

追求·卓越



军工品质 | 稳如磐石

泉州天智合金材料科技有限公司

TIZ Advanced Alloy Technology Co.,Ltd.

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泉州天智合金材料科技有限公司
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泉州天智合金材料科技有限公司位于福建省泉州市洛江区科技工业园，于2013年12月31日注册成立。公司以特种合金材料研发及规模化生产为主营业务，属福建省泉州市重点引进高科技项目，军工后备企业。

公司研发团队拥有材料学博士生导师2名、博士2名、硕士5名，分别来自于日本九州工业大学、北京科技大学、中南大学。拥有合金材料领域已授权发明专利6项，另有多项发明专利正在申报之中。

公司获得GJB9001B-2009武器装备质量管理体系国家军用标准认证，通过ISO9001质量管理体系认证，实行ERP系统管理。并组建特种合金及纳米材料研发中心，实验室面积超过1200平米，配套完善的合金材料实验制备仪器、分析检测仪器及材料应用评测装备，承担福建省泉州市重大科技项目多项。

目前公司的主要产品以特种合金粉末为主，包括：

- 1.低松比、超细金刚石工具用改性合金胎体粉末多个品种；
- 2.高性能软磁粉末：FeSi、FeNi、FeSiCr、MPP等多系列品种；
- 3.小尺寸、高精度、复杂结构成形如3D打印、MIM用超细不锈钢粉末；
- 4.纳米Ag、Cu、Ni、Co单质粉末，纳米W-Cu、Ag-Cu-Sn、W-Ni-Fe等合金粉末，以及纳米炭黑等多个品种；

- 5.精滤、超滤多孔材料用合金粉末；

- 6.其他定向研发供应的细晶、非晶组织全致密材料用合金粉末；

泉州天智合金材料科技有限公司自成立以来，得到了粉末冶金行业新老客户及多位前辈、朋友的大力支持和帮助，获得了良好的发展。目前公司具备各类合金粉末3000吨/年的产能，并在持续扩大之中。

我们将竭尽全力，用最优秀的产品、最诚挚的态度、最细致的服务回报广大客户和行业朋友们，感谢您对我们的关心和支持！

TIZ Advanced Alloy Technology Co., Ltd. is located at Quan zhou city, Fujian province, China. We are focusing on the mass production and technology researches of special alloy materials. TIZ is an innovation technology company highly regarded and introduced by Fujian province aggressively, and this is also a military production company. Our professional R&D division includes materials science professors(Ph.D supervisor of USTB), Dr. of synthetic chemistry of materials(USTB), Dr. of materials science(KIT Japan), two masters of materials science(USTB), master of electronic engineer, master of materials science(CSU). Six invention patents authorization had been granted and our many new technology in alloy materials are prepared be patented.

TIZ is exciting "national military standard" and ERP manage system and had passed ISO9001 certification. 7 sections are set: R&D section, Sales section, Producing section, Quality Control section, Finance section, Materials section, Human Resources section. TIZ also constituted our Special Alloy and Nano-materials Research Center for the development of new products and for many special materials research project. At present, main productions of TIZ are special alloy powders, there are:

- 1.Low apparent density, modified super-fine alloy powders for diamond cutting tools.
- 2.Soft magnetic powders:FeSi, FeNi, FeSiCr, MPP others.
- 3.Super-fine stainless powders for small size, high-precision, irregular shape 3D print and MIM.
- 4.Nano-scale Ag, Cu, Ni, Co powders, Nano-scale W-Cu, Ag-Cu-Sn, W-Ni-Fe nano-scale core particles.

