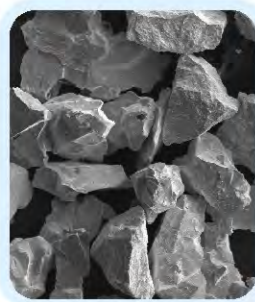
Cast Tungsten Carbide



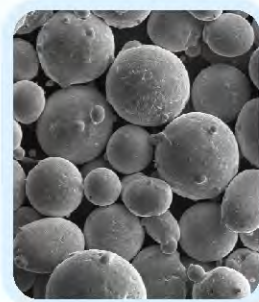
Surfacing /Spray&Fuse Material



Matrix Powder for PDC bit



Metal Alloy Powder

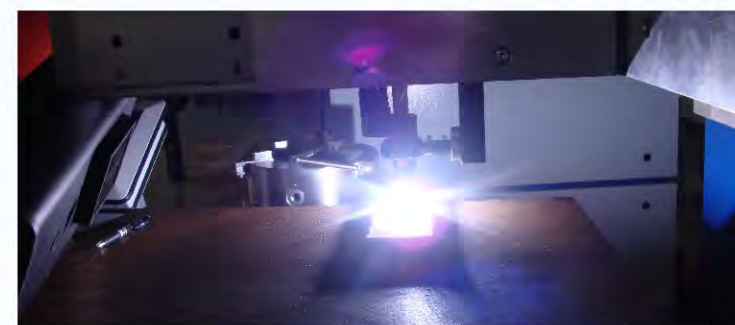


Products Characteristic

- ◆ Hard-facing material products can be used to manufacture and repair the surface of parts by the hard-facing technology such as surfacing welding (PTA, laser cladding, oxyacetylene surfacing), spray&fuse welding, infiltration and thermal spraying etc. Not only significantly enhance the wear resistance, corrosion resistance, heat resistance, impact resistance and other properties of the parts surface, but also can prepare special functional coatings such as sealing, insulation and heat insulation. It can improve the service life of the parts significantly and reduce the manufacturing cost of the parts.

Mainly Used For

- ◆ Surfacing welding (PTA, laser cladding, oxyacetylene surfacing), spray&fuse welding, infiltration and thermal spraying etc.
- ◆ Protection and repair of various rolls and wear-resistant, heat-resistant and corrosion-resistant spare parts in metallurgical equipment;
- ◆ Protection and repair of crushing machinery in mining equipment;
- ◆ Thermal spraying and surfacing welding of cement grinding rollers and glass conveyor rollers in the building materials industry;
- ◆ Protection and repair of grinding rollers, fan blades and turbine blades in thermal power generation equipment;
- ◆ Thermal spray protection of various tube walls of high-pressure boilers;
- ◆ Overlay welding and repair of various forging dies;
- ◆ Surfacing welding of raw material extrusion rolls and hammers in food, grain and oil, and feed processing equipment;
- ◆ Protection of shafts, valves and various seals in the petrochemical industry;
- ◆ Surface protection and repair of oil drilling tools;
- ◆ Wear-resistant, corrosion-resistant protection and repair for various key components in the aviation field.



TUNGSTEN CARBIDE MATERIAL



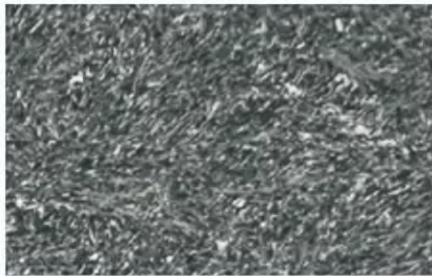
CAST TUNGSTEN CARBIDE

Description

- ◆ Cast tungsten carbide which is made of W and WC by melted broken, is irregular dark gray particles with high melting point (2525°C), high hardness(HV0.1≥2000), and high wear resistance.
- ◆ The products are used for the preparation of diamond oil drill bit matrix materials, plasma (PTA) surfacing materials, spray welding materials and cemented carbide wear-resistant electrode (wire), etc., and used in pre-reinforcement of wear-resistant surface or repairing worn surface for mining, oil, metallurgical industries, construction machinery, agricultural machinery and steel industries.



SEM morphology
of cast tungsten
carbide



Microstructure of
cast tungsten
carbide

Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)							
	W	T.C	F.C	Cr	V	Si	O	Fe
ZTC 11	95-96	3.8-4.1	≤0.08	≤0.1	≤0.05	≤0.02	≤0.05	≤0.3

Specification & Particle Size

Spec.	Particle Size
ZTC1109	-840+590μm(20-30mesh)
ZTC1111	-590+420μm(30-40mesh)
ZTC1115	-420+250μm(40-60mesh)
ZTC1119	-250+177μm(60-80mesh)
ZTC1123	-177+125μm(80-120mesh)
ZTC1126	-250+44μm(60-325mesh)
ZTC1127	-210+38μm(70-400mesh)
ZTC1128	-177+74μm(80-200mesh)

Spec.	Particle Size
ZTC1129	-149+105μm(100-140mesh)
ZTC1131	-149+62μm(100-230mesh)
ZTC1134	-125+88μm(120-170mesh)
ZTC1140	-105+74μm(140-200mesh)
ZTC1142	-88+44μm(170-325mesh)
ZTC1143	-74+44μm(200-325mesh)
ZTC1147	-44μm(-325mesh)
ZTC1148	-38μm(-400mesh)

SPHERICAL CAST TUNGSTEN CARBIDE

Description

- Spherical cast tungsten carbide dark gray particles which is made by ultra high-temperature spheroidization or gas atomization process, is dendritic crystal composed of WC and W₂C and has high melting point(2525°C), high hardness (HV0.1≥2700), high feather structure (content≥90%), chemical stability, excellent flowability, high microhardness and high wear corrosion resistance.
- The products are used for the preparation of diamond oil drill bit matrix materials, plasma (PTA) surfacing materials, spray welding materials and cemented carbide wear-resistant electrode (wire), etc., and widely used in the oil drill bit, PDC drill tool and other melting, spraying (welding), and surfacing products, mainly used in the wear-resistant surface pre-reinforcement.



SEM morphology
of spherical cast
tungsten carbide



Microstructure
of spherical cast
tungsten carbide

Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)									
	W	T.C	F.C	Ti	Mo+Co+Ni	Cr	V	Si	O	Fe
ZTC12	95-96	3.8-4.2	≤0.08	≤0.1	≤0.2	≤0.1	≤0.05	≤0.02	≤0.05	≤0.3

Specification & Physical Properties

Spec.	Particle Size(mesh)	Corresponsive Size Range (μm)
ZTC1215	-40+60	-420+250
ZTC1219	-60+80	-250+180
ZTC1221	-60+100	-250+150
ZTC1230	-100+200	-150+75
ZTC1243	-200+325	-75+45
ZTC1233	-100+325	-150+45

MACROCRYSTALLITE TUNGSTEN CARBIDE

Description

- Macrocrystallite cast tungsten carbide which is made of the precisely chosen raw material and special alloying, is a fully carbonized and dense light grayish crystal tungsten carbide powder with homogeneous microstructure, excellent thermal stability, and has high hardness (HV0.1≥1600), high melting point (2700°C), excellent wear and impact resistance property.
- The products are used for the preparation of diamond oil drill bit matrix materials, plasma (PTA) surfacing materials, spray welding materials, cemented carbide wear-resistant electrode (wire) and the raw material in cemented carbide production, etc., and used in the wear-resistant surface pre-reinforcement or wear repair of mining, oil, metallurgical industries, construction machinery, agricultural machinery and steel industries, and cemented carbide.



SEM morphology
of macrocrystallite
tungsten carbide



The microstructure
of macrocrystallite
tungsten carbide

Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)									
	W	T.C	F.C	Ni	Co	Ti	Ta	Nb	Si	Fe
ZTC21	Bal.	6.1~6.2	≤0.06	-	-	≤0.15	≤0.03	≤0.03	≤0.02	≤0.25

Specification & Physical Properties

Spec.	Particle Size (mesh)	Corresponsive Size Range (μm)
ZTC2115	-40+60	-425+250
ZTC2119	-60+80	-250+180
ZTC2128	-80+200	-180+75
ZTC2144	-200+400	-75+38
ZTC2147	-325	-45

CEMENTED CARBIDE PELLET

Description

- ◆ Cemented carbide pellet which is made of WC and Co through granulating, pressing and sintering, is spherical or subspherical dark gray cemented carbide particles with high hardness (HV0.11400-1600), high wear resistance and erosion resistance.
- ◆ The products are used for the preparation of cemented carbide wear-resistant electrode (wire), spray welding materials and surfacing materials, and used in the wear-resistant surface pre-reinforcement or wear repair of mining, oil (drill bit, wear-resistant belt), metallurgical industries, construction machinery, agricultural machinery and steel industries.



Cemented
carbide pellet



Microstructure of
cemented carbide
pellet X1000

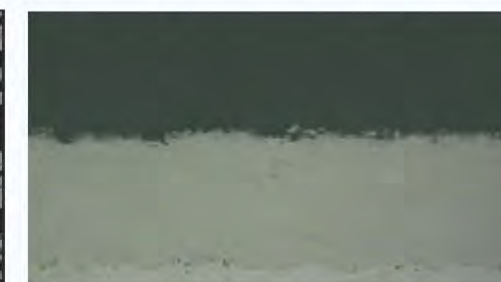
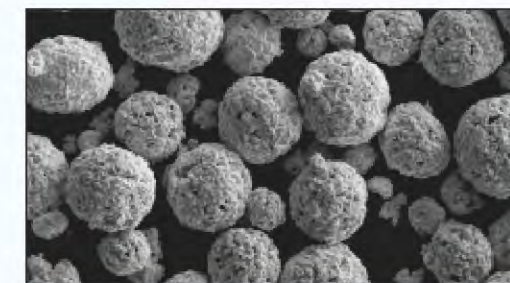
Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)					
	Co	T.C	F.C	Ti	Fe	O
ZTC31	5.8-6.8	5.4-5.8	≤0.1	≤0.5	≤1.0	≤1.0
ZTC32	3.5-4.0	5.5-5.9	≤0.1	≤0.5	≤1.0	≤1.0
ZTC33	5.7-6.3	5.4-5.8	≤0.1	≤0.5	≤1.0	≤0.3

Microstructure and Physical Properties

Grade	Physical properties		Microstructure		
	Density (g/cm ³)	Hardness (HV)	Porosity (≤)	Free Carbon (≤)	Microstructure
ZTC31	14.5-15.2	≥1400	A04B04	C04	No decarburization No cabalt aggregated
ZTC32	14.8-15.3	≥1400	A04B04	C04	
ZTC33	14.5-15.0	≥1400	A04B04	C02	

THERMAL SPRAY MATERIAL



WC-12Co THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered or sintered and crushed gray/black spherical; Agglomerated and sintered powders are spherical or nearly spherical with good flowability; Sintered and crushed powders are irregular.
- ◆ Maximum service temperature:500°C.
- ◆ The dense coating with high hardness, and has resistance to abrasive wear, fretting wear, adhesive wear and erosion wear.
- ◆ High fracture toughness.
- ◆ Mainly used in mechanical parts, oil and gas equipment, metallurgical roller and pump seal units, etc.



Typical cross-section and surface morphology of WC-12Co thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Co(%)	Fe(%)	O(%)
ZTC42	5.2-6.0	11.5-12.5	≤1.0	≤0.5
ZTC42D	5.2-6.0	11.5-12.5	≤0.15	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4251	WC-Co	53-20	≥4	≤25	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/k2)
ZTC4253	88/12	45-20	≥4	≤25	
ZTC4252	Sintered & crushed	45-15	≥4	≤25	
ZTC4251D		53-20	≥4	≤18	
ZTC4253D	WC-Co	45-20	≥4	≤18	◎ HVOF
ZTC4252D	88/12	45-15	≥4	≤18	
ZTC4281D	Agglomerated	45-11	≥4	≤18	
ZTC4254D	&sintered	38-10	≥4	≤18	
7TC4282D		30-10	≥4	≤18	◎ APS

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Coating Deposited & Properties



Cross-section metallograph of WC-12Co coating

Recommended Spray Parameters(HVOF)

Material	WC-12Co
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	6
Kerosene(L/h)	22.7
Oxygen(L/min)	944
Carrier gas (Ar)(L/min)	7.5
Powder feed rate(g/min)	70-100
Spraying distance(mm)	350-380

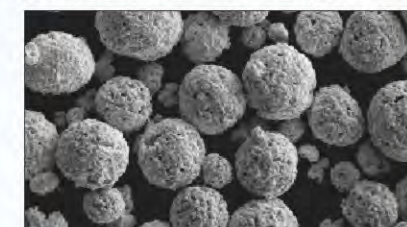
Coatings Properties

Hardness(HV _{0.05})	1100-1300
Bonding strength(MPa)	>70MPa
Deposited efficiency(%)	40-50%
Porosity(%)	<1%

WC-17Co THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered or sintered and crushed gray/black spherical; Agglomerated and sintered powders are spherical or nearly spherical with good flowability; Sintered and crushed powders are irregular.
- ◆ Maximum service temperature:500°C.
- ◆ The dense coating with high hardness, and has resistance to abrasive wear, fretting wear, adhesive wear and erosion wear.
- ◆ Higher fracture toughness than WC-12Co.
- ◆ Mainly used in aircraft landing gear, extrusion die, wire drawing equipment, paper roller, glass industry, crushing roller and pump seal parts, etc.



Typical cross-section and surface morphology of WC-17Co thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Co(%)	Fe(%)	O(%)
ZTC43	4.7-5.2	16.5-17.5	≤1.0	≤0.5
ZTC43D	4.7-5.2	16.5-17.5	≤0.15	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4351	WC-Co	53-20	≥4	≤25	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4353	83/17	45-20	≥4	≤25	
ZTC4352	Sintered & crushed	45-15	≥4	≤25	
ZTC4351D		53-20	≥4	≤18	
ZTC4353D	WC-Co	45-20	≥4	≤18	◎ HVOF
ZTC4352D	83/17	45-15	≥4	≤18	
ZTC4381D	Agglomerated	45-11	≥4	≤18	
ZTC4354D	&sintered	38-10	≥4	≤18	
ZTC4382D		30-10	≥4	≤18	◎ APS

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-17Co coating

Recommended Spray Parameters(HVOF)

Material	WC-17Co
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	6
Kerosene(L/h)	22.7
Oxygen(L/min)	944
Carrier gas (Ar)(L/min)	7.5
Powder feed rate(g/min)	70-100
Spraying distance(mm)	350-380

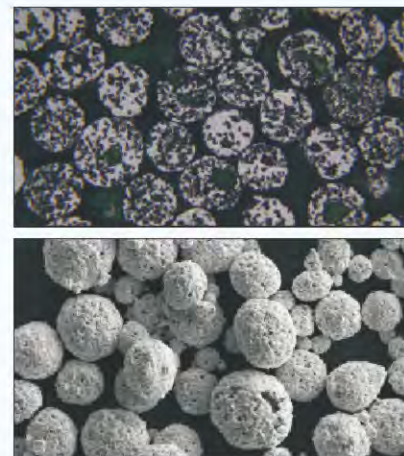
Coatings Properties

Hardness(HV _{0.05})	950~1200
Bonding strength(MPa)	>70 Mpa
Deposited efficiency(%)	45~55%
Porosity(%)	<1 %

WC-10Co4Cr THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered or sintered and crushed gray/black spherical; Agglomerated and sintered powders are spherical or nearly spherical with good flowability; Sintered and crushed powders are irregular.
- ◆ Maximum service temperature: 500°C.
- ◆ Density coatings with high hardness, and has resistance to abrasive wear, corrosion wear and erosion wear.
- ◆ Replacing hard chrome plating.
- ◆ Co/Cr has better corrosion resistance and wear property than Co, especially for wetting and corrosion environment.
- ◆ Mainly used in aircraft landing gear, gate valve, ball valve, paper roller, hydraulic cylinder, compressor rod, metallurgical roller and mechanical parts, etc.



Typical cross-section and surface morphology of WC-10Co4Cr thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Co(%)	Cr(%)	Fe(%)	O(%)
ZTC45	5.0-6.0	9.0-10.5	3.0-4.5	≤1.0	≤0.5
ZTC45D	5.0-6.0	9.0-10.5	3.0-4.5	≤0.15	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4551	WC-Co-Cr 86/10/4	53-20	≥4	≤25	◎ HVOF(JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4553		45-20	≥4	≤25	
ZTC4552		45-15	≥4	≤25	
ZTC4551D	WC-Co-Cr 86/10/4	53-20	≥4	≤18	◎ HVOF(JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4553D		45-20	≥4	≤18	
ZTC4552D		45-15	≥4	≤18	
ZTC4581D	Agglomerated & sintered	45-11	≥4	≤18	◎ HVOF
ZTC4554D		38-10	≥4	≤18	
ZTC4582D		30-10	≥4	≤18	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-10Co4Cr coating

Recommended Spray Parameters(HVOF)

Material	WC-10Co4Cr
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	6
Kerosene(L/h)	24
Oxygen(L/min)	944
Carrier gas (Ar)(L/min)	7.5
Powder feed rate(g/min)	70-80
Spraying distance(mm)	340-380

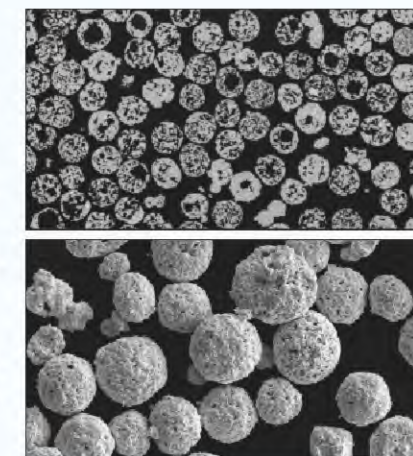
Coatings Properties

Hardness(HV _{0.05})	1150-1400
Bonding strength(MPa)	>70MPa
Deposited efficiency(%)	40-55%
Porosity(%)	<1%

WC-10Ni THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered spherical or nearly spherical gray/dark powders with good flowability;
- ◆ Max.operating temperature 500C;
- ◆ Density coatings with high hardness, high abrasion, fretting, adhesion, erosion and corrosion wear resistance;
- ◆ Nickel is better than Cobalt in wetting environment with highly corrosion resistance;
- ◆ Non magnetic;
- ◆ Mainly used in oil field equipment (highly corrosion resistance), petrochemical industry, ball valve (oxidizing environment), plate valve, offshore equipment and parts, etc.



Typical cross-section and surface morphology of WC-10Ni thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Fe(%)	O(%)
ZTC47D	5.3-5.8	9.0-11.0	≤0.2	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4751D	WC-Ni 90/10	53-20	≥4	≤18	◎ HVOF(JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4753D		45-20	≥4	≤18	
ZTC4752D		45-15	≥4	≤18	
ZTC4781D	Agglomerated & sintered	45-11	≥4	≤18	◎ HVOF
ZTC4754D		38-10	≥4	≤18	
ZTC4782D		30-10	≥4	≤18	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-10Ni coating

Recommended Spray Parameters(HVOF)

Material	WC-10Ni
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	4
Kerosene(L/h)	24
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	8.5
Powder feed rate(g/min)	80-100
Spraying distance(mm)	340-380

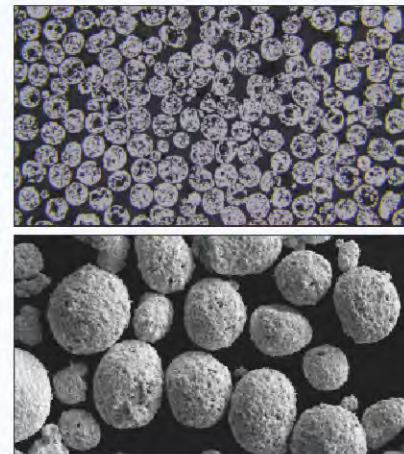
Coatings Properties

Hardness(HV _{0.05})	1050~1250
Bonding strength(MPa)	>70 Mpa
Deposited efficiency(%)	40~50 %
Porosity(%)	<1 %

WC-12Ni THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles with good flowability;
- ◆ Maximum service temperature: 500°C;
- ◆ The dense coating with high hardness, and has resistance to abrasive wear, fretting wear, adhesive wear, erosion wear, and corrosion wear;
- ◆ Ni has better corrosion resistance than Co, especially for wetting and corrosion environment;
- ◆ Non magnetism;
- ◆ Mainly used in oilfield equipment (strict corrosion performance requirements), petrochemical industry, ball valves (under oxidizing environment), plate valve, offshore equipment and parts, etc.



Typical cross-section and surface morphology of WC-12Ni thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Fe(%)	O(%)
ZTC4AD	5.2-6.0	11.5-12.5	≤0.5	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4A51D	WC-Ni	53-20	≥3.5	≤18	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4A53D		45-20	≥3.5	≤18	
ZTC4A52D		45-15	≥3.5	≤18	
ZTC4A81D	Agglomerated	45-11	≥3.5	≤18	◎ HVOF ◎ HVOF ◎ APS
ZTC4A54D	&sintered	38-10	≥3.5	≤18	
ZTC4A82D		30-10	≥3.5	≤18	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-12Ni coating

Recommended Spray Parameters(HVOF)

Material	WC-12Ni
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	4
Kerosene(L/h)	24
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	8.5
Powder feed rate(g/min)	70-100
Spraying distance(mm)	340-380

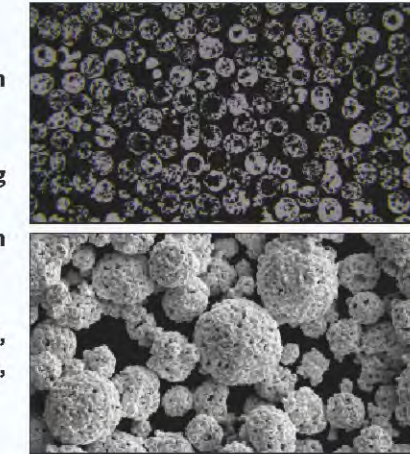
Coatings Properties

Hardness(HV _{0.05})	1000-1200
Bonding strength(MPa)	>70MPa
Deposited efficiency(%)	40-50%
Porosity(%)	<1%

WC-17Ni THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles with good flowability;
- ◆ Maximum service temperature: 500°C;
- ◆ The dense coating with high hardness, and has resistance to abrasive wear, fretting wear, adhesive wear, erosion wear, and corrosion wear;
- ◆ Ni has better corrosion resistance than Co, especially for wetting and corrosion environment;
- ◆ Non magnetism;
- ◆ Mainly used in oilfield equipment (strict corrosion performance requirements), petrochemical industry, ball valves (under oxidizing environment), plate valve, offshore equipment and parts, etc.



Typical cross-section and surface morphology of WC-17Ni thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Fe(%)	O(%)
ZTC4BD	4.7-5.2	16.5-17.5	≤0.5	≤0.5

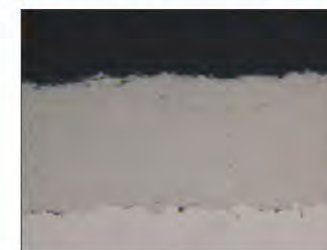
PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4B51D	WC-Ni	53-20	≥3.5	≤18	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4B53D		45-20	≥3.5	≤18	
ZTC4B52D		45-15	≥3.5	≤18	
ZTC4B81D	Agglomerated	45-11	≥3.5	≤18	◎ HVOF ◎ HVOF ◎ APS
ZTC4B54D	&sintered	38-10	≥3.5	≤18	
ZTC4B82D		30-10	≥3.5	≤30	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-17Ni coating

Recommended Spray Parameters(HVOF)

Material	WC-17Ni
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45-15
Spray Gun	JP5000
Nozzle(inch)	4
Kerosene(L/h)	23
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	8.5
Powder feed rate(g/min)	80-100
Spraying distance(mm)	340-380

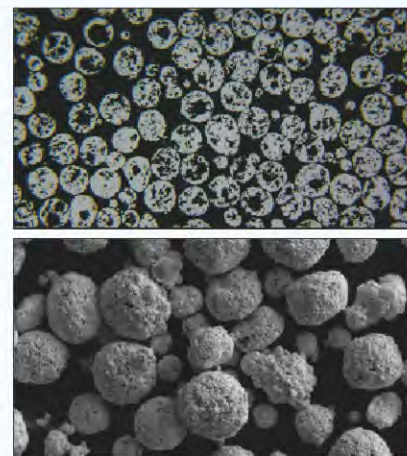
Coatings Properties

Hardness(HV _{0.05})	950-1200
Bonding strength(MPa)	>70 Mpa
Deposited efficiency(%)	40-50 %
Porosity(%)	<1 %

WC-15NiCr THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles with good flowability;
- ◆ Maximum service temperature: 500°C;
- ◆ The dense coating with high hardness, and has resistance to abrasive wear, sliding wear, erosion wear, cavitation;
- ◆ NiCr has better corrosion resistance than Co, CoCr, and excellent resistance to seawater (salt water) corrosion;
- ◆ Mainly used in oil field equipment, ball valve (oxidizing environment), gate hydraulic lever, transportation container hydraulic lever, petrochemical industry, offshore equipment and parts etc.



Typical cross-section and surface morphology of WC-15NiCr thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Cr(%)	Ni(%)	Fe(%)	O(%)
ZTC4CD	4.7-5.3	2-4	9-11	≤0.5	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4C51D	WC-Ni-Cr 85/12/3 Agglomerated &sintered	53-20	≥3.5	≤18	◎ HVOF(JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4C53D		45-20	≥3.5	≤18	
ZTC4C52D		45-15	≥3.5	≤18	
ZTC4C81D		45-11	≥3.5	≤18	◎ HVOF ◎ APS
ZTC4C54D		38-10	≥3.5	≤18	
ZTC4C82D		30-10	≥3.5	≤18	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-15NiCr coating

Recommended Spray Parameters(HVOF)

Material	WC-15NiCr
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45~15
Spray Gun	JP5000
Nozzle(Inch)	6
Kerosene(L/h)	23
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	8.5
Powder feed rate(g/min)	70~80
Spraying distance(mm)	340~380

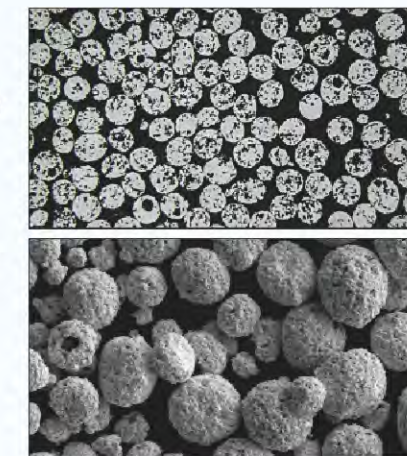
Coatings Properties

Hardness(HV _{0.05})	1000-1350
Bonding strength(MPa)	> 70MPa
Deposited efficiency(%)	35-50%
Porosity(%)	< 1%

WC-20Cr-7Ni THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles with good flowability;
- ◆ Maximum service temperature: 750°C. Can be used in humid environments;
- ◆ The dense coating has resistance to oxidation, corrosion, abrasive wear;
- ◆ Anti-oxidation and corrosion resistance are better than WC-Co based coating;
- ◆ Mainly used in iron & steel industry, paper making, pump valves, etc.



Typical cross-section and surface morphology of WC-20Cr-7Ni thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Cr(%)	Fe(%)	O(%)
ZTC48D	5.8-6.4	6-8	20-23	≤0.5	≤0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4851D	WC-Cr ₃ C ₂ -Ni 73/20/7 Agglomerated &sintered	53-20	≥4	≤18	◎ HVOF(JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4853D		45-20	≥4	≤18	
ZTC4852D		45-15	≥4	≤18	
ZTC4881D		45-11	≥4	≤18	◎ HVOF ◎ APS
ZTC4854D		38-10	≥4	≤18	
ZTC4882D		30-10	≥4	≤30	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of WC-20Cr-7Ni coating

Recommended Spray Parameters(HVOF)

Material	WC-20Cr ₃ C ₂ -7Ni
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45~15
Spray Gun	JP5000
Nozzle(Inch)	6
Kerosene(L/h)	23
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	8.0
Powder feed rate(g/min)	70~80
Spraying distance(mm)	340~360

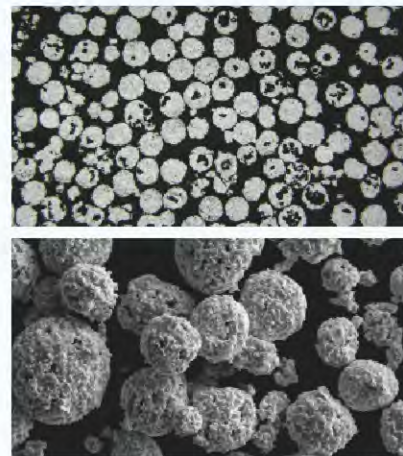
Coatings Properties

Hardness(HV _{0.05})	950~1200
Bonding strength(MPa)	>70 Mpa
Deposited efficiency(%)	35~45 %
Porosity(%)	<1 %

Cr₃C₂-37WC-18NiCoCr THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles;
- ◆ Maximum service temperature:700°C;
- ◆ The coating has excellent resistance to sliding wear, abrasive wear, erosion wear, corrosion wear, cavitation and corrosion;
- ◆ High temperature solid/liquid/gas corrosion resistance;
- ◆ Excellent corrosion resistance for high temperature complex corrosion;
- ◆ Mainly used in pump valve parts, power generation boilers, biomass burning boilers, chemical industry, etc.



Typical cross-section and surface morphology of Cr₃C₂-37WC-18NiCoCr thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Co(%)	Ni(%)	Cr(%)	O(%)	Fe(%)
ZTC49D	7.8-8.4	3-4	10.5-12.5	39.5-42.5	≤0.5	<0.5

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC4951D	Cr ₃ C ₂ -WC-NiCoCr	53-20	≥2.5	—	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC4953D		45-20	≥2.5	—	
ZTC4952D		45-15	≥2.5	—	
ZTC4981D	Agglomerated	45-11	≥2.5	—	◎ HVOF
ZTC4954D	&sintered	38-10	≥2.5	—	
ZTC4982D		30-10	≥2.5	—	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of Cr₃C₂-37WC-18NiCoCr coating

Recommended Spray Parameters(HVOF)

Material	Cr ₃ C ₂ -37WC-18NiCoCr
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45~15
Spray Gun	Jp5000
Nozzle(inch)	6
Kerosene(L/h)	25
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	7.5
Powder feed rate(g/min)	70~80
Spraying distance(mm)	320~380

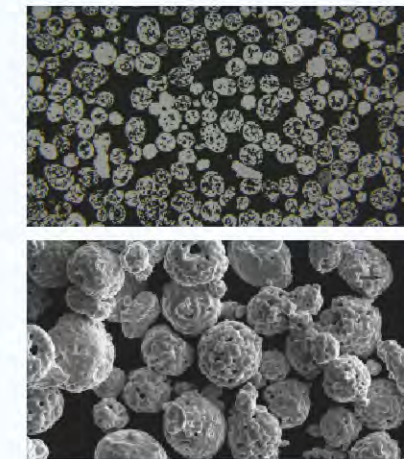
Coatings Properties

Hardness(HV _{0.05})	1050-1250
Bonding strength(MPa)	>60MPa
Deposited efficiency(%)	40-48%
Porosity(%)	<3%

Cr₃C₂-20NiCr THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles;
- ◆ Maximum service temperature:870°C;
- ◆ The coating has excellent resistance to sliding wear, abrasive wear, erosion wear, corrosion wear, cavitation and corrosion;
- ◆ High temperature solid/liquid/gas corrosion resistance;
- ◆ Mainly used in gas turbines, aircraft engines, valve rod, power generation boilers, metallurgical furnace roller and the hydraulic valves, etc.



Typical cross-section and surface morphology of Cr₃C₂-20NiCr thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Cr(%)	O(%)	Fe(%)
ZTC51D	9.7-10.7	15-17	余量	≤0.5	<0.15

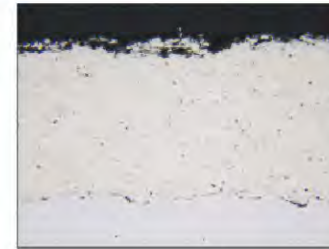
PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC5151D	Cr ₃ C ₂ -NiCr 80/20	53-20	≥2.0	—	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC5153D		45-20	≥2.0	—	
ZTC5152D		45-15	≥2.0	—	
ZTC5181D	Agglomerated & sintered	45-11	≥2.0	—	◎ HVOF
ZTC5154D		38-10	≥2.0	—	
ZTC5182D		30-10	≥2.0	—	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of Cr₃C₂-20NiCr coating

Recommended Spray Parameters(HVOF)

Material	Cr ₃ C ₂ -20NiCr
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45~15
Spray Gun	Jp5000
Nozzle(inch)	8
Kerosene(L/h)	25
Oxygen(L/min)	920
Carrier gas (Ar)(L/min)	8.0
Powder feed rate(g/min)	50~60
Spraying distance(mm)	320~360

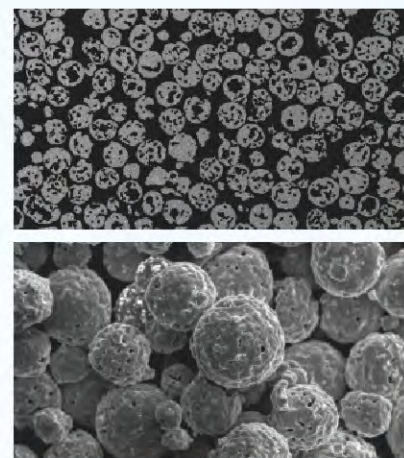
Coatings Properties

Hardness(HV _{0.05})	1100~1250
Bonding strength(MPa)	>50 Mpa
Deposited efficiency(%)	30~45 %
Porosity(%)	<3 %

Cr₃C₂-25NiCr THERMAL SPRAY POWDER

Description

- ◆ Agglomerated and sintered gray/black spherical or nearly spherical particles;
- ◆ Maximum service temperature:870°C;
- ◆ The coating has excellent resistance to sliding wear, abrasive wear, erosion wear, corrosion wear, cavitation and corrosion;
- ◆ High temperature solid/liquid/gas corrosion resistance;
- ◆ Mainly used in gas turbines, aircraft engines, valve rod, power generation boilers, metallurgical furnace roller and the hydraulic valves, etc.



Typical cross-section and surface morphology of Cr₃C₂-25NiCr thermal spray powder

Grade & Chemical Composition

Grade	T.C(%)	Ni(%)	Cr(%)	O(%)	Fe(%)
ZTC52D	9.1-10.1	19-21	Bal.	≤0.5	≤0.15

PS: "D" stands for spherical or nearly spherical thermal spray powder.

Specification & Physical Properties

Spec.	Type	Size Fraction (μm)	Apparent density (g/cm ³)	Flow Rate (s/50g)	Application
ZTC5251D	Cr ₃ C ₂ -NiCr 75/25 Agglomerated & sintered	53-20	≥2.0	—	◎ HVOF (JP5000、JP8000/DJ2600、DJ2700/Jet Kote / Woka Jet/K2)
ZTC5253D		45-20	≥2.0	—	
ZTC5252D		45-15	≥2.0	—	
ZTC5281D		45-11	≥2.0	—	◎ HVOF ◎ APS
ZTC5254D		38-10	≥2.0	—	
ZTC5282D		30-10	≥2.0	—	

PS: Supply customized particle size distribution powder.

Coating Deposited & Properties



Cross-section metallograph of Cr₃C₂-25NiCr coating

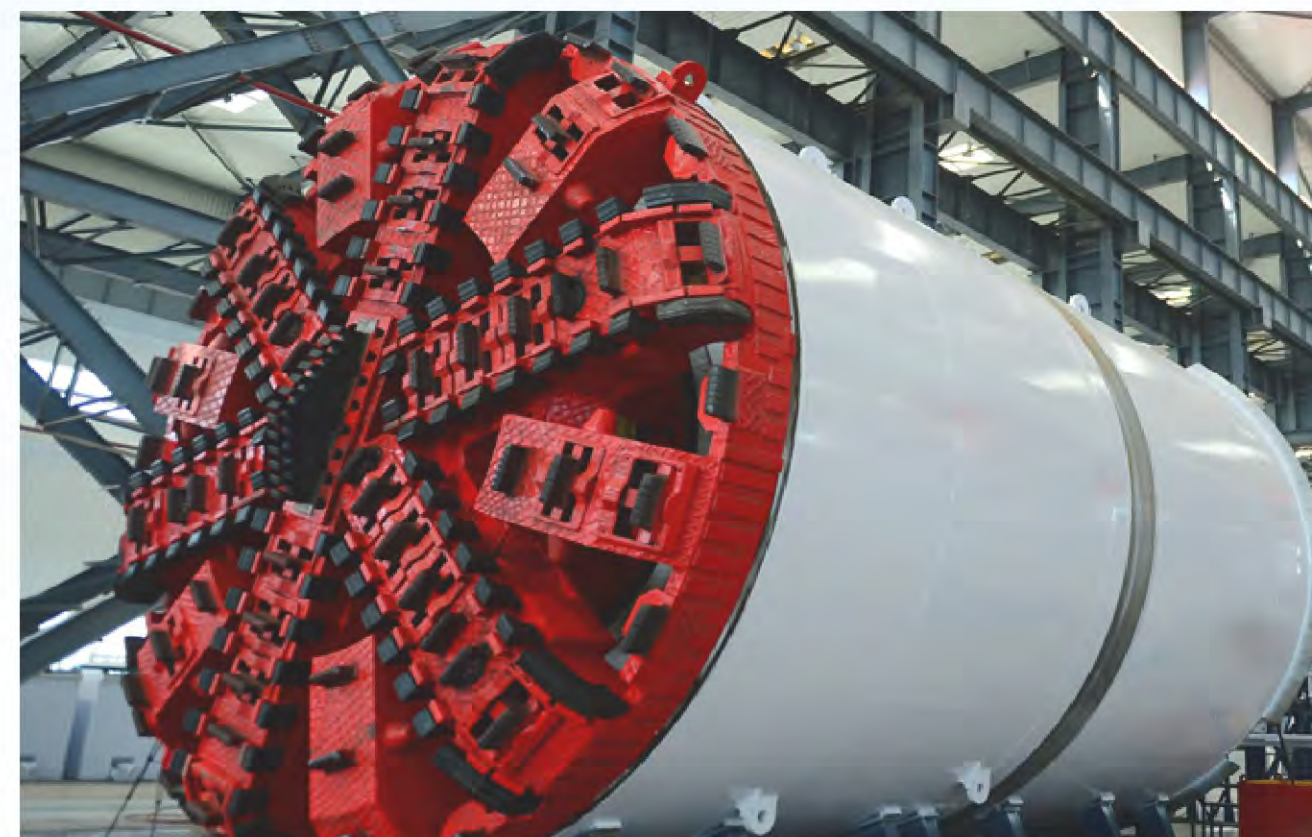
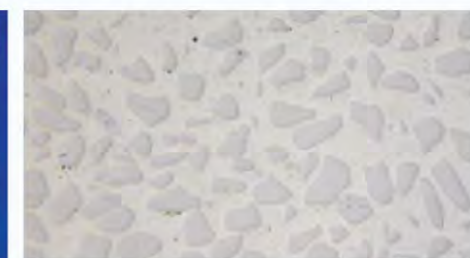
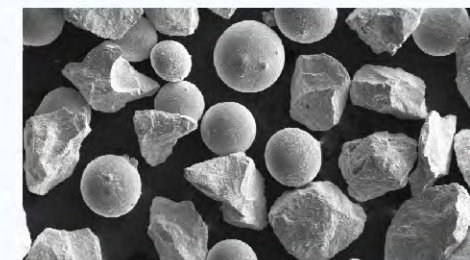
Recommended Spray Parameters(HVOF)

Material	Cr ₃ C ₂ -25NiCr
Manufacturing	Agglomerated & sintered
Size fraction(μm)	45~15
Spray Gun	JP5000
Nozzle(inch)	8
Kerosene(L/h)	25
Oxygen(L/min)	900
Carrier gas (Ar)(L/min)	7.5
Powder feed rate(g/min)	50~60
Spraying distance(mm)	320~360

Coatings Properties

Hardness(HV _{0.05})	900-1200
Bonding strength(MPa)	>50MPa
Deposited efficiency(%)	30-45%
Porosity(%)	<3%

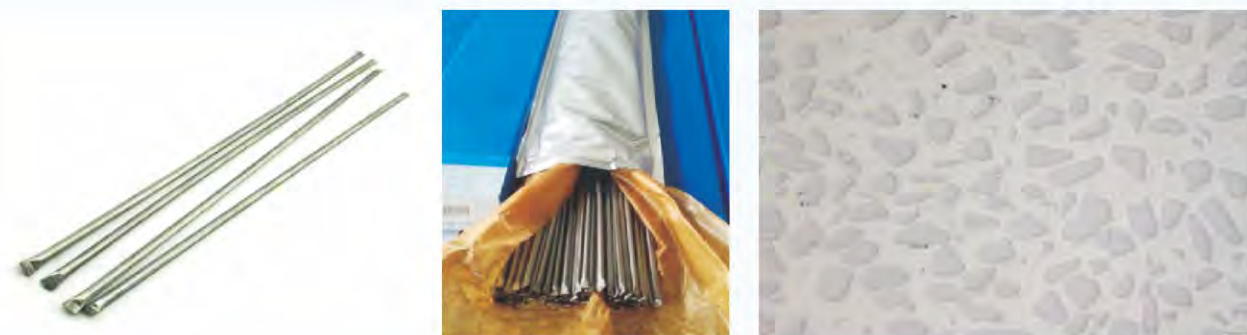
SURFACING/SPRAY&FUSE MATERIAL



CAST TUNGSTEN CARBIDE TUBE WELDING ROD

Description

- ◆ Hard phase (such as Cast WC etc.) are uniformly filled in a low-carbon steel strip to form a tubular welding rod. Cast WC/Casting tungsten carbide is irregularly shaped, it has high hardness($\geq 2000\text{HV}_{0.05}$) and excellent wear resistance. Oxyacetylene flame surfacing welding layer has good wear resistance.
- ◆ Typically used in rode construction, mining, drilling equipment as well as feed grinder hammer etc. Use oxygen-acetylene weak carbonization flame surfacing welding or argon tungsten arc welding.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC61	Cast WC etc.	Low-carbon steel

Specification

Grade	Size(mm)	Appliccation
ZTC6119B	$\Phi 4 \times 600$	Feed grinder hammer
ZTC6119C	$\Phi 5 \times 600$	
ZTC6C11B	$\Phi 4 \times 600$	Rigid body drill wing
ZTC6C11E	$\Phi 6 \times 600$	Rigid drill gauge
ZTC6D11B	$\Phi 4 \times 600$	Cone drill palm bank

CEMENTED CARBIDE PELLET TUBE WELDING ROD

Description

- ◆ Hard phase (such as cemented carbide pellet etc.) are uniformly filled in a low-carbon steel strip to form a tubular welding rod. cemented carbide pellet is composed of tungsten carbide and cobalt. Spherical or nearly spherical particle, high hardness ($1400\text{HV}_{0.05}$ - $1600\text{HV}_{0.05}$), excellent wear resistance and erosion resistance. Oxyacetylene flame surfacing welding layer has good wear resistance.
- ◆ Especially suitable for surface surfacing welding of oil drilling and natural gas geological tools.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC62	cemented carbide pellet etc.	Low-carbon steel

Specification

Grade	Size(mm)	Hardness of welding layer(HRC)
ZTC6219A	$\Phi 3.2 \times 600$	HRC ≥ 60
ZTC6211B	$\Phi 4 \times 600$	HRC ≥ 60
ZTC6211C	$\Phi 5 \times 600$	HRC ≥ 60

FeCrMo ALLOYED WEAR-RESISTANCE FLUX-CORED WIRE

Description

- ◆ The iron-based alloy powders(such as Cr, Mo etc.) are filled into the steel strip and then crimped and drawn into welding wires of different diameters.
- ◆ The deposited metal is a high chromium alloy, which has toughness, crack resistance, peeling resistance, high heat resistance, and high wear resistance after work hardening. The material is easy to polish and cannot be processed.
- ◆ Used in the repair and remanufacturing of crusher rolls, percussion arms, hammers, picks, propellers, fan impellers, screen plates, liners etc.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC63	Chromium-containing iron-based alloy powder	Low-carbon steel

Specification

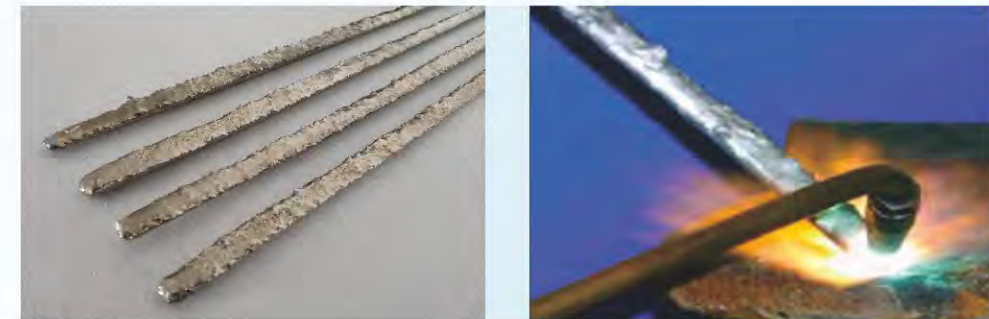
Grade	Diameter(mm)	Hardness of welding layer(HRC)
ZTC63A1	Φ1.6	HRC≥55
ZTC63A2	Φ2.0	HRC≥55
ZTC63A3	Φ2.4	HRC≥55
ZTC63A4	Φ3.2	HRC≥55
ZTC63A5	Φ4.0	HRC≥55

NOTE: Flux cored wire diameter and weight can be tailored with customer requirements.

CEMENTED CARBIDE COMPOSITE ROD

Description

- ◆ The cemented carbide pellets(high hardness and cutting capacity) with copper-based alloy have good wettability.
- ◆ Cemented carbide with sharp edges can be used for working conditions that require cutting , or blunt edge for grinding cutting conditions. Mainly used in oil and gas drilling(fishing tools, centralizers, hole openers), milling tools, agricultural machinery, grain and oil machinery etc.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC64	WC-Co cemented carbide	Copper alloy

Specification

Grade	Cemented carbide size(mm)	Length(mm)
ZTC6455	1.6~3.2	450
ZTC6457	3.2~4.8	450
ZTC6458	4.8~6.4	450
ZTC6460	6.4~8.0	450
ZTC6462	8.0~9.5	450

NOTE: the size of cemented carbide can be customized according to customer requirements.

FLEXIBLE WELDING ROPE

Description

- Flexible welding rope is made of hard-phase(such as Cast WC, Cemented carbide etc.) and self-fluxing nickel-based alloy on the nickel wire by extruding methods. Cast WC / Cemented carbide has high hardness and excellent wear resistance. Self-fluxing nickel-based alloy has spherical or nearly spherical shape, and high wettability with Cast WC / Cemented carbide.
- The welding layer has an extremely effective protection against erosion and abrasive attack. Typically used in mining, drilling, agricultural equipment as well as chemical and food processing industries etc.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC6A	Cast WC, Spherical Cast WC	Nikel-based alloy

Specification

Grade	Diameter(mm)	Packaging(kg)
ZTC6A091B	4	15
ZTC6A091E	6	15
ZTC6A091F	8	15

NOTE: The particle size and category of hard-face can be tailored with customer requirements.

LASER CLADDING/PTA/FLAME SPRAY POWDER

CAST TUNGSTEN CARBIDE/Ni BASED ALLOY

Description

- Blended powders which contain casting tungsten pellets and nickel-based self-fluxing alloy, dark gray pellets. Casting tungsten carbide is irregularly shaped, it has high hardness($\geq 2200\text{HV}0.1$) and excellent wear resistance. Ni-based alloy powder is spherical or nearly spherical, and has good wettability with cast tungsten carbide. PTA surfacing welding layer has good wear resistance and low porosity.
- Mainly used in wear resistance, anti-erosion surface or wear repair for mining extraction, oil drilling, machinery equipment, grain and oil equipment etc.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC67	Cast WC	Nickel-based alloy powder

NOTE: Different nickel-based alloy powder can be tailored with customer requirements. (Ni25, Ni35, Ni45, Ni60 etc.)

Specification

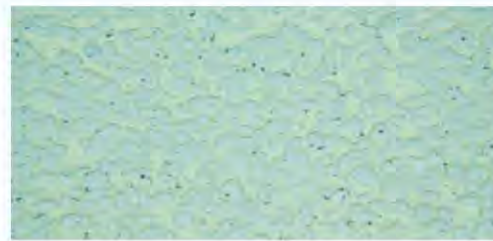
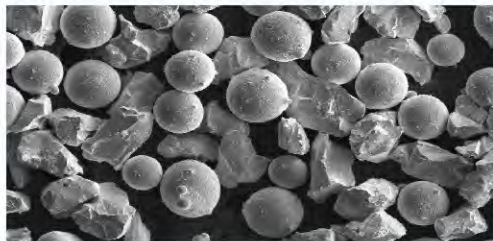
Grade	Composition(wt.%)		Granularity (μm)	Hardness of welding layer(HRC)
	Cast WC	Nickel-based alloy powder		
ZTC673344	40	60	45-150	54-62
ZTC673345	50	50	45-150	56-62
ZTC673346	60	40	45-150	58-62

LASER CLADDING/PTA/FLAME SPRAY POWDER

MACROCRYSTALLITE TUNGSTEN CARBIDE/Ni BASED ALLOY

Description

- ◆ Blended powders which contain macrocrystallite tungsten carbide pellets and nickel-based self-fluxing alloy, dark gray pellets. Macrocrystallite tungsten carbide is irregularly shaped, it has Coarse grains, high hardness($\geq 1700\text{HV}0.1$), impact resistance and excellent wear resistance. Ni-based alloy powder is spherical or nearly spherical, and has good wettability with macrocrystallite tungsten carbide. PTA surfacing welding layer has good wear resistance, low porosity and Excellent impact resistance
- ◆ Mainly used in wear resistance, anti-erosion surface or wear repair for mining extraction, oil drilling, machinery equipment, grain and oil equipment etc.



Grade & Chemical Composition

Grade	Hard-phase	Bonding-phase
ZTC68	Macrocrystallite tungsten carbide	Nickel-based alloy powder

NOTE: Different nickel-based alloy powder can be tailored with customer requirements. (Ni25, Ni35, Ni45, Ni60 etc.)

Specification

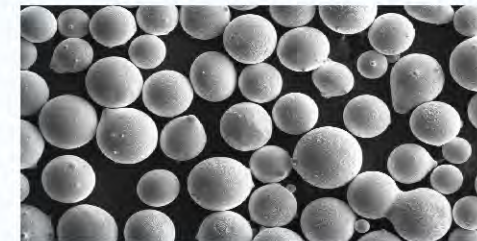
Grade	Composition(wt.%)		Granularity (μm)	Hardness of welding layer(HRC)
	MTC	Nickel-based alloy powder		
ZTC683344	40	60	45-150	50-56
ZTC683345	50	50	45-150	52-56
ZTC683346	60	40	45-150	52-58

LASER CLADDING/PTA/FLAME SPRAY POWDER

SPHERICAL CAST TUNGSTEN CARBIDE/Ni BASED ALLOY

Description

- ◆ Blended powders which contain spherical casting tungsten pellets and nickel-based self-fluxing alloy, dark gray pellets. Spherical casting tungsten carbide is spherical or nearly spherical, it has high hardness($\geq 2700\text{HV}0.1$) and excellent wear resistance. Ni-based alloy powder is spherical or nearly spherical, and has good wettability with cast tungsten carbide. PTA surfacing welding layer has good wear resistance, low porosity and Excellent impact resistance.
- ◆ Mainly used in wear resistance, anti-erosion surface or wear repair for mining extraction, oil drilling, machinery equipment, grain and oil equipment etc.



Grade & Chemical Composition

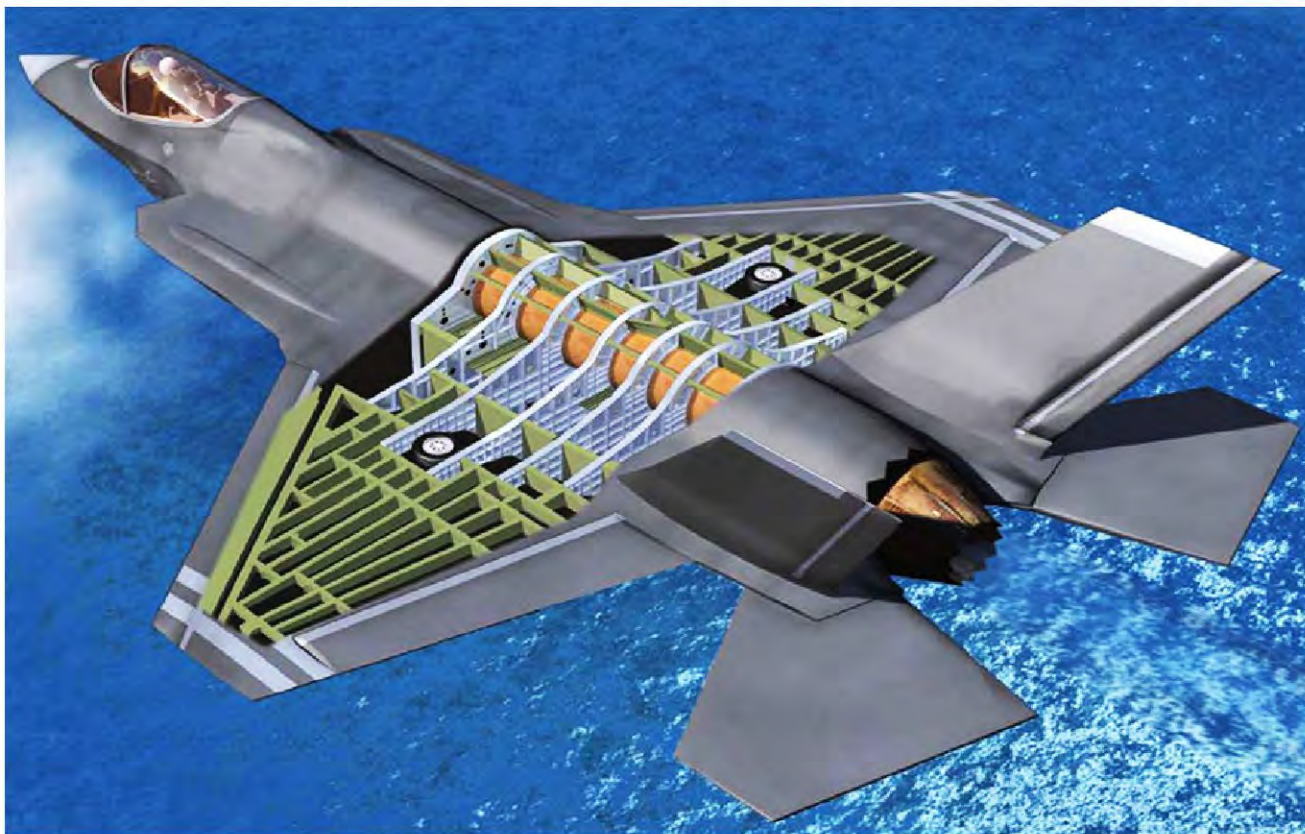
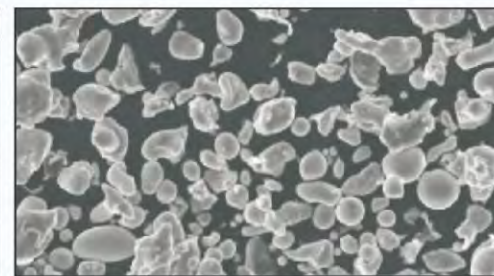
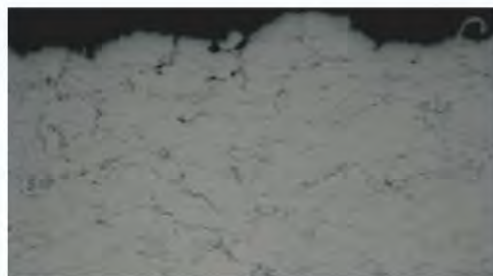
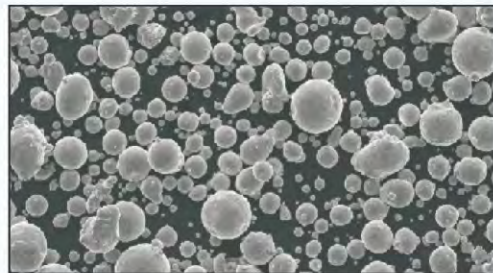
Grade	Hard-phase	Bonding-phase
ZTC69	Spherical casting tungsten carbide	Nickel-based alloy powder

NOTE: Different nickel-based alloy powder can be tailored with customer requirements. (Ni25, Ni35, Ni45, Ni60 etc.)

Specification

Grade	Composition(wt.%)		Granularity (μm)	Hardness of welding layer(HRC)
	SCTC	Nickel-based alloy powder		
ZTC683344	40	60	45-150	50-56
ZTC683345	50	50	45-150	52-56
ZTC683346	60	40	45-150	52-58

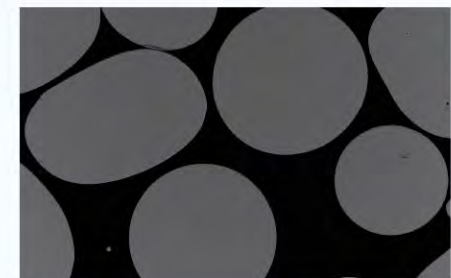
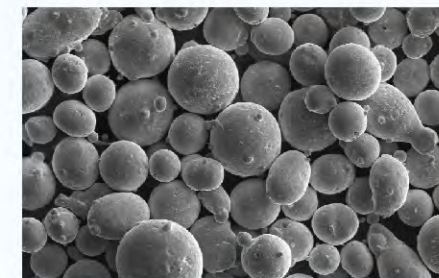
METAL ALLOY MATERIAL



NICKLE BASED SELF-FLUXING ALLOY POWDER

Description

- ◆ The powder is prepared by gas or water atomization of molten metal alloy that is smelted in a vacuum medium frequency furnace. It is made up of spherical or subsphaeroidal silver-gray particles with strong deoxidization, slagging ability and good matrix wettability.
- ◆ It is mainly used in plasma transferred arc (PTA), spray welding and High-velocity oxygen-fuel spraying (HVOF) etc. The powder has abrasion resistance, corrosion resistance, high temperature resistance and other properties. So it is suitable for various equipment components' surface strengthening, surface protection and surface repair, and widely used in petroleum, chemical, mining and other industries.
- ◆ Particle Size: 0.015mm-0.150mm. (Providing powder with different particle size distribution according to customer's requirement)



Grade & Chemical Composition

Grade	Chemical Composition							Type of alloy powder
	Ni	Cr	B	Si	C	Fe	O	
ZTCM15101	Bal.	5.0~10.0	1.0~2.0	2.0~3.5	≤0.2	≤4.0	≤0.08	Ni25
ZTCM13302	Bal.	7.0~10.0	1.5~2.5	2.0~3.5	≤0.4	≤4.0	≤0.08	Ni35
ZTCM15204	Bal.	11.0~15.0	2.0~3.0	2.0~3.5	0.3~0.6	≤5.0	≤0.08	Ni45
ZTCM13905	Bal.	14.0~17.0	2.5~4.0	3.5~5.0	0.5~0.9	≤5.0	≤0.08	Ni55
ZTCM13306	Bal.	15.0~20.0	3.0~4.5	3.0~5.0	0.5~1.1	≤5.0	≤0.08	Ni60

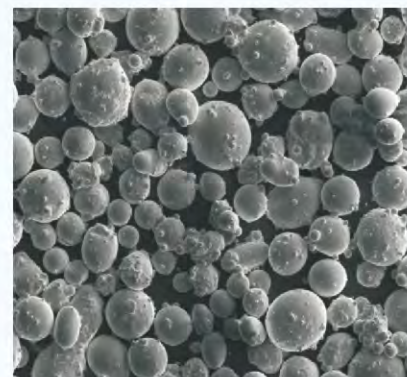
Specification & Physical Properties

Spec.	Powder Size (μm)	Flow Rate (s/50g)	Apparent Density (g/cm ³)	Type of alloy powder
ZTCM15101	-53+20	≤20	≥4.0	Ni25
ZTCM13302	-150+45	≤20	≥4.0	Ni35
ZTCM15204	-45+15	≤20	≥4.0	Ni45
ZTCM13905	-106+45	≤20	≥4.0	Ni55
ZTCM13306	-150+45	≤20	≥4.0	Ni60

SUPER ALLOY POWDER (MCrAlY)

Description

- The powder is prepared by gas atomization of molten metal alloy that is smelted in a vacuum medium frequency furnace. It is made up of spherical or subsphaeroidal silver-gray particles with good resistance to high temperature oxidation and corrosion resistance properties. It can be used as high temperature corrosion resistant coating and thermal barrier coating substrate.
- It is mainly used in atmospheric plasma spraying (APS), low pressure plasma spraying (LPPS) and High-velocity oxygen-fuel spraying (HVOF) etc. It is suitable for the surface protection of various metal materials, and widely used in component protection of aerospace, steam turbine and other industries.
- Particle Size: 0.011mm-0.105mm. (Providing powder with different particle size distribution according to customer's requirement)



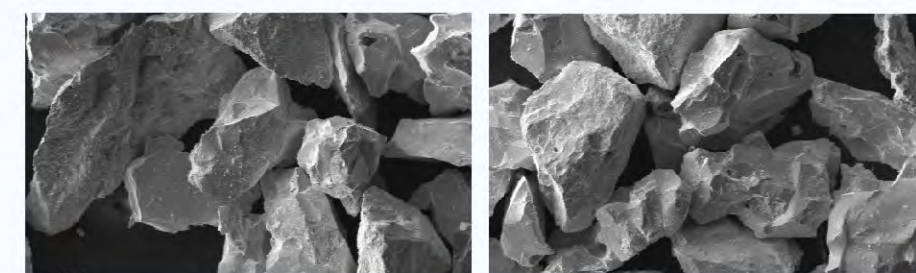
Grade & Chemical Composition

Grade	Chemical Composition					
	Ni	Cr	Co	Al	Y	O
ZTCM45201	Bal.	21.0~23.0	—	9.0~11.0	0.8~1.2	≤0.05
ZTCM45102	Bal.	13.0~21.0	18.0~28.0	10.0~15.0	0.1~0.8	≤0.05
ZTCM45103	29.0~35.0	18.0~24.0	Bal.	5.0~11.0	0.1~0.8	≤0.05
ZTCM45205	Bal.	—	—	4.5~5.5	—	≤0.05

Specification & Physical Properties

Spec.	Powder Size (μm)	Flow Rate (s/50g)	Apparent Density (g/cm ³)	Type of alloy powder
ZTCM45201	53~20	≤20	≥3.7	NiCrAlY
ZTCM45102	53~20	≤20	≥3.7	NiCoCrAlY
ZTCM45103	45~15	≤20	≥3.7	CoNiCrAlY
ZTCM45205	45~15	≤20	≥3.7	Ni5Al

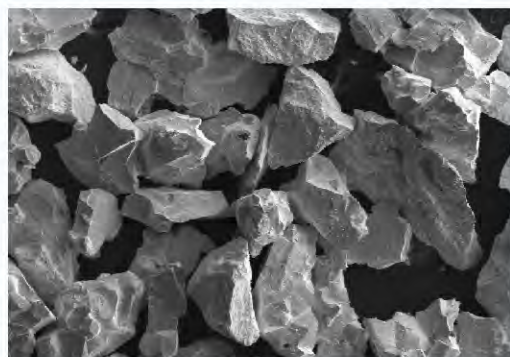
MATRIX POWDER FOR PDC BITS



ZTC71 MATRIX POWDERS FOR DIAMOND BITS

Description

- ZTC71 matrix powders is mainly composed of macrocrystalline tungsten carbide and Nickel powder. After special treatment, control and screening, the different powders are prepared according to different application requirements of customers, which are mainly used for infiltration of high-performance diamond matrix drill bits and parts, TC bearings. ZTC71 matrix powder has good wear resistance, corrosion resistance, impact resistance and a high penetration absorption value.



SEM morphology of ZTC71 matrix powder



Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)							
	Fe	T.C	F.C	Si	Ni	Ti	Ta	Nb
ZTC71	≤0.3	3.2-4.1	≤0.06	≤0.1	0-15	≤0.08	≤0.03	≤0.03

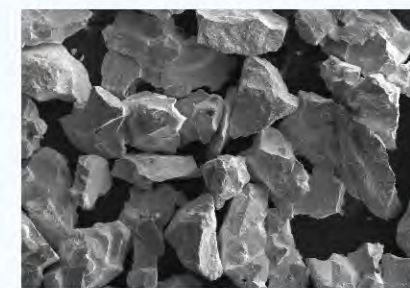
Specification & Physical Properties

Grade	Particle size(mesh)	Transverse Rupture Strength(MPa)	Impact toughness(J/cm ²)
ZTC7128	-80+200	650-800	2.0-2.8
ZTC7127	-70+400	700-800	2.0-3.0
ZTC7126	-60+325	920-1000	3.5-5.1

ZTC72 MATRIX POWDERS FOR DIAMOND BITS

Description

- The ZTC72 series is specifically designed for matrix materials of PDC bits. It is a type of matrix powder products with superior erosion resistance, abrasion resistance and good infiltration performance.



SEM morphology of ZTC72 matrix powder



Grade & Chemical Composition

Grade	Chemical Composition(Wt, %)							
	Fe	T.C	F.C	Mo	Ni	Ti	Ta	Nb
ZTC7232K1	≤3.2	5.2-5.6	≤0.04	≤0.1	-	≤0.08	≤0.03	≤0.03
ZTC7232K2	2.5-3.0	5.7-6.0	≤0.04	≤0.05	-	≤0.03	≤0.03	≤0.03
ZTC7226K3	≤1.0	5.4-5.9	≤0.04	≤0.1	1.5-2.5	≤0.08	≤0.03	≤0.03

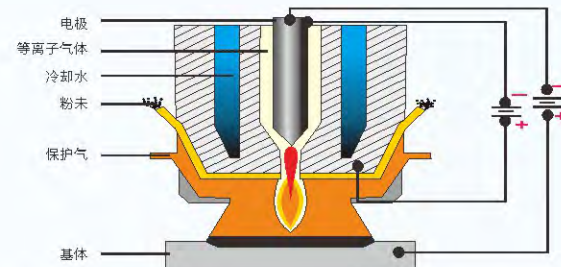
Specification & Physical Properties

Grade	Particle size(mesh)	Apparent Density(g/cm ³)	Tap Density(g/cm ³)	Transverse Rupture Strength(MPa)	Macro-hardness (HRC)
ZTC7232K1	-80+325	7.3-8.5	9.5-10.0	586-862	34-42
ZTC7232K2	-80+325	7.2-8.2	10.5-10.9	655-1000	38-42
ZTC7226K3	-60+325	7.2-8.2	9.1-9.8	620-931	32-40

Classification & Application

Grade	Characteristic	Application
ZTC7232K1	Mainly composed of cast tungsten carbide and macrocrystalline tungsten carbide and used by most drill bit factories. Through controlling particle size,the powder has a higher loose density and tap density; it has superior wear and erosion resistance that other tungsten carbide matrix powders.	Mainly used in erosion-resistant, wear-resistant and impact-resistant infiltration drill products.
ZTC7232K2	Mainly composed of cast tungsten carbide and macrocrystalline tungsten carbide;The optimized particle size distribution enables the product to have excellent wear resistance after infiltration.	Mainly used in harsh working conditions that are easy to wear and erosion.
ZTC7226K3	Mainly composed of cast tungsten carbide,macrocrystalline tungsten carbide and nickel powder; Through controlling particle size,the powder has a higher loose density and tap density; it has superior wear and erosion resistance that other tungsten carbide matrix powders.	Mainly used in erosion-resistant, wear-resistant and impact-resistant infiltration drill products.

HARD-FACING TECHNOLOGY



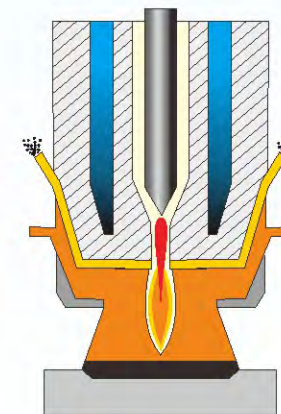
Hard surface materials are combined with the surface of parts or matrix materials mainly by built-up welding, spray welding or melting and infiltration methods, which can make components to have wear resistance, high temperature resistance and corrosion resistance. So it will extend products' lifespan, reduce consumption & production costs, and improve work efficiency.

BUILT-UP WELDING TECHNOLOGY

Built-up welding is to use gas welding, plasma transfer arc welding (PTA) or electric welding processes to weld metal with wear resistance, corrosion resistance and other special properties onto the surface of metal materials or parts. It is usually used to repair wear and crack parts of the workpiece. Thus the repaired workpiece can be strengthened and have the wear resistance, heat resistance, corrosion resistance, and etc. As an economical and rapid process for material surface modification, built-up welding has been widely used in more and more fields, among which oxyacetylene flame welding and plasma arc welding are most widely used.

OXYACETYLENE FLAME WELDING

Oxyacetylene flame welding is the most common method of built-up welding. This process can melt the welding rod by oxyacetylene flame and coat it onto the surface of workpiece to form a hard layer. The process equipment is simple, only oxygen, acetylene and flame gun are needed. This method requires that the surface of the workpiece must be cleaned up and the workpiece must be preheated to an appropriate temperature before welding. If the weld pool is too large, it is easy for the welding layer to have pores. Therefore minimize the weld pool during surfacing, so as to avoid the deposition of tungsten carbide particles to the bottom of the weld layer or solid solution with the matrix material due to too long melting time.



PLASMA TRANSFER ARC WELDING

Plasma transfer arc welding (PTA) can be used for processing special valves, drill bits, mining parts, mold, shaft, and etc. Although this built-up welding equipment is relatively complex and high cost, the welding layer thickness can be controlled. The grains of welding layer are uniform and neat, and combined with the matrix by metallurgy way. However the control parameter of welding is complex, so the operators must have high operation skills.

CONTACT US

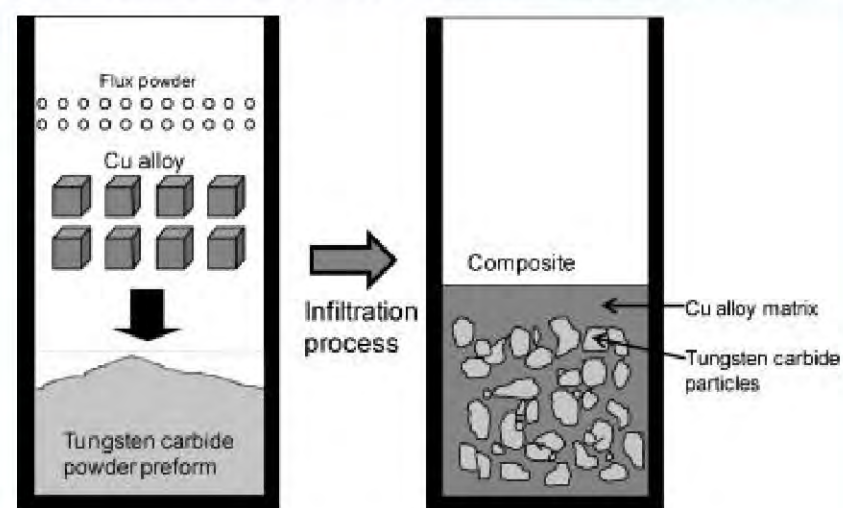
■ THERMAL SPRAY TECHNOLOGY

The principle of thermal spraying technology is to use a heat source to heat metallic or nonmetallic materials to molten or semi-molten state, then to use high speed air flow to blow the molten or semi-molten materials into tiny particles, and those tiny particles are injected onto the treated workpiece to form a solid coating, which can get different excellent physical and chemical properties such as hardness, wear resistance, corrosion resistance, heat resistance, oxidation resistance, heat insulation, insulation, conductive, sealing, sterilization, anti-microwave radiation and etc. Thermal spraying technology can not only repair the discarded parts but also strengthen and protect the new parts that will be extended their lifespan. However, the thermal spray coating are mechanically combined with the matrix, which should be avoided the impact environment. At present, the commonly used thermal spraying technologies include flame spraying (FS), high-velocity oxygen-fuel spraying (HVOF), plasma spraying (PS), cold spraying (CS) and so on. Nowadays with the rapid development of spraying technology, it is moving towards the direction of automation and intelligence.



■ INFILTRATION TECHNOLOGY

The infiltration technology is a method, which relies on the external liquid metal wetting the porous powder body. Under the action of capillary force, the liquid metal flows along the pores between particles until the pores are completely filled. And it will form a compact workpiece after the infiltration cooling. This method is commonly used in oil industry to manufacture PDC drill bits.



■ Main Sales and Service Offices

Zigong International Marketing LLC.

Mobile: 440-364-0330

Email: xdsun@zigonginternational.com

Texas Office: 4560 Kendrick Plaza Dr, Suite 100 Houston, Texas 77032: United States

Tel: 281-987-1001

Fax: 281-987-1002

Ohio Office: 38500 Chardon Road, Willoughby Hills, Ohio 44094: United States

Tel: 440-269-8160

Fax: 440-269-8174

Zigong Cemented Carbide Imp. & Exp. Co., Ltd.

No. 111, Renming Road, Zigong, Sichuan, P.R. China

Tel: 0086-0813-5516646

Fax: 0086-0813-5200405

Email: yangzj@zgccc.com

Web: www.zgccc.com

Zigong Tungsten Carbide Co, Ltd.

No. 6 Rongchuan First Branch, High-Tech Industrial Zone, Zigong City, Sichuan Province, China

Tel: 0086-0813-5517957 0086-0813-5516356 0086-0813-5517977

Fax: 0086-0813-5516356

Email: wangli@zgccc.com

web: www.zgccc.com