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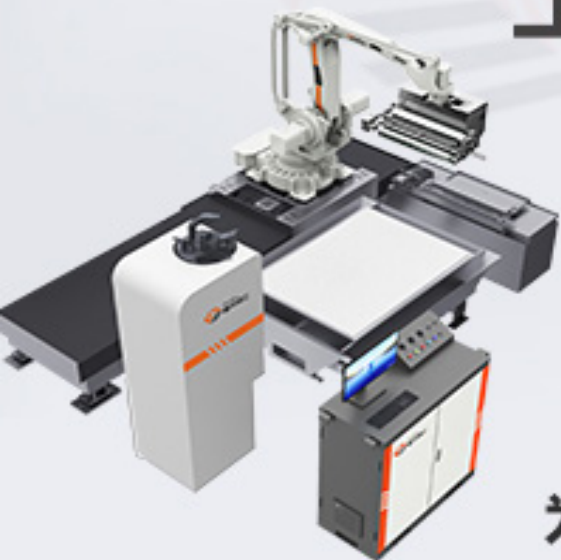
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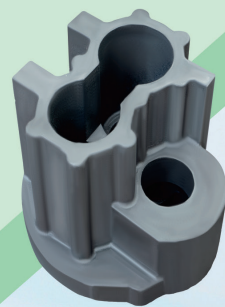
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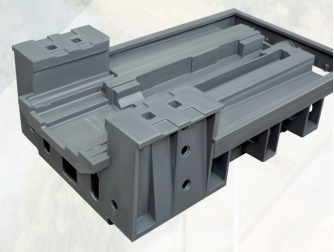
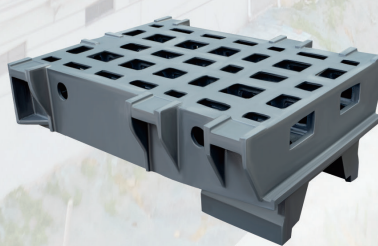
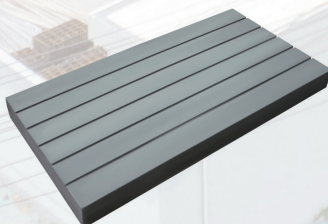
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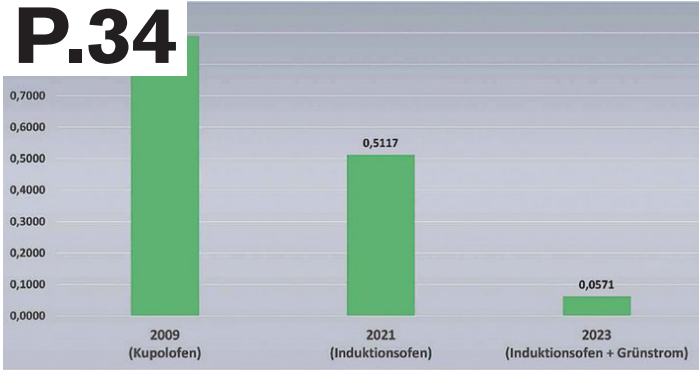
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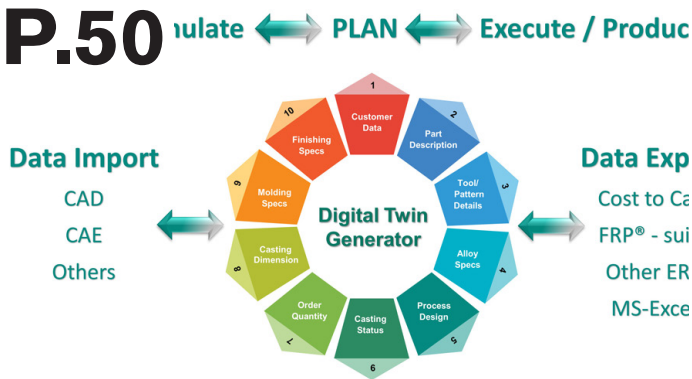
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4th Diecasting CEO Summit & Lightweight Forum Held

第四届压铸 CEO 峰会暨有色铸造轻量化 高层论坛成功举办

From November 23-26, 2023, the highly anticipated "4th Diecasting CEO Summit & High Level Forum on Lightweight Nonferrous Casting" was successfully held in Zhuhai, Guangdong Province. Nearly 1000 people, including leaders of industry associations across the country, experts in the die-casting industry, representatives from institutes, universities, and enterprises, attended the meeting. Since 2016, sponsored by China Foundry Association, the summit has been successfully held for three sessions, with nearly 800 attendees of each session and executives participants accounting for about 70%, which truly creating a high-end and highly influential industry platform.

With the theme of "Empower a New Era with Technology", and for the first time, the summit brings together four branches of China Foundry Association to jointly organize, namely the Die Casting Branch, Low Pressure Casting Branch, Squeeze Casting Working Committee, and Semi Solid Working Committee. The forum focuses on the industry pain points and hot topics of the non-ferrous field, and guides entrepreneurs in planning development and laying out new industrial tracks under the existing environment through macroeconomic analysis, industry development prospects, and scientific and technological achievements display. The 8 sub-forums also focus on technical exchanges in areas such as die-casting, low-pressure, extrusion, semi-solid and magnesium alloy industrialization. It provides a perfect platform for experts, scholars, corporate executives, and supplier representatives to learn the cutting-edge technologies, exchange on hot topics, explore new ideas, and lead innovation. At the same time, the organizer also arranges four visit routes for participants to further expand interactions.

During the conference, the "Top 50 China Die Casting Enterprises", "China Die Casting Growth Star", and "Top 20 China Die Casting Mold Enterprises", selected by "Foundry Engineering", were recognized and awarded, which proved the significant improvement of the diecasting industry in terms of enterprise scale and innovative research and development capabilities. ■

2023年11月23-26日,备受行业期待的“第四届压铸 CEO 峰会暨有色铸造轻量化高层论坛”在广东珠海成功举办,来自全国各省、市、地区铸造协/学会组织负责人,铸造行业专家,院所、高校、企业负责人和代表近1000人出席会议。

自2016年起,由中国铸造协会主办的压铸峰会已成功举办三届,每届参会人数达到近800人,其中企业高管占比约70%,真正打造了一个高端且极具影响力的行业交流平台。

本届论坛以“科技赋能新时代”为主题,首次集合中国铸造协会压铸分会、低压铸造分会、挤压铸造工作委员会和半固态工作委员会四个有色铸造的分支机构共同办会,针对有色铸造领域的行业痛点和热点话题设计内容,通过宏观经济分析、行业发展前瞻、科技成果展示,为企业家在现有环境下谋划发展、布局产业新赛道指引方向。本届论坛特设的8场分论坛,围绕压铸、低压、挤压、半固态及镁合金产业化等领域开展技术交流,专家学者、企业高管、供应商代表,将聚焦前沿、关注热点、开拓思路、引领创新,为行业高质量发展赋能。同时,组委会还安排了珠海、高要、深圳、顺德四条企业参观路线,以进一步扩宽行业的交流与互动。

会议期间,由《铸造工程》评选出的“中国压铸50强”“中国压铸成长之星”“中国压铸模具20强企业”上台接受了表彰。获评企业无论从企业规模还是创新研发能力等方面,都比以往有了明显提升,用实际效果证明了中国铸造转型升级的成果。■

Huaxinglong New Energy Vehicle Intelligent Project Began Construction

华兴隆新能源汽车智造工厂项目动工建设

On November 20, 2023, Zhejiang Huaxinglong Mold Material Technology Co., Ltd., a member of China Foundry Association, held a grand groundbreaking ceremony for the "10,000t Mold Material for New Energy Vehicle, Large-scale Heat Treatment, 3D

2023年11月20日,中国铸造协会理事单位——浙江华兴隆模具材料科技有限公司“新能源汽车万吨模具材料、大型热处理、3D打印增材创新智能工厂项目”奠基仪式

Printing Additive and Intelligent Factory Project" in Qianwan New Area, Ningbo City, Zhejiang Province. The project is equipped with China's first German imported 9-ton vacuum gas quenching furnace, mainly providing production and processing services for high-end die-casting mold materials for new energy vehicles. The total investment is about 500 million yuan, in which the fixed assets investment is about 300 million yuan, covering an area of 50 acres (nearly 33,333sqm), and a building area of about 80,000sqm. After the capacity is fulfilled, the expected output value will reach RMB800 million yuan. The project is expected to be completed and put into operation in December 2024.

Huaxinglong is a leading supplier of lightweight and integrated mold materials for new energy vehicles of well-known domestic and foreign OEMs, serving industries such as automobiles, home appliances, communications, and healthcare. Starting from August 2018, Huaxinglong Group has comprehensively laid out its new energy industry. Currently, it has completed the systematic research and development of high-end die-casting and plastic die steel, 3D printing additive manufacturing equipment, and powder independently. It has entered into the innovative research and development field of integrated die-casting molding for new energy vehicles and die materials for large-scale structural components. ■

在浙江省宁波市前湾新区隆重举行。项目配套了中国首台德国进口 9 吨真空气体淬火炉，主要为新能源汽车用高端压铸模具材料提供生产和加工服务。项目总投资约 5 亿元人民币，其中固定资产投资约 3 亿元人民币，占地面积 50 亩，建筑面积约 80000 平方，达产后预计产值达 8 亿元人民币。项目预计于 2024 年 12 月建成投产。

华兴隆为国内外多家知名主机厂新能源汽车轻量化、一体化模具材料的主力供应商，服务于汽车、家电、通讯、医疗等行业。2018 年 8 月起，华兴隆集团全面布局新能源产业，目前已完成自主品牌高端压铸及塑胶模具钢、3D 打印增材制造设备与粉末的系统研发，进入了新能源汽车一体化压铸成型与大型结构件模具材料的创新攻关领域。■

Unveiling the Future of Die Casting: LK Dreampress 16000T Takes Center Stage

揭开压铸的未来： 力劲 Dreampress 16000T 占据中心舞台

The LK Dreampress 16000T stands tall, not just as a marvel of engineering but as the culmination of dreams and aspirations. With each advancement, LK reaffirms its commitment to not just keep pace but to lead the industry in innovation, driven by the ingenuity and passion of its team.

Frontiers of Innovation: Leading the Die Casting Industry

With the introduction of the LK Dreampress 16000T, the boundaries of innovation in die casting have been once again pushed beyond expectations. This launch epitomizes LK's unwavering commitment to pushing the limits of technological advancement in the industry. The 16000T not only signifies a leap in scale but also a testament to LK's unyielding pursuit of innovation, showcasing that there are no limits to what can be achieved.

The Evolutionary Path of LK Die Casting Machines:

Behind every increase in tonnage – from the 6000T to the groundbreaking 16000T – lies a narrative of tireless

力劲集团 Dreampress 16000T 巍然屹立，不仅是工程的奇迹，也是梦想和渴望的巅峰。每一次压铸领域的发展与进步，都会在团队创新和激情的驱动下，不仅会跟上行业发展的步伐，还要引领行业创新，履行我们的承诺。

创新前沿：引领压铸行业

随着力劲集团 Dreampress 16000T 的发布，压铸创新的边界再次被打破，并且超出了预期。此次发布也再次印证了力劲坚定不移地致力于推动行业技术进步，不断突破行业发展边界的承诺。16000T 不仅标志着规模的飞跃，也证明了力劲对创新的不懈追求，在对未来的探索道路上永无止境。

力劲压铸机的蜕变之路

从 6000T 到突破性的 16000T 超级压铸单元的诞生，每一次吨位增加的背后都隐藏着不懈努力、协作精神和超越预期的集体愿景。这是一条反映了力劲追求满足市场需



efforts, collaborative minds, and a collective vision to exceed expectations. It's a journey that reflects the perseverance and teamwork driving LK's quest to meet market demands and exceed technological thresholds.

The demand-driven evolution of equipment is evident in the diverse applications of LK's die casting machines. From sedan rear cabins to MPV rear cabins, SUV front and rear cabins, to the cutting-edge battery trays and the exploration of A00-grade automobile chassis, LK is turning conceptual ideas into reality.

LK Total Solution: Elevating Efficiency with Specialized Solutions

In the pursuit of comprehensive solutions, LK introduces the MCG5, a 5-axis Double Column CNC Machining Center. It is designed to tackle the unique challenges of processing automotive large integrated structural components. The MCG5 has seamlessly integrated into automotive factories, emerging as a vital tool for precision machining in the mass production of components such as EV battery casings, front cabins, rear floors, and other critical parts. Its ability to efficiently process these components underscores its pivotal role in advancing the precision manufacturing landscape for modern automotive requirements.

Conclusion:

As we prepare to converge at Euroguss, LK stands ready not only to unveil the remarkable capabilities of the MCG5 but also to introduce a groundbreaking technology - the thixotropic piston injection solution. This cutting-edge innovation marks a significant milestone in achieving semi-solid magnesium alloy production, revolutionizing the landscape of alloy manufacturing for the automotive industry.

To learn and explore more comprehensive solutions offered by LK. Please visit: www.lk.world. ■

求和超越技术门槛的毅力和团队合作精神的蜕变之路。

在力劲压铸机的应用中，需求驱动变革的特征体现得非常明显。从轿车后舱到 MPV 后舱、SUV 前后舱，再到尖端的电池托盘和对 A00 级汽车底盘的探索，力劲正在将概念性理念变为现实。

力劲整体解决方案：通过压铸全流程工艺自动化解决方案提高效率

为了追求全面的解决方案，力劲推出了 MCG5 系列五轴双柱数控加工中心，它旨在应对处理汽车大型集成结构部件的独特挑战。MCG5 已联动无缝集成到汽车制造厂，联动大型压铸单元生产，成为新能源汽车电池壳、前舱、后地板和其他关键零部件等零部件大规模生产中精密加工的重要工具；其高效处理这些部件的能力突显了其在推进现代汽车要求的精密制造领域的关键作用。

结论：

在我们准备聚集 Euroguss 之际，力劲除了向我们展示 MCG5 系列的卓越性能，还准备引入一项开创性的技术——触变活塞注射解决方案。这项尖端创新标志着实现半固态镁合金生产的一个重要里程碑，彻底改变了汽车行业的合金制造格局。

探索更多 LK 提供的整体解决方案，欢迎访问 www.lk.world。■

Celebrating 4 Years of Excellence in Markranstaedt, Germany

明志科技德国 Markranstädt 生产基地成功运营 4 周年



It's a significant milestone for Mingzhi Technology Leipzig GmbH (MTL), as it has approached 4 years of successful operations at our European Production facility in Markranstädt, Germany.

In this timeframe, MTL has firmly established itself on the market as an experienced producer of core shop machines for foundry customers.

Our investment in this operation has borne fruit with an expansive office space spanning 900m² and a state-of-the-art workshop covering an impressive 2000m².

But our impact goes beyond numbers and dimensions. MTL has become an integral part of the local community, opening its doors to local schools for open-day experiences and offering internships to budding technical talents from nearby schools.

Our journey would not have been possible without the dedication and enthusiasm of our 26-strong workforce. They are the heart and soul of MTL, driving our growth and innovation. We are excited to announce that we are actively seeking new talent to join our team across various roles – be it technical, administrative, or sales.

Our commitment to innovation continues with the ongoing development of cold box/inorganic core machines, focusing on producing cores for automotive components like aluminum subframes. We're also proud to serve niche markets with our Hot Box/Shell machines.

明志科技迎来了又一个重要里程碑，公司迁入德国萨克森州 Markranstädt 的莱比锡明志科技有限公司 (MTL) 已经成功运营 4 年了。

在此期间，MTL 团队展现出了坚韧的决心，战胜了新冠疫情，站稳了脚跟，取得了令人欣喜的成果——

已拥有占地 900 平方米的宽敞办公大楼和占地 2000 平方米的先进车间；

已在土耳其、墨西哥、英国、意大利、法国市场取得成绩，并瞄准了目标市场包括德国、北欧及东欧地区。在前 2 年销售额短暂下滑后，又回到了强劲的增长轨道上；

MTL 向当地学校提供开放日体验，为附近学校内崭露头角的技术人才提供实习机会，扩大在当地的影响力，成为当地不可或缺的一部分。

MTL 的发展离不开 20 多名核心员工的奉献和热情。他们推动着公司的成长和创新。同时，MTL 也在积极招募新的人才加入，无论是技术、管理，还是销售。

MTL 致力于创新，不断研发升级冷芯/无机制芯设备，专注于生产如铝制副车架等汽车零部件的砂芯；同时，我们的热芯和壳型机也能很好地服务于细分市场。

While we've made waves across Turkey, Mexico, UK, Italy, France, our gaze is set on the horizon. Our future target markets include Germany, Scandinavian countries, and expansion within Eastern Europe.

Through the challenges of the COVID-19 pandemic, MTL has shown resilience and determination. After a temporary dip in sales, we are back on a robust growth trajectory, aiming for a turnover of 8 million euros in 2023, 10 million euros in 2024, and an impressive 14 million euros by 2025.

We are immensely proud to be a wholly owned subsidiary of Suzhou Mingzhi Technology Co., Ltd., a trailblazer in core shop equipment and precision sand cores since 2003. Our commitment to technology and innovation continues to drive us forward. ■

苏州明志科技有限公司作为 MTL 的母公司，是其坚强的后盾，中德协同会将技术和创新的承诺继续推动前行。

感谢您见证 MTL 的成长！一起期待成功和创新的未来！ ■

Exclusive|Leap 7000T Delivered To Changan Auto

独家 | Leap 7000T 已正式交付长安汽车使用

The highly anticipated delivery of two LEAP 7000T ultra-large die-casting machines by YIZUMI to the revered Changan Auto has great excitement throughout the industry on August 28.

YIZUMI has achieved another significant breakthrough in the realm of ultra-large machinery after the delivery of the 8500T ultra-large injection molding machine. It's a pivotal milestone for YIZUMI in the field of metal forming.

The LEAP 7000T ultra-large die-casting machines, a culmination of relentless research and innovation by YIZUMI, are poised to meet the demand of integrated die-casting in NEV manufacturing.

Empowering the Future of Integrated Die-casting for Changan Auto

As a vanguard in automotive manufacturing, Changan Auto has always set up the integrated die-casting in its strategic development of lightweight, with the boomer development of NEV. The 7000T machines will be applied to produce front and rear floor panels for new NEVs. It further strengthens Changan's competitive edge in the realm of integrated die-casting.

YIZUMI ultra-large die-casting machine were well recognized by customers

Focusing on the new strategy, the LEAP series die-casting machine was mutually developed by international R&D team with decades of experience in die-casting. To integrating advanced technologies from China and Europe, YIZUMI has conducted independent research and development in an all-round way and owned completely independent intellectual property rights. LEAP series not only can satisfy the higher requirement of the rapid development of die-casting industry on the performance, function and complete die-casting process, it

8月28日，伊之密向著名汽车品牌—长安汽车交付了两台 LEAP 7000T 超大型压铸机，令整个行业都为之一振。

这是继 8500T 超大型注塑机交付后，伊之密在超大型设备领域取得的又一项重大突破，也是伊之密在金属成形加工领域的一个关键里程碑。

LEAP 7000T 超大型压铸机是伊之密坚持创新研发的高峰展示，可以满足新能源汽车生产制造中对于一体化压铸的需求。

为长安汽车一体化压铸的未来发展赋能

作为汽车制造行业先锋，随着新能源汽车的不断发展，长安汽车一直按照轻量化造车的战略不断前进。7000T 超大型压铸机将用于生产新一代新能源汽车车体内的前后底板。这一应用将进一步凸显长安汽车在一体化压铸领域的竞争优势。

伊之密超大型压铸机已得到客户的广泛认可

专注于新的发展战略，LEAP 系列压铸机是由拥有数十年压铸经验的国际研发团队共同开发的。伊之密同时整合了来自中欧的先进技术，全面实施自主研发，拥有完全自主知识产权。LEAP 系列不仅可以满足压铸行业快速发展中，对性能、功能和一次实现完整压铸流程的更高要求，还可以更好地贴合客户的需求并提供智能解决方案。它整合了不同类型的复杂压铸工艺，使压铸更容易。



could also provide smart solutions to better understand demands from customers. It adapts different types of complicated die-casting process and makes die-casting easier.

When the LEAP series debuted to public since July 2021, YIZUMI has developed die-casting machine size from medium to ultra-large of the LEAP series ranging from 380T to 9000T.

The delivery of the LEAP 7000T to Changan Auto not only heralds a momentous achievement for YIZUMI but also signifies China's rising prowess in the global manufacturing arena. With development of integrated die-casting, ultra-large die-casting machines remains the ineluctable trajectory of global manufacturing. The symbiotic collaboration marks the passage into a new era of NEV manufacturing and has laid the groundwork for the development of NEV revolution. ■

自 LEAP 系列于 2021 年 7 月首次亮相开始，伊之密已经开发了从中型到超大规模的 LEAP 系列产品，范围涵盖 380T 到 9000T。

本次交付 LEAP 7000T 不仅展示了伊之密的重大技术成就，也标志着中国在全球制造领域的实力不断增强。随着一体化压铸技术的发展，超大型压铸机已经成为了全球制造业不可避免的发展趋势。本次伊之密和长安的成功合作，标志着新能源汽车制造业新时代的开启，为新能源汽车技术革命的发展奠定了基础。■

KBR Foundry Provides One-stop Service for Investment Casting

科博尔为精密铸造提供一站式服务

Established in 2003, KBR Foundry, a subsidiary of Suzhou KBR Machine Tool Group Co., Ltd. is a professional manufacturer and one-stop solution provider of gray iron and ductile iron castings for the mechanical industries such as machine tool, lathe bed, chassis, and air compressor pump. It focuses on batch and large castings production. The company has received the certification of ISO9001:2008.

KBR started the construction of its production base in

苏州科博尔铸造成立于 2003 年，隶属于苏州科博尔机床集团有限公司，为机床、床身、机壳、空压泵等机械行业提供铸件生产及加工的一站式服务，专注于批量和大型铸件的生产，公司已通过质量管理体系 ISO9001:2008 认证。

科博尔铸造于 2019 年 3 月在安徽宁国投资建厂，总

Ningguo, Anhui in March 2019, and the new plant has been put into production in 2021, with a total construction area of nearly 91,000m². Through the advanced furan resin and coated sand casting technologies, the new plant is specialized in producing gray iron (HT) and ductile iron (QT) castings, with an annual output of over 40000 tons.

The company is well-equipped with advanced investment casting production equipment, physical & chemical analysis and testing equipment, which can meet the requirements of different customers. The products are widely used in fields such as machine tools, air compressors, and construction machinery. By now, KBR castings have been exported to countries such as Japan, the United States, Germany, and Canada. KBR Foundry has become a major supplier to multiple international enterprises. ■

建筑面积约为 91000 平方米，工厂已于 2021 年投产。公司采用先进的呋喃树脂砂铸造工艺，专业生产灰铁（HT）材质、球铁（QT）材质等产品，年产量达 40000 多吨。

公司拥有十分完善的熔模铸造生产设备，先进的理化分析、检测设备，能满足不同客户的要求。公司产品广泛应用于机床、空压机、工程机械等领域，目前，公司产品已出口至日本、美国、德国、加拿大等国家，科博尔铸造已成为多家国际企业的主要供应商。

更多信息，请访问公司网站：<https://kbrcn.com/> ■



IKD FÖHL to Establish Headquarter of Automotive Parts R&D and Manufacturing in Taicang

爱柯迪富乐汽车精密零部件研发制造总部项目落户太仓

On December 20, 2023, the signing ceremony of the IKD FÖHL Automotive Precision Parts R&D and Manufacturing Headquarter project was held in Taicang, Jiangsu Province. The IKD FÖHL Automotive Precision Parts R&D and Manufacturing Headquarter project is engaged in the development, production, and sales of automotive parts, high-end construction hardware, etc.. It is a global leader in the zinc die-casting field, and is expected to achieve an annual output value of over RMB 850 million yuan and an annual tax revenue of over RMB35 million yuan after reaching production.

IKD FÖHL Precision Technology (Taicang) Co., Ltd. was formerly a wholly-owned subsidiary of German FÖHL Group in China. In July 2023, IKD became the largest shareholder through investment and acquisition, and was renamed to its current name. ■

2023 年 12 月 20 日，爱柯迪富乐汽车精密零部件研发制造总部项目成功签约。爱柯迪富乐汽车精密零部件研发制造总部项目从事开发、生产、销售汽车零部件、高档建筑五金件等产品，是锌合金压铸领域的全球领先者，达产后预计实现年产值超 8.5 亿元，年税收超 3500 万元。

据了解，爱柯迪富乐精密科技（太仓）有限公司前身是德国 FÖHL 集团在中国成立的全资子公司，2023 年 7 月，爱柯迪股份有限公司通过投资并购，成为公司最大股东，并更名为现在的公司名称。■

TAA Metal Builds its First Overseas Plant in Thailand

大亚金属在泰国设立工厂

On December 4, 2023, the groundbreaking ceremony for the construction of Zibo TAA Metal factory in Thailand was grandly held. It is TAA's first factory in Southeast Asia and also its first overseas metal abrasive production base. TAA Metal Thailand factory covers an area of approximately 20,000 square meters, and the first phase of the project is scheduled to start production in early May 2024, with an estimated production capacity of 30,000 tons.

Mr. Qingji Han, Chairman of TAA Group, delivered a speech and said that the construction of the Thai factory will better serve overseas customers, improve the company layout and medium-and long-term strategic development plans, and effectively enhance the company's competitiveness and overseas market share.

As one of the most dynamic and promising economies in Southeast Asia, Thailand has a superior geographical location, convenient transportation network, and abundant human resources. The completion of the Thai factory will lay a solid foundation for TAA Group to further expand its international market and enhance its global market share and influence. ■

热 2023 年 12 月 4 日，淄博大亚金属科技股份有限公司泰国新工厂建设项目动土奠基仪式隆重举行。泰国工厂是大亚公司在东南亚布局的首家工厂，也是大亚在全球范围内的首个海外金属磨料生产基地。大亚金属泰国工厂占地约 20000 平方米，一期项目计划于 2024 年 5 月初投产，预计产能 3 万吨。

大亚集团董事长韩庆吉发表致辞，对泰国工厂动土奠基表示热烈的祝贺，韩总表示，泰国工厂的建设将更好地为海外客户提供服务，完善公司的业务布局和中长期战略发展规划，有效提升公司行业竞争力和海外市场占有率。

泰国作为东南亚地区最具活力和潜力的经济体之一，拥有优越的地理位置、便利的交通网络和丰富的人力资源。泰国工厂的建成将为大亚集团进一步拓展国际市场，提升公司在全球市场占有率和影响力打下坚实的基础。■

The 8th National Foundry Industry Vocational Skills Competition Successfully Held

第八届全国铸造行业职业技能竞赛成功举办

On October 20-22, 2023, the final of the 8th National Foundry Industry Vocational Skills Competition was grandly held in Jincheng, Shanxi. The competition consisted of four processes: mold making (vertical parting molding line operation and lost foam production operation), melting and pouring, pattern, and die & mold. The contestants were selected from frontlines of foundry enterprises through preliminary rounds.

The competition has break new records in various aspects. Firstly, the number of competition programs has increased from 3 to 4, and for the first time, an additive manufacturing competition was held participated by vocational college students; Secondly, the number of participating teams reached 20; the third is there were 295 finalists, including 21 female contestants. Among them, the youngest was 25 and the oldest was 58 years old.

The competition was supported and held in 8 enterprises

2023 年 10 月 20-22 日，第八届全国铸造行业职业技能竞赛决赛在山西晋城隆重举行。大赛共设铸造造型（分为垂直分型造型线操作和消失模生产操作）、熔炼浇注、铸造模型、压铸模具 4 个项目，参赛选手从全国铸造企业的一线人员中通过预赛选拔产生。

本届竞赛各项指标再创新高，一是竞赛工种首次由 3 个增加到 4 个，还首次举行了由职业院校学生参加的增材制造项目竞赛；二是参赛队伍首次达到 20 个；三是决赛选手数量高达 295 名，其中还有 21 名女选手参赛，参赛选手中年龄最小的 25 岁，最大的 58 岁，均为历届之最。

赛场情况：启用 8 家企业，11 个赛场。其中熔炼浇注工是 5 家企业，7 个赛场，14 台套电炉同时启动；竞赛时



and 11 venues, in which 5 enterprises and 7 venues for melting and pouring, and 14 sets of electric furnaces have been started simultaneously. The competition final cycle has been increased to 4 days; The number and scale of supporting activities for the competition were all the most in history.

The National Foundry Industry Vocational Skills Competition has been held for seven consecutive sessions since 2015. It has been approved by the Ministry of Human Resources and Social Security as a national level competition since 2018. It is the largest and highest level brand for such events in China, and has set a "wind vane" for the skills development of foundry industry personnel. ■

间方面，为了工作更细更扎实，竞赛决赛周期增加至4天；大赛配套活动之丰富、活动规模之大为历届之最。

全国铸造行业职业技能竞赛自2015年举办以来，已连续举办七届，自2018年经人社部批准成为国家级竞赛，是我国铸造行业规模最大、级别最高的品牌赛事，为广大铸造从业人员树立了技能成才的“风向标”。■

China's First Dual Carbon Research Institution for Foundry Established

我国铸造行业首个双碳研究机构正式成立

On December 18, 2023, the founding ceremony of the Dual-Carbon Working Committee of China Foundry Association ("Dual Carbon Committee") was held in Beijing. More than 70 representatives from 63 companies, including China Foundry Association, other industry associations, and foundry enterprises attended the meeting. Members of the committee were elected.

It has been three years since China first proposed carbon peak and carbon neutrality goals on September 22, 2020. The domestic carbon emission management system is gradually maturing, and the carbon neutrality direction in downstream

2023年12月18日，中国铸造协会双碳工作委员会（简称：双碳委）成立大会在北京召开，来自中国铸造协会、机械行业协会、铸造企业的63家单位70余位代表出席本次会议。会议选举产生了双碳委委员单位。

中国自2020年9月22日首次提出碳达峰、碳中和目标距今已有3年，国内碳排放管理体系逐步趋于成熟，汽车等铸造下游行业碳中和导向越来越明确，铸造行业碳减排意识基本形成。为解决企业实际问题，中国铸造协会决定成立

industries such as automobiles is becoming increasingly clear. The awareness of carbon reduction in the foundry industry has been strengthened. In order to solve practical problems for enterprises, China Foundry Association has decided to establish the "Dual Carbon Working Committee" to accomplish interpretation and promotion of carbon peak and carbon neutrality policies, such as automobiles industry, formulate a technical route for "carbon peak and carbon neutrality" in the foundry industry, and guide enterprises to effectively fulfill carbon reduction commitment. ■

“双碳工作委员会”，组织行业碳达峰碳中和政策解读和宣贯、邀请专家讲解汽车等重点下游行业碳中和要求，制定铸造行业“碳达峰、碳中和”技术路线，指导企业有效落实碳减排工作。■

Upgraded Exchange between China-Russia Foundry Experts 中俄铸造行业领军企业交流升级



In November, 2023, China Foundry Association organized a delegation of 30 Chinese foundry experts to exhibit and visit Metal Expo 2023, held in Moscow, Russia, led by Mr. Thomas Gao, Executive Deputy President of China Foundry Association. Participating companies include:

Jiangsu Jiaming Advanced Carbon Materials Co.,Ltd.
Harbin Kedewei Metallurgy Co., Ltd
Shandong Angyi Equipment Manufacture Co.,Ltd.
Liaoning Prete Environmental Protection Technology Co., Ltd.
Weifang Tuangong Machinery Co., Ltd.
Hebei Lianshuo Machinery Manufacturing Co.,Ltd.
Tianjin Zhongyiming Technology Co.,Ltd.
Xiangyang Juli High Technology Material Co.,Ltd.
Zhiheng (Tianjin) Industry Co. LTD.

2023年11月，中国铸造协会执行副会长高巍率中铸协代表团参加第29届俄罗斯国际铸造展览会 METAL EXPO 2023。参团企业有：

江苏嘉明碳素新材料有限公司
哈尔滨科德威冶金股份有限公司
山东昂熠设备制造有限公司
辽宁普雷特环保科技有限公司
潍坊团共尔机械有限公司
河北联硕机械制造有限公司
天津中屹铭科技有限公司
襄阳聚力新材料科技有限公司

Hangzhou Heli Machinery Co., Ltd.
Xintai Xinsheng Foundry Co., Ltd.
Shandong Jinlei Renewable Energy Heavy Equipment Co., Ltd

Liaoning Hang'an Core Technology Co., Ltd.
Shandong Huida Vermicular Graphite Equipment Co., Ltd.
ChengDu RuiHua Machinery Manufacturing CO., LTD
Chengdu Yehua Technology Co., Ltd.
Qiqihar Heavy Casting Co., LTD
Taizhou Hongkang Dianqi CO., LTD.
Botou Dongjian Foundry Co., Ltd.
Shandong Useen Casting Co., Ltd.
Jiangsu Renshen Qiutie Co., Ltd.
Hunan Xinquan Technology Co., Ltd.

The delegation was warmly received by the Russian Foundry Association and the Liaison Office of the China Foundry Association in Russia, and met with new and old friends. The exhibition effect exceeds the expectation, and the enterprise harvest is full. After the exhibition, the delegation visited Vladimir Foundry and Gorky Automobile Foundry Company.

This is the 29th edition of the most professional foundry and metallurgy exhibition in Russia. And this is the third time CFA sent a delegation to exhibit. The exhibition lasts for four days, including four themes of casting, metallurgy and machinery. There are more than 800 exhibitors, including 350 exhibitors from China.

At present, the economic, trade and technical exchanges between China and Russia have been rising to a new level. China Foundry Association will continue to work with the Russian Liaison Office of China Foundry Association to make joint efforts to promote Chinese enterprises to strengthen cooperation with all aspects of the Russian foundry industry.

The 10th High-level Forum of the BRICS Foundry Association is scheduled to be held in Russia in October 2024. Member enterprises are sincerely invited to continue to pay close attention to the Russian market dynamics. ■

致恒（天津）实业有限公司
杭州合立机械有限公司
新泰市鑫晟铸造有限公司
山东金雷新能源重装有限公司
辽宁航安型芯科技股份有限公司
山东汇达蠕墨装备有限公司
成都耶华科技有限公司
成都瑞华机械制造有限公司
齐齐哈尔重型铸造有限责任公司
泰州市宏康电气有限公司
泊头市东建铸造有限责任公司
山东宇信铸业有限公司
江苏人参生铁有限公司
湖南鑫泉科技有限公司

代表团一行受到俄罗斯铸造协会，中铸协驻俄罗斯联络处的热情接待，会见了新、老朋友。展会效果超预期，企业收获满满。展会后，代表团一行到弗拉基米尔铸造厂和高尔基汽车铸造公司进行参观、交流。

本届展会俄罗斯国内最知名和最专业的铸造冶金行业展会，2023年为第29届。这也是中铸协第三次组团参与俄罗斯铸造展会。展会为期四天，包含铸造、冶金、机械等四个主题，参展企业800多家，其中来自中国展商有350家。

当前，中、俄铸造经贸和技术交流不断迈上新台阶，中铸协将继续携手中铸协俄罗斯联络处一起，为推动中国企业加强与俄罗斯铸造行业各方面合作共同努力。

金砖国家铸造业联合会第10届高层论坛计划于2024年10月在俄罗斯召开，诚邀会员企业持续关注俄罗斯市场动态。 ■



President of Russian Foundry Association Visit to China Foundry Association

俄罗斯铸造协会主席一行到访中铸协



On January 11th, 2024, Mr. Andrey Dibrov, President of Russian Foundry Association visited China Foundry Association, accompanied with Mr.Yuxin Han, Director of China Foundry Association Russian Liaison Office. Mr.Libbo Zhang, President of CFA, had an official meeting with Mr.Dibrov. Mr.Dongsheng Wang, Vice President and Secretary General, Ms.Qi Fan, Vice President, Mr.Thomas Wei Gao, Executive Vice President and Ms.Xing Chen, Deputy Secretary General of CFA also joined the meeting.

The two parties had detailed discussion on 2024 BRICS Foundry Association High-end Forum and relevant activities and expressed mutual determination on fully supporting the above mentioned events. China Foundry Association also invited Russian Foundry Association to participate with CFA into the WFO meeting which will be held in October, 2024 in Deyang, Sichuan Province of China.

The friendly conversation also covered how to make full use of exhibitions both in China and Russia to facilitate member foundry manufacturers to further explore overseas market and promote international technical and trade exchanges in the future. ■

2024年1月11日，俄罗斯铸造协会主席安德烈斯布洛夫夫到访中国铸造协会，中铸协俄罗斯联络处主任韩育新陪同来访。中铸协会会长张立波、执行副会长范琦、执行副会长兼秘书长王东生、执行副会长高巍、副秘书长陈星、行发部赵刚、国展部尤扬、聂飞接待并参加座谈。会上，双方就2023年在俄所开展的合作项目进行总结，并对2024年工作计划进行交流。

座谈过程中，双方着重就金砖国家铸造业联合会将于2024年举行的“金砖国家铸造业领导人高层论坛”召开及举行的相关活动进行讨论，坚定了双方共同支持活动举办的决心。同时，俄铸协表示愿与中铸协一同，参与于2024年10月举行的世界铸造组织德阳会议。

2024年度，中铸协将持续秉承为行业服务的理念，继续发挥好平台与服务职能，带领广大行业企业走出去，襄助企业开拓俄罗斯市场，讲好中国铸造的故事，为铸造行业的高质量发展贡献新的力量。■

Calderys Inaugurates A Brand-New Building For Its Second Public School In India

凯得力印度公司开办的第二所学校举行新校园揭幕仪式

Calderys has inaugurated on September 22, a brand-new building for its second school in Wankaner - in the Gujarat state of India in the presence of Shri Jitubhai Somani, - a member of legislative Assembly from Wankaner, Shri G.T. Pandya--District Collector of Morbi, Michel Cornelissen--President and Chief Executive Officer of the Calderys Group, Ish Mohan Garg - Senior Vice President Asia Pacific region, as well as Gujarat Government Officials.

The new building, includes 13 classrooms from Nursery to Class 10, and hosts state-of-the-art academic spaces with dedicated Science laboratories, IT centers, a playground and all other amenities following the standards of the Central Board of Secondary Education (CBSE), the national education body. At full capacity, the school will welcome 500 students by 2026.

The Wankaner Calderys DAV school is the second school opened by Calderys and the D.A.V. College Managing Committee (DAV CMC), a renowned non-governmental educational organization in India overseeing more than 900 schools, 75 colleges and one university.

The first school was opened in 1995 by Calderys and the DAV CMC in Katni, in the state of Madhya Pradesh. Today it counts more than 1,000 students from the local communities.

When Calderys started its plant in Wankaner in 2015, there was no English medium school in the city, and therefore most of the parents had to send their children to the city of Rajkot, 65 km away from Wankaner. "At the time of the opening of our Wankaner plant, the educational landscape of the area was a barrier to attract and retain talent", says Satyendra Kumar, Industrial Operations Director of Calderys South West Asia, "we did not want our employees to have to choose between a good job and their children's education".

With this in mind and in line with its commitment to having a positive impact wherever it does business, Calderys decided to open an English medium Central Board School in Wankaner in a rented building in order to provide high quality education to the children of its employees, as well as to the local community.

"We believe in the transformative power of education", says Ish Mohan Garg, Senior Vice President APAC of the Calderys Group and Managing Director of Calderys in India. "Our first school in Katni has been a success since the very beginning. Having had the opportunity to open, and now expand, this second school is an immense source of pride".

This new school started with 33 students in April 2020.

9月22日，凯得力公司在印度古吉拉特邦万加内尔为其第二所学校的全新校园揭幕，万加内尔立法会议员 Shri Jitubhai Somani、莫尔比地区收藏家 Shri G.T.Pandya、凯得力集团总裁兼首席执行官 Michel Cornelissen、凯得力亚太地区高级副总裁 Ish Mohan Garg，以及古吉拉特邦政府官员等出席了揭幕仪式。

新建筑包括从幼儿园到10年級的13个年级教室，拥有最先进的学术空间，配有专门的科学实验室、信息技术中心、操场和其他设施，符合国家教育机构中央中等教育委员会（CBSE）的标准。到2026年，学校将迎来500名学生，实现满额招生。

万加内尔凯得力 DAV 学校是凯得力集团和 D.A.V. 学院管理委员会（DAV CMC）合办的第二所学校，该委员会是印度著名的非政府教育组织，负责管理900多所学校、75所学院和一所大学。

第一所学校于1995年由凯得力集团和 DAV CMC 在中央邦的卡特尼市开办。如今，该校已有1000多名来自当地社区的学生。

2015年，当凯得力公司在万加内尔开办工厂时，这里还没有英语学校，因此大多数家庭不得不把孩子送到距离万加内尔65公里的拉杰果德市。凯得力公司西南亚工业运营总监 Satyendra Kumar 表示：“在我们的万加内尔工厂开业时，该地区的教育现状是吸引和留住人才的障碍。我们不希望我们的员工面临着工作和孩子教育的选择。”

鉴于此，以及公司对于在任何地方开展业务都带来积极影响的承诺，凯得力公司决定在万加内尔租赁的一栋大楼里开设一所英语教学的学校，为其员工的子女以及当地社区提供高质量的教育。

凯得力集团亚太地区高级副总裁兼凯得力印度董事总经理 Ish Mohan Garg 表示：“我们相信教育的变革力量。我们在卡特尼的第一所学校从一开始就取得了成功。我们有机会开办了第二所学校，而且又扩大了规模，这让我们感到无比自豪。”

这所新学校于2020年4月开学，共有33名学生。从那



Since then, it has steadily grown notably thanks to the dedication of the teaching team. This year, the total school enrolment has increased to 190 students and the aim is to welcome 500 students by 2026.

Michel Cornelissen, Calderys' President and CEO, comments: "This initiative is fully aligned with Calderys' commitment towards its people and local communities. It reflects our engagement towards education here in India, not only for our employees' children but for the benefit of the larger community".

Ish Mohan Garg concludes "We often hear about the global learning crisis. With our initiatives around education, especially with our two schools in the country, we demonstrate tangibly our engagement to foster children's access to quality education. At the same time we facilitate the parents' work opportunities at Calderys in India. This is a virtuous circle that has proven its success over the past years."

For more information, visit www.calderys.com ■

时起，由于教学团队的奉献精神，学校得到稳步发展。今年，学校总入学人数已增至 190 人，目标是到 2026 年迎来 500 名学生。

凯得力集团总裁兼首席执行官 Michel Cornelissen 表示：“这一举措完全符合凯得力公司对其员工和当地社区的承诺。反映了我们对于印度教育事业的积极参与，这不仅是出于我们对员工子女关心，也将有益于范围更广的社区”。

Ish Mohan Garg 总结说：“我们经常听到关于全球学习危机的消息。通过我们的教育举措，特别是公司在印度开办两所学校，我们切实展示了公司致力于促进儿童获得优质教育的机会。同时，我们为印度凯得力公司的家庭提供了工作机会。这是一个良性循环，这一成功举措在过去几年已经得到了证明。”

更多信息，请访问 www.calderys.com。■

BMW First Casting In New High-Tech Light Metal Foundry

宝马高新轻金属铸造厂首次浇注成功

The light metal foundry at the BMW Group plant in Landshut is entering a new era. The official first casting of an aluminium housing for the highly integrated fifth-generation electric drive took place on an extensive expansion area. In a few days, the innovative manufacturing area will start series production. This will increase the annual production capacity for the key cast component of the BMW Group's E-drive system to up to 800,000 units annually.

"This is a milestone for the Landshut light metal foundry and the Landshut plant," said site manager Dr Stefan Kasperowski.

The BMW Group is investing more than 200 million euros in the expansion of the Landshut light metal foundry. The focus is on expanding capacity for the production of the central housing for the highly integrated electric drive topology. The cast component, which is highly complex in terms of its contour and functional integration, combines the electric motor, transmission and inverter.

The new light metal foundry uses the so-called Injector Casting process. The innovative casting technology was designed and patented by process specialists at the Landshut light metal foundry and developed for highly industrialised series production. The high quality requirements and the complex geometry of the central housing called for a new casting technology that combines the advantages of a wide variety of casting processes. Injector casting guarantees a significantly finer microstructure and thus improved mechanical properties of the casting. In addition, it enables a reduced cycle time and, as a result, a significant reduction in energy consumption as well as lower CO₂ emissions due to a lower casting temperature. The process is also characterised by reduced resource consumption, as less recycled material is required. This is because no additional sprue system is required due to the filling with the injector. The process thus saves up to 40 per cent of the melt.

As in all areas of the Landshut light metal foundry, only cores made of inorganic binder systems are used in the new systems, which are emission-free and environmentally friendly. This, too, is an innovation developed in Landshut.

In mid-November, the Landshut light metal foundry receives the renowned Automotive Lean Production Award in the category "Component Supplier" for its innovation of injector casting. Winners of this award are among the absolute "Champions League" in the automotive sector.

With the expansion of the Landshut light metal foundry, the location strengthens its importance for a successful transformation of the BMW Group towards e-mobility. In

宝马集团位于兰茨胡特的轻金属铸造厂正在进入新的时代。为高度集成的第五代电动车完成了的铝合金壳体首次浇注。随后，其创新制造区将开始批量生产。这将使宝马集团电动车关键铸件的年产能提高到80万件。

工厂经理 Stefan Kasperowski 博士说：“这是兰茨胡特轻金属铸造厂的一个里程碑。”

宝马集团将投资2亿多欧元扩建兰茨胡特轻金属铸造厂，重点是扩大高度集成的电动汽车中央壳体的产能。该壳体铸件在外形和功能集成方面非常复杂，包含电机、变速器和逆变器等部件。

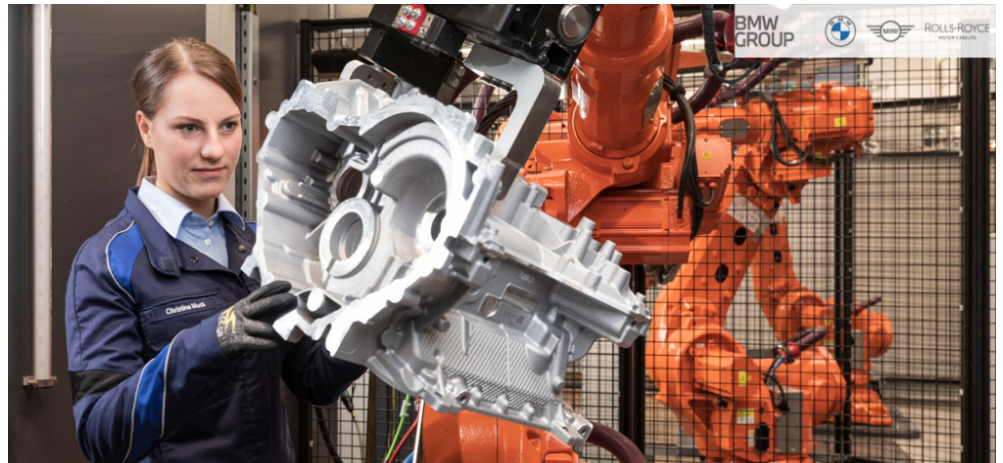
新的轻金属铸造厂采用了所谓的喷射铸造工艺。这项创新的铸造技术由兰茨胡特轻金属铸造厂的工艺专家设计并获得专利，用于高度工业化的批量生产。生产中央壳体的高质量要求和复杂几何形状要求采用一种新的铸造技术，该技术结合了多种铸造工艺的优点。喷射铸造工艺保证了铸件具有更为精细的微观结构，从而提高了铸件的力学性能。此外，它能够缩短生产时间，接受较低的浇注温度，因此显著降低了能耗以及CO₂排放。由于使用喷射填充而不需要额外的浇口系统，该工艺产生的回炉材料较少，具有降低资源消耗的特点，最高可减少40%的熔融金属浇注量。

与兰茨胡特轻金属铸造厂的所有生产区域一样，新系统中只使用无机粘结剂系统制芯，是零排放和环保生产。这也是兰茨胡特工厂的一项创新。

11月中旬，兰茨胡特轻金属铸造厂因其喷射铸造工艺的创新而获得著名的“零部件供应商”中的汽车精益生产奖。该奖项的获得者当属汽车行业绝对的“冠军企业”。

随着兰茨胡特轻金属铸造厂的扩建，工厂发展对宝马集团向电动汽车的成功转型更加重要。未来，兰茨胡特将为第五代全电动汽车的所有电机/变速器提供壳体，年产能达80万台。这些壳体目前用于全电宝马i4、宝马i5和宝马i7车型以及宝马iX和宝马iX1。从2025年起，兰茨胡特工厂还将为下一代全电

future, Landshut will supply the housings for all motor/transmission variants for fully electric vehicles of the fifth generation, up to 800,000 units per year. They are currently used in the fully electric BMW i4, BMW i5 and BMW i7 models as well as the BMW iX and BMW iX1. From 2025, the Landshut plant will also supply the next generation of all-electric vehicles, the New Class. Production of the e-drive combination takes place in the competence centre for e-components at the Dingolfing plant.



The light metal foundry of the BMW Group plant Landshut

The light metal foundry at the Landshut plant is the BMW Group's only production facility for light metal castings in Europe. Last year, the employees produced around 3.3 million cast components with a total weight of more than 73,000 tonnes. The scope of production includes engine components such as cylinder heads and crankcases, components for electric drives as well as large-scale structural components for the vehicle body. The light metal foundry is one of the most modern foundries in the world.

Source: www.bmw-werk-landshut.de ■

电动汽车 New Class 提供零部件。混合电动汽车在丁戈尔芬工厂的电动部件研发中心进行生产。

宝马集团兰茨胡特轻金属铸造厂

兰茨胡特的轻金属铸造厂是宝马集团在欧洲唯一的轻金属铸件生产基地。2022年，工厂生产了约330万个铸件，总重量超过73000吨。生产范围包括气缸盖、曲轴箱等发动机部件、电动驱动部件以及车身大型结构部件。兰茨胡特轻金属铸造厂是世界上最现代化的铸造厂之一。

来源: www.bmw-werk-landshut.de ■

Hyundai Is Developing Giga Press To Boost Ev Production And Cut Costs

现代汽车开发一体化铸造技术，提高电动汽车产量并降低成本

Hyundai is taking a page from Tesla as it plans to model a new EV production method after its Giga Casting. The new process, “hypercasting,” can significantly cut costs while boosting output.

According to an exclusive report from the Korean newspaper Hankyung, Hyundai’s new EV production method is inspired by Tesla’s Giga Casting.

The process involves injecting molten aluminum alloy into casting molds that harden into the vehicle’s frame. Since

据韩国《韩京报》独家报道，现代汽车正在效仿特斯拉，采用全新的电动汽车生产方式，用“一体化铸造”来提高产量的同时显著降低成本。

该生产方式与特斯拉的一体化铸造类似，将熔融铝合金注入铸造模具中，直接硬化成车身框架。特斯拉2020年在美国工厂引入了该一体化铸造技术，随后在中国和德国工厂落地。



introducing the method in 2020 at Tesla's Fremont Factory, the EV maker has introduced it at its plants in China and Germany.

The massive machines produce parts much bigger than what the auto industry was used to. Automakers can save much-needed time and resources without the need to bond multiple parts (it can also help reduce the vehicle's weight). Tesla is said to have reduced costs by about 30% using Giga Casting. Traditional methods include drilling thousands of holes in around 70 steel plates and welding them together individually.

Hyundai, which reached a tentative wage pact with its South Korean labor union Tuesday, agreed to a "special agreement for future growth." The goal is to boost domestic investment to convert existing ICE manufacturing plants into "core manufacturing bases for future vehicles."

Korea's largest automaker has decided to develop its own casting, processing, and assembly plant, with production planned for 2026. The company already filed for the "hypercasting" trademark with the United States Patent and Trademark Office on August 21, 2023.

Hyundai isn't the only one looking to take a page from Tesla to boost EV production. Several automakers, including Toyota, Volkswagen, and Volvo, are looking to introduce similar processes.

The South Korean automaker is also looking to counter Tesla's proliferating Supercharger network in its domestic market with its own ultra-fast chargers. Hyundai has had success so far in transitioning into the electric era with EV models, including the IONIQ 5, IONIQ 6, and Kona Electric. However, to keep up with EV leaders like Tesla and BYD, Hyundai sees an opportunity to transform its production network.

Source: www.electrek.co. ■

这种生产方式能够生产超大型汽车车身，节省宝贵的时间和资源成本，并且无需粘合多个零部件，能够减轻车辆的重量。据称特斯拉使用一体化铸造降低了30%的成本。如果采用传统的生产方式，需要在大约70块钢板上钻数千个孔，然后再焊接在一起。

现代汽车与韩国工会达成了一项暂定的工资协议，并同意达成一项“未来增长特别协议”。目标是增加国内投资，将现有的ICE制造厂转变为“未来汽车的核心制造基地”。

作为韩国最大的汽车制造商，现代汽车决定开发自己的铸造、加工和组装工厂，并计划于2026年投产。公司已于今年8月21日向美国专利商标局申请了“hypercasting”（超级铸造）商标。

现代汽车并不是唯一一家希望借鉴特斯拉的经验来提高电动汽车产量的公司。包括丰田、大众和沃尔沃在内的汽车制造商也在引入类似的工艺。

现代汽车公司还希望用自己的超快速充电网络来与特斯拉竞争。到目前为止，现代汽车已推出包括IONIQ 5、IONIQ 6和Kona electric在内的纯电动车，成功过渡到电动车时代。然而，为了跟上特斯拉和比亚迪等电动汽车领跑者的步伐，现代汽车还需抓住创新生产方式的机会。

来源：www.electrek.co. ■



The Wind Of Change Will Come, And We Must Be Ready

变革终将来临，准备势在必行

2nd INTERNATIONAL FORUM AVANCED LIGHT METAL SOLUTIONS by FSA

铸造之星联盟（FSA）主办第二届国际先进轻金属论坛

Thomas Fritsch, Chief Editor

Foundry planet 主编 托马斯·弗里奇

The second edition of the Advanced Light Metal Solutions Forum was an extraordinary gathering of brilliant minds, dedicated professionals and great guests. It was more than just an event; It was an inspiring convergence of innovative ideas and future possibilities under the leitmotif Advanced Light Metal Solutions - For a sustainable, decarbonized Automotive Industry.

Exciting presentations and intensive exchange with a view to an eco-friendly automotive industry

Seven years after the first edition, the Forum was the ideal platform for the 150 participants from 18 countries to make new and promising connections, to get in touch with customers and to consolidate fruitful relationships with the members of the FSA - Foundry Star Alliance. The strength and vibrancy of the industry network was confirmed through meetings and multiple interactions.

The interaction with industry experts and visionaries at Villa Baiana was a unique experience with meaningful discussions on innovative applications, emerging trends, sustainability and decarbonization in the automotive sector. The collective knowledge shared and the team spirit at the forum were remarkable.

以“先进的轻金属解决方案——致力于可持续、低碳的汽车行业”为主题，第二届先进轻金属解决方案论坛邀请了众多行业专家、学者和特邀嘉宾的参与。这不仅仅是一场论坛，也是一次鼓舞人心的大会，会议期间研讨了创新理念及未来发展。

聚焦汽车行业节能、开展精彩演讲交流

自7年前举办第一届论坛后，本次论坛为来自18个国家的150名参会者建立新的、有价值的联系提供了理想的平台，架起了与客户的沟通桥梁，巩固了与铸造之星联盟（FSA）成员之间富有成效的联系。通过会议和交流，显现了行业的实力和活力。

行业专家及具有远见的代表们在巴亚纳别墅酒店（Villa Baiana）就汽车行业的创新应用、新趋势、可持续发展和碳减排话题等进行了深度交流，并取得了共识、交流了经验。

会议还讨论了大型压铸件和整个周边设备的研发，强调了电动汽车用的替代铸件，例如铸钢件等。

Roberto Vavassori 等嘉宾的主旨演讲令人印象

The presentations and discussions also revolved around the development of so-called giga-castings in die casting and the entire peripheral equipment, but in addition, alternatives for e-mobility, for example made of steel, were also highlighted.

Keynote speakers such as Roberto Vavassori impressively showed how the energy turnaround can be successfully shaped, but also how much effort and energy will be necessary, especially if one takes the geopolitically different competitive conditions as a basis.

Sandy Munro travelled from the USA to share his experiences in the field of product development with the participants in a passionate and striking manner. Of course, the focus was on the advantages of giga-casting and aluminum for e-mobility, and Munro believes that much is still possible and that the hype for large structural components in die casting is only the beginning.

The exchange of knowledge, insights and experiences has become synonymous with Villa Baiana and is to be continued. Great changes are coming, IDRA head Riccardo Ferrario is sure, we just have to be prepared. The future opens opportunities, and the organizers are sure that with the support and participation of their partners, they will be able to shape them in an innovative and sustainable way.

The organizers' thanks are rightly directed at the commitment of the participants, who are an integral part and contribute significantly to the success. Add to this the charm of the location in Franciacorta, the proximity to IDRA's headquarters with the possibility of allowing sufficient exhibition space for all FSA members and the great hospitality.

About Foundry Star Alliance

The Foundry Star Alliance is a group of leaders in their specific field of activity who have decided to

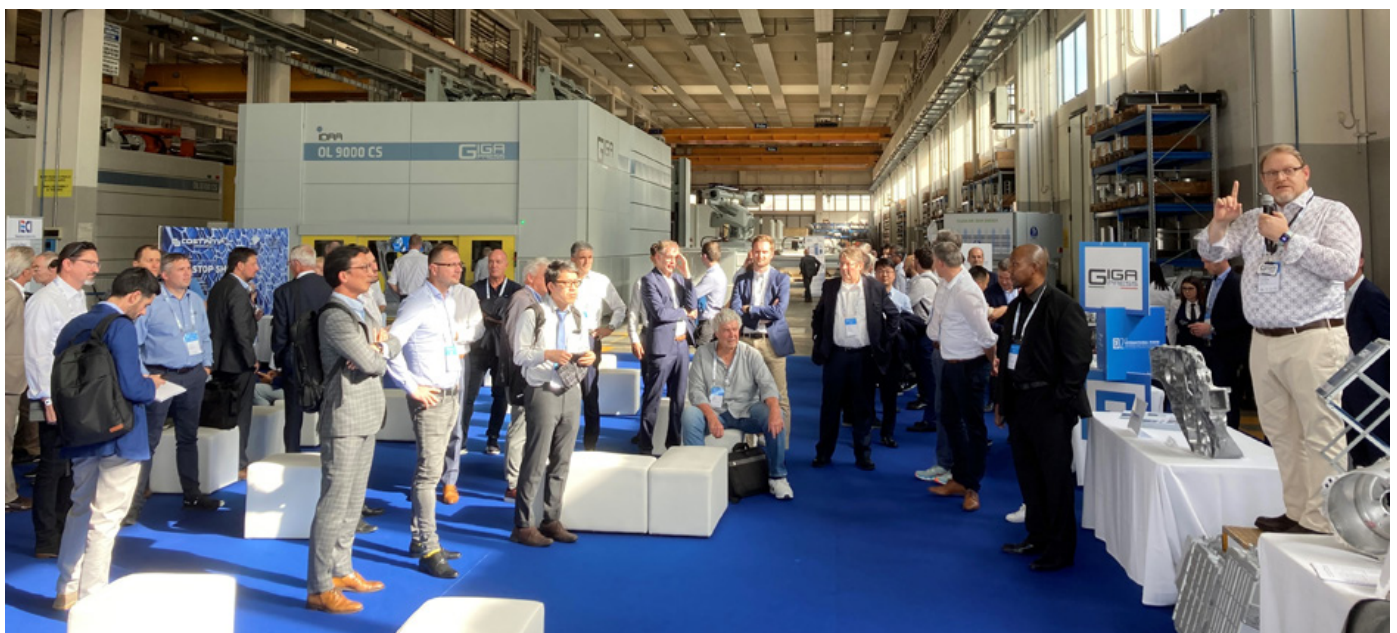
深刻，报告讲解了如何成功实现能源转型，以及需要做出的努力和付出的精力，尤其是考虑到不同地缘政治条件下存在的竞争。

从美国远道而来的 Sandy Munro，与参会代表分享了他在产品开发领域的经验，重点是大型压铸件和铝在电动交通工具生产中的优势，Munro 认为大型压铸结构件的兴起只是一个开始，还有很大的可能性。

知识、见解和经验的交流已成为本次 Villa Baiana 论坛活动的标志，而且还将继续下去。面对即将到来的大变革时代，意德拉公司主席里卡多·费拉里奥确信，我们能做的就是做好准备。未来充满着机遇。活动主办方相信，在合作伙伴的支持和参与下，他们将能够以创新和可持续的方式迎接未来。主办方向参会者表达了感谢，因为他们是不可或缺的，对论坛的成功做出了很大贡献。此外，Franciacorta 的地理位置极具魅力，靠近意德拉公司总部，可以为所有 FSA 成员提供足够的展示空间以及热情周到的服务。

铸造之星联盟

铸造之星联盟（FSA）是由各特定领域的领导企业组成的，致力于通过共同努力，为全球高压压铸（HPDC）轻合金市场的快速增长提供支持。原始设备制造商（OEMs）的全球发展所需要的知识和技能水平是单一公司无法获得的。FSA 的成员共同努力，将集体的资源和专业技术融合在一起，开发出市场上集成度、自动化水平最高以及最可靠的高压压铸生产核心技术。■



work together and combine their efforts to best support the rapid growth of the global HPDC light alloy markets. The global approach of the OEMs requires a level of knowledge and skills that is not available in a single company. FSA members work together and pool their collective resources and specific technologies, resulting in the best integrated, automated and reliable high pressure die casting production core on the market. ■

WFO's Josef Suchy Medal For Mr. Hiroyoshi Kimura

世界铸造组织为木村博彦先生颁发 Josef Suchy 奖章

The World Foundry Organization (WFO) held a Forum at GIFA where the Young Researchers and Early Career Professionals Conference Awards and the Jozef Suchy Medal were handed out.

The opening ceremony of the WFO Forum celebrated in Düsseldorf as part of the activities of GIFA 2023 offered the attendees the possibility to see the handout of the WFO Josef Suchy medal for meritorious services to the WFO. This recognition was created in the name of Professor Jozef Suchy, who had served the WFO as both a President, Treasurer and member of the executive committee for over 20 years. His dedication to the organization, his university and the global industry was testament to the passion he had for the industry.

In this occasion, the WFO awarded Mr. Hiroyoshi Kimura from Japan with this medal.

Mr. Kimura was born in 1940 (Showa 15), he had a Bachelor of Science and Engineering in Mechanical Engineering from Waseda University in 1964 (Showa 39) and he is nowadays the Honorary Chairman of Kimura Foundry, one of the most relevant foundry groups in Japan. Some of his major Career Highlight are among others, being the President of Kimura between 1982 and 2011 and Chairman-Representative Director between 2011 and 2014, having some Major Public Service Positions like Advisory Committee Member in National Institute of Advanced Industrial Science and Technology, Committee Member in Fuji-no-Kuni Administrative and Financial Reform Promotion Conference, Committee Member in Next Generation 3D Printing Technology Integrated Development Organization of the Technology Research Association, or Chairman in Japan Foundry Engineering Society and Chairman in Japan Foundry Association. He has also received some Personal Awards and Recognitions like the Minister of Economy, Trade and Industry Award for the Development of Rapid Delivery and High-Quality Full Mold Casting System (November 2005) or the Order of the Rising Sun, Gold and Silver Rays (November 2016), among

世界铸造组织 (WFO) 在今年的 GIFA 展期间举办了一场论坛, 为青年研究员和资深职业专家会议奖和 Jozef Suchy 奖章在此会议上颁发。

作为 2023 年 GIFA 展会活动的一部分, 在世界铸造组织论坛开幕式上, 参会者有机会见证了 Josef Suchy 功勋奖章的颁奖仪式。这一奖项是以 Jozef Suchy 教授的名义设立的, 他曾担任世界铸造组织主席、财务主管和执行委员会成员, 为世界铸造组织服务 20 多年。他对世界铸造组织、他所在的大学和全球铸造行业的奉献精神证明了他对行业倾注的热情。

在此论坛期间, 世界铸造组织向来自日本的木村博彦先生颁发了奖章。

木村先生出生于 1940 年, 于 1964 年获得早稻田大学机械工程系理工学士学位, 现为日本最具影响力的铸造企业之一木村铸造公司的名誉董事长。他的职业生涯高光时刻包括: 曾于 1982-2011 年担任木村铸造公司社长, 2011-2014 年担任董事, 还担任过一些行业内的职位, 如国家先进工业科学技术研究所咨询委员会委员, 下一代 3D 打印技术综合研发组织委员, 以及曾担任日本铸造工学会理事长、日本铸造协会理事长。他还获得了一些个人奖项和认可, 如经济、贸易和工业部长颁发的快速交付和高质量实型铸造系统研发奖 (2005 年 11 月)、金/银光勋章 (2016 年 11 月) 等。此外, 木村先生还在世界铸造组织执行委员会任职数年, 并在全球各地宣传该组织及其全球合作目标。世界铸造组织秘书长 Jose Javier Gonzalez 先生表示: “由于木村先生对全球铸造业和世



others. Along with these great achievements Kimura-San served for several years on the WFO Executive Committee and travelled the world promoting the organization and its global collaborative objectives. “Taking into consideration his incredible support to the global foundry industry and the WFO, we are really honored to give him this WFO Jozef Suchy medal,” expressed the WFO General Secretary Jose Javier Gonzalez.. ■

界铸造组织给予的极大支持，我们非常荣幸地将这枚世界铸造组织 Jozef Suchy 奖章授予他。” ■

Investment Firm Acquires Waupaca Foundry

投资公司收购沃帕卡铸造公司

Proterial, parent company of AFS Corporate Member Waupaca Foundry Inc., has signed a definitive agreement to be acquired by Monomoy Capital Partners, a private investment firm based in New York City. Financial terms of the private transaction were not disclosed.

Waupaca Foundry will continue to operate under its current management team, led by President, CEO, and COO Michael Nikolai.

Headquartered in Wisconsin with operations dating back to 1871, Waupaca Foundry supplies gray and ductile iron to diverse markets using state-of-the-art processes and technology led by high-caliber people and processes. The company is a leading supplier of cast and machined iron castings for automotive, commercial vehicle, agriculture, construction, and other

美国铸造协会会员企业沃帕卡铸造公司的母公司 Proterial 已签署最终协议，将被总部位于纽约的私人投资公司 Monomoy Capital Partners 收购。这项交易的财务条款并未披露。

沃帕卡铸造公司将继续保持现有的管理和运营团队，由总裁、首席执行官兼首席运营官 Michael Nikolai 领导。

沃帕卡铸造公司总部位于威斯康星州，始于 1871 年，公司拥有高素质的员工和先进的生产技术，向不同市场供应灰铁和球墨铸铁件，是汽车、商用车、农业机械、建筑和其他工业领域的铸铁和机加工铸件的领先供应商。该公司拥有 4000 多名员工，经营着 5 家产能达 140 万吨的铸造厂，是

industrial markets. It has over 4,000 employees and operates five iron foundries with 1.4 million tons of capacity, making it one of the largest metal casting suppliers in the world.

“Waupaca Foundry is excited to start a new chapter with Monomoy, an experienced, operationally-focused investment group, to continue to invest and grow our commitment to our customers, suppliers, and employees,” said Nikolai. “The Waupaca leadership team looks forward to a bright future and the opportunities that can stem from this partnership.”

“In 2014, we partnered with Waupaca Foundry to further accelerate our global expansion. Since then, our successful collaboration resulted in the increased efficiency of manufacturing sites and raw material procurement in North America,” said Proterial Representative Director, Chairman, President, and CEO Sean Stack. “I would like to thank Mike, his team, and all the dedicated employees at Waupaca for their important contributions to the business and Proterial. We believe they will be in great hands with Monomoy and well-positioned for continued growth and success.”

“Waupaca Foundry has made tremendous advancements during its time with Proterial, and we are enthusiastic about building on that momentum as we establish our partnership with the Company,” said Monomoy Founding Partner and Co-CEO Dan Collin. “We look forward to working alongside Mike and the Waupaca team to leverage our operational resources to unlock continued growth.”

The transaction is expected to close in early 2024. ■

世界上规模最大的金属铸件供应商之一。

Nikolai 表示：“沃帕卡公司很高兴能与 Monomoy 一起开启新的篇章，Monomoy 是一家经验丰富、专注于运营的投资集团，将继续通过投资来实现我们对客户、供应商和员工的承诺。沃帕卡的领导团队期待着公司更加光明的未来以及新的合作关系带来的发展机遇。”

Proterial 公司董事代表、董事长、总裁兼首席执行官 Sean Stack 表示：“2014 年，我们与沃帕卡铸造公司合作，从而进一步加快了我们的全球扩张。从那时起，我们的成功合作提高了公司在北美生产基地和原材料采购的效率。因此，我要感谢 Mike 和他的团队，以及沃帕卡公司所有员工，感谢他们为行业 and Proterial 公司做出的贡献。我们相信他们将与 Monomoy 携手，为持续增长和未来成功做好准备。”

Monomoy 创始合伙人兼联合首席执行官 Dan Collin 表示：“沃帕卡铸造公司在与 Proterial 的合作期间获得了很大的发展，我们非常期待在与公司建立合作关系的过程中巩固这一势头。我们期待着与 Mike 和沃帕卡的团队合作，利用我们的资源助力沃帕卡公司实现持续增长。”

本次收购预计将于 2024 年年初完成。■

Texmo Precision Castings To Acquire Majority Share In Feinguss Blank

Texmo Precision Castings 将获得 Feinguss Blank 公司的多数股份

UK-based Texmo Precision Castings has announced it will acquire a majority share of German company Feinguss Blank.

Following the acquisition, the company will trade as Texmo Blank: the only investment castings specialist capable of manufacturing in the U.S., Europe and Asia. Texmo Blank combines the history and manufacturing excellence of Feinguss Blank, with Texmo Precision Castings' like-minded focus on quality precision casting, as well as its customer base and infrastructure.

The company will employ a skilled workforce of more than 1,750, and utilize 1 million sq ft of manufacturing space across three continents.

Both companies have reputations as family-run firms with a

总部位于英国的 Texmo 精密铸造公司宣布将收购德国 Feinguss Blank 公司的多数股权。

收购后，新公司将以 Texmo Blank 的名义进行交易：这是唯一一家能够在美国、欧洲和亚洲开展业务的精密铸件企业。Texmo Blank 将 Feinguss Blank 公司的生产历史和卓越能力与 Texmo 精密铸造公司对高质量精密铸件的共同承诺及其客户群、基础设施优势相结合。

新公司将雇佣 1750 多名有经验的员工，在亚、欧、美三大洲的生产基地面积达到 100 万平方英尺（约 92903 平方米）。

focus on quality over all else. The Blank family will continue to hold a minority share in Texmo Blank Germany.

“It gives me great pleasure to be able to announce our new collective identity as Texmo Blank,” said Texmo Precision Castings Managing Director Arjunan Ramachandran. “The opportunity to join forces with a firm as respected as Feinguss Blank is an exciting one for everybody involved, and innovation will lead the way as we grow together.”

Welcoming Texmo Blank, Juliane Blank, managing director of Blank Holding GmbH, added: For more than 60 years, BLANK has created a name for itself in the investment casting world that is well-known in German-speaking countries, but now also well beyond. In the process, the Blank family has always put the well-being and further development of the company first.

“The continuous globalization of the last 30 years shows a clear trend that makes it necessary for a company like ours to position itself worldwide in order to be successful. We are very happy to be working with the Texmo Group and the Ramachandran family to make Blank a strong global company. We are particularly pleased that two family businesses have found each other here, based on similar values and history, and can thus combine their strengths globally.” ■

两家家族企业都以质量为重，在业内享有声誉。Blank 家族将继续持有 Texmo Blank 德国公司的少数股权。

Texmo 精密铸造公司的董事总经理 Arjunan Ramachandran 表示：“我很高兴能够宣布我们的新身份，即 Texmo Blank。与 Feinguss Blank 这样受人尊敬的公司携手，对所有成员来说都是激动人心的，创新将引领我们共同成长。”

Blank Holding GmbH 董事总经理 Juliane Blank 对 Texmo Blank 的成立表示欢迎，补充道：60 多年来，Blank 公司在精密铸造行业占有一席之地，享誉德语国家，而且现在其影响力已远远超出了德语国家。在这个过程中，Blank 家族始终把公司的健康和可持续发展放在首位。

“过去 30 年，不断发展的全球化趋势，使得像我们这样的公司必需走全球化道路，才能取得成功。我们很高兴能够与 Texmo 集团和 Ramachandran 家族合作，使 Blank 成为一家强大的全球公司。我们特别高兴的是，基于相似的价值观和发展历史，两家家族企业现在走到了一起，我们可以在全球范围内发挥双方优势。” ■

Bingham & Taylor Celebrate Expansion, Modernization

Bingham & Taylor 公司进行扩建和现代化改造

AFS Corporate Member Bingham & Taylor celebrated a two-year expansion and upgrades at its Culpeper, Virginia, foundry with a ribbon-cutting event on October 6. Virginia Gov. Glenn Youngkin along with local and regional elected officials were in attendance to show their support for the company's newly unveiled electric melt system.

The new system has reduced injuries by over 90%, lowered CO emissions by 98%, and increased recycled content abilities for their products to contain greater than 99% recycled content. It has also significantly expanded production capacity, which resulted in adding 32 hourly and 13 salaried/professional jobs into the Culpeper community. Bingham & Taylor has invested \$23 million dollars over the last five years into this expansion.

“Over the years, we have consistently created innovative products and accessories to address a variety of performance, durability, and security issues in the industry, which has allowed us to have the edge on many of our competitors,” said Owner Laura Grondin. “I have a strong commitment to the community and our employees to ensure Bingham & Taylor is sustainable and viable for years to come. This expansion and modernization is just one of many opportunities for us to invest in the communities we work in and serve.” ■

2023 年 10 月 6 日，美国铸造协会会员企业 Bingham & Taylor 公司在其弗吉尼亚州卡尔佩珀的铸造厂举行了剪彩仪式，庆祝为期两年的扩建和改造项目竣工。为了表示对该公司新推出的电炉熔炼系统的支持，弗吉尼亚州州长格伦·扬金以及当地官员出席了活动。

新系统将减少 90% 以上的事故伤害，将 CO₂ 排放降低 98%，将其生产系统可再生能力提高到 99% 以上。还显著提高了产能，为 Culpeper 社区增加了 32 个小时工和 13 个带薪 / 专业工作岗位。Bingham & Taylor 公司在过去五年中为这一扩建项目投资了 2300 万美元。

公司拥有者 Laura Grondin 表示：“多年来，我们一直在生产创新的产品和配件，以解决行业中的各种性能、耐用性和安全问题，使我们保持着竞争优势。我对社区和我们的员工有着坚定的承诺，要确保 Bingham & Taylor 公司在未来几年的可持续发展以及可行性。这次的扩建及现代化改造只是公司为我们所工作和服务的社区采取的措施之一。” ■

Wisconsin Aluminum Foundry To Build With \$11 Million Tax Credit

威斯康星州铝铸造厂用 1100 万美元税收抵免资金进行扩建升级

Cinnaire, a nonprofit community development financial organization, has secured an \$11 million New Markets Tax Credit Investment for AFS Corporate Member Wisconsin Aluminum Foundry (WAF), based in Manitowoc, Wisconsin. With it, the foundry will be able to expand with more manufacturing and office square footage. With the expansion comes 80 new jobs.

The 50,000-sq-ft foundry construction and 12,000 sq ft of renovated office space will meet two local needs: the creation of entry-level and living wage jobs with supportive services for low-income individuals and a growing demand for nonferrous metal foundry products manufacturing utilizing advanced processes.

WAF CEO Sachin Shivaram said, "As a century-old, family-owned company, we care deeply about the well-being of our team members, and that's evidenced by the company's strong compensation, good benefits, and job security. This investment will only bolster that commitment."

"We see how high-quality employment like what we offer can transform lives, and we make extra effort to ensure that our jobs are accessible to anyone seeking employment," Shivaram added. "NMTCs will play a huge role in helping us continue to be the type of employer that our community has relied on: One that offers high-quality employment and goes the extra mile to help make these great jobs accessible to low-income individuals."

WAF's expansion project will be completed in two phases in 2024: The industrial component, which is new construction, will finish in March, while the office remodel will be completed in October. ■

Cinnaire 是一家非营利社区发展金融组织，为总部位于威斯康星州马尼托瓦克的美国铸造协会会员企业威斯康星铝铸造公司（WAF）争取了 1100 万美元的新市场税收抵免资金。WAF 公司将用这 1100 万美元扩大生产和办公面积，同时也将新增 80 个工作岗位。

占地 50000 平方英尺的厂房建设以及占地 12000 平方英尺的办公室改造工程，将满足两方面的需求：为当地的低收入个人提供支持，为他们提供基础的和生活保障性工作岗位；以及利用先进工艺生产有色金属铸件，满足不断增长的市场需求。WAF 公司首席执行官 Sachin Shivaram 表示：

“作为一家有百年历史的家族企业，我们非常关注公司成员的幸福，丰厚的薪酬、良好的福利和工作保障就是证明。而这项投资将会增强公司的这一承诺。”

Shivaram 补充道：“我们知道，公司提供的高质量就业机会将改变生活，我们做了更多的努力，以确保任何求职者都能在公司获得工作机会。新市场税收抵免资金（NMTC）将在帮助我们继续成为社区所依靠的雇主方面发挥巨大的作用，即通过提供高质量的就业，并竭尽全力帮助低收入个人获得好的工作机会。”

WAF 的扩建项目将于 2024 年分两个阶段完成：新建厂房将于 3 月竣工，办公室改造将于 10 月完成。■

BCI Solutions Procures New Mold Machine, Mold Handling System

BCI Solutions 公司采购造型线和模具处理系统

BCI Solutions, an AFS Corporate Member in Bremen, Indiana, has made a major investment in its production capabilities with the procurement of a new DISA Molding Machine and a Mold Handling System from Summit Foundry Systems. The company said this strategic move reinforces its

为提高产能，位于印第安纳州不来梅的美国铸造协会会员企业 BCI Solutions 公司，从 Summit Foundry Systems 公司采购一台新的迪砂造型机和铸型搬运系统。公司表示，这一战略举措增强了其提供高质量产品和提高生

commitment to delivering high-quality products and enhancing its manufacturing efficiency.

“This investment underscores our dedication to delivering top-tier products and services to our valued customers,” said JB Brown, CEO at BCI Solutions. “The addition of the DISA machine and Mold Handling System from Summit Foundry Systems will not only improve our production capabilities but also expand our capacity more through enhanced efficiency and precision.”

BCI Solutions anticipates the installation of the equipment will be completed by fall of 2024. The investment is expected to have a significant positive impact on production efficiency, lead-time reduction, and product quality. ■

产效率的承诺。

BCI Solutions 公司首席执行官 JB Brown 表示：“这项投资突显了我们致力于为公司客户提供顶级产品和服务的承诺。新增的迪砂造型线和铸型搬运系统，不仅将提高我们的生产能力，通过提高生产效率和精细度，从而进一步扩大公司产能。”

BCI Solutions 公司预计将于 2024 年秋季完成新设备的安装。该投资将在提高生产效率、缩短交付周期和提高产品质量方面产生积极影响。■

中国铸造协会2024年出国团组

INTERNATIONAL EXHIBITIONS AND CONFERENCES CFA PARTICIPATES IN 2024

序号 NO.	活动名称 EVENT	活动时间 DATE	国家和地区 COUNTRY AND REGION
1	纽伦堡压铸展 EUROGUSS	1月16-18日 JAN. 16-18	德国 纽伦堡 NUREMBERG, GERMANY
2	韩国压铸展 KOREA DIECASTING EXHIBITION	4月1-5日 APRIL 1-5	韩国 首尔 SEOUL, KOREA
3	墨西哥压铸展 MEITECH 北美铸造行业年会 Metalcasting Congress	4月17-19日 APRIL 17-19 4月23-25日 APRIL 23-25	墨西哥 蒙特雷 MONTEREY, MEXICO 美国 密尔沃基 MILWAUKEE, USA
4	第32届欧洲精密铸造会议（意大利）EICF	5月12-15日 MAY 12-15	意大利 那不勒斯 NAPLES, ITALY
5	巴西铸造展（南美铸造展）FENAF	6月18-21日 JUNE 18-21	巴西 圣保罗 SÃO PAULO, BRAZIL
6	土耳其铸造展 ANKIROS 波兰凯尔采铸造展 METAL	9月19-21日 SEP. 19-21 9月24-26日 SEP. 24-25	土耳其 伊斯坦布尔 ISTANBUL, TURKEY 波兰 凯尔采 KIELCE, POLAND
7	俄罗斯冶金铸造展 METAL EXPO	10月29-11月1日 OCT. 29-NOV. 1	俄罗斯 莫斯科 MOSCOW, RUSSIA
8	俄罗斯第10届金砖国家铸造业高层论坛 THE 10TH BRICS FOUNDRY FORUM	11月 NOVEMBER	俄罗斯 RUSSIA
9	日本压铸展 J-DEC	11月14-16日 NOV. 14-16	日本 横滨 YOKOHAMA, JAPAN

中国铸造协会 国际交流与展览部

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Mexican Diecasting Industry Outlook

墨西哥压铸行业展望

José Luis Grajales Zaldivar, president of the World Diecasting Council

墨西哥压铸理事会主席 何塞·路易斯·格拉哈莱斯·扎尔迪瓦尔

Mexico is going through a moment never before seen in its history given the high interaction that the world economy has today. Mexico emerges as a great alternative for the world, specifically for the manufacturing sector, with a population of almost 140 million inhabitants.

With the busiest border in the world, with the trading partner with the greatest purchasing power in the world, they make Mexico a very powerful export platform. Mexico has a modern road infrastructure, with a powerful industrial capacity, capable of moving several sectors. In the Metallurgical sector, which today occupies seventh place worldwide in melted products, specifically in the aluminum die casting sector with a production of almost 2 million tons of finished part. They make this industry gain enormous relevance worldwide.

We must also highlight the fact that Mexico also occupies today seventh place in light car production, for this reason, companies from all over the world are looking to establish their companies in Mexico.

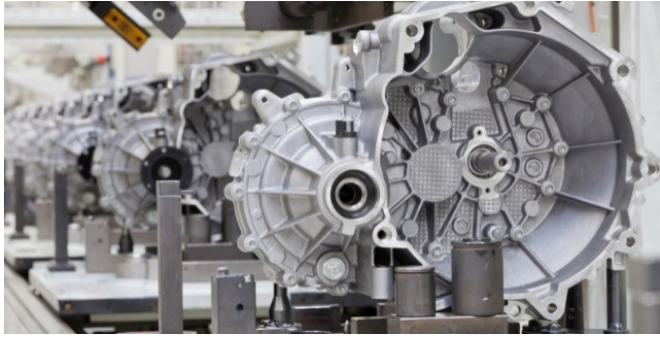


当前，世界经济互相影响、高度互动。墨西哥已迎来一个前所未有的时刻，正在成为全世界范围内制造业领域的焦点，为其近 1.4 亿人口带来巨大的机遇。

墨西哥凭借着拥有世界上最繁忙的边境，以及世界上购买力最强的贸易伙伴，使墨西哥成为一个强大的出口平台。墨西哥拥有现代化的道路基础设施，具有强大的工业能力，能够促进几个部门的发展。就铸造冶金领域而言，墨西哥在熔炼行业

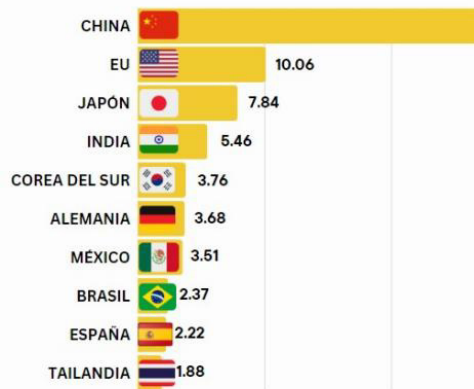
排名世界第七。特别是在铝压铸行业，墨西哥的压铸件年产量达近 200 万吨，使该行业在全球范围内具有巨大的相关性。

此外，墨西哥在轻型汽车生产领域位列世界第七位，世界各地的公司都在考虑在墨西哥建厂。



Taking advantage of the high capacity of its technicians and their quality levels, its geographical location, and the friendly culture of Mexicans. Many inputs, services and raw materials will be required in the near future to continue with this accelerated growth that Mexico is experiencing today. These are some examples of the requirements that Mexico will have in the coming months, molds, paints, crucible, die releases, software, refractories, die casting machines, ferroalloys, technical services and many more needs that will have to be covered by this growth.

It is for this reason that DIE CASTING EXPO MEXICO and MEITECH emerged. The most important exhibition in Latin America in the DIE CASTING and ALUMINUM sectors. Welcome to join it and establish connections with the Mexican diecasting industry. ■



墨西哥拥有高水平和高素质的技术人员、地理位置优越。在不久的将来，墨西哥将需要更多投资，需要提供技术服务和原材料的企业助力墨西哥正在经历的快速发展。例如，未来一段时间，墨西哥对模具、涂料、坩埚、脱模剂、软件、耐火材料、压铸机、铁合金、技术服务等的需求将不断增长。

正是出于这个原因，墨西哥压铸技术展览会应运而生，这是拉丁美洲地区压铸和铝行业最重要的展会。欢迎加入并与墨西哥压铸行业建立联系。 ■



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Successful Conversion From Cupola To Induction Furnace

冲天炉到感应炉的成功转换

By Dr. Marco Rische, Wolfgang Baumgart, Sebastian Haardt, Stefan Schmitt
作者：Dr. Marco Rische, Wolfgang Baumgart, Sebastian Haardt, Stefan Schmitt

The conversion from cupola to induction furnaces is a decisive step for foundries on the path to decarbonizing their production. An important challenge here is scrap quality, which must be better in the induction furnace than in the cupola. ABP Induction and Zorc Technologies offer specially developed tools for this purpose, which allow optimized operation of the induction furnace. This article uses practical examples to show how a conversion can be made successfully.

The pressure from environmental policy requirements to achieve the climate targets set for industrial consumers is constantly increasing, also driven by the CO₂ tax on fossil fuels. All industrial consumers of coke, oil and gas are pursuing alternative solutions to meet the medium-term environmental targets for CO₂-neutral production. All companies surveyed in a study by Römheld & Moelle stated they would ask their suppliers for climate-neutral castings by 2050 at the latest, with 21% planning to do so by 2025 and 46% by 2030.

ABP has recognized this paradigm shift to CO₂ neutrality and has committed to this goal through its "Your Partner on the Way to Zero Emission" campaign. To meet the demand for decarbonization, ABP sees great potential in replacing fossil fuels with modern induction furnace technology for ecological, economic and technical independence. In this way, users make a significant contribution to implementing the targets for decarbonizing energy-intensive industrial applications.

The inductive heating uses electrical energy. In this process, the heat required for the process is introduced directly into the molten material. The process is effective and, when green energy is used, it is also carbon-neutral. ABP can plan the entire process chain for the replacement of the conventionally heated cupola and accompany the customer along the path to conversion to electrically operated induction furnace technology. This is rounded off by digital tools and AI solutions from ABP partner Zorc Technology.

Foundries with Cupola Melting Operation–

将冲天炉熔炼改为感应电炉熔化，是铸造厂在生产中减少碳排放的决定性一步。而其中一项重要挑战是用于熔化的废料的质量，因为感应炉熔化的废料的质量要求比冲天炉使用的高。为此，ABP 感应系统公司和 Zorc 技术公司开发了专用工具，用于优化感应炉的操作。本文通过实际案例来介绍如何成功地进行转换。

为实现气候目标，以及对化石燃料征收碳税所产生的推动作用，工业企业受到的环境政策压力不断增强。所有使用焦炭、石油和天然气的工业企业都在寻求替代解决方案，以实现碳中和的中期目标。在 Römheld & Moelle 公司所进行的一项研究中，所有接受调查的公司都表示，最迟到 2050 年，他们将要求供应商提供满足碳中和要求的铸件，21% 的公司计划在 2025 年实现目标，46% 的公司计划在 2030 年实现目标。

ABP 公司已经认识到这种碳中和模式的转变，并通过“净零碳排放合作伙伴”活动致力于实现这一目标。为了满足减少碳排放的需求，ABP 公司认为用现代感应炉技术替代化石燃料，在生态性、经济性和技术独立性方面具有巨大潜力。这样，对实现能源密集型工业降低碳排放目标作出了重大贡献。

感应加热使用电能。在这个过程中，生产所需的热能被直接导入需要熔化的材料，这是有效的生产工艺；当使用绿色能源时，这也是碳中和的。ABP 公司可以设计完整的工艺流程，替换传统的冲天炉，并与客户一起向感应电炉技术转变。ABP 的合作伙伴 Zorc 技术公司的数字工具和人工智能解决方案完全满足了这一要求。

铸造企业冲天炉熔炼的现状与挑战

当铸造厂考虑从冲天炉转换为感应炉进行熔炼作业

Status Quo & Challenges

When foundries consider converting from a cupola to an induction furnace melting operation, there are two fundamental challenges to consider: First, the conversion from cupola to induction furnace also means a change in operation--from continuous supply to discontinuous operation, to batch operation. The second challenge is scrap quality. In cupola melting operations, it is not uncommon to run even poor scrap grades. The induction furnace operation cannot cope with this because the coupling then becomes significantly worse. This makes it much more difficult, if not impossible, to achieve a utilization rate of 100%. Utilization rates of 60% are more likely. Keeping this gap as small as possible hinges on how the electromagnetic field couples to the scrap. This is strongly dependent on the set scrap quality and the parameters of the electrical power supply.

A practical example: Thanks to the conversion from coke-fired cupola to induction furnaces (Fig. 1), a large part of the emissions at Römheld & Moelle can be dealt with by changing the energy mix. A special contract with its energy supplier enables the foundry to obtain 100% of its electricity from hydropower in 2023 and 2024.

What does this mean from a metallurgical point of view? Iron melted in the cupola has a high sulfur content due to the process. For the production of spheroidal graphite cast iron, therefore, single- or two-stage processes are used to produce the ready-to-cast melt. However, the production of vermicular graphite is consistently based on two-stage processes. In these two-stage processes, the first stage is used for desulfurization, typically achieving sulfur levels of

时, 将面临两个基本的挑战: 首先, 从冲天炉转换为感应炉也意味着金属液从连续供应变为间歇式供应, 也就是批量供应; 第二个挑战是废金属料的质量。冲天炉熔炼作业, 甚至品质较差的废金属料也是可接受的。感应炉熔化无法接受这种情况, 因为耦合效果会明显变差。这使得实现 100% 的废料利用率变得更加困难, 利用率更有可能仅有 60%。如果让这个差距尽可能小, 取决于电磁场如何与废金属料耦合。这在很大程度上取决于特定的废料质量和电器参数。

实际计算表明: 从使用焦炭的冲天炉转换为感应电炉 (图 1), Römheld & Moelle 研究项目中的大部分排放可以通过改变能源结构来解决。与能源供应商签订的特别合同使铸造厂能够在 2023 年和 2024 年使用 100% 的水力发电。

从冶金学的角度来看, 这意味着什么? 由于工艺的原因, 冲天炉熔炼的铁含硫含量较高, 因此, 对于球墨铸铁的生产, 采用一段法或两段法生产待浇注的金属液。然而, 蠕墨铸铁的生产一直采用两段法工艺。在此两段法的生产中, 第一阶段用于脱硫, 使硫含量能够降到 0.06%–0.025%; 在第二阶段, 调整石墨的形态和金属基体的组成, 以达到铸件所需的机械和物理性能 (图 2)。

使用含钙化合物对冲天炉化铁进行连续脱硫是可能实现的。具体来说, 使用碳化钙作为脱硫剂也是一种选择,

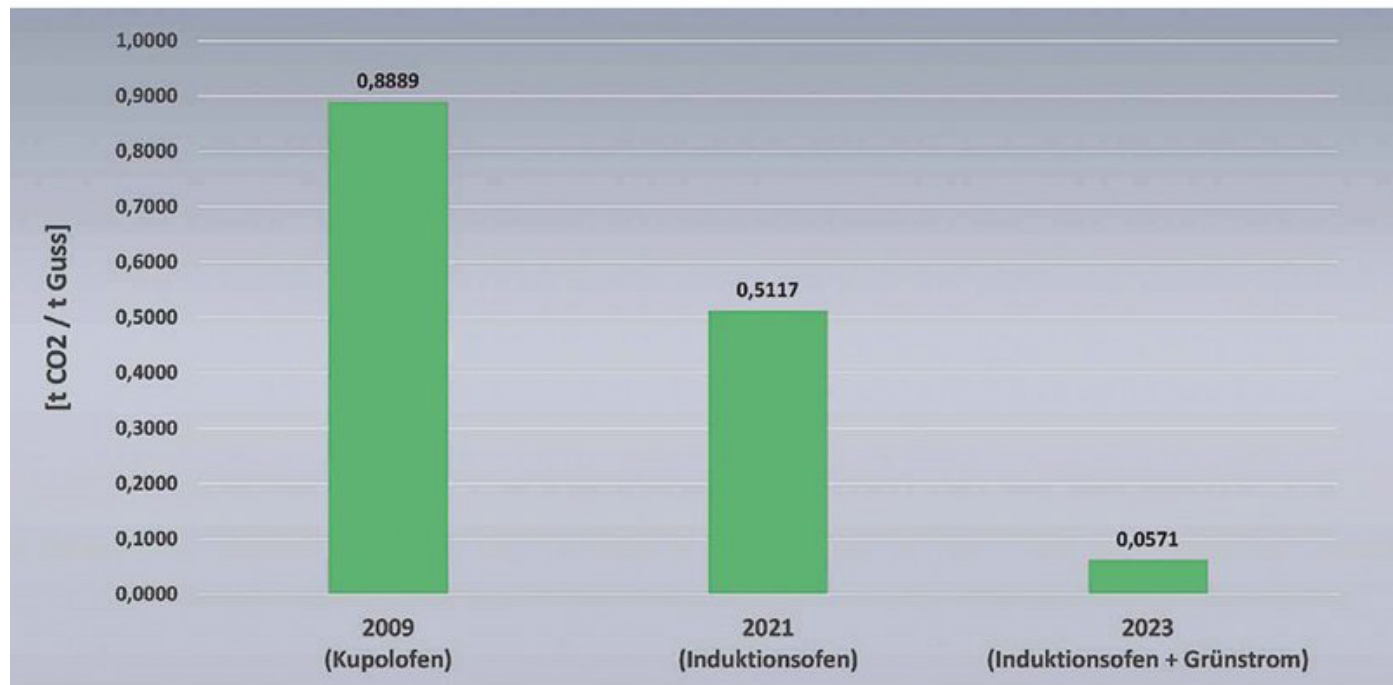


Figure 1: Römheld & Moelle Carbon Footprint in Scopes 1 & 2.

图 1: Römheld 和 Moelle 碳足迹 (范围 1 和 2)。

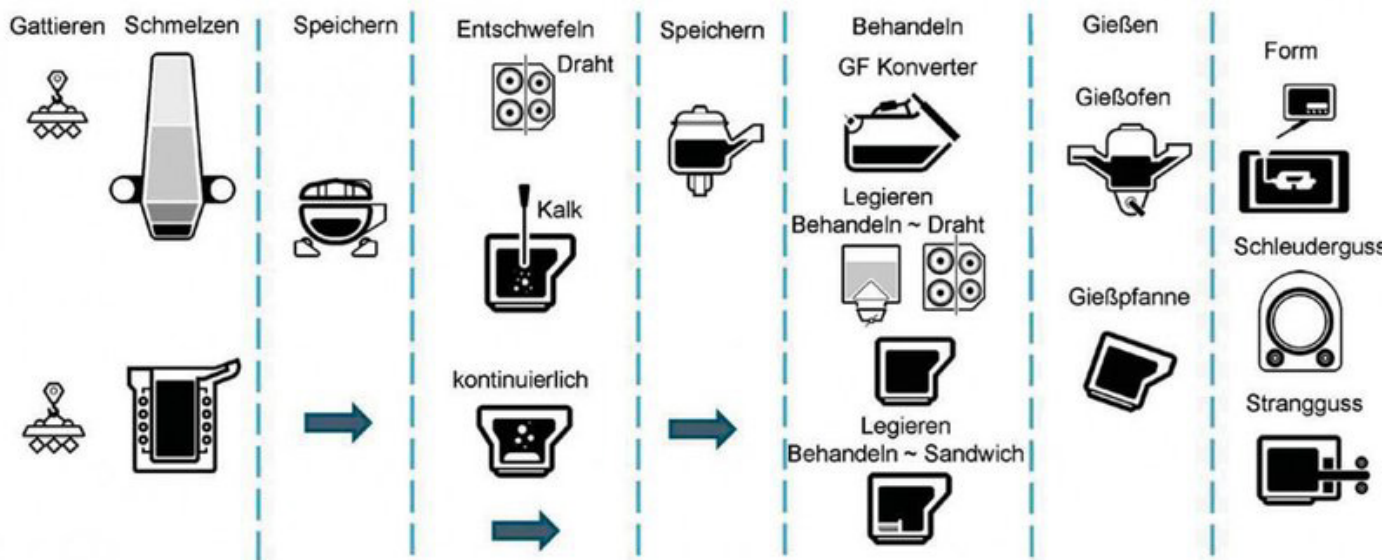


Fig. 2: Overview of the large number of possible process steps from the melting units to the mold.
图 2: 铸件大批量生产工艺从熔炼到造型工艺的概述。

0.06 to 0.025%. In the second stage, the morphology of the graphite phase and the composition of the metallic matrix are then adjusted to achieve the desired mechanical and physical properties of the material in the component (Fig. 2).

Continuous desulfurization of cupola iron is possible using compounds containing calcium. Specifically, the use of calcium carbide as a desulfurization agent is also an option, but this is rarely used in foundry processes today due to environmental concerns.

Discontinuous desulfurization processes include the Mg wire feeding process and the modern lime injection process developed by the Institute for Technologies of Metals at the University of Duisburg-Essen under the direction of Rüdiger Deike and the materials development department of the Fritz Winter company under the direction of Marc Walz.

To produce the ready-to-cast melt from the resulting base iron, a second step involving treatment with magnesium, rare earths and inoculants is carried out. In particular, the wire feeding and the pour-over method have become established. Modern wire feeding methods also use an inoculation wire in addition to the magnesium wire, resulting in dynamic inoculation during treatment. The final step on the way to the desired metallurgy is inoculation during the casting process. This inoculation can be carried out by means of a pouring jet inoculation or an inoculation in the casting or runner system.

Requirements for a modern induction furnace melting operation

As already described above, a modern induction furnace can only work with high quality metals and scrap. That is why induction furnace manufacturers also usually recommend a

但由于环保问题，目前在铸造中很少使用。

不连续脱硫工艺包括镁线喂丝工艺和先进的喷石灰工艺，是由 Rüdiger Deike 领导的德国杜伊斯堡 - 埃森大学金属技术研究所和 Marc Walz 领导的 Fritz Winter 公司材料研发部门开发的。

首先用基础铁原料熔化生产待浇注的金属液，第二步使用镁、稀土和孕育剂对金属液进行处理。需要指出的是，喂丝工艺和冲入法已经在使用。现代的喂丝工艺把镁线和孕育剂线配合在一起使用，即在处理过程中实现动态孕育。获得理想冶金效果的最后一步是在凝固过程中孕育。这种孕育方法是在浇注时喷射孕育剂或在把孕育剂放入浇注系统中。

现代感应电炉熔化作业的要求

如上所述，现代感应电炉只能使用符合质量要求的金属和废料。这就是为什么感应电炉制造商通常也会推荐用户使用一定等级的废金属材料。否则，由于耦合效果较差，无法满负荷进行生产。然而，为尽量减少熔化时间，从而减少能耗，电源必须达到恒定的功率范围，可以最大限度地提高生产率，理想的情况是有 100% 的能量输入。

然而，感应电炉的耦合取决于负载电路：设备的功率根据其电气和原料的电磁性能而变化。因此，必须优化因加料引起的静态损耗。ABP 公司可以对这些操作进行测量

certain grade of scrap with which the equipment should be operated. Otherwise, the full output cannot be generated due to the poorer coupling. However, the goal must be a constant power range- ideally with 100% energy input over the course of the batch to minimize the melting time and thus the energy input and, of course, to maximize productivity.

However, the coupling of the induction furnace depends on the load circuit: the power of the equipment adjusts according to the bulk of the feedstock based on its electrical as well as magnetic properties. Stationary losses due to recharging must therefore be optimized. ABP makes it possible to measure and evaluate these operations and to guide the customer in batching. For this purpose, ABP uses the patented OptiCharge tool it has developed itself (Fig. 3). It measures the electrical influencing variables necessary to optimize performance. These parameters are compared to the current weight and the algorithm determines the lowest possible weight necessary to achieve full power consumption. The desired result is controlled batching for optimum adaptation of the weight to the power consumption over the complete material couples optimally due to its ferromagnbatch duration. Whenever physical conditions permit, re-batching can be performed. This cold etc properties until it loses them at the Curie temperature point at 760°C.

The technical furnace parameters for this are recorded by the digital inverter control and converted into recommended actions for energy-efficient loading with the OptiCharge system. When starting up a batch with partial filling of ferromagnetic melting material, small portions of this material are automatically refilled. As a result, measurable energy savings and production increases can be achieved in daily production operations as compared to non-controlled batching. Surveys show that induction furnaces already produce less than half the CO² emissions to melt one ton of cast iron compared to cupolas in today's electricity mix. If the share of electricity generated from renewable sources increases, CO² emissions decrease accordingly.

This system is therefore eminently important for the transition from the cupola to the induction furnace in order to continue to provide a high continuous supply of the molten iron for the process. This is where OptiCharge reduces power dips to a minimum.

The physical background: The possibility to operate in the constant output range was created by the fact that there are thyristors in different sizes and it has become established that the next larger size is always used that is above the desired output power. This creates an optimal operating mode. However, this also means that current and voltage in the product can do more--the output power itself and a certain power window beyond that.

The principle works, as the load characteristics show (Fig. 4): If you run the induction furnace at full voltage and there is little scrap material in the furnace, little material couples and you run the furnace at low power. Even if the furnace operator adds more material and the furnace is half

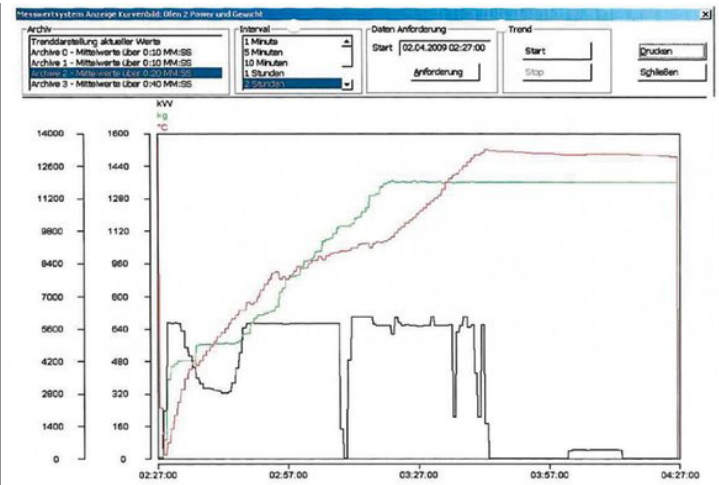


Figure 3: Classic power curve of an induction furnace over a single batch.
图 3：感应电炉单炉的经典功率曲线。

和评估，并指导客户进行加料作业。为此，ABP 公司使用自己开发的专利产品 OptiCharge (图 3)，可以测量优化性能所需的电气影响变量。将这些参数与当前权重进行比较，然后确定实现满功率所需的最低权重。结果导向就是控制炉料的加入过程，以使重量与整体材料的耦合功耗实现最佳匹配，这是由于其铁磁配料持续时间实现的。只要物理条件允许，就可以再次加入炉料。这种冷的磁特性，到居里温度 760°C 将失去。

感应电炉耦合的技术参数由数字逆变器控制记录，并通过 OptiCharge 系统转换为节能模式的操作。当开始将部分炉料加入到熔融的磁性铁料中，可实现小部分的自动加料。因此，在日常生产操作中可测量，与非控制的加料相比，可以实现节能和增效。研究显示，在当前的电力结构中，感应炉熔每化 1 吨铸铁所排放的 CO₂ 还不到冲天炉的一半。如果采用可再生能源电源的比例增加，CO₂ 排放量也会相应减少。

因此，这个系统对于从冲天炉转换为感应电炉非常重要，为了继续提供连续的熔融铸铁，OptiCharge 将功率降低的时间减到最低。

物理背景：电源工作在恒定输出范围内，是由不同尺寸的晶闸管决定的，并且已经确定，未来将使用高于所需的输出功率的更大尺寸的元器件。这也确定了可优化的作业方式，这也意味着元器件中的电流和电压可以做更多——输出功率本身和特定的功率窗口。

如负载特性 (图 4) 所示，其工作原理是：感应电炉在满电压下运行，如果炉内的炉料很少，材料的耦合作用很低，电炉将在低功率下运行。此时，如果操作工向炉内加入更多炉料，使炉膛达到半满，在满电压时，电源功率

full, the point of 100% power at full voltage is reached, and even though only 60% of the electricity is used. If you add more material, it couples even better, uses more electricity, and the furnace needs less energy to drive more power in the process. This is the voltage reserve that can be used despite full power. In practice, however, material is sometimes added beyond this point, as the process then becomes simpler, since material has to be added less frequently and the workload is lower. However, this is not beneficial to the process, because if one were to stop filling the furnace sooner, the material fed in would be heated rapidly because the furnace would quickly couple up to the Curie temperature. The scrap then loses its magnetic properties, the coupling becomes worse-- and the operation falls back one characteristic. Now you need more voltage again to drive the current to get to 100% power. However, as less and less material is magnetic, the current continues to decrease as the voltage is at its maximum level. The result is that the output drops. If material were to be added now instead, you would continue to have 100% power.

This system is essential for those switching from cupolas to induction furnaces because these operations often must cope with poorer scrap qualities, which is precisely what causes the coupling to deteriorate. They also rely on a ready supply of molten iron for their processes, which is why a control tool like OptiCharge is so valuable.

Conversion of the melting operation

To better evaluate how processes that use induction melting differ from those that incorporate a cupola as the melting unit, we will explain the specifics using three processes from actual practice.

Example 1: Flake-graphite cast iron brake discs

In the production of cast iron brake discs with lamellar graphite, the cupola can benefit from its advantageous nucleation state. However, the requirements for brake discs have increased considerably in recent years. As a result, the material is required to have high thermal conductivity, which can only be achieved if the cast material solidifies hypereutectically. In many cases, the carbon levels required for this cannot be produced directly by the cupola, so carburizing becomes necessary. In addition, the sound specifications to prevent squeaking of modern brake discs require carbon contents in narrow tolerances, which can only be produced by duplication in an induction furnace. All this is eliminated by melting in an electric induction furnace (Fig. 5).

The challenge in using an inductive melting method is, on the one hand, dynamic inoculation, which is technically easy to realize by adding an inoculation wire to the casting trough. Strontium as an element effective in inoculations is the agent of choice here. Another difficulty is the control of microporosities, which often occur at the transitions from cap to disc. Microporosities form between the arms of large austenite dendrites. In this context, the targeted use of lanthanum in the final inoculation step has proven helpful.

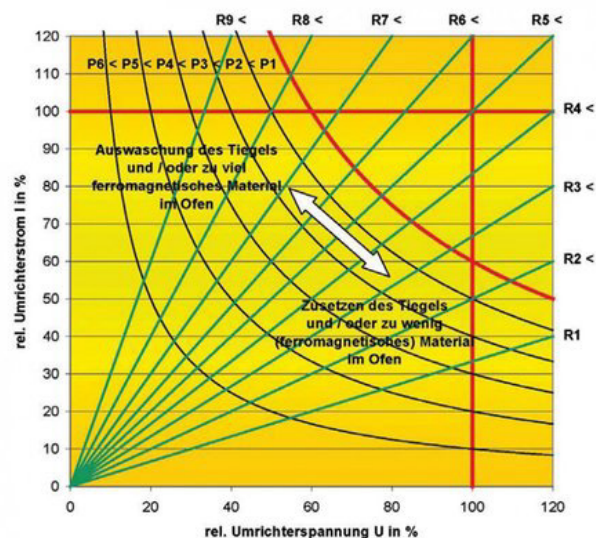


Fig. 4: Load characteristics for an induction furnace, design of a constant power converter.

图 4: 恒功率逆变器设计, 感应电炉负载特性。

将达到 100%，即使只使用了 60% 的电流。如果加入更多的炉料，耦合作用更好，电流更大，这样，电炉可以使用较少的能量获得更大的功率。这是电压储备，无论是否满功率都可以使用。如果实际生产中，加料时只要超过这个点位，加料过程会变得更简单，因为加料频次会降低，工作量也会减少。然而，这种加料方式对熔炼工艺不利，因为如果过快的将炉膛填满，因为炉况将很快耦合，送入的材料将被迅速加热，并达到居里温度。然后，炉膛内的炉料失去磁性，耦合变得更差，并且操作特性降低。此时需要更多的电压来驱动电流达到 100% 的功率。然而，由于具有磁性的材料越来越少，电流继续下降，即使电压是在最大一档，功率仍然下降。如果此时向炉内加入炉料，电源功率将恢复到 100%。

对于从冲天炉改为感应炉熔炼的操作者来说，这个系统是必不可少的，因为熔炼作业时通常不得不处理质量较差的废金属料，这正是导致耦合恶化的原因。生产线还需要稳定的铁液供应，这就是为什么像 OptiCharge 这样的控制工具如此有价值。

熔炼作业的转变

为了更好地评估使用感应炉熔炼与使用冲天炉熔炼的工艺有何不同，我们将从实际使用的 3 个工艺案例来解释具体情况。

例 1: 片状石墨铸铁的制动盘

在生产具有片状石墨形态的铸铁制动盘时，冲天炉的

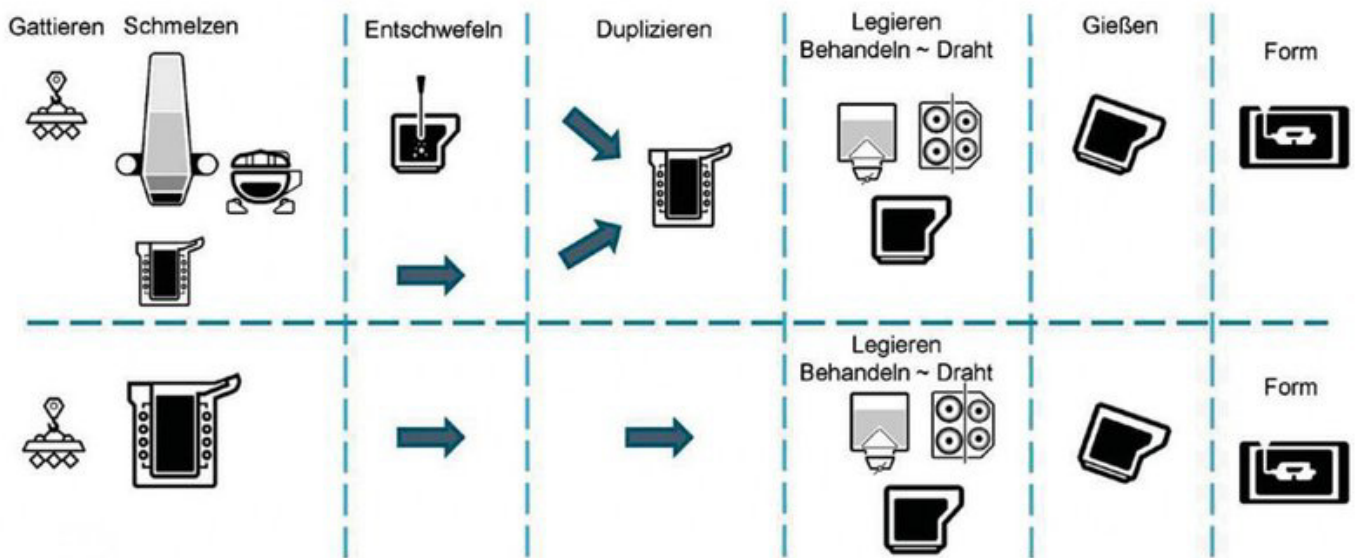


Fig. 5: Comparative process diagram for the production of cast iron brake discs with lamellar graphite--above with the cupola as melting unit, below with the electric induction furnace.

图 5: 生产具体片状石墨形态的铸铁制动盘的工艺对比图——上图以冲天炉为熔炼单元，下图为感应电炉。

Example 2: Nodular graphite casting cast iron pipes

Nodular graphite cast iron pipes are manufactured using the centrifugal casting process. In the process, the cast iron pipe cools on the mold wall and forms iron carbides. Since iron carbide has a carbon content of 6.7%, the amount of free graphite produced during solidification is greatly reduced. As a result, the free graphite cannot counteract shrinkage when the liquid phase solidifies. This has the desired effect: the cast iron pipe shrinks and can be removed from the mold. The pipe is then passed through the annealing furnace, where the iron carbide dissolves and the graphite diffuses to the spherulites. The pipe expands and reaches its final dimensions. The original nucleation state from the melt aggregates directly influences the dimensions of the component.

A cupola produces a fluctuating metallurgical condition due to varying levels in the forehearth as well as changing metallurgy during start-up and shutdown cycles. The resulting dynamics in the nucleation state require a complex control loop when using a cupola, whereas this control is much simpler when melting in an electric induction furnace (Fig. 6).

Example 3: Vermicular graphite

Cast iron with vermicular graphite is found in the powertrain in the cylinder head, in the cylinder crankcases and in the clutch disks. This is a material for the mass market in heavy goods vehicle traffic. The material is also used in brake discs for high-speed trains.

When vermicular graphite is produced by adding desulfurized cupola iron, it is limited because the

优势是可以熔炼出具有良好成核的铁液。然而，近年来对制动盘的要求显著提高。例如，要求材料具有高导热性，这只有在铸件过共晶凝固的情况下才能实现。在多数情况下，冲天炉熔炼不能直接达到所要求的碳含量，因此还需要增加渗碳工艺。此外，为了防止制动盘发出吱吱声的声音，要求碳含量在很严格的公差范围内，这只能通过感应炉中调质生产。所有这些问题，都可以通过感应炉熔化来消除（图 5）。

采用感应电炉熔化的挑战一方面是动态孕育，这在技术上很容易通过在浇注过程中添加孕育剂来实现。锆作为一种有效的孕育剂元素，在本案例中作为首选。另一个困难是控制缩松和缩孔，这通常发生在浇道到制动盘的过渡位置。在大奥氏体枝晶臂间形成微孔。在这种情况下，在最后孕育处理时有针对性地使用镧已被证明是有益的。

例 2: 球墨铸铁管

球墨铸铁管采用离心铸造工艺制造。在此过程中，铸铁管在管模壁上冷却并形成碳化铁。由于碳化铁的含碳量为 6.7%，因此在凝固过程中产生的游离石墨量大幅度减少。因此，当液相凝固时，游离石墨的膨胀不能抵消铸管的收缩。这也是预期的效果：铸管收缩，可以轻易地从模具中取出。然后管子进入退火炉，在那里碳化铁溶解，石墨扩散形成球状石墨。铸管膨胀并达到最终尺寸。熔融铸

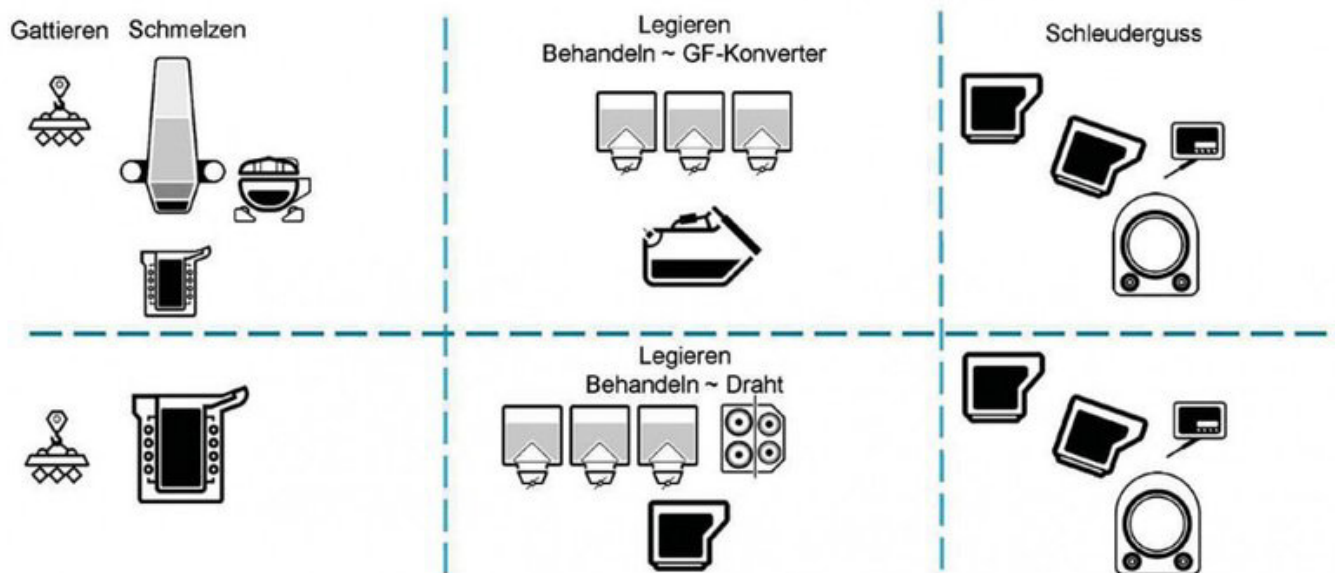


Fig. 6: Comparison of process chains for the production of nodular graphite cast iron pipes. When using the inductive melting method, nucleation state changes of the subsequent taps are compensated by means of dynamic inoculation via an inoculation wire as an additive to the treatment wire. This results in a small variation in measurement tolerance.

图 6: 球墨铸铁管生产工艺流程比较。当采用感应炉熔炼, 通过喂丝孕育作为处理, 通过动态孕育来补偿后续金属液的成核状态变化。这将导致测量公差的微小变化。

accompanying elements from the cupola can often exceed the final analytical specifications. The proportion of desulfurized iron can vary between 30 and 70% depending on the specification. When using this material, the cupola cannot effectively use its strong point, which is its naturally good nucleation state. The formation of vermiculites occurs with high levels of undercooling, while a good nucleation state automatically gives rise to spherulites due to metallurgical factors.

The control loop for vermicular graphite production modifies the melt by adding magnesium, cerium mixed metal and inoculant. This control loop uses the measured values from the thermal analysis of the ready-to-pour melt and retroactively corrects the control variables of the next ladle via a feedback loop. The fluctuations in the base iron caused by adding cupola iron are a disturbance variable here. A switch to iron completely melted in the induction furnace simplifies this process considerably (Fig. 7).

Planning and implementing the conversion The engineering team

"What should the dimensions of our melting plant be?" "How can I increase productivity?" "Which upgrades will pay for themselves most quickly in terms of ROI?" --These are all questions foundry operators ask themselves when converting from cupolas to induction furnaces. And they are important questions, as they often entail large investments or can boost earnings. In order to be able to perfectly design, scale

铁的原始成核状态直接影响尺寸。

由于前炉的液位变化以及开炉和停炉周期中冶金学的变化, 冲天炉产生的冶金过程是波动的。当使用冲天炉时, 在成核状态下产生的动力学需要复杂的控制流程, 而在感应电炉熔化时, 这种控制要简单得多 (图 6)。

例 3: 蠕墨

蠕墨铸铁主要应用在动力系统的气缸盖, 汽缸曲轴箱和离合器盘。这种材料适用于重型货车运输市场。这种材料也可用于高速列车的制动盘。

当使用带有脱硫装置的冲天炉生产蠕墨铸铁时, 因为冲天炉炉料中伴随的元素通常会超过最终的成份规格, 因此生产是受限的。根据规格不同, 脱硫铁的比例可在 30 ~ 70% 之间变化。在生产这种材料时, 冲天炉不能有效地利用其长处, 即其天然良好的成核状态。蠕状石墨的形成发生在过冷程度高的情况下, 而良好的成核状态由于冶金因素自动形成球状。

蠕墨铸铁生产控制系统通过添加镁、铈混合金属和孕育剂对熔融铸铁进行改性。该控制系统使用待浇注熔体热分析的测量值, 并通过系统反馈追溯修正下一浇包的控制变量。因加入冲天炉的铁液而引起的待浇注铁液成份波动是这里的扰动变量。转换为使用感应炉熔化, 极大简化了

and plan a melting plant, ABP has developed the Meltshop Designer. This determines which solution is the best when it comes to material flow in the foundry. ABP experts can develop simulations for different foundry situations in close coordination with the customer's staff involved in the process, present alternatives when setting up the furnace, and include different configurations from the ladles to the filling of the molding system.

The metallurgical team

The metallurgical team must have expertise in cast iron production using the induction furnace as well as skills in producing the desired nucleation state. In contrast to the cupola, this is largely produced in a synthetic manner in the induction furnace. The metallurgical team creates a digital twin of the complete metallurgical process chain to evaluate and optimize all process steps in advance of the conversion from cupola to induction melting operation.

The energy efficiency of induction melting depends crucially on the sequence of materials to be batched and the timing of the recharging. These factors are incorporated into the Digital Twin's knowledge base, so the Zorc Genesis AI calculates batch composition and melt sequence based on this expertise. To determine the optimal time for charging, based on the current coupling and Curie temperature, ABP has developed the patented Opticharge tool mentioned earlier.

The synthetic nucleation state is generated in several

这一过程（图 7）。

计划和实施转换 工程团队

“熔炼工部的面积应该是多少？”“我怎样才能提高工作效率？”“就投资回报率而言，哪些升级能最快收回成本？”——这些都是铸造厂经营者在将冲天炉改造成感应电炉时提出的问题。这些都是很重要的问题，因为这些通常涉及大量投资或者可以提高收益。为了能够完美地设计、扩展和规划熔炼工部，ABP 公司开发了熔化车间设计软件。这可以帮助确定铸造车间熔炼和浇注作业，哪种解决方案是最好的。ABP 公司的专家与客户的工作人员密切沟通，为不同的铸造工艺进行开发模拟，为电炉设置提供备选方案，并包括从浇包到浇注系统的不同配置。

冶金团队

冶金团队必须具有使用感应电炉熔化铸铁的专业知识以及生产所需成份控制的技能。与冲天炉相反，这主要是在感应炉中以合成方式生产的。冶金团队创建了完整冶金工艺链的数字孪生，以便在从冲天炉转换为感应

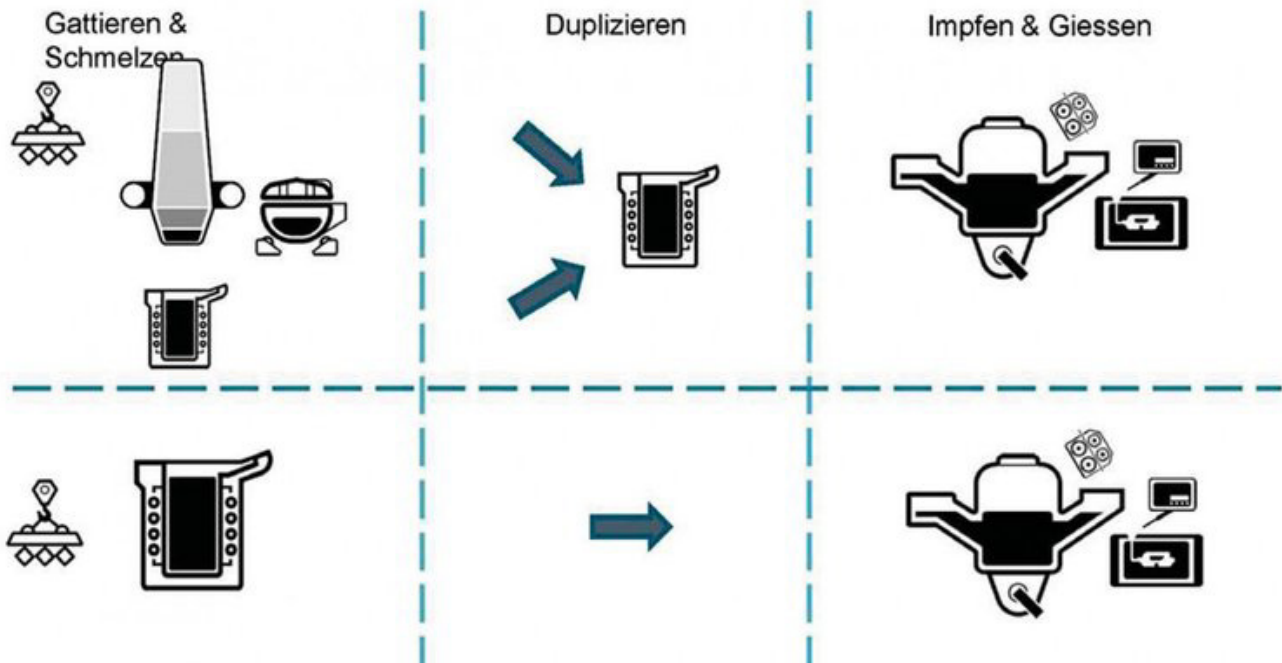


Fig. 7: Comparison of process chains for the production of components made of cast iron with vermicular graphite. The inductive melting method introduces significantly less interference into the control loop for producing the desired graphite morphology using Mg/Cer mixed metal and inoculation treatment.

图 7: 蠕墨铸铁件生产工艺流程比较。感应炉熔化对控制系统的干扰明显减少，使用 Mg/Cer 混合金属孕育处理产生所需石墨形态。

stages. It starts in the furnace via the adding of silicon carbide (SiC), whose special physics during the dissolution process forms the basis for the nucleation state [5]. The next step in achieving the desired nucleation state for nodular graphite casting and vermicular graphite alloys involves adding cerium mixed metal (CerMM) and carbon prior to treatment. Cerium compounds have a high density and are not lost during the treatment process. In the production of thick-walled cast iron, it must of course be considered that cerium compounds can result in undesirable graphite shapes, up to and including chunky graphite. This requires a metallurgical balancing act in which the addition of elements such as antimony or bismuth creates an equilibrium that has a positive effect on graphite precipitation.

The interlinking of consulting services and production operations is a core feature of the metallurgical team. The service team's broad experience base enables them to provide comprehensive training to the production team. The production team, in turn, has precise knowledge of the foundry processes and brings with it a significant wealth of experience that must be incorporated into the process planning.

The specific implementation

Scheduling

The timeline for the conversion from a cupola to an induction melting unit is the biggest challenge and requires a strategic approach. It is a challenge for the planning team, the executing engineering team responsible for the implementation and the production team to use the newly established process chain. In the process, the condition of the existing production environment, including all integrated aggregates, must be converted to the newly designed process and plant technology, considering all parameters and influencing variables.

Engineering phase

The Meltshop Designer is used in the engineering phase, which is what makes its variability so valuable. ABP experts can simulate all materials by accessing or incorporating new materials into a large database. Various one-off or periodic events can also be simulated, for example power supply limitation, a not exactly uncommon problem in which energy providers reduce power supply at certain times when more power is currently being drawn elsewhere in the power grid. The basis for the simulation is data: The added value comes from the analysis performed by the ABP experts based on the linkage of the information. The simulation results in the recommended actions for moving from the cupola to the induction furnace.

Zorc's Genesis AI also works with data and uses the digital twin as a basis for controlling process flows. In the planning phase, it is used to simulate and optimize the processes in the newly designed melting operation. This helps to identify and avoid bottlenecks early in the planning process.

炉熔化操作之前评估和优化所有工艺步骤。

感应熔炼的能量效率主要取决于炉料的投料顺序和送电时间。这些因素被整合到数字孪生的知识库中，因此 Zorc Genesis AI 可以根据这些专业知识计算批次组成和熔化顺序。为了根据电流耦合和居里温度确定最佳送电时间，ABP 公司开发了前面提到的专利 Opticharge 工具。

合成成核状态是分几个阶段产生的。它在炉内通过碳化硅 (SiC) 的加入而开始，碳化硅在溶解过程中的特殊物理特性形成了成核状态的基础 [5]。实现球墨铸造和蠕墨铸铁所需成核状态的下一步是在处理前加入混合金属铈 (CerMM) 和碳。铈化合物密度高，在处理过程中不会丢失。在生产厚壁铸件时，当然必须考虑到铈化合物会导致不希望石墨形状，甚至包括块状石墨。这需要冶金学平衡行为，其中添加的元素，如锑或铋，创造一个平衡，对石墨的沉淀有积极的影响。

咨询服务和生产操作的相互联系是冶金团队的核心特征。服务团队广泛的经验基础使他们能够为生产团队提供全面的培训。反过来，生产团队对铸造工艺有精确的了解，并带来了大量的经验，必须纳入工艺计划。

具体实施

调度

从冲天炉改为感应电炉熔化，转换时间是最大的挑战，需要一个战略性的方法。对于计划团队、负责实施的执行工程团队和生产团队来说，使用新建立的工艺流程是个挑战。在生产过程中，必须考虑到所有参数和影响变量，将现有生产环境的条件，包括所有的集物料，转换为新设计的工艺和工厂技术规范。

工程阶段

在工程阶段使用 Meltshop Designer 软件，这就是它的可变性如此有价值的原因。ABP 专家可以通过访问或将新材料纳入大型数据库来模拟所有材料。各种一次性或周期性事件也可以模拟，例如电力供应限制，这并不是罕见的问题，能源供应商在某些时候减少电力供应，而目前更多的电力正在电网的其他地方被吸收。模拟的基础是数据，附加价值来自于 ABP 专家基于信息的联系所进行的分析。模拟结果给出了从冲天炉转换到感应炉的推荐行动。

Zorc's Genesis AI 软件也与数据一起工作，并使用数字孪生作为控制流程的基础。在规划阶段，它用于模拟和优化新设计的熔化操作过程。这有助于在规划过程的早

Transition of metallurgy from the cupola process to induction melting

While the cupola is still active, measurements of the metallurgical state are performed using thermal analysis, spectrometry and combustion analysis. Here, the precise mapping of the data is important to establish a link to the microstructural and mechanical properties obtained. This is provided by the service-oriented software Foundry Cloud developed by Zorc. Modern thermal analysis uses double-chamber crucibles to simulate the final stream inoculation or casting stone inoculation.

On the one hand, the data obtained during this phase are used to define the target parameters for the new melting process in such a way that the core parameters of the melt remain stable or improve during the conversion to ensure the smoothest possible transition during further processing of the components. This phase should last about four weeks to cover all metallurgical conditions. When the induction melting process is ramped up, it usually takes another four weeks for all aspects of the new process to be correctly mapped in the digital twin.

Tools for optimal planning and control of a modern production process

How is the metallurgy controlled and how are the transport logistics and the melt treatment and casting units controlled? Both can be answered in one sentence: with the Zorc Genesis AI, whose expertise is integrated into a digital twin. The Digital Twin mirrors the charging and melting process by replicating the physical processes in the furnace in a virtual environment. In doing so, it considers the pouring both in the charging troughs and in the furnace itself. It simulates the oxygen balance and the dynamics of the nucleation elements. It also describes the energy flow in the induction melting furnace, including the cooling capacity.

During the pouring and transport process, it tracks the interactions with the environment (atmospheric oxygen) and calculates the heat dissipation via convection and radiant heat. The Digital Twin has a comprehensive knowledge of the physics and chemistry of the wire feeding processes as well as the pour-over processes and simulates the associated nucleation processes. In the casting and solidification process, the twin performs simulation-based analysis to determine the effects of melt composition and nucleation state on part properties. In addition, the digital twin also keeps an eye on seemingly everyday processes: It calculates the duration of a forklift run, recognizes bottlenecks when tapping the iron and takes into account the break times of the forklift drivers.

Digital Twin Data Sources

To compare its forecasts with the current actual situation, the digital twin requires information about the current production status. The Digital Twin's "senses" are the measuring devices in the production environment. Traditional measuring instruments such as spectrometers determine the melt composition, while temperature measuring lances and pyrometers measure the bath temperature. Methods such as thermal analysis capture the dynamics of the solidification

期识别和避免瓶颈。

从冲天炉熔炼到感应炉熔化的冶金转变

在冲天炉仍处于工作状态时，使用热分析、光谱分析和燃烧分析对冶金状态进行测量。在这里，数据的精确映射对于建立与获得的微观结构和力学性能的联系非常重要。这是由 Zorc 开发的面向服务的软件 Foundry Cloud 提供的。现代热分析使用双室坩埚来模拟最终的随流孕育或冲入法孕育。

一方面，在这一阶段获得的数据用于确定新熔化工艺的目标参数，使金属液的核心参数在转换过程中保持稳定或改善，以确保在进一步加工部件时尽可能平稳地过渡。这一阶段应持续 4 周左右，以涵盖所有冶金条件。当感应熔炼工艺加速时，通常需要另外 4 周的时间才能将新工艺的所有方面正确地映射到数字孪生中。

用于现代生产过程的最佳规划和控制的工具

如何控制冶金，如何控制运输物流，铁液处理和浇注？这两个问题都可以用一句话来回答：使用 Zorc Genesis AI，它的专业知识被整合到一个数字孪生中。数字孪生通过在虚拟环境中复制熔炉中的物理过程来反映充电和熔化过程。在这样做过程中，它考虑了在装料槽和炉子本身的浇注。它模拟了氧平衡和成核元素的动力学。还描述了感应熔炼炉内的能量流动，包括冷却能力。

在浇注和输送过程中，它跟踪与环境（大气中的氧）的相互作用，并计算对流和辐射热的散热。数字孪生对喂丝过程的物理和化学以及浇注过程有全面的了解，并模拟相关的成核过程。在铸造和凝固过程中，孪生体进行基于模拟的分析，以确定熔体成分和形核状态对零件性能的影响。此外，这个数字孪生体还关注着看似日常的流程：它计算叉车运行的时间，识别出铁时的瓶颈，并考虑叉车司机的休息时间。

数字孪生数据来源

为了将其预测与当前的实际情况进行比较，数字孪生需要有关当前生产状态的信息。数字孪生的“感官”是生产环境中的测量设备。传统的测量仪器如光谱仪确定熔体成分，而测温枪和高温计测量熔池温度。热分析等方法可以捕捉到凝固过程的动力学，从而得出关于成核状态和石墨形态的结论。

诸如 Zorc Track & Trace 等系统用于确定叉车的位置，甚至在带有“室内 GPS”的车间中，以及跟踪工艺流程中的钢包位置。面向服务的软件（如 Foundry Cloud）提供了读取数据源（如测量设备、PLC 系统或物联网设备）

process and allow conclusions to be drawn about the nucleation state and graphite morphology.

Systems such as the Zorc Track & Trace are used to determine the position of forklifts, even in halls with "Indoor GPS", as well as to track the ladle position in the process flow. Service-oriented software such as the Foundry Cloud provides all the services required to read data sources such as measuring devices, PLC systems or IoT devices and convert them into a structured database.

And what is the AI doing? Production planning and process control

AI has the task of planning the next steps in the short, medium and long term in order to effectively solve the tasks set in the production process. Much like a chess computer, it searches for the optimal strategy. The way the task is formulated can influence the character of the production. The question is whether cost priority is higher than meeting deadlines or vice versa. All these factors can be adjusted with the help of parameters. The AI calculates optimal future trajectories while developing a plan that takes into account resources such as labor, energy consumption, electricity costs, etc.

Interaction with process owners and employees

The Zorc Genesis AI creates a workflow plan in much the same way that a navigation system suggests a route. Analogous to a navigation system, the human planner is not obliged to strictly adhere to this plan. Instead, he may deviate from it. The Genesis AI then calculates an adjusted workflow based on the new situation.

Tasks within the workflows are distributed via the Foundry Cloud to employees using mobile or stationary devices. The feedback is used by the Genesis AI to capture the current status of production and dynamically adapt workflows to deviating situations. A self-optimizing process: by following the procedure described above, production within FoundryCloud generates data that is used to refine all aspects of the Digital Twin. This, in turn, enables the Genesis AI to further optimize all aspects of production while learning from employee experience.

Conclusion

To achieve decarbonization targets, the transition of operations from fossil fuels to virtually carbon-neutral production is of great importance. How can foundries with cupola operations address the requirement for decarbonization? For the experts at ABP Induction and Zorc Technology, the solution lies in switching from cupola to induction furnace operation and controlling the processes using digital tools which incorporate AI. The induction furnace has clear advantages when operating with high-grade scrap, and additional tools such as ABP OptiCharge and the ABP Meltshop Designer can increase production capacity and throughput and improve energy efficiency. The flexibility of production with stringent quality requirements is achievable with the help of dynamic production planning and control using digitalization. The use of Zorc Genesis AI

并将其转换为结构化数据库所需的所有服务。

人工智能在做什么？生产计划和过程控制

人工智能的任务是在短期、中期和长期内规划下一步，以便有效地解决生产过程中设置的任务。就像一台国际象棋计算机，它寻找最优策略。任务的制定方式会影响生产的性质。问题是成本优先级是否高于完成最后期限，反之亦然。所有这些因素都可以通过参数进行调整。人工智能在考虑人力、能源消耗、电费等资源的同时，会计算出最优的未来轨迹。

与流程所有者和员工的交互

Zorc Genesis AI 软件创建工作流程计划的方式与导航系统建议路线的方式非常相似。类似于导航系统，人类规划者没有义务严格遵守这个计划。相反，他可能会偏离它。Genesis AI 会根据新情况计算出调整后的工作流程。

工作流程中的任务通过 Foundry Cloud 分发给使用移动或固定设备的员工。Genesis AI 使用反馈来捕获生产的当前状态，并动态地调整工作流程以适应偏离的情况。自我优化过程：通过遵循上述过程，Foundry Cloud 中的生产用于改进数字孪生的各个方面的数据。这反过来又使 Genesis AI 能够进一步优化生产的各个方面，同时学习员工的经验。

结论

为了实现减少碳排放的目标，从化石燃料转向碳中和的生产非常重要。使用冲天炉熔炼的铸造厂如何解决减少碳排放的要求？对于 ABP 感应公司和 Zorc 技术公司的专家来说，解决方案在于从冲天炉转换到感应炉熔化，并使用包含人工智能的数字工具控制过程。感应炉在处理高品位废钢时具有明显的优势，而 ABP OptiCharge 和 ABP Meltshop Designer 等附加工具可以提高生产能力和吞吐量，并提高能源效率。借助数字化的动态生产计划和控制，可以实现具有严格质量要求的生产灵活性。Zorc Genesis AI 的使用代表了这些系统的下一个进化阶段，即使在复杂的生产情况下也能提高效率。

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represents the next evolutionary stage of these systems and will result in increased efficiency even in complex production situations.

<https://www.abpinduction.com>

<https://www.zorc-technology.com/>

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a-small-footprint/

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“Weiye School” Foundry Focus Series(First)

—— Veins

“伟业学堂”铸造焦点系列篇（一）

—— 脉纹

Veining defect in the inner cavity of castings is a pain point and difficult issue that trouble the foundry industry, especially for the key castings such as automotive engine cylinder block, cylinder head, exhaust pipe, turbine shell and brake disc. The veining defect in the inner cavity of castings creases the cleaning world load, reduces the cleanness in the inner cavity of castings, and at the same time, it will also produce the associated defects such as metal penetration, sintering, coating skin, which will lead to the scraps of castings in serious cases.

So, how do veins come about? We know silica sand undergoes phase change and expansion at 573°C, resulting in sand core expansion and crack under certain conditions. Hot metal penetrates into the crack and form the veining defects. After the hot metal penetrates into the gap of sand core, it penetrates into the gap of surrounding sand particles and forms metal penetration defect. The inner cavity of casting will be blocked in serious cases. If veining defects and metal penetration defects coexist, it will be very difficult to clean the castings..

In order to prevent and solve the problems of veining defect, foundry workers have explored a variety of process technical routs, such as the use of calcined sand, the addition of a certain proportion of special sand, and the selection of anti-veining coating, inorganic material anti-veining additive or organic material anti-veining additive, and other common measures, as well as adjusting sand granularity, dispersing the pouring gate, reducing pouring temperature and other auxiliary measures. Practice has proved that traditional solutions not only increase production cost, but also make unstable improvement effects on veining defects, especially the associated defects caused by improper use of anti-veining materials, such as metal penetration, sintering, coating skin, casting deformation, size deviation and even surface depression, which seriously influences the confidence to improve defects and casting quality of the foundry.

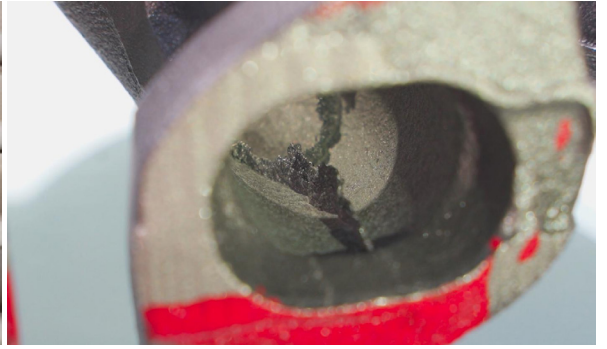
Today, I carefully recommend a compound anti-veining agent DK-2, which not only eliminates veining defects completely, but also does not produce associated defects. DK-2 anti-veining additive is a pinky powder material that

铸件内腔脉纹缺陷是困扰铸造行业的痛点和难点问题，尤其对于汽车发动机缸体、缸盖、排气管、涡轮壳及刹车盘等关键铸件，内腔脉纹缺陷增加了铸件的清理工作量，降低了铸件内腔的清洁度，同时还会产生内腔粘砂、烧结、涂料皮等伴生缺陷，严重时会引起铸件报废。

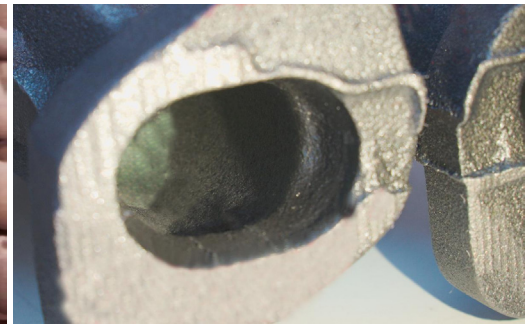
那么，脉纹是怎么产生的呢？我们知道硅砂在 573°C 时会发生相变和膨胀，在一定条件下导致砂芯膨胀并产生裂缝，铁水渗入砂芯缝隙中形成脉纹缺陷。铁水渗入砂芯缝隙后，同时向周边的砂粒间隙渗透，形成粘砂缺陷，粘砂严重时堵实铸件内腔。当脉纹缺陷和粘砂缺陷共存时，铸件的清理难度非常大。

为了防止和解决脉纹缺陷，铸造工作者探索了多种工艺技术路线，比如使用焙烧砂、添加一定配比的特种砂、选择防脉纹型涂料、无机物防脉纹添加剂或有机物防脉纹添加剂等常见措施，以及调整原砂粒度，分散浇道口，降低浇注温度等辅助措施。实践证明，传统的解决方案不但增加了生产成本，同时脉纹缺陷的改善效果也不稳定，尤其是不当使用防脉纹材料时产生相关联的伴生缺陷，比如粘砂、烧结、涂料皮、铸件变形、尺寸超差甚至表面凹陷等问题，严重影响铸造工厂的改善信心和铸件品质。

今天，我慎重地向大家推荐一款复合型防脉纹剂 DK-2，不但能彻底消除铸件内腔的脉纹缺陷，并且不产生相关联的伴生缺陷。DK-2 防脉纹添加剂呈红色粉末状，是多种有机物和无机物的混合材料，通过科学的选型和配比，既规避了单一有机物或单一无机物的固有缺点，同时充分发挥了不同组分的性能优势。我们通过大量成功的应用案例，和行业同仁们分享如下结论：



加入 DK-2 前
Before using DK-2



加入 DK-2 后
After using DK-2

is a mixture of a variety of organic and inorganic substances. Through scientific selection and ratio, it not only avoids the shortcomings of a single organic or an inorganic material, but also fully develops the performance advantage of different components. Through a large number of successful cases, we would like to share the following conclusions with our industry colleagues:

Under the condition of cold core process, the addition amount of DK-2 anti-veining agent only accounts for 0.3-0.8% of total weight of the original sand, which does not affect the strength of sand core and it is not necessary to increase the amount of resin added.

DK-2 anti-veining agent can completely eliminate veining defect in the inner cavity of castings .

It should be noted in particular that there will be no associated defects such as metal penetration, sintering, coating skin, casting deformation, size deviation and casting surface depression when DK-2 is used.

Compared with other anti-veining materials, DK-2 anti-veining additive consumes the lowest material cost and the inner cavity cleanliness of casting is the best, which has the advantage of comprehensive cost.

If there are veining defects or defects caused by veins in the inner cavity of your castings, please contact us via E-mail: chinaweiyee@pdswy.cn or visit website www.shengshiweiye.cn to know more about us. We will try our best to provide you anti-veining additive DK-2 with excellent performance and systemic technical solutions. Henan Weiye Company looks forward to further communication and cooperation with you. ■

1、在冷芯工艺条件下，DK-2 防脉纹剂加入量仅占原砂总重量的 0.3% 到 0.8%，不影响砂芯强度，不需要提高树脂的加入量。

2、DK-2 防脉纹剂可以彻底消除铸件内腔的脉纹缺陷。

3、需要特别说明的是，使用 DK-2 防脉纹剂时，不会产生粘砂，烧结，涂料皮，铸件变形，尺寸超差及铸件表面凹陷等伴生缺陷。

4、与其它防脉纹材料相比，DK-2 防脉纹剂消耗的材料成本最低，铸件内腔清洁度最理想，具有综合成本上的优势。

如果您的铸件内腔有脉纹缺陷，或者由脉纹引起的缺陷，请通过 E-mail: chinaweiyee@pdswy.cn 联系我们或登录网站 www.shengshiweiye.cn 了解更多详情，我们将竭诚为您提供性能优良的防脉纹添加剂，以及系统的技术解决方案，河南伟业公司期待与您做进一步的交流与合作。 ■

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Ask Chemicals Presents Reziance Resin Portfolio

亚世科化学推出 Reziance 树脂产品组合

ASK Chemicals, a global leader in chemical solutions for the casting industry and a supplier of high-performance resins, unveils its new Reziance brand portfolio of industrial resins. Building on its expertise in phenolic resins in both the foundry and industrial resin businesses, ASK Chemicals is expanding its footprint into new markets with a new product line of phenolic resins.

The acquisition of the industrial resin business in 2021 represented a significant milestone in ASK Chemicals' diversification strategy. It expanded the company's focus to include a wide range of applications such as friction, abrasives, refractories, impregnation, wood, paints and coatings.

"ASK Chemicals offers high-performance phenolic resins and specialty solutions for casting and a growing range of industrial applications," states Christoph Henseler, Chief Business Development Officer at ASK Chemicals. "With the launch of our REZIANCE industrial resin brand, we are embarking on an exciting journey of diversification. I am confident that with our passionate global team and our high-performance products, we offer attractive benefits to our customers."

ASK Chemicals' technical understanding of the industries, combined with its legacy expertise in industrial phenolic resins, makes the company a partner of choice for demanding technical solutions. The commitment to technical excellence and high customer satisfaction has always been central to ASK Chemicals' go-to-market approach. ■

亚世科化学公司是铸造行业化学解决方案的全球领导者，也是高性能树脂的供应商，推出了其新的工业树脂 Reziance 产品组合。亚世科化学公司凭借其在铸造和工业树脂领域中酚醛树脂方面的专业知识，正在通过新的酚醛树脂产品线将其足迹扩展到新市场。

2021年，亚世科化学公司对工业树脂业务的收购是公司多元化战略的一个重要里程碑，将公司的产品重点扩展到更为广泛的应用领域，如摩擦、磨料、耐火材料、浸渍、木材、油漆和涂料。

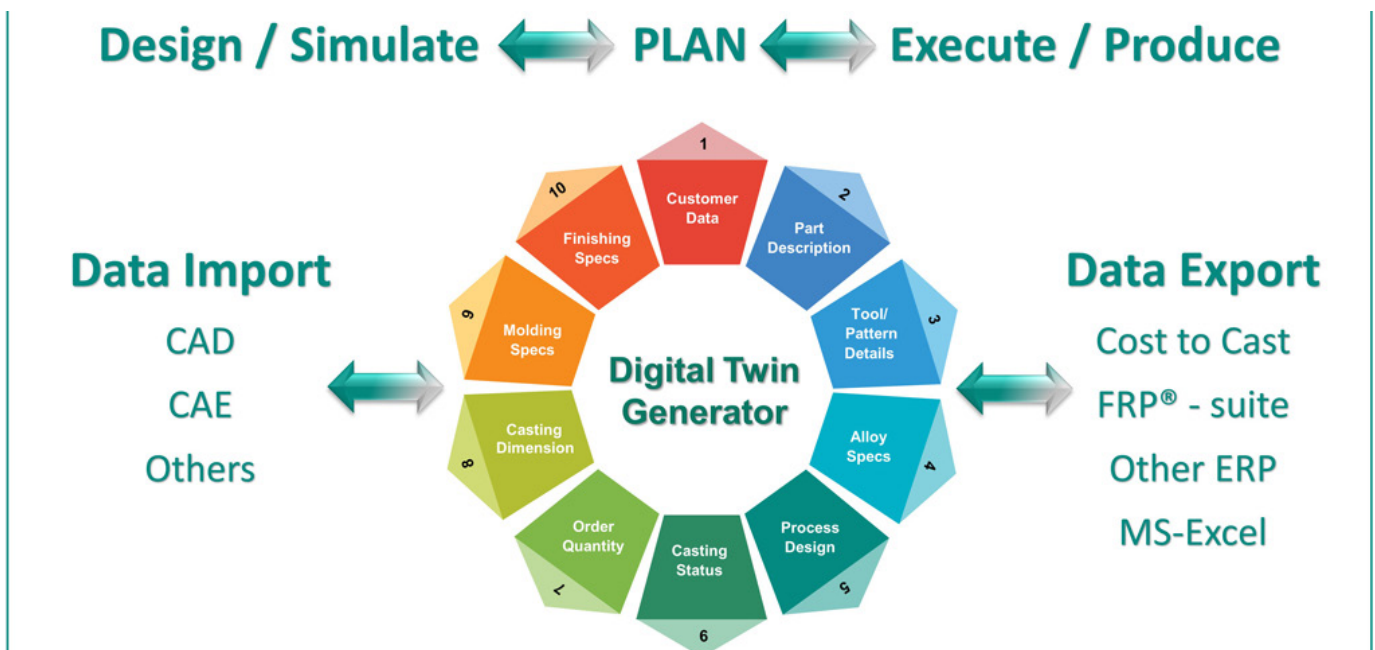
亚世科化学公司首席业务拓展官 Christoph Henseler 表示：“亚世科化学为铸造和越来越多的工业领域提供高性能酚醛树脂和专业解决方案。随着 Reziance 工业树脂产品的推出，公司开启了多元化发展的道路。我相信，凭借充满激情的全球团队和高性能的产品，公司将为客户创造更多的价值。”

亚世科化学公司对行业技术的深入了解，以及拥有在工业酚醛树脂方面的长期专业知识，使公司成为客户对于越来越严苛的技术解决方案的首选合作伙伴。对卓越技术和客户高满意度的承诺一直是亚世科化学公司市场营销战略的核心。■



Frp®.Dtg/C2C (Frp® - Digital Twin Generator And Cost To Cast Enabler) - Your Ai Based Rfq And Resource Planning Tool

FRP®Dtg/C2C (Frp®- 数字孪生发生器和铸造成本计算器) - 您的基于人工智能的询价请求和资源规划工具



Motivation:

After RFQ received it may take up to a week or longer to establish a BOM + workplan + Manpower plan + Materials / Purchase Items availability + Machinery plan + Timings + many other Master Data!

- Scenario ideas and manufacturing routes are excluded in such preparation timing.

- Many assumptions / estimates prevail in metal casting operations!

- The work preparation department has a HUGE workload and may overlook items while establishing a robust pricing result!

Solution:

·FRP®.DTG can generate the complete digital twin (i.e. the FRP® - Resource Plan = BOM + Workplan + Manpower plan + Materials + Purchase Items + Machinery plan + Timings + any

SIR 的解决方案适应汽车工业生产流程的变化以及对替代机加工操作日益增长的需求。

动机:

在收到询价后，可能需要一周或更长的时间来建立下列表单：物料清单 + 工作计划 + 人力计划 + 材料 / 采购项目可用性 + 设备计划 + 计时方案 + 许多其他主要数据！

在上述准备过程中已经排除了方案设计和制造工艺的时间。

在铸造生产过程中存在许多假设的可能性和相应的预期！

前期准备部门面临的工作量庞大，可能会导致在建立稳健的价格结果的过程中，忽略一些要素！

other Master Data) through a few easily accessible information fields (or even automatically obtained from CAD / simulation solutions) and data entry within MINUTES!

- The FRP®.DTG master data is upfront to be established by the FRP® team

- Manufacturing Scenarios can be easily utilised

- No assumptions / estimates (unless they are part of the master data and on purpose)

- Work preparation department workload reduced by up to 80%, a robust pricing is created to ensure profitability is always there, even IF unforeseen obstacles occur.

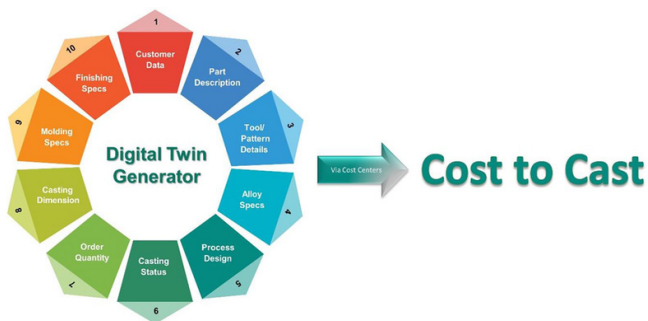
- The process is: èFast / èSecure / èