

北京金煤创业科技股份有限公司
Beijing JinMei Entrepreneur Co., Ltd.

金属基陶瓷复合铸造技术

MMC - Metal matrix ceramic insert casting technology

公司简介

Company profile

北京金煤创业科技股份有限公司于2006年成立，2016年改制为股份制公司并成功登陆新三板。公司总部坐落在中国北京中关村科技园古城基地。是集研发，生产，出口销售的互联网+新材料制造企业。

公司主营金属基陶瓷复合材料，耐磨耐热材料，冶金、矿山、水泥、燃煤热电厂设备配件等。产品：高铬陶瓷复合铸造耐磨材料，马氏体钢陶瓷复合铸造耐磨耐冲击材料及各类高锰钢陶瓷复合材料，金属基陶瓷纤维复合材料。

Beijing JinMei Entrepreneur Co., Ltd (DJM) was established in 2006, Headquarter located in Zhongguancun High-tech Park in Beijing, China. DJM was restructured into Joint-Stock company & listed on NEEQ in 2016. DJM's a research and development, production, export sales of Internet + new materials manufacturing enterprises.

DJM is focusing on Metal Matrix Ceramic Composite (MMCC) material, wear-resistant and heat-resistant material.

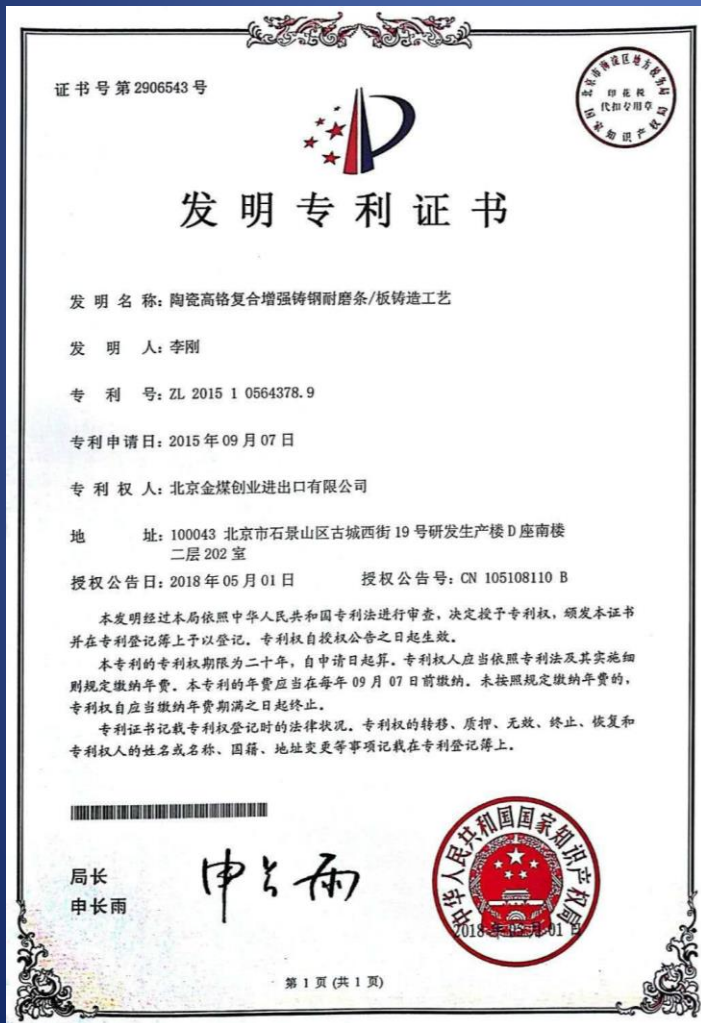
Products: High chromium cast iron ceramic composite castings, Martensite steel ceramic composite castings, high manganese steel ceramic composite castings, and Metal matrix ceramic fibre composite casting materials, ZTA ceramic mechanical parts. Products are widely used in metallurgical industry, mining, cement, Coal-fired thermal power plant as spare parts.



