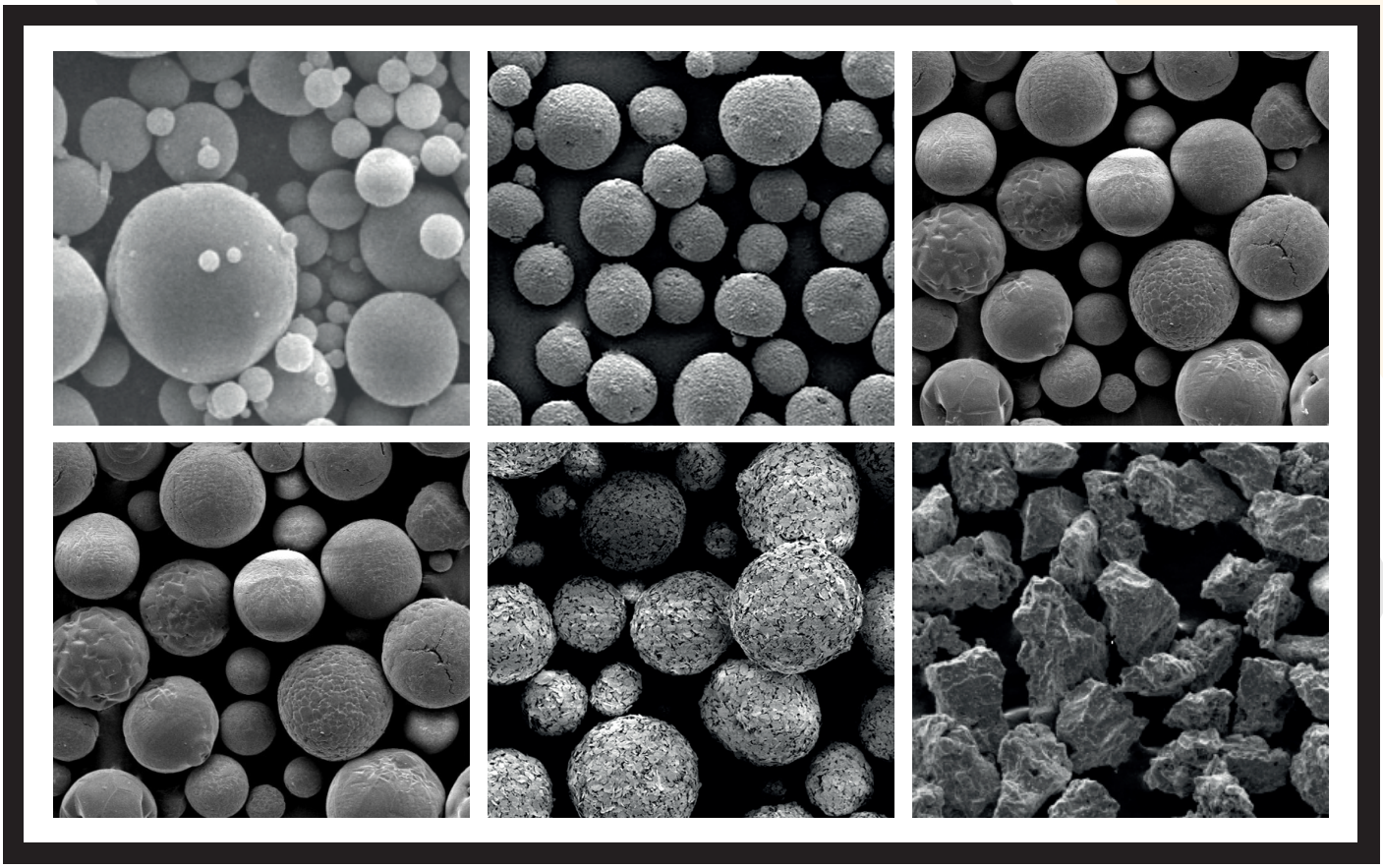
DFSINGENIERIA

Diseño Fabricación Soluciones de Ingeniería



Harfacing materials and solutions

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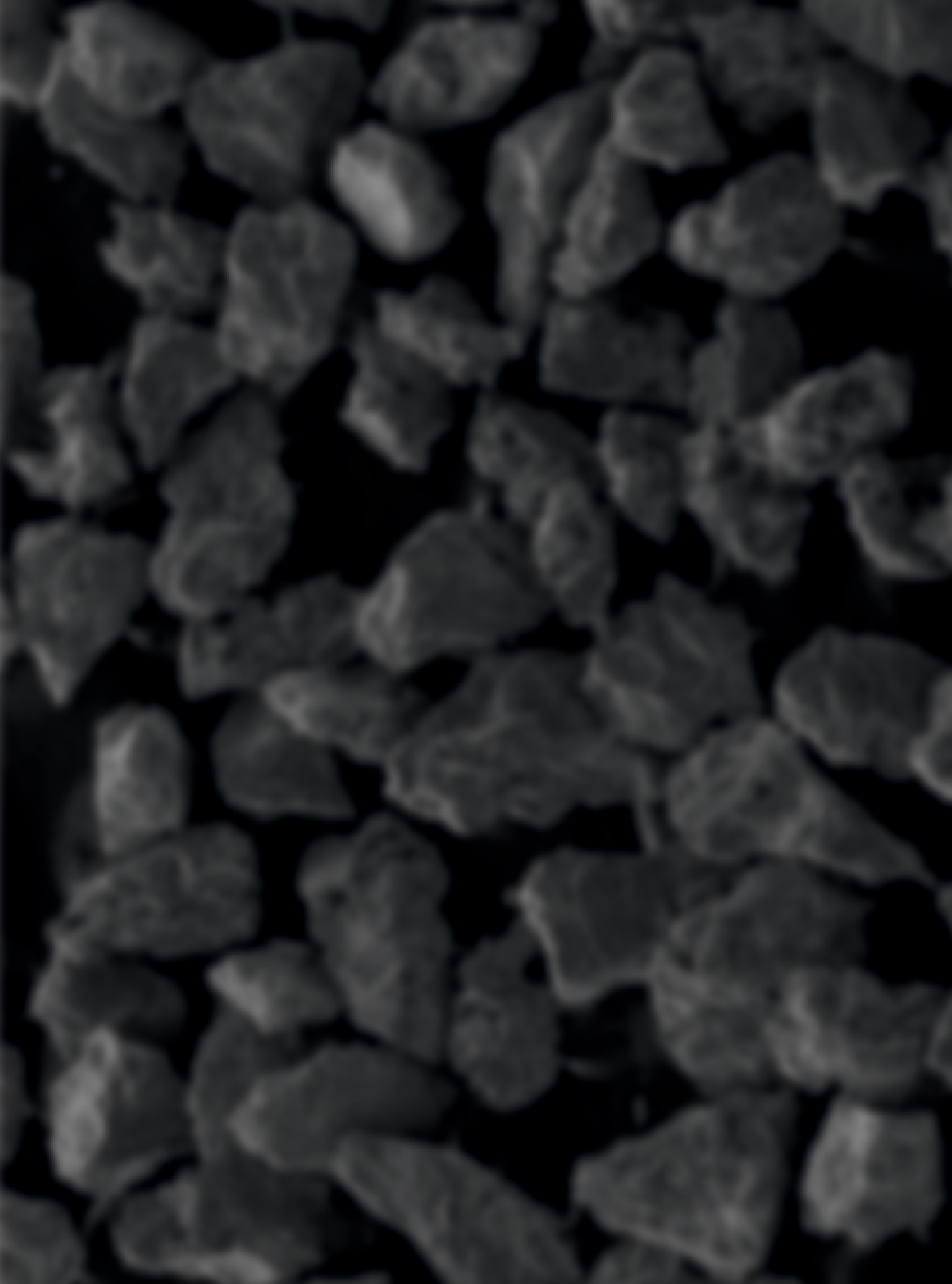
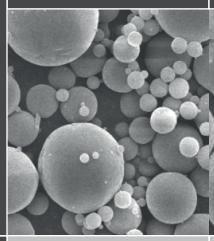
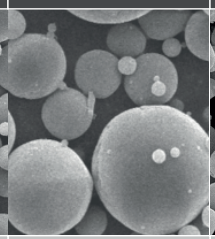
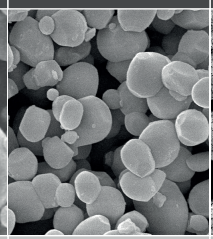
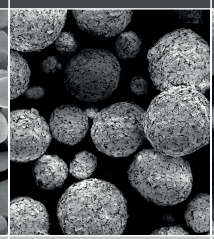
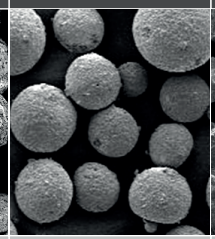
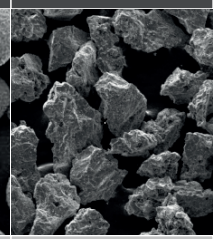
https://dfsingenieria.com