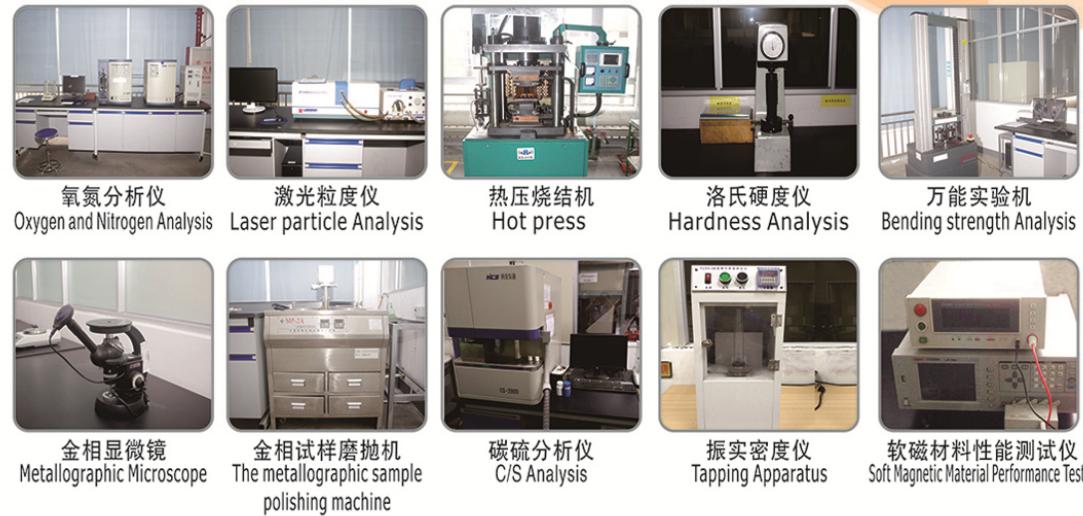
- 5.Alloy powders for Refined filtration, Ultrafiltration porous materials.

6. Other alloy powders for fine crystal, amorphous materials with 100% density for directional researches.

TIZ had got so many supports from our dear customs and friends since our company was established. Because of this, We are growing rapidly and obtained good reputations. Now, TIZ has the capability of 3000 tons/year including all kinds of alloy powders, and we are doing our best to expand for the future. We are ready to supply the best powders and meticulous service with most sincere attitude to our customs. We are waiting and grateful for your contact and supports.



先进的检测设备 Advanced Testing Equipment



完善的体系保证 Perfect Quality Management System



军工体系认证证书 Military Quality Management System Certification

软磁合金粉末产品名录

Soft Magnetic Powders Manual

一、主要产品系列 Main product categories

Fe-Si 系合金 Fe-Si-Cr 系合金 Fe-Ni 系合金 Fe-Ni-Mo 系合金 Fe-Cr 系合金 Fe 基非晶
Fe-Si Series Fe-Si-Cr Series Fe-Ni Series Fe-Ni-Mo Series Fe-Cr Series Amorphous

二、软磁粉末产品及特性总览 Product specifications and physical parameters

牌号 Designation		化学成分 Chemical Components wt%	D50 um	氧含量 Oxygen content wt%	松装密度 Apparent density g/cm ³	振实密度 Tap Density g/cm ³	Ms emu/g
FeSi Series	FeSi3.5	Si 3.2~3.8 Fe Bal.	3~6 10~13 20~23	0.4~0.6 0.3~0.45 0.15~0.3	1.9~2.5 2.6~3.2 3.0~3.4	3.3~3.6 4.0~4.4 4.2~4.5	205 205 205
	FeSi6.5	Si 6.2~6.8 Fe Bal.	10~13	0.3~0.45	2.6~3.2	4.0~4.4	191
	FeSiCr-A	Si 3.0~4.0 Cr 4.0~5.0 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.0~4.4	192
	FeSiCr-B	Si 2.0~3.0 Cr 4.0~5.0 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.0~4.4	188
	FeSiCr-C	Si 4.0~5.0 Cr 5.0~6.0 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.0~4.4	179
FeNi Series	FeSiCr-D	Si 6.0~7.0 Cr 4.0~5.0 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.0~4.4	177
	FeSiCr-E	Si 4.0~5.0 Cr 4.0~5.0 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.0~4.4	176
	High Flux	Ni 49~51 Fe Bal.	10~13	0.15~0.3	2.6~3.2	4.5~4.8	-
	MPP	Mo 2~3 Fe 16~17 Ni Bal.	10~13	0.15~0.3	2.6~3.2	4.5~4.8	-
	AMP-1	Si Cr B Fe Bal.	3~6 20~23	0.30~0.60 0.10~0.25	1.9~2.5 3.5~4.0	3.3~3.6 4.4~4.8	150 150
Iron-based amorphous	AMP-2	Si B Fe Bal.	20~23	0.10~0.25	3.5~4.0	4.4~4.8	155
	AMP-3	Si B Fe Bal.	20~23	0.10~0.25	3.5~4.0	4.4~4.8	175

注：可根据客户需求提供不同规格粒度软磁粉末；

Remark: Powders With Different Chemical Composition And Particle Size Distribution Are Available According To Customers' Requirements.

FeSi 粉体特性

FeSi Series

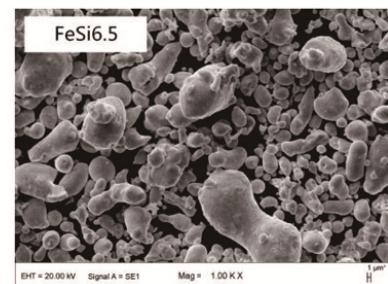
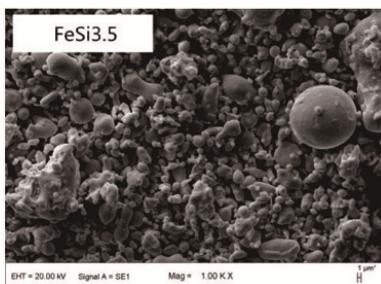
化学成分 Chemical components

品种 Category	成分 Element content (wt%)							
	Si	Cr	Al	Mn	C	S	P	Fe
FeSi3.5	3.2-3.8	0.7-0.9	≤0.02	≤0.05	≤0.02	≤0.008	≤0.008	Bal.
FeSi6.5	6.2-6.8	≤0.1	≤0.02	≤0.08	≤0.02	≤0.02	≤0.02	Bal.

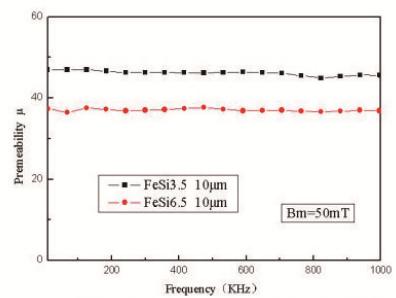
物理特性 Powders physical characteristics

品种 Category	激光粒度 Laser particle size/ μm			振实密度 Apparent density g/cm ³	松装密度 Apparent density g/cm ³	氧含量 Oxygen content wt%
	D10	D50	D90			
FeSi3.5 (-500 mesh)	3~5	10~13	27~30	3.9~4.4	2.5~3.5	0.3~0.45
FeSi6.5 (-500 mesh)	3~5	10~13	27~30	3.9~4.4	2.5~3.5	0.3~0.45

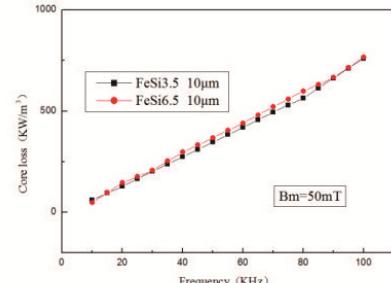
粉体形貌 Powders microscopic morphology



软磁特性 Powders soft magnetic properties



FeSi3.5/6.5 合金粉磁导率随频率变化曲线图
Variation of permeability with the frequency of FeSi3.5/6.5 alloy powders



FeSi3.5/6.5 合金粉磁损耗随频率变化曲线图
Variation of core loss with the frequency of FeSi3.5/6.5 alloy powders

主要用途 Main application

FeSi 合金磁粉芯具有较好的直流叠加特性、高频低损耗及高的频率稳定性等，特别适用于低压大电流、大功率密度及高频化的技术要求；主要运用到电力有源功率补偿电路、太阳光伏系统的电源滤波器；也可以制成高功率密度集成电感器，大量应用到 POL 负载点和 VRM 电力电源中。

FeSi alloy powders have excellent DC-bias characteristics, low-loss in high-frequency and frequency stability features, especially have good performances under low-voltage high-current, high power density and high frequency condition. It is mainly applied to source power compensation circuits, solar photovoltaic system power filter, it also could be made into high power density integrated inductor for POL loading point and VRM power applications.

FeSiCr 粉体特性

FeSiCr Series

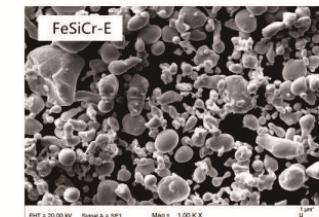
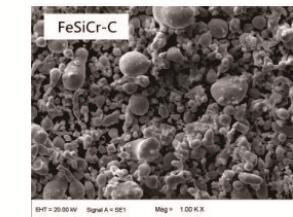
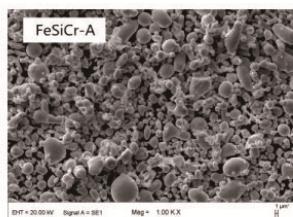
化学成分 Chemical components

品种 Category	成分 Element content (wt%)							
	Si	Cr	Al	Mn	C	S	P	Fe
FeSiCr-A	3.0-4.0	4.0-5.0	≤0.02	≤0.06	≤0.02	≤0.02	≤0.02	Bal.
FeSiCr-C	4.0-5.0	5.0-6.0	≤0.02	≤0.2	≤0.025	≤0.04	≤0.04	Bal.
FeSiCr-E	4.5-5.5	4.5-5.5	≤0.02	≤0.06	≤0.025	≤0.02	≤0.02	Bal.

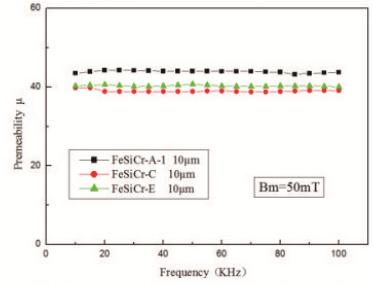
物理特性 Powders physical characteristics

品种 Category	激光粒度 Laser particle size/ μm			振实密度 Apparent density g/cm ³	松装密度 Apparent density g/cm ³	氧含量 Oxygen content wt%
	D10	D50	D90			
FeSiCr-A	3~5	10~13	27~30	4.0~4.4	2.5~3.5	0.15~0.3
FeSiCr-C	3~5	10~13	27~30	4.0~4.4	2.5~3.5	0.15~0.3
FeSiCr-E	3~5	10~13	27~30	4.0~4.4	2.5~3.5	0.15~0.3

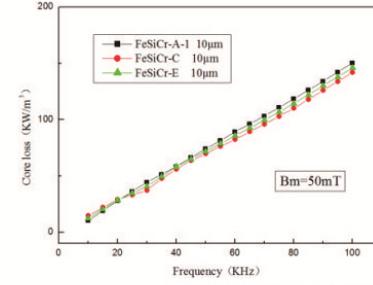
粉体形貌 Powders microscopic morphology



软磁特性 Powders soft magnetic properties



Variation of permeability with the frequency of FeSiCr-A/C/E alloy powders



Variation of core loss with the frequency of FeSiCr-A/C/E alloy powders

主要用途 Main application



铁硅铬(FeSiCr)不锈钢粉末具有高含量、耐饱和电流特性好、绝缘阻抗高及不生锈等优点，性能优良，广泛应用于各个工业领域和科技领域，具体应用如：1、小功率变压器/高频功率变压器；2、高性能电子元器件，如滤波器、电容器、互感器、扼流圈等；3、开关电源；4、磁屏蔽材料；5、吸波材料。FeSiCr alloy with high inductance, excellent DC superposition characteristics, also owns excellent insulation resistance and anti-rust, etc. It's widely applied to various industrial fields and scientific domains, and the specific applications are as follows: 1.Low power / high frequency power transformer; 2.High-performance electronic components, such as filters, inductors, transformers, chokes, etc. 3.Switching power supply; 4.magnetic shielding materials; 5.absorbing materials.

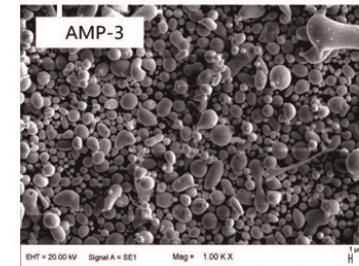
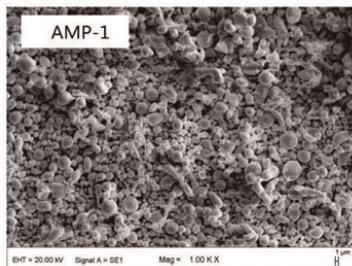
化学成分 Chemical components

品种 Category	成分 Element content (wt%)							
	Si	Cr	B	Mn	C	S	P	Fe
AMP-1	6.5-7.0	2.5-3.5	2.5-3.5	≤0.1	0.7-0.8	≤0.01	≤0.02	Bal.
AMP-3	2.5-3.5	-	3.0-4.0	≤0.1	0.5-0.7	≤0.01	≤0.02	Bal.

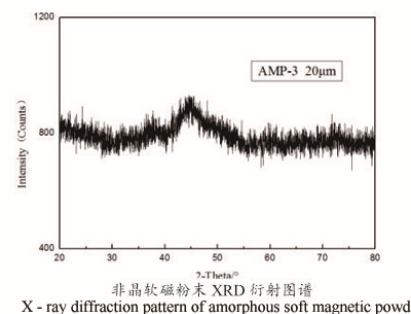
物理特性 Powders physical characteristics

品种 Category	激光粒度 Laser particle size/ μm			振实密度 Apparent density g/cm ³	松装密度 Apparent density g/cm ³	氧含量 Oxygen content wt%
	D10	D50	D90			
AMP-1	2~3	4~6	8~20	3.3-3.6	1.9-2.5	0.3-0.6
AMP-3	2~3	4~6	8~20	3.3-3.6	1.9-2.5	0.3-0.6

粉体形貌 Powders microscopic morphology



特性分析 Diffraction analysis



X-ray diffraction pattern of amorphous soft magnetic powder

主要用途 Main application

非晶合金具有较好的软磁性能，其磁导率和电阻率高，矫顽力小，对应力不敏感，不存在由晶体结构引起的磁晶各向异性，具有耐蚀和高强度等特点。软磁性能比较理想，广泛应用于电力电子技术、通讯、开关电源、传感器以及抗电磁干扰部件。

Fe-based amorphous alloys with good corrosion resistance and high strength have excellent magnetic properties, due to its high permeability and resistivity, low coercive force, insensitive to stress and without the intrinsic magneto-crystalline anisotropy caused by the crystal structure. Because of its superior magnetic properties, the Fe-based amorphous are widely used in power electronics, communications, switch power supply, sensor and anti-electromagnetic interference components.

粉末特性 Powders characteristic

- TIZ alloyed powders with accurate and homogenous chemical composition, low oxygen content are suitable for sintering, which also guarantees a great smoothness surface of the parts;
- TIZ alloyed powders with a narrow particle size distribution and relatively fine powders size which ensure the higher density of the sintered parts, makes it more suitable for the thin-walled parts and micro-injection molding;
- TIZ alloyed powders with excellent properties such as good spherical shape, scattered with less agglomeration, higher apparent and tap density and good liquidity, achieves a greater feeding load and higher dimensional accuracy of the sintered pieces.

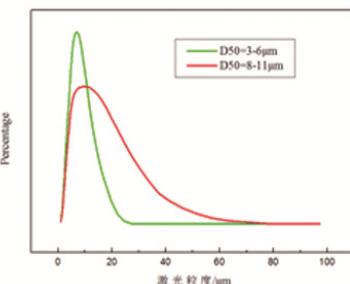
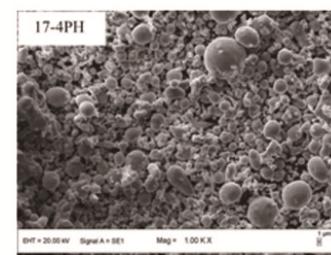
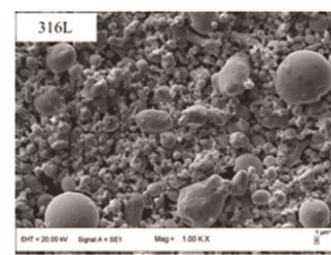
- 合金粉末化学成分准确、均匀，氧含量低，粉末烧结活性好，制件表面光洁度高；
- 粉末颗粒细，且粒度分布范围窄，制件烧结致密度高，适用于薄壁件、微型件注射成型；
- 粉末球形度好，颗粒分散，团聚少。粉末松装、振实密度高、流动性好，喂料装载量大，烧结件尺寸精度高。

化学成分 Chemical components

品种Category	C	Si	Mn	Ni	Cr	Cu	Nb	Mo	Fe
不锈钢粉 Stainless steel powders	316L	≤0.03	≤1.00	≤1.50	12.0~15.0	16.0~18.0	~	~	2.0~3.0
	304L	≤0.03	≤1.00	≤1.50	9.0~13.0	18.0~20.0	~	~	~
	17-4PH	≤0.07	≤1.0	≤1.00	3.0~5.0	15.5~17.5	3.0~5.0	0.15~0.45	~
	440C	0.95~1.20	≤1.00	≤1.00	≤0.2	16.0~18.0	~	0.75	~
	Fe-2%Ni	N/A	≤0.35	≤0.5	1.5~2.5	≤0.2	~	~	~
	HK-30-A	0.35~0.50	≤1.75	≤1.5	19.0~22.0	24.0~26.0	~	1.2~1.5	~
低合金钢 Alloy steel powders	4140	0.4~0.6	0.2~0.4	0.5~0.8	≤0.3	0.9~1.2	≤0.3	~	0.15~0.25
	8620	0.12~0.23	~	~	0.4~0.7	0.4~0.6	~	~	~

注：本公司可根据客户的具体要求，制备不同粒度水平、不同牌号的产品，同时也可为客户定向开发新产品；
Remark: Powders With Different Chemical Composition And Particle Size Distribution Are Available According To Customers' Requirements.

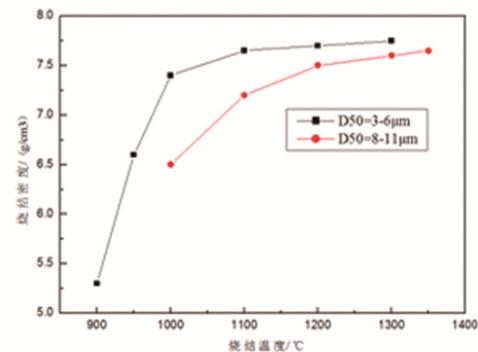
粉体形貌及粒度分布 Powders microscopic morphology and laser particle size distribution



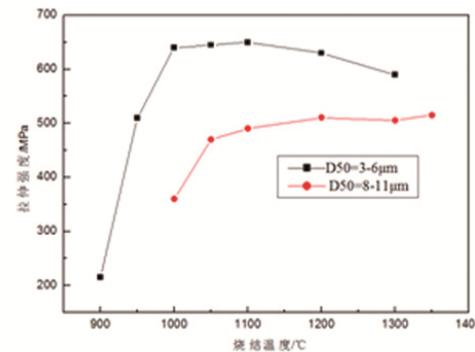
物理特性 Powders physical characteristics

激光粒度 Laser particle size/ μm			氧含量 Oxygen content wt%	振实密度 Tap density g/cm^3	松装密度 Apparent density g/cm^3
D10	D50	D90			
2~3	4~6	8~10	0.3~0.6	3.3~3.6	1.9~2.5
3~4	8~11	25~27	0.25~0.3	4.2~4.5	2.5~3.0
				4.7~4.95	2.8~3.3
3~4	8~11	25~27	0.25~0.3	4.2~4.5	2.5~3.0
				4.7~4.95	2.8~3.3

粉末烧结特性 Powders sintering characteristics



316L不同粒度粉末烧结密度随烧结温度变化曲线图
Variation of sintering density with sintering temperature
of 316L alloy powders with different particle size



316L不同粒度粉末烧结件拉伸强度随烧结温度变化曲线图
Variation of tensile strength with sintering temperature
of 316L alloy powders with different particle size

主要用途 Main application



天智公司采用独创超微粉末球化制备技术及粉末材料表面改性等工艺，制备的MIM粉末已在到国际先进水平，现已稳定供货3-6μm、8-11μm两款不同粒度不锈钢粉末，公司年产能达2000余吨。公司产品主要应用于：1、3C类电子产品；2、汽车、机械等行业的各类型结构零部件；3、医疗器械、钟表行业。

TIZ company adopts the original ultrafine spherical preparation technology and surface modification process. The production quantity of 3-6μm, 8-11μm two specifications of stainless powder have achieved 100tons/month and we can supply for our customs stably. TIZ company can reach an annual capacity of more than 2,000 tons. Stainless powders are mainly used in: 1. 3C electronic products; 2. Automotive, machinery and other industries of various types of structural parts; 3.Medical equipment, watches and clocks industry