发明专利证书 Patent certificate

陶瓷高铬复合增强铸钢耐磨条板铸造工艺
Metal Matrix ceramic composite casting

陶瓷高锰钢复合耐磨件铸造工艺
High Mn Steel Matrix ceramic composite casting



MMC-Cr 高铬铸铁陶瓷复合耐磨材料

MMC-Cr (High Chromium cast iron matrix ceramic insert casting wear-resistant material)

MMC-Cr (High Chromium cast iron matrix ceramic insert casting wear-resistant material)

That is, the reinforcement phase - ceramic particles are fused and cast in the easily worn parts of metal parts with high chromium cast iron as the base material. The metal-ceramic composite layer is formed by the metallurgical combination of ceramic particles and casting alloy. The metallurgical bonding of ceramic particles with metal is realized by the heat of metal liquid. The hardness of ceramic-ceramic composite layer formed by ceramic particles and matrix metal shows a step distribution. The hardness of ceramic particles in the composite layer can reach 3-4 times of the hardness of high chromium cast iron material, so as to achieve the anti-wear effect; Compared with ordinary high chromium cast iron, the service life of the product is greatly extended.

The hardness of the High chromium iron ceramic composite layer is distributed in steps:

Ceramic particles hardness= HV2100

Hardness of metal around ceramic particles = 60-65HRC

Hardness of Basis material =High chromium iron = 58-62HRC

Suitable for use under low impact and high wear conditions

MMC-Cr 高铬铸铁陶瓷复合耐磨材料

即在高铬铸铁为基材的金属部件易磨损部位熔铸增强相-陶瓷颗粒.通过陶瓷颗粒与铸造合金的冶金结合来实现金属陶瓷复合并形成金属陶瓷复合层;陶瓷颗粒与金属的冶金结合是通过金属液体的热量来实现的;陶瓷颗粒与基体金属形成金属陶瓷复合层的硬度呈阶梯分布:复合层中陶瓷颗粒的硬度可达高铬铸铁材料硬度的3-4倍,从而实现抗磨的效果;与普通高铬铸铁件相比,产品使用寿命大幅度延长。

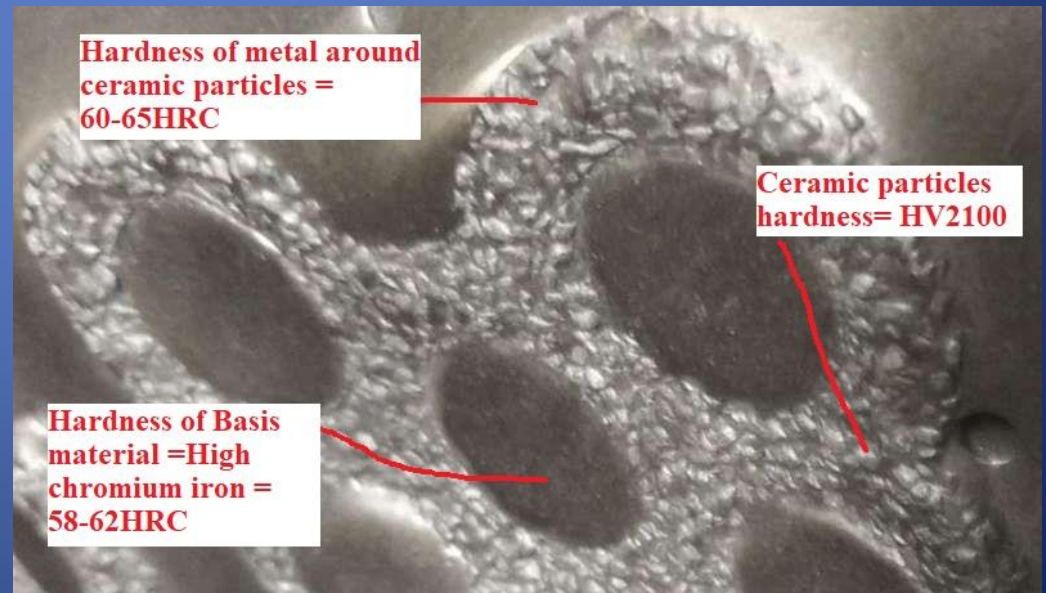
高铬陶瓷复合层的硬度呈阶梯分布:

陶瓷颗粒硬度= HV2100

陶瓷颗粒周围的金属硬度= 60-65HRC

基材硬度=高铬铸铁= 58-62HRC

适合在低冲击和高磨损条件下使用



MMC-M 马氏体钢陶瓷复合耐磨材料

MMC-M (Martensite steel matrix ceramic Insert casting Wearparts)

MMC-M (Martensite steel matrix ceramic insert casting wear-resistant material)

That is, the reinforcement phase - ceramic particles are cast in the easily worn parts of the metal parts with martensitic steel as the base material. The metal-ceramic composite layer is formed by the metallurgical combination of ceramic particles and casting alloy. The metallurgical bonding of ceramic particles with metal is realized by the heat of metal liquid. The hardness of ceramic-ceramic composite layer formed by ceramic particles and matrix metal is distributed in a step: give full play to the characteristics of high strength and high hardness of martensitic steel, reduce the plastic deformation of metal parts, and improve the impact resistance; Combined with the high wear resistance of ceramic particles, the anti-wear performance of the working surface is improved. The result is a metal component that is both wear resistant and impact resistant. Due to the selection of martensitic steel as the base material, so that the composite material has a good welding, and processing properties, while the product is suitable for flame gas cutting, grinding wheel saw, shear, water cutting, plasma and other cutting methods, welding without preheating or subsequent heating treatment; Compared with ordinary high chromium cast iron, the service life of the product is greatly improved.

The hardness of the Martensite Steel ceramic insert composite layer is distributed in steps:

Ceramic particles hardness= HV2100

Hardness of metal around ceramic particles = 60-65HRC

Hardness of Basis material =Martensite Steel = 48-53HRC

It is suitable for use under high impact and high wear conditions and can be welded

MMC-M 马氏体钢陶瓷复合耐磨材料

即在马氏体钢为基材的金属部件易磨损部位熔铸增强相-陶瓷颗粒.通过陶瓷颗粒与铸造合金的冶金结合来实现金属陶瓷复合并形成金属陶瓷复合层;陶瓷颗粒与金属的冶金结合是通过金属液体的热量来实现的;陶瓷颗粒与基体金属形成金属陶瓷复合层的硬度呈阶梯分布:充分发挥马氏体钢的高强度及高硬度特点,减少金属部件的塑性变形,提高抗冲击能力;结合陶瓷颗粒的高耐磨特性,提高工作面的抗磨性能;从而获得即耐磨且抗冲击的金属部件。因选用马氏体钢为基材,从而使复合材料具有很好的焊接,及加工性能,同时产品适用火焰气割,砂轮锯,剪切,水割,等离子等多种切割方式切割,焊接时无需对其进行预热或后续加热处理;与普通高铬铸铁件相比,产品使用寿命大幅度提高。

马氏体钢陶瓷复合层的硬度分布:

陶瓷颗粒硬度= HV2100

陶瓷颗粒周围的金属硬度= 60-65HRC

基体硬度=马氏体钢硬度= 48-53HRC

适合在高冲击、高磨损条件下使用,可焊接



MMC-Mn高锰钢陶瓷复合耐磨材料

MMC-Mn (High Manganese Steel Ceramic Insert casting wearparts)

MMC-Mn (High-manganese ceramic insert casting wear-resistant material)

That is, the reinforcement phase - ceramic particles are fused and cast in the easily worn parts of metal parts with high manganese steel as the base material. The metal-ceramic composite layer is formed by the metallurgical combination of ceramic particles and casting alloy. The metallurgical bonding of ceramic particles with metal is realized by the heat of metal liquid. The hardness of ceramic-ceramic composite layer formed by ceramic particles and matrix metal shows a step distribution. In the casting engineering, alloy elements in composite ceramic materials are used to refine the grain of high-manganese steel, improve the matrix properties of high-manganese steel, give full play to the work-hardening characteristics of high-manganese steel, reduce plastic deformation, and improve the low-impact wear resistance. Combined with the high wear resistance of the ceramic material, the wear resistance of the working surface is improved, so that the wear-resistant and impact-resistant material is obtained. The life of high manganese steel ceramic composite is greatly improved.

The hardness of the High manganese steel ceramic insert composite layer is distributed in steps:

Ceramic particles hardness= HV2100

Hardness of metal around ceramic particles = 60-65HRC

Basis material=High manganese steel =Hardness HB190-220

Impact hardness of High manganese steel = HB400-500

It is suitable for use under high impact and high wear conditions

MMC-Mn 高锰钢陶瓷复合耐磨材料

即在高锰钢为基材的金属部件易磨损部位熔铸增强相-陶瓷颗粒.通过陶瓷颗粒与铸造合金的冶金结合来实现金属陶瓷复合并形成金属陶瓷复合层;陶瓷颗粒与金属的冶金结合是通过金属液体的热量来实现的;陶瓷颗粒与基体金属形成金属陶瓷复合层的硬度呈阶梯分布:在浇铸工程中利用复合陶瓷材料中的合金元素细化高锰钢晶粒,提高高锰钢基体性能,充分发挥高锰钢的加工硬化特点,减少塑性变形,提高低冲击耐磨能力;结合陶瓷材料的高耐磨特性,提高工作面的抗磨性能,从而获得即耐磨且抗冲击的耐磨材料。高锰钢陶瓷复合材料的寿命大幅度提高。

高锰钢陶瓷复合层的硬度呈阶梯分布:

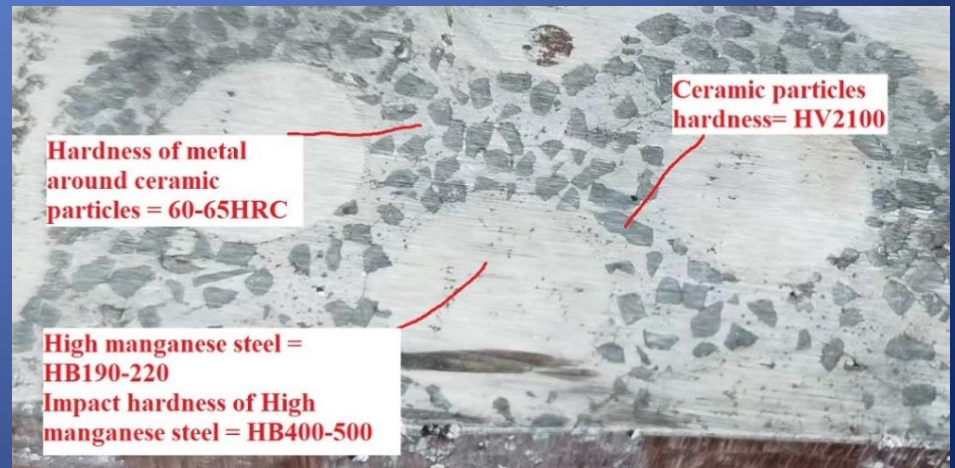
陶瓷颗粒硬度= HV2100

陶瓷颗粒周围的金属硬度= 60-65HRC

基材=高锰钢=硬度HB190-220

高锰钢冲击硬度= HB400-500

适合在高冲击、高磨损条件下使用

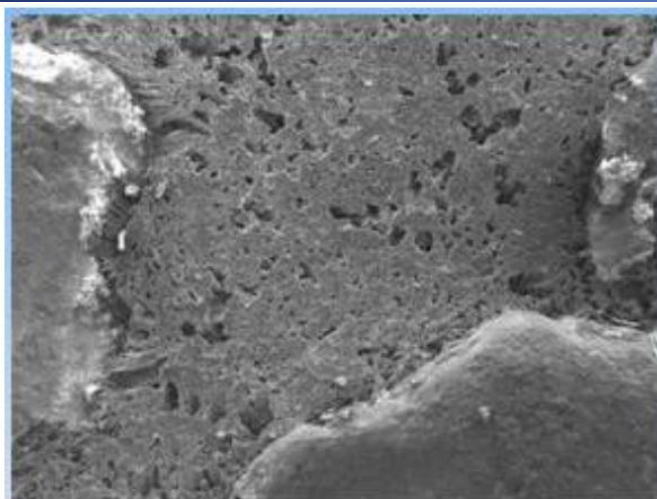
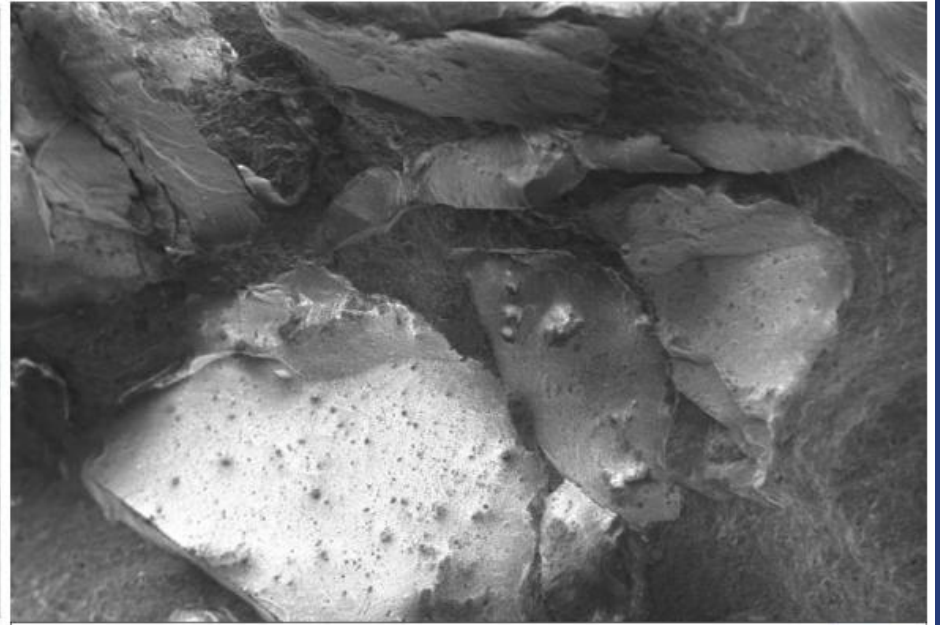


