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

陶瓷复合磨机-衬板

MMC Mill-Liner

公司简介
Company profile

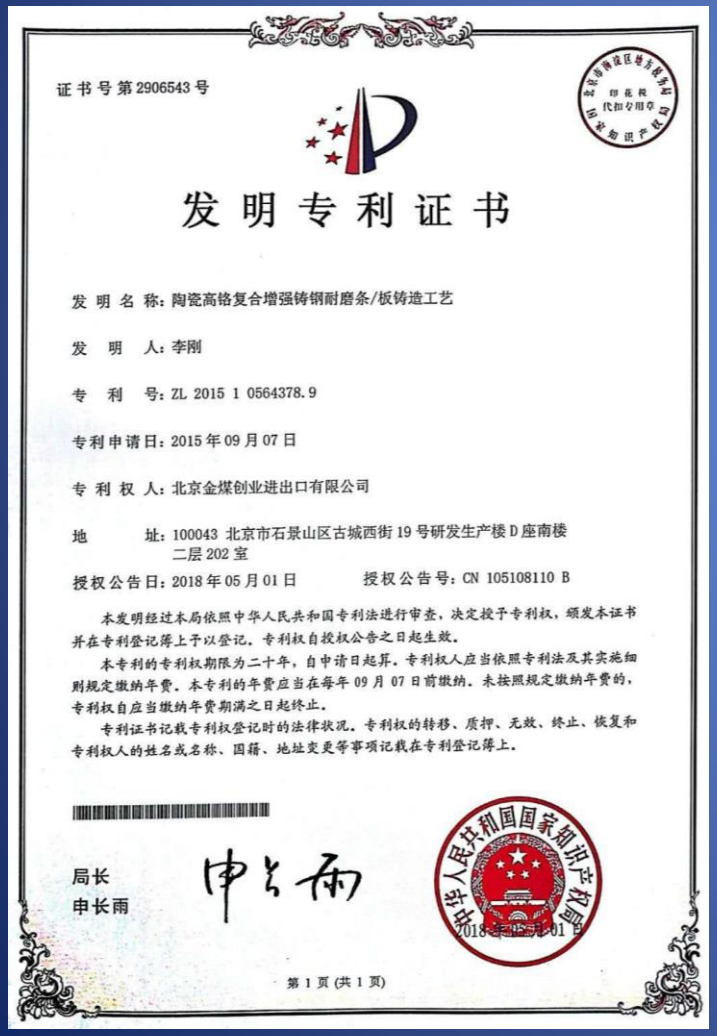
北京金煤创业科技股份有限公司于2006年成立，2016 年改制为股份制公司并成功登陆新三板。公司总部坐落在中国北京中关村科技园古城基地。是集研发，生产，出口销售的互联网+新材料制造企业。
公司主营金属基陶瓷复合材料，耐磨耐热材料，冶金、矿山、水泥、燃煤热电厂设备配件等。产品：高铬陶瓷复合铸造耐磨材料，马氏体钢陶瓷复合铸造耐磨耐冲击材料及各类高锰钢陶瓷复合材料，金属基陶瓷纤维复合材料，ZTA陶瓷机械零部件。

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



证书号第2906543号

发明专利证书

发明名称：陶瓷高铬复合增强铸钢耐磨条/板铸造工艺

发明人：李刚

专利号：ZL 2015 1 0564378.9

专利申请日：2015年09月07日

专利权人：北京金煤创业进出口有限公司

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授权公告日：2018年05月01日　　授权公告号：CN 105108110 B

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2018年05月01日

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

证书号第4307009号

发明专利证书

发明名称：陶瓷高锰钢复合耐磨件铸造方法

发明人：李刚

专利号：ZL 2018 1 1057291.2

专利申请日：2018年09月11日

专利权人：北京金煤创业科技股份有限公司

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授权公告日：2021年03月19日　　授权公告号：CN 109128098 B

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2021年03月19日

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其他事项参见续页

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

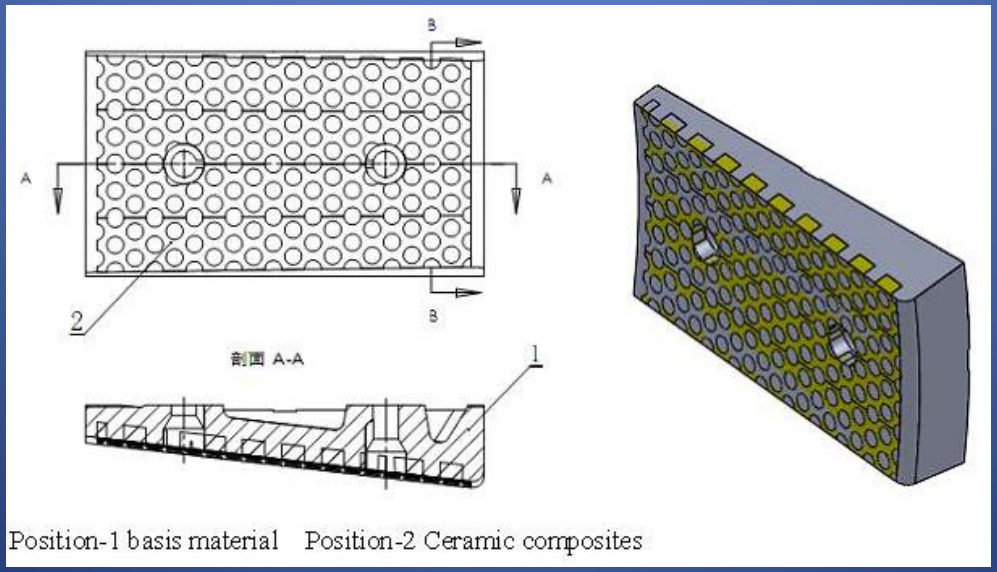
高锰钢冲击硬度= HB400-500

适合在高冲击、高磨损条件下使用

陶瓷金属复合磨机衬板技术介绍

Metal ceramic insert composite mill liner technology introduction

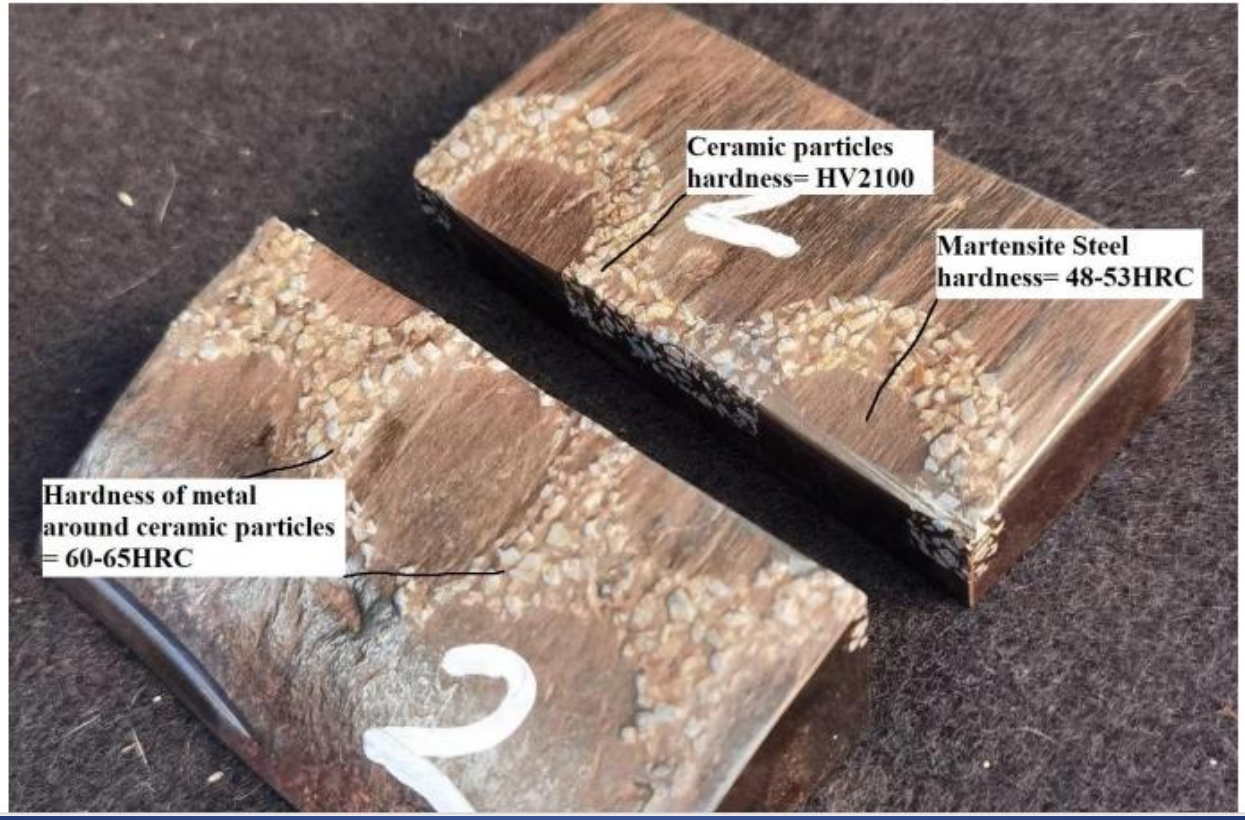
- 为进一步提高球磨机衬板耐磨寿命，DJM 选用高锰钢（或马氏体钢）陶瓷复合材料，即在高锰钢（或马氏体钢）材料表面嵌铸陶瓷颗粒形成陶瓷金属复合材料层，这层复合层的耐磨性能可达高锰钢材料的2 – 3倍，同时这一复合层的厚度可制成达到原备件厚度的1/3，并可根据原磨损曲线有针对性的制作，即使某些颗粒出现裂纹，也只局限于颗粒本身而不扩展至基体，从而获得高耐磨且耐冲击的效果。
- To improve its wear life of the ball mill liners, DJM adopts the composite material of High Mn Steel (or Martensite steel) and ceramic, namely, the ceramic particles are casted into the surface of alloy to form a composition of ceramic-metal. Its ability of wear resistance is 2-3 times of old Material, the thickness is 1/3 of the original one and can be manufactured according to the original wear curve, even the crack happens to some particles, it will not extend to the base material, thereby obtaining the capacity of high abrasion and impact resistance. The life span of Ceramic composite liner is more than two times of Mid-alloy liner, and more than 2-3 times of high manganese steel liner.



Position-1 basis material Position-2 Ceramic composites

金属陶瓷复合衬板与高锰钢衬板机械性能对照统计表					
		高锰钢衬板（Mn13）		陶瓷复合衬板	备注
1	抗拉 RM	680Mpa min		1200N/mm	
2	屈服 ReH	270Mpa min		900 N/mm	
3	冲击	90J min		35J Min	
4	硬度	HB190-210		48-53HRC	基体硬度
				HV2100	陶瓷颗粒硬度
				60-65HRC	陶瓷颗粒周围的金属硬度
5	金相组织	奥氏体		回火马氏体+弥散碳化物颗粒	

附：金属陶瓷复合衬板硬度阶梯分布图



陶瓷金属复合球磨机衬板

Metal ceramic insert composite Ball mill liner

陶瓷金属复合球磨机衬板

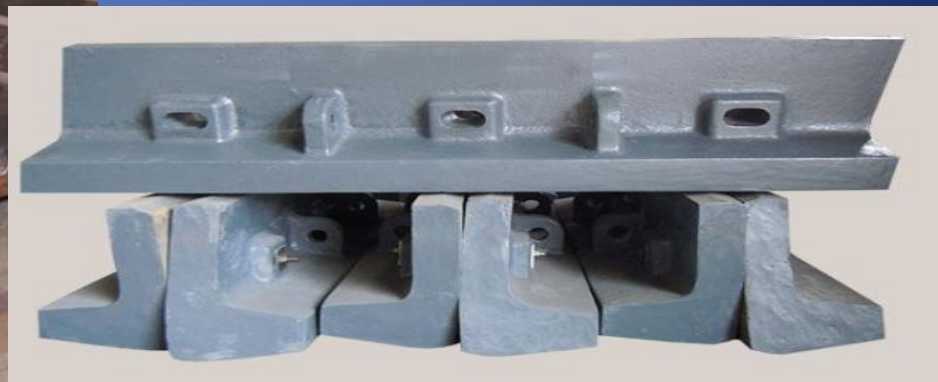
Metal ceramic insert composite Ball mill liner

金属陶瓷复合球磨机衬板使用寿命对比统计表					
物料	使用工况	高锰钢衬板使用寿命		陶瓷复合衬板使用寿命	备注
煤炭	燃煤热电厂	2-4 年		8 年以上	
生料（石灰石）	水泥厂	7-8 个月		24 个月	
铁矿石	铁选厂	4-6 个月		18 个月	
铝矿	强化烧结	7-8 个月		24 个月	
铜矿	选厂	4-6 个月		18 个月	
金矿	选厂	4-6 个月		18 个月	

金属陶瓷复合铸造自(半)磨机衬板技术介绍
Metal ceramic composite shell liner of SAG mill technology introduction

为进一步提高衬板耐磨寿命，DJM 选用（高锰钢）或马氏体钢陶瓷复合铸造工艺生产衬板，即在（高锰钢）或马氏体钢材料表面熔铸陶瓷颗粒形成陶瓷金属复合材料层，这层复合层的耐磨性能可达高锰钢材料的2–3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，从而获得高耐磨且耐冲击的效果。（高锰钢）或马氏体钢陶瓷复合铸造衬板使用寿命是高锰钢产品的2倍以上。

- In order to further improve the wear resistance life of the liner plate of SAG Mill, the liner is produced by the selection of high manganese steel or martensite steel ceramic composite casting process. That is, the ceramic metal composite layer is formed by casting ceramic particles on the surface of (high manganese steel) or martensite steel. The wear resistance of this composite layer is 2-3 times that of high manganese steel. At the same time, the thickness of the composite layer can be made into a third of the thickness of the original spare parts, and can be made according to the original wear curve



金属陶瓷复合铸造自(半)磨机衬板
Metal ceramic insert composite shell liner of SAG mill

金属陶瓷复合半自磨机衬板使用寿命对比统计表					
物料	使用工况	合金钢衬板使用寿命		陶瓷复合衬板使用寿命	备注
铁矿	铁选厂	4-6 个月		12 月以上	
铜矿	选厂	4-6 个月		12 月以上	
金矿	选厂	4-6 个月		12 月以上	

金属陶瓷复合铸造自(半)磨机衬板

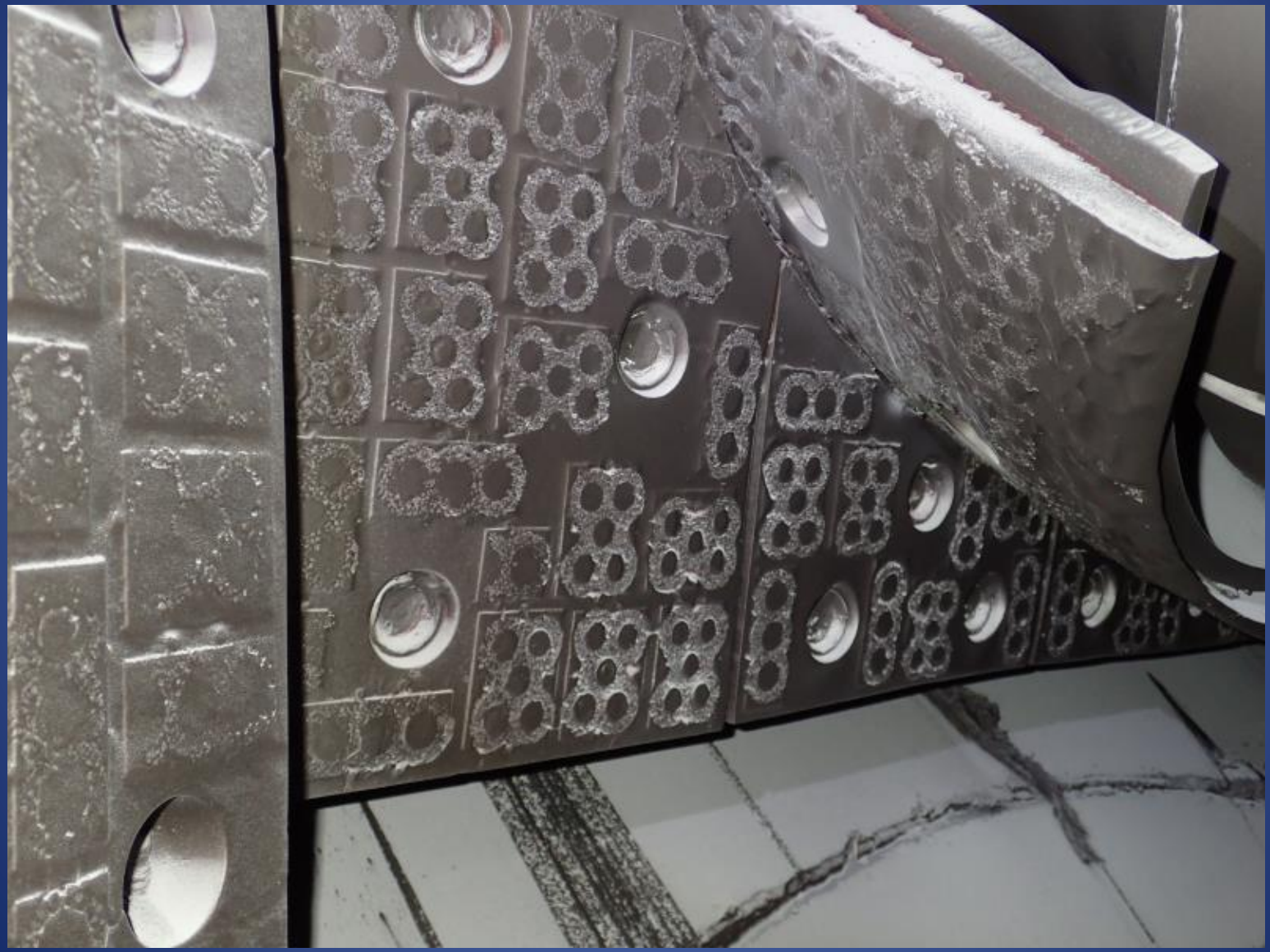
Metal ceramic insert composite shell liner of SAG mill

半自磨机溜槽衬板
downspout Liner of SAG mill

溜槽衬板（ downspout Liner）

溜槽衬板 downspout liner

使用实例- 衬板（Liner）



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谢谢！ / Thanks !

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