Distributions Portfolio

We offer selection of high-quality materials and material combinations which are precise and reliable in quality.

POWDER TYPE	Water atomized	Gas atomized	Blended	Dense coated	Agglomerated & Sintered	Fused & Crushed
						
PROCESS	Atomizing with water into a chamber and subsequent drying	Atomizing molten metal or alloy with high pressure gas (N2, Ar) stream into a chamber	Mixing of 2 or more powders	Reduction of a metal salt solution	Spray drying of a suspension consisting of fine powders and organic binder and subsequent sintering	Fusing in arc furnaces, Carbon tube followed by cooling and crushing
CHARACTE-RISTICS	Ball-like, Dense, increased oxygen content compared to gas atomized	Spherical, dense, high purity, low oxygen content	Different morphologies, segregation possible	Blocky or irregular composite	Spherical, Porous, Constituents, Homogenously, Distributed	Blocky, irregular, dense
EXAMPLES	Ni60A Ni60CuMo	Stainless steel Co-base	NISF+FTC NISF+WC-Co	Ni-Graphite Ni-Al Ni-Cr-Al	WC-10C04Cr WC-17Co WC-12Co	FTC A1203 Cr2O3

Customized Service

We not only provide these products list on this brochure, we also can distribution different kinds of powder as customers' requirements by our different equipments.

Spray Drying

Spray drying can be used for production of some special products which have character of good fall flow, spherical particle shape, and coarse size. We make fine powder which have bad flow ability, become coarse and spherical powder, if you have one or more than one kind of powder, we can do it according to your size. We will blend and mill it, make sure this mixture is suit for spray drying, then we spray dry it and put it in vacuum furnace to sinter it, we can adjust the app. density by controlling the sinter temperature. Just let us know your demand, we will discuss it internal with our engineer team, and design the production for you.

Atomized

With the rapid movement of fluid (dielectric) shock or other metal or alloy broken into small droplets of liquid, solid powder preparation method followed by condensation. Atomization is the best way to produce completely alloyed powder, the product is called pre alloy powder. Each particle of the powder not only has the advantages of uniform chemical composition with the same set of molten alloys, but due to the rapid solidification and refinement of the crystal structure; eliminating macro segregation of the second phase. Atomized include water atomized and gas atomized two kinds. Usually, the inert gas atomized powder particles were round, the oxygen content was the lowest (100 *10), can be directly used for hot forming technology (such as hot isostatic pressing) made of dense product. Water atomized powder particles are irregular in shape, high oxygen content (higher than 600 *10), must be approved by annealing treatment, but it has very good compression performance, can be cold pressure forming, sintering and mechanical parts.

Sinter and Crushed

Sinter and crushed is a traditional techniques for production of high melt point metal alloy. We will use the carbon tube furnace to melt two or more than two kinds of metal or ceramic. Then crystallize it. When the compound comes out from the furnace it is ingot shape, we will crush and sieve it to make sure the size is qualified.

Dense Coated

Coated powder is a composite powder, which a different components powder coated on the particle surface. We always produce dense coated powders by chemical method. Such as NiAl powder.