DJM-VEGA-Magotteaux 电镜/金相对比

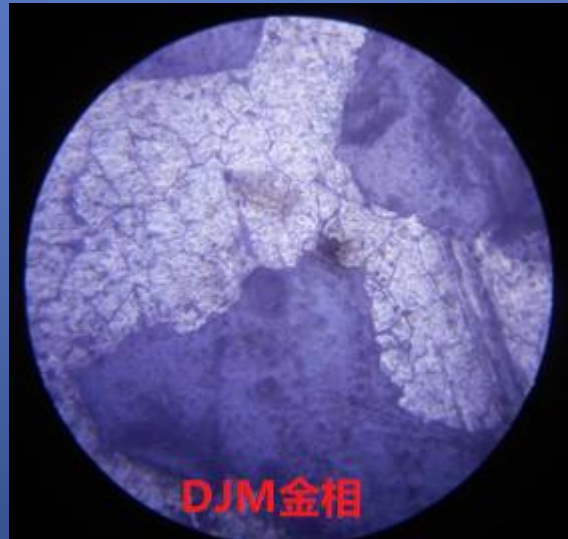
Magotteaux-马氏体钢陶瓷复合-金相



DJM--马氏体钢陶瓷复合-金相



秦弘-高铬铸铁陶瓷复合-金相



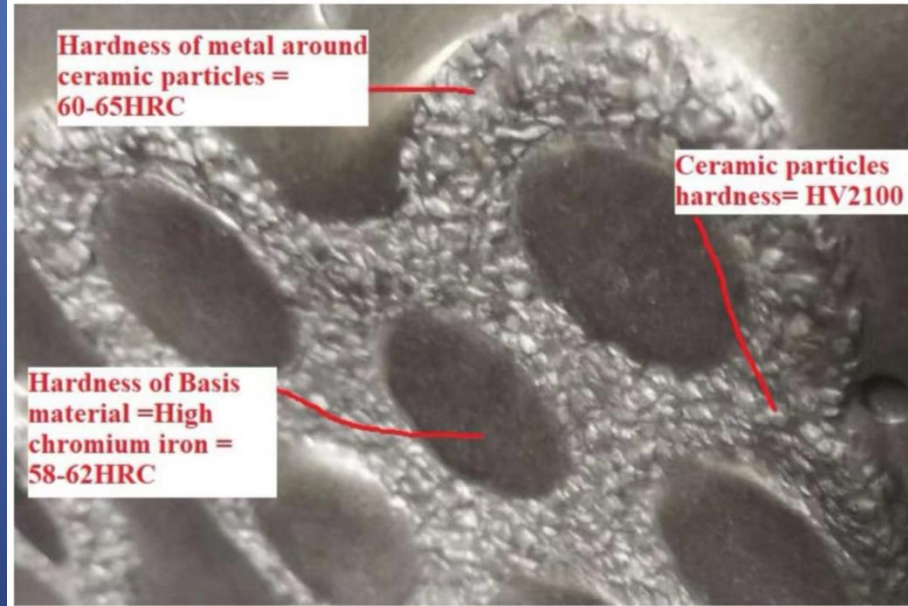
Ceramic Core for Ceramic insert casting



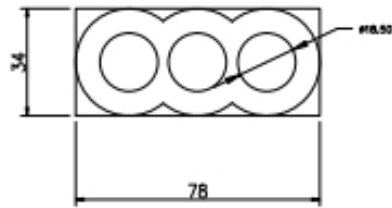
Hardness of metal around
ceramic particles =
60-65HRC

Ceramic particles
hardness= HV2100

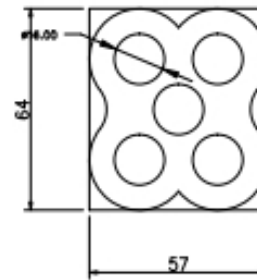
Hardness of Basis
material =High
chromium iron =
58-62HRC



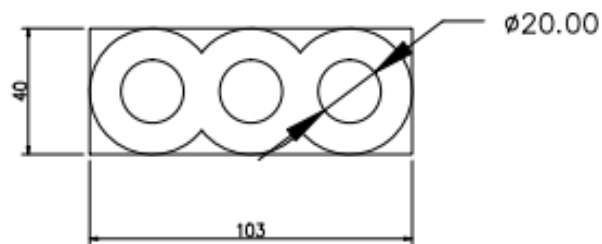
Ceramic core technical specifications



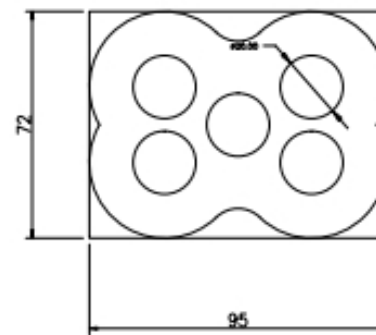
小三 6.75g/mm



小五孔 7.75g/mm



大三孔 8.85g/mm



大五孔 13.68g/mm

Basis Material of Ceramic insert castings

- The wear spare parts by ceramic insert casting is high wear resistant, the life span is several times of the traditional material.
 - The technology is suitable for production of Blow bar, Jaw plate, bowl liner, Mantle/Concave, Grinding roller, Liner, Chute liner, Hammer, and etc.... The ceramic cores can be applied to resin sand casting, water glass sand casting, vacuum casting, and lost foam casting and
 - The technology is suitable for production of high manganese steel, high chrome cast iron, heat resistant steel and alloy steel wear parts.
 - MMC-Mn- High Manganese Steel matrix ceramic insert composite casting
 - MMC-Cr- High Cr cast iron matrix Ceramic insert composite casting
 - MMC-M- Martensite Steel matrix Ceramic insert composite casting
 - MMC-B - Bimetallic ceramic insert composite casting
 - MMC-H - Heat resistant steel ceramic insert casting
-
- The hardness of the High manganese steel ceramic composite layer is distributed in steps:
 - Ceramic particles hardness= HV2100
 - Hardness of metal around ceramic particles = 60-65HRC
 - Basis material=High manganese steel =Hardness HB 190-220
 - Impact hardness of High manganese steel = HB400-500
 - It is suitable for use under high impact and high wear conditions
 - the service life of high manganese steel ceramic insert castings is more than 1 times of that of conventional high manganese steel
-
- The hardness of the High chromium iron ceramic composite layer is distributed in steps:
 - Ceramic particles hardness= HV2100
 - Hardness of metal around ceramic particles = 60-65HRC
 - Hardness of Basis material =High chromium iron = 58-62HRC
 - Suitable for use under low impact and high wear conditions
 - The biggest advantage of our Ceramic insert casting technology is that it greatly improves the service life of the product. The life span is several times of the traditional material.
-
- The hardness of the Martensite Steel ceramic composite layer is distributed in steps:
 - Ceramic particles hardness= HV2100
 - Hardness of metal around ceramic particles = 60-65HRC
 - Hardness of Basis material =Martensite Steel = 48-53HRC
 - It is suitable for use under high impact and high wear conditions and can be welded

陶瓷布局及安装
installation and layout of Ceramic core

- Usually, the shape type and size of the ceramic core should be selected according to the casting drawings. We will design the casting process, layout of the ceramics according to the casting drawings, and choose the type, size of the ceramic core, The ceramic core is very simple and convenient to use, according to we design the casting process of the ceramic core with nails or self-tapping screws fixed to the sand mould can be.



板锤陶瓷布局及使用效果

installation and use effect of Ceramic core for ceramic insert casting Blow Bar



锤头陶瓷布局及安装

installation and use effect of Ceramic core for ceramic insert casting Hammer



Ceramic insert Hammer



陶瓷金属复合球磨机衬板

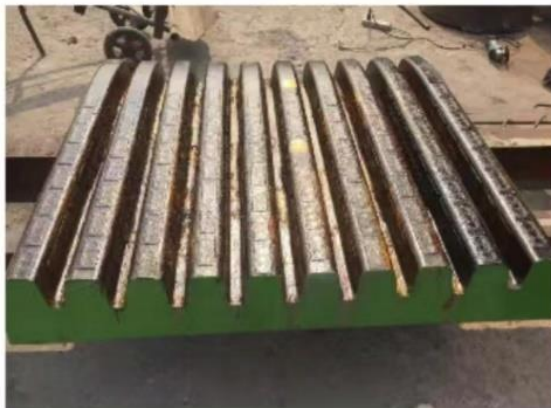
Metal ceramic insert composite Ball mill liner



陶瓷布局及安装

installation and use effect of Ceramic core for ceramic insert casting Jaw Plate





陶瓷布局及安装

installation and use effect of Ceramic core for ceramic insert casting Mantle / Bowl



high manganese steel ceramic insert casting Cone

19:38 ✓



19:39

high manganese steel ceramic insert casting mantle

19:44 ✓



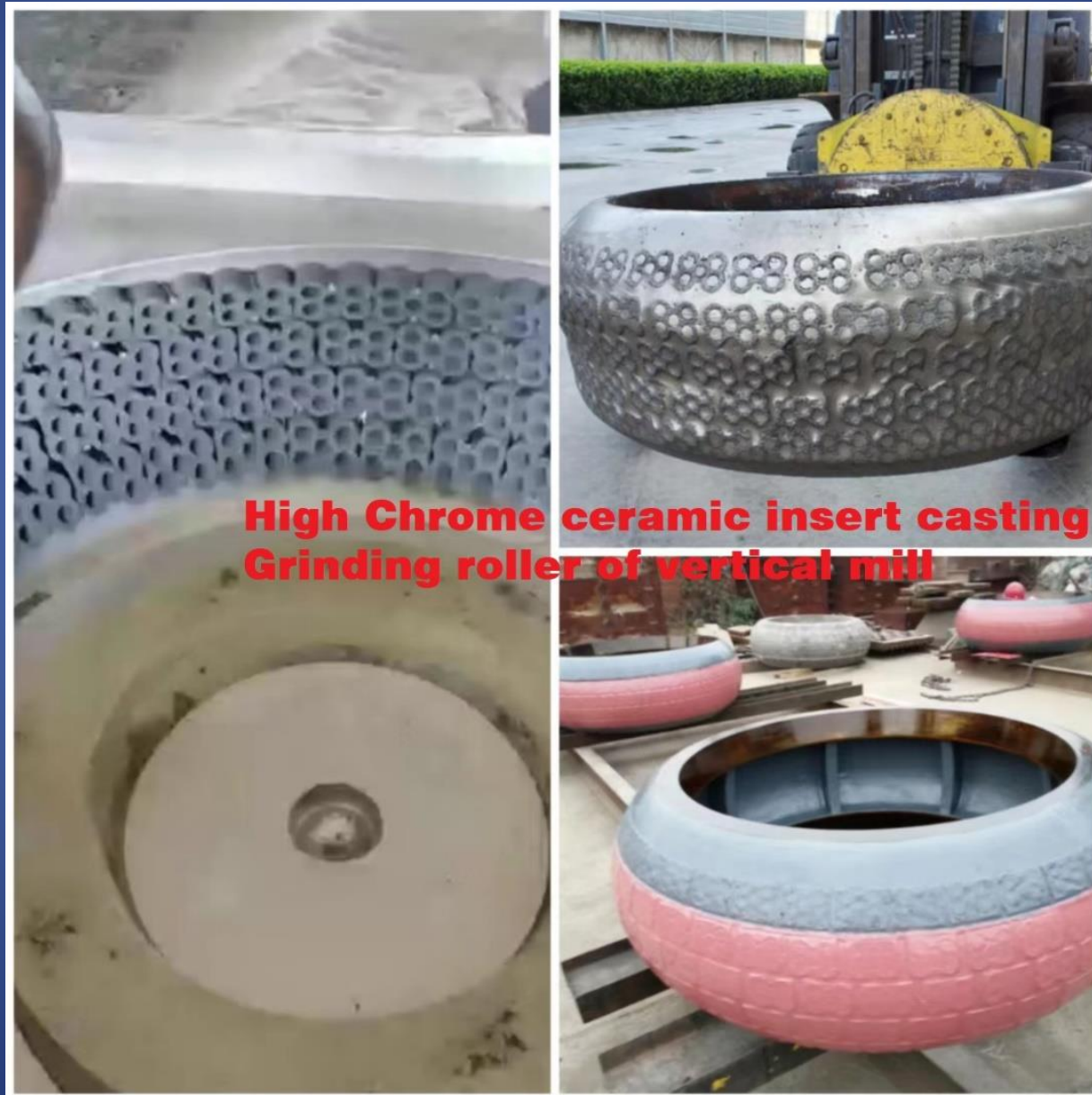
19:39



19:47 ✓

陶瓷布局及安装

installation and use effect of Ceramic core for ceramic insert casting Roller



陶瓷布局及安装

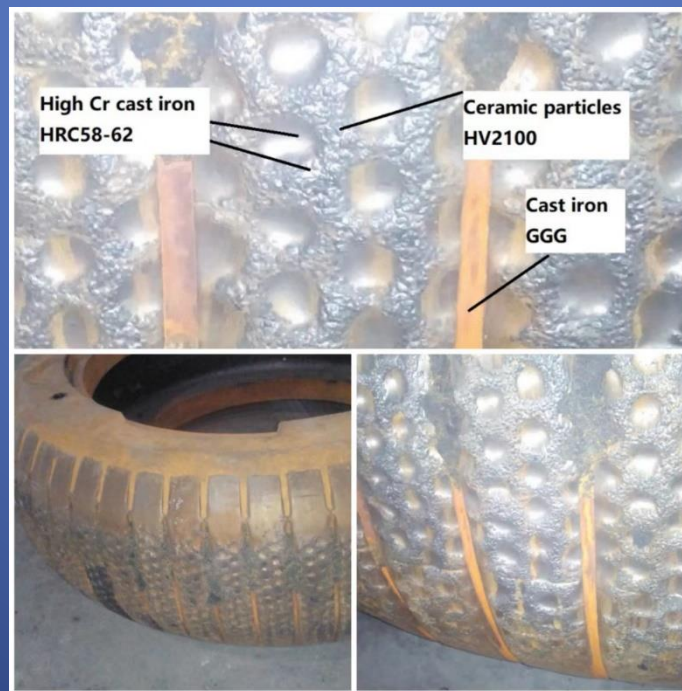
installation and use effect of Ceramic core for ceramic insert casting Liner



双金属陶瓷复合立磨辊套- (MMC-B: GGG + High Cr Cast Iron + Ceramic)

Roller of Bimetallic ceramic insert casting- (MMC-B: GGG + High Cr Cast Iron + Ceramic)

- 为进一步提高其耐磨寿命，DJM 选用球铁基高铬陶瓷复合材料，即：在高铬材料中熔铸陶瓷颗粒形成高铬陶瓷金属复合材料层，选用球铁为辊套基体，在辊套表面熔铸高铬陶瓷复合层，这层复合层的耐磨性能可达高Cr材料的3-4倍，同时这一复合层的厚度可制成达到原备件厚度的1/3，并可根据原磨损曲线有针对性的制作，球铁高铬陶瓷辊套和衬板磨煤时平均磨损量（磨损深度）每1000小时为2-4mm，而高铬辊套和衬板磨煤时平均磨损量（磨损深度）每1000小时为5-9mm，球铁高铬陶瓷辊套/衬板是高铬产品的三倍以上。
- In order to further improve its wear resistance life, DJM selects a ductile iron based high chromium ceramic composite material, namely: High chromium ceramic metal composite material layer is formed by casting ceramic particles in high chromium material, ductile iron is selected as the matrix of roll sleeve, and high chromium ceramic composite layer is cast on the surface of roll sleeve. The wear resistance of this composite layer can reach 3-4 times that of high Cr material, and the thickness of this composite layer can be made to reach 1/3 of the thickness of the original spare part, and can be made according to the original wear curve. The average wear (wear depth) of the high chromium ceramic roller sleeve and liner is 2-4mm per 1000 hours, while the average wear (wear depth) of the high chromium roller sleeve and liner is 5-9mm per 1000 hours, and the high chromium ceramic roller sleeve/liner is more than three times that of the high chromium products.



陶瓷复合雷蒙磨-磨辊-磨环
Ceramic insert Raymond mill-Ring-roller





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谢谢！ / Thanks！

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