股票代码：834914
Stock code: 834914

FHZL 峰华卓立

创世界领先技术

To Create the World's Leading Technology

立3D行业标杆

To Build Up 3D Industry Benchmark

FHZL 峰华卓立

砂型3D打印机

Sand 3D Printer



（公众号二维码）

广东峰华卓立科技股份有限公司

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广东峰华卓立科技股份有限公司

GUANGDONG FENGHUA ZHUOLI TECHNOLOGY CO.,LTD.

公司简介 Company Profile

广东峰华卓立科技股份有限公司是中国砂型3D打印技术研发并产业化的开创者，成功创造了无模铸型制造技术(PCM)，并将之应用于铸造工业，技术源于清华大学颜永年教授团队。

Guangdong Fenghua Zhuoli Technology Co., Ltd.(initially FHZL) is the earliest company engaged in independent R&D and commercialization of sand 3D printing technology in China. The company successfully adopted the PCM(Patternless Casting Manufacturing) technology and applied the technology into the foundry industry. The technology was from Professor Yan Yongnian of Tsinghua University.



公司正门
Front gate of the company



设备安装车间
Equipment installation workshop



公司董事长屈志先生给来宾作介绍
Mr. Qu Zhi, chairman of the company, made introduction to the guests



全国铸造考察团参观公司
The delegation of China Foundry Association visited the company

公司大事记 Company History

中国自主研发 Independently Researched And developed By Chinese

微滴喷射3DP工艺 Micro-Droplet jetting Technique

砂型3D打印装备标杆企业 Benchmark Enterprise Of Sand 3D Printer

- **1997**年, 无模铸型制造技术（PCM）在清华大学理论研究
  1997, the theoretical research of Patternless Casting Manufacturing (PCM) technology was conducted by Professor Yan Yongnian in Tsinghua University, China.
- **2002**年,公司从清华大学引进无模铸型制造技术（PCM）
  2002, PCM technology was introduced to the company.
- **2011**年，国家领导人与颜永年教授技术交流
  2011, the then National Leader communicated with Professor Yan Yongnian on the technology.
- **2015**年，公司成功挂牌新三板，股票代码：834914
  2015, the company successfully listed on the New OTC Market, the stock code: 834914
- **2017**年，并购四川维珍子公司
  2017, the company acquired Sichuan Weizhen Hi-tech Material Co., Ltd
- **2019**年，公司成立增材制造装备事业部，独立经营3D打印装备
  2019, the company was separated into two divisions: Additive Manufacturing Equipment Division and Rapid Manufacturing Service Division. The former is specialized in the independent R&D, manufacturing and sales of sand 3D printer.
- **2019**年，推出第四代砂型3D打印机
  2019, the fourth generation sand 3D printer was successfully launched and promoted to the market.
- **2020**年，推出第四代砂型3D打印机升级版
  2020, the upgrade version of the fourth generation sand 3D printer was launched.



国家领导人与颜教授交流
The former National Leader communicated with Professor Yan



国家领导人与颜教授交流
The National Leader communicated with Professor Yan



新三板挂牌
Listed on the New OTC Market





国家高新企业
National High-tech Enterprise



信用评价3A企业
Enterprise of 3A Credit Rating



科学技术奖证书
Certificate of Science and Technology Award



中国铸造协会会员证书
China Foundry Association
Membership Certificate



ISO9001认证
ISO9001 certification



ISO14001认证
ISO14001 certification

- 发明专利23项
  Patent for invention 23 pcs
- 软件著作5项
  Software registration 5 pcs
- 实用新型专利59项
  Utility model patent 59 pcs
- 发表论文30篇
  Published thesis 30 pcs
- 外观设计专利25项
  Design patent 25 pcs
- 参与制订国家/行业标准3个
  Participate in national/industry standards 3 pcs