DFS | CARBIDES

For wear protection

CARBIDES			For wear protection
	Grain Size in um or Specification	**Chemistry/Powder Type**	**Typical Properties and Applications**
WC-Co 88	5-30 10-38 15-45 20-53 45-90	WC-Co 88/12 Agglomerated & Sintered	• HVOF, APS, HVAF • Medium WC • Hard, dense coatings with good abrasion, erosion and sliding wear resistance • Smooth coatings with fine microstructure and high bond strengths • Low oxidation and corrosion resistance • Used for general wear, paper rolls, wire drawing equipment, fan and compressor blades, pump seals and housing, machine parts, etc.
WC-Co 83	5-30 10-38 15-45 20-53 45-90	WC-Co 83/17 Agglomerated & Sintered	• HVOF, APS • Coarse WC • Higher ductility than WC-Co 88/12 due to higher Co content • Hard, dense coatings with low sliding wear and high impact resistance • Protection against fretting and abrasion • Low oxidation and corrosion resistance • Used in aviation applications (fan and compressor blades, mid-span stiffeners, fire tracks, etc.), extrusions, glass industry, paper mill rolls, pump parts, wire drawing equipment, etc.
WC-CoCr/A	5-30 15-45	WC-CoCr 86/10/4 Agglomerated & Sintered	• HVOF • Sub-micron WC • Extremely smooth surface finish achievable
WC-CoCr/F	5-30 10-38 15-45 20-53 45-90	WC-CoCr 86/10/4 Agglomerated & Sintered	• HVOF, HVAF • Fine WC • CoCr matrix shows higher corrosion and abrasion resistance than Co matrix • Useable in water based solutions and wet corrosive environments • Smooth coatings with fine microstructure and high bond strengths • Hard chrome replacement • Used for paper rolls, ball valves, hydraulic cylinders, compressor shafts, mud pump rotors.
Cr3C2-NiCr-75	5-30 10-38 15-45 20-53 45-90	Cr3C2-NiCr 75/25 Agglomerated & Sintered	• HVOF • Medium carbide • For dense oxidation and erosion resistance coatings • Good cavitation resistance • Hot gas corrosion resistance • Used for valves stems, turbine components, fuel rod mandrels, etc.
WcCoCr-Cr/C	5-30 10-38 15-45 20-53 45-90	45/15 µm Sintered & Crushed	• HVOF, atmospheric plasma spraying (APS) • Max. operating temperature 500ºC • CoCr matrix shows higher corrosion and abrasion resistance than Co matrix • Hard chrome replacement • Used for cylinder rods, ball valves, oil field equipment, steel process rolls, etc.

DFS | CARBIDES

For wear protection

CARBIDES			For wear protection
	Grain Size in um or Specification	**Chemistry/Powder Type**	**Typical Properties and Applications**
WC-CrC-Ni	5-30	WC–CrC–Ni 73/20/7 Agglomerated & Sintered	• HVOF • Higher oxidation and corrosion resistance than pure WC–Ni–based coatings • Smooth coatings with fine microstructure and high bond strengths • Used for gate valves, etc.
	10-38		
	15-45		
	20-53		
	45-90		
WC-Ni-Ag	5-30	WC–Ni 90/10 Agglomerated & Sintered	• HVOF • Better corrosion protection than WC–Co • Superior deposition efficiency • Used for fan blades, pump components, dies, valve seats, oil field apparatus • and other erosion, abrasion and sliding wear applications
	10-38		
	15-45		
	20-53		
	45-90		
WC-Ni-Cr	5-30	WC–Ni 90/10 Sintered & Crushed	• HVOF • Better corrosion protection than WC–Co • Superior deposition efficiency • Used for fan blades, pump components, dies, valve seats, oil field apparatus • and other erosion, abrasion and sliding wear applications
	10-38		
	15-45		
	20-53		
	45-90		
Cr3C2-NiCr-80	5-30	Cr3C2–NiCr 80/20 Agglomerated & Sintered	• HVOF • Higher hardness than 75/25 ratio
	10-38		
	15-45		
	20-53		
	45-90		

DFS | COBALT BASED

For PTA / laser hardfacing / TIG / Oxy-acetylene

COBALT BASED	Grain Size in um or Specification	Chemistry / Powder Type	Cross reference St.	Typical Properties and Applications
Co-1	-180 +53 µm -53 +15 µm	C: 24.5 Cr: 30.00 Si: 1.00 W: 13.00 Ni: 3.0 Fe: 3.0 Mn<1.0 Mo<1.0 Go Rem. Gas Atomized	Grade 1	• Cobalt based gas atomized alloys • Exhibit excellent wear, galling, corrosion and erosion resistance • At high temperatures they retain these properties • Showing a high degree of hardness • Applicable to valve seat insets, bearing, cutter edge rotary ring etc.
Co-6	-180 +53 µm -53 +15 µm	C: 12.0 Cr: 29.00 Si: 1.00 W: 4.50 Ni: 3.0 Fe: 3.0 Mn<1.0 Mo<1.0 Go Rem. Gas Atomized	Grade 6	• Cobalt based gas atomized alloys • Exhibit excellent wear, galling, corrosion and erosion resistance • At high temperatures they retain these properties • Showing a high degree of hardness • Applicable to valve high temperature valve, turbine blade etc.
Co-12	-180 +53 µm -53 +15 µm	C: 14.0 Cr: 30.00 Si: 1.30 W: 8.50 Ni: 3.0 Fe: 3.0 Mn<1.0 Mo<1.0 Go Rem. Gas Atomized	Grade 12	• Cobalt based gas atomized alloys • Exhibit excellent wear, galling, corrosion and erosion resistance • At high temperatures they retain these properties • Showing a high degree of hardness • Applicable to high temperature, pressure valves, sawteeth, screw flights etc.
Co-21	-180 +53 µm -53 +15 µm	C: 0.25 Cr: 27.00 Si: 1.00 W: 0.20 Ni: 3.0 Fe: 3.0 Mn<1.0 Mo<1.0 Go Rem. Gas Atomized	Grade 21	• Cobalt based gas atomized alloys • Exhibit excellent wear, galling, corrosion and erosion resistance • At high temperatures they retain these properties • Showing a high degree of hardness • Applicable to fluid valve, brass casting die, valve seat etc.
Co-T800	-180 +53 µm -53 +15 µm	C: 0.25 Cr: 27.00 Si: 1.00 W: 0.20 Ni: 3.0 Fe: 3.0 Fe<1.50 Mo: 28.00 Go Rem. Gas Atomized	T 800	• Cobalt based gas atomized alloys • Exhibit excellent wear, galling, corrosion and erosion resistance • At high temperatures they retain these properties • Showing a high degree of hardness • Applicable to fluid valve, brass casting die, valve seat etc.

DFS | COBALT BASED		for / TIG / Fuse welding	
R-Co1	Diameter: 3.2–8.0 mm Length: 1 meter/as your requirement	C -2.45 Cr-30.00 Si-1.00 W-13.00 Ni<3.00 Fe<3.00 Mn<1.00 Mo<1.00 Co-Bal	• Valvet sear inserts, bearing, cutter edge, rotary ring, etc.
R-Co6		C-1.40 Cr-29.00 Si-1.30 W-4.50 Ni<3.00 Fe<3.00 Mn<1.00 Mo<1.00 Co-Bal	
R-Co12		C-1.40 Cr-30.00 Si-1.30 W-8.50 Ni<3.00 Fe<3.00 Mn<1.00 Mo<1.00 Co-Bal	
R-Co21		C-0.25 Cr-27.00 Si-1.00 W-0.20 Ni<3.00 Fe<2.00 Mn<1.00 Mo<5.50 Co-Bal	

DFS | OXIDES

For wear protection, chemical, resistance and heat protection

OXIDES		For wear protection chemical resistance and heat protection	
	Grain Size in um or Specification	**Chemistry/Powder Type**	**Typical Properties and Applications**
Cr203	140–270 mesh 15–45 um 10–20 um 10–35 um	Cr2O3 99.5% Fused & Crushed	• APS • Hard, corrosion and wear resistant ceramic coatings • Insoluble in acids, alkalis and alcohol • Used for anilox rolls in printing machines, pump seals areas, wear rings, etc.
Cr203-TiO2	140–270 mesh 15–45 um 10–20 um 10–35 um	Cr2O3–TiO2 75/25 Fused & Crushed	• APS • Lower hardness but better toughness than pure Cr2O3 coatings • Used in wear applications where more toughness is needed
ZrO2–Y2O3	140–270 mesh 15–45 um 10–20 um 10–35 um	ZrO2–Y2O3 93/7 Fused & Crushed	• APS • Used for thermal barrier coatings, protection of graphite sheets, etc.
Al2O3	140–270 mesh 15–45 um 10–20 um 10–35 um	Al2O3 Fused & Crushed	• APS • Resistance against corrosion, abrasion, erosion and sliding wear • Excellent dielectric properties • Stable in most acids and alkalis
Cr2O3–TiO2–SiO2	140–270 mesh 15–45 um 10–20 um 10–35 um	Cr2O3–TiO2–SiO2 92/3/5 Fused & Crushed	• APS • Hard, dense and wear resistant coatings • Good corrosion resistance • Higher mechanical shock resistance than pure Cr2O3
Al2O3–TiO2-97	140–270 mesh 15–45 um 10–20 um 10–35 um	Al2O3–TiO2 97/3 Fused & Crushed	• APS • Grey alumina for use as corrosion, abrasion, erosion and sliding wear resistant coatings • Typical applications in textile machines for guiding and handling of thread, rolls in paper industry, etc.

DFS | OXIDES

For wear protection, chemical, resistance and heat protection

OXIDES	For wear protection chemical resistance and heat protection		
	Grain Size in um or Specification	**Chemistry/Powder Type**	**Typical Properties and Applications**
Al2O3-TiO2-20	140–270 mesh	Al2O3-TiO2 20/80 Blended	• APS • Compared with Al203-TiO2(97/3) Fused & Crushed, less hard and corrosion resistant.
	15–45 um		
	10–20 um		
	10–35 um		
Al2O3-TiO2-60	140–270 mesh	Al2O3-TiO2 60/40 Blended	• APS • Lower hardness • wear and erosion resistant • Good grindability • Polished coatings with reduced wettability • Used in textile industry, household applications(pans), etc.
	15–45 um		
	10–20 um		
	10–35 um		
TiO2	140–270 mesh	TiO2 Fused & Crushed Black	• APS • Moderate wear resistance compared with Al203 or Al203-TiO2 • Soluble in alkailis and sulfuric acid • Decorative black coatings • Slightly conductive
	15–45 um		
	10–20 um		
	10–35 um		
ZrO_2–Y_2O_3 93/7	140–270 mesh	ZrO_2–Y_2O_3 93/7 Fused and Crushed (White)	• APS • Blocky particle shape • For dense and vertically cracked coatings
	15–45 um		
	10–20 um		
	10–35 um		
MgO–ZrO_2	140–270 mesh	MgO–ZrO_2 22/78 Fused and Crushed	• APS • Blocky particle shape • For dense and vertically cracked coatings
	15–45 um		
	10–20 um		
	10–35 um		

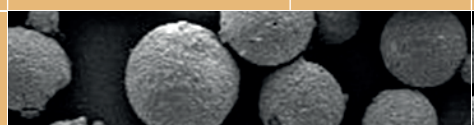
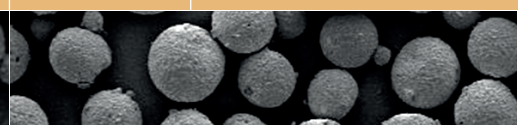
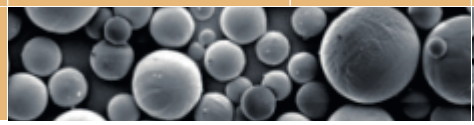
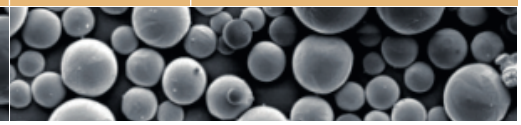
DFS | NiSF

For wear and corrosion protection

NiSF					For wear and corrosion protection
	Grain Size in um or Specification	Chemistry / Powder Type	Cross reference		Typical Properties and Applications
			Praxair	Metco	
NiSF-70	-106 +45 μm -53 +15 μm -45 +15 μm	Cr16 Si 4.1 Fe4.5 B3.1 C 0.8 Ni Rem Atomized	1257H	15E 15F Diamalloy 2001	• Self-fluxing type alloy • Good corrosion and wear properties • High hardness with low friction coefficient • Applicable to repair and reinforce the wire drawing roller and CAM, plunger etc.
NiSF-65	-125 +53 μm -53 +22 μm 	Cr16 Si 4.1 Fe 4 B 4 Cu 3.2 Mo 3.0 C 0.8 Ni Rem Atomized		16C	• Self-fluxing type alloy • Good corrosion and wear properties • High hardness with low friction coefficient • Applicable to repair and reinforce the fix, impeller, piston valve, valve etc.
NiSF-90	-125 +45 μm 	Cr1 Si 3 Fe 5 B 1 C 0.1 Ni Rem Atomized		Deloro 28	• Self-fluxing type alloy • Good corrosion and wear properties • Specialized in glass mould of the spray welding and repair of cast iron workpieces

DFS | SPRAY MOLYDENUM

For wear protection

DFS | SPRAY MOLYDENUM					For wear protection
DFS	Grain Size in um or Specification	Chemistry/Powder Type	Density	Flow	Production Progress
DFS20-310.275 DFS20-310.175	20–75 75–150	Spherical Mo	1.3–3.0g/cm³	<50s/50g	Spray Drying
					
DFS20-320.275 DFS20-320.175	20–75 75–150	Spherical Mo	<6.0g/cm³	<20s/50g	Plasma Rotating Atomization
					
DFS20-311.670 DFS20-311.610	7–60 mesh 60–100 mesh	Irregular	1.5–3.5g/cm³	25–40s/50g	Sinter

DFS | COATEDS

For wear protection, chenical resistance and heat protection

COATEDS			For wear and corrosion protection
	Grain Size in um or Specification	Chemistry/Powder Type	Typical Properties and Applications
DFS20 012.175	170–325mesh	Ni5Al	• Self priming powder, high temperature oxidation resistance, good processing performance, repair the bow and arrow
DFS20 013.115	115–325mesh	Ni18Al	• Oxidation wear, primer coatings
DFS20 015.115	115–325mesh	Ni20Al	• Primer coatings
DFS20 022.155	150–325mesh	Ni20Cr	• Anti corrosion coating, cosmetic powder
DFS20 023.155	150–325mesh	Ni16Cr8Fe	• Repair of corrosion resistant, nickel base alloy workpieces
DFS20 024.115	115–325mesh	Ni9Cr5Al5Mo	• Coating adhesive, good processing performance, oxidation and corrosion
DFS20 025.115	115–325mesh	(Ni20Cr)6Al	• Anti corrosion coating, ceramic backing
DFS20 401.115	115mesh–20um	Ni17Cr5Al3CoY2O3	• Self adhesive, anti corrosion, thermal barrier coating layer
DFS20 402.115	115–325mesh	Ni18Cr7Al5Mo	• Good resistance to oxidation and corrosion resistance, adhesive coating
DFS20 403.175	170–325mesh	Ni5Mo5.5Al	• Self adhesive, strong toughness, anti erosion, anti shock, protect the parts, bearing seal and valve
DFS20 405.150	15–50um	Ni31B9C	• Wear resistant coating, more wear-resistant than Al2O3 Cr3C2 and TiC metal ceramic
DFS20 408.155	150–325mesh	Ni30Cu	• Corrosion resistance, high temperature resistance, good thermal conductivoty, used for machine tool
DFS20 410.155	150–325mesh	Ni20-75Al203	• Corrosion resistance, high temperature resistance, oxidation resistance, thermal shock resistance
DFS20 420.240	200–400mesh	Ni25MoS2	• Antifriction coating, good lubricity, good chemical and thermal stability, is applied to the dynamic sealing, low friction material
DFS20 430.240	200–400mesh	Ni(20–25)Carbide	• High hardness, wear resistance, Nai Chongshuo, for wear and cutting material
DFS20 450.155	150–325mesh	Ni50Cr	• High temperature oxidation resistance, corrosion resistance to sulfur and vanadium, used in oil fired boiler corrosion, corrosion resistance

Particle Size Conversion Chart

A.S.T.M MESH	MICRON	IN MM
5	4000	4.00
7	2812	2.81
10	2057	2.05
12	1680	1.68
14	1405	1.40
16	1240	1.20
18	1003	1.00
20	850	0.85
25	710	0.71
35	500	0.50
40	420	0.42
45	355	0.35
50	300	0.30
60	250	0.25
70	210	0.21
80	180	0.18
100	150	0.15
120	125	0.12
140	105	0.10
170	90	0.09
200	75	0.075
230	63	0.063
270	53	0.053
325	45	0.045
400	37	0.037
500	25	0.025
625	20	0.020

DFSINGENIERIA

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