ISO9001认证
ISO9001 certification



ISO14001认证
ISO14001 certification



CE认证
CE certification



发明专利证书
Certificate of Invention Patent



实用新型专利证书
Certificate of Utility Model Patent



外观设计专利证书
Certificate of Design Patent



广东省高新技术产品
Guangdong High-tech Product



打印控制软件版权证书
Copyright Registration Certificate
of Printing Control Software



分层软件版权证书
Copyright Registration Certificate
of Layering Software

FHZL 峰华卓立

砂型3D打印介绍 Introduction of Sand 3D Printing

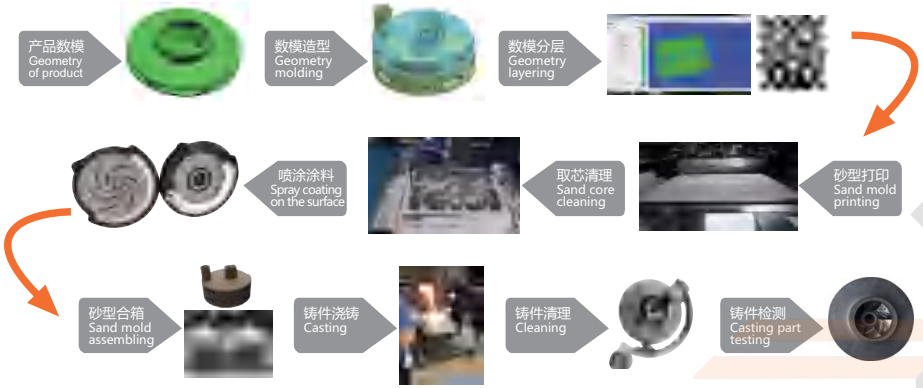
创世界领先技术 立3D行业标杆
To Create the World's Leading Technology To Build Up 3D Industry Benchmark

工艺原理 Technical Principle

无模铸型制造技术（PCM，Patternless Casting Manufacturing），是将快速成形技术应用到传统的树脂砂铸造工艺中的新技术。首先从零件CAD模型得到铸型CAD模型，由铸型CAD模型的STL文件分层，得到截面图形，再以层面信息产生控制信息。造型时，让催化剂与原砂均匀的搅拌，喷头按照截面图形精确的喷射粘结剂，粘结剂与催化剂发生胶联反应，一层层固化型砂而堆积成形。粘结剂和催化剂共同作用的型砂被固化在一起，固化完一层后再粘接下一层，所有的层粘接完之后就得到一个空间实体。型砂在粘接剂没有喷射的地方仍是散砂，比较容易清除。清理出中间未固化的散砂就可以得到一个有一定壁厚的铸型，在铸型的表面涂敷或浸渍涂料之后就可用于浇注金属。

PCM (Patternless Casting Manufacturing) is a new technology that applies rapid prototyping technology to conventional resin sand casting process. First, the casting model is obtained from the CAD design of the part, and the STL file of the casting model is layered to obtain the cross section details, and the control information is generated by the layer information. During modelling, the printheads offer precise jetting of binder to a layer of activator-mixed sand. The binder reacts with the activator immediately to make the sand bound and solidified into the 3D shape. After printing a layer, a new layer of sand is re-coated over the previous layers and the process repeats until the sand mold or cores are completed. The unbound sand where no binder is jetted is loose and easy to clean.By cleaning up the intermediate uncured sand, a sand mold can be unloaded and can be used for casting metal after necessary simple treatment.

砂型3D打印工艺流程 Sand 3D Printing Process



PCM技术与传统有模技术比较的优势 Benefits of PCM Technology over Conventional Foundry Process

项目 (ITEM)	PCM工艺与传统有模工艺相比较 Comparison between PCM Technology and Conventional Foundry Process
制作过程 Production Preparation	无模具，直接打印铸型。 Patternless, sand molds and cores can be ready in one single build.
制作周期&成本 Lead Time&Cost	产品开发周期短，约3-5天，生产总成本低。 Short lead time less than 3-5 days at a low cost.
技能要求 Skill Requirements of Operation	设备自动化程度高，操作者专业技能要求普通，培训一周即可上岗操作。 High automation, workers with limited experience can operate independently after one-week's basic training.
工作环境 Working environment	有害物质排放少，生产环境良好，符合绿色铸造生产政策。 Clean and environmentally friendly with little effluent and emission.
制作工艺 Manufacturing Process	1、型、芯可一体成型，减少铸型合箱误差； 2、无拔模斜度，铸件接近设计意图，可减少铸件重量与机械加工的余量； 3、不需要考虑脱模结构，可以生产任意形状铸型，灵活性高； 4、灵活更改产品结构，再生产约束条件少。 1. Mold and core can be built accurately as an integrate part in a single build, reducing assembly tolerance. 2. In no need of pattern draft, hyper-realistic prototypes can be created in lightweight structures with less machining allowance. 3. Suited for greater design freedom with no geometry limitation and no need of demoulding. 4. High flexibility on structure modification and recreation by simply modifying the CAD data and then reprinting.

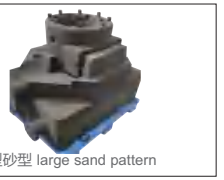
3D打印砂型 3D Printed Sand Molds & Cores

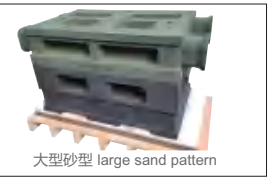

叶轮芯 impeller core


机匣壳体 power-brake housing


阀芯 valve core


液压阀 hydraulic valve


大型砂型 large sand pattern


大型砂型 large sand pattern


缸盖水道芯
water channel core of cylinder head


增压器芯
supercharger core


无机粘结剂砂型
Inorganic binder sand mold

3D打印铸造金属零件 Casting Parts by 3D Printed Sand Molds


缸体 cylinder


缸盖 cylinder head


泵体泵盖 pump and pump head


泵体 pump


进气管 intake pipe


飞机机匣 power-brake of aircraft


电池包 battery pack


排气管 exhaust pipe


液压阀 hydraulic valve

砂型3D打印机 sand 3D printer

打印材料：呋喃、无机盐类粘结剂、硅砂、宝珠砂、陶瓷砂等人造砂。
Printing Materials: Furan resin, inorganic binder, silica sand, nice foundry sand, ceramic sand etc.

打印分层软件：自主研发，具备十多项特色功能，如砂型边缘内部墨量可变、砂型局部加密打印等。
Layering Software: The printing layering software is self-developed with more than 10 features, for example, partial enhancement printing, variable ink volume inside and at the edge of the sand mold to reduce the cost of consumables, etc.

打印控制软件：自主研发，二十余年的3D打印技术与多种金属材料铸造应用经验融为一体，具有几十种应用配方供用户选择。
Printing Control Software: The self-developed printing control software is a perfect integration of the company's twenty-year expertise of 3D printing technology and rich experience of casting application on various metal materials, with dozens of application solutions for end-users' option.

第四代砂型3D打印机主要技术指标

The main technical index of the 4th generation sand 3D printer

机型 (Model)	PCM2200	PCM1800	PCM1200	PCM800	PCM300
最大打印尺寸 (mm) Max printing size (mm)	2200x1000x800	1800x1000x700	1200x1000x600	800x750x500	300x250x250
标配喷头数量（个） Printing nozzle Qty(pcs)	4x1024P	4x1024P	4x1024P	2x1024P	1x1024P
分层厚度 (mm) Layer thickness (mm)	0.2-0.5可调 0.2-0.5Adjustable				
砂型尺寸精度 (mm) Printing precision(mm)	± 0.3				
打印速度（秒/层） Printing Speed (Sec./layer)	24	22	18	22	14
成型效率 (L/h) Forming efficiency (L/h)	165	147	120	49	9.6
满箱打印时间(小时/箱,0.5mm/层) Full box printing time (H/box,0.5mm/layer)	10.66	8.55	6	6.11	1.94
打印分辨率 (dpi) Printing resolution ratio (dpi)	300x400 or 400x400				
抗拉强度 (Mpa) Tensile strength(Mpa)	0.8-2MPa，最高可达成2.5MPa（与砂料有关） 0.8-2 MPa, Maximum up to 2.5 MPa (related to sand)				
发气量 (ml/g,850℃) Gas evolution (ml/g,850℃)	呋喃粘结剂：≤ 18ml/g，最低可达13ml/g（与砂料有关） Furan binder: ≤ 18ml/g, Minimum up to 13ml/g (related to sand) 无机粘结剂：≤ 14ml/g（与砂料有关）Inorganic binder:≤ 14ml/g (related to sand)				
打印砂料 Printing material	硅砂、陶瓷砂、宝珠砂、CB砂..... Silica sand, calcined sand, synthetic sand, ceramic sand, etc.				
应用范围 Range of application	铸有色金属类、铸铁类、铸钢类 Casting nonferrous metal, iron and steel etc				
砂箱数量 (个) Job box(pcs)	1 or 2 可选配 Can choose 1 or 2				
其它规格机型 Other model	接受订制 Can be customized				



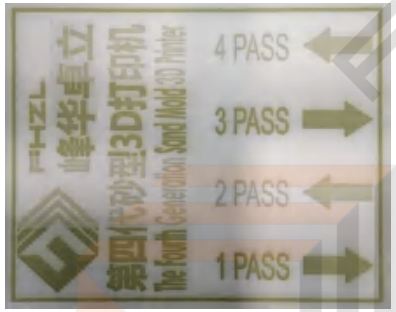
选择峰华卓立的优势 The Advantages of FHZL

品牌 BRAND

- 公司坚持产、学、研、应用一体化经营的道路，将自己研发的砂型3D打印机应用于公司的铸造车间，并不断的技术升级，历时近20年的磨练，积累了丰富的铸造工艺技术经验
- 我公司的砂型3D打印机市场占有率高，国内市场用户数量居首位，最先打入国际市场
- 设备完全自主研发，获得多项国家发明专利，不存在专利和版权纠纷
- Insisting on the integration of R&D, manufacturing and application, the company utilizes its own sand 3D printer to its foundry workshop for constantly upgrading its technology. After twenty years of hardworking, FHZL has accumulated rich experience in foundry process and application.
- FHZL has a high market share on sand 3D printers. The number of our users in the domestic market ranks the first and FHZL is the first Chinese enterprise to export sand 3D printers to overseas market.
- The sand 3D printer self-developed by our company has won lots of national invention patents, with no disputes on patent and copyright.

产品 PRODUCT

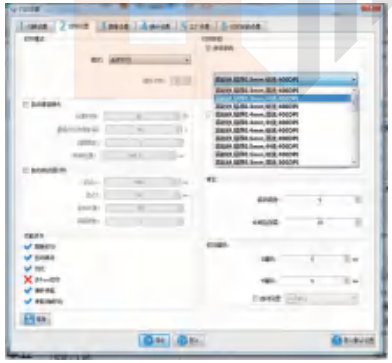
- 打印效率行业领先，喷头数量更少，打印速度却比同行更快
- 打印工艺配方化，自主研发的打印管理软件，用户可以根据铸造工艺要求，选择相应的打印配方和参数
- 关键核心部件采用国际知名品牌。
- Best printing efficiency in the industry. Less print heads for binder jetting, but higher printing speed.
- Multiple choices of printing solutions. End-users can select appropriate printing formulas and parameters on our self-developed printing control software to fit different requirements of casting process.
- Essential parts are from top international brands.



4个pass打印一层
4 pass print one layer

成本 COST

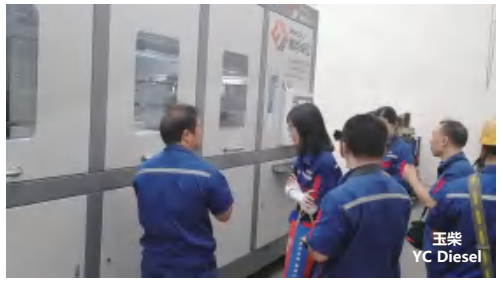
- 运行成本低，耗材利用率高。例如：打印过程中铺砂的余砂自动收集，在线直接循环使用，节约耗材
- 维护成本低。例如：更少数量的喷头达到相对更高的打印效率，喷头维护成本低
- 独创局部铺砂打印、局部加密打印功能，更有效节约成本。
- Low operating costs and high utilization of consumables. For example, the overflow sand during printing can be collected automatically and can be directly recycled online.
- Low maintenance cost: Less print heads than rivals, but higher printing efficiency and lower maintenance cost of print heads.
- The unique features like partial printing and partial enhancement printing, can save cost for customers.



几十种打印配方供用户选择
Multiple choices of printing solutions for users

部分设备展示 Displays of sand 3D printer


济柴
Jinan Diesel


玉柴
YC Diesel



印度MAGNA
Magna,India


俄罗斯SANDFORM
Sandform,Russia


恒利
Heng Li


中国工程物理研究院
CAEP

荣誉客户 Clients

安徽创融 | 安徽恒利 | 俄罗斯SandForm | 甘肃伯骊江 | 广西玉柴 | 辽宁晋鼎 | 江淮汽车

华南3D打印应用中心 | 四川维珍 | 印度MAGNA | 肇庆学院 | 中北大学 | 重庆小康 | 山东济柴

上海交大 | 清华大学 | 上海汉钟 | 中国工程物理研究院 | 河北中天正邦 | 中山九浩然 | 隆基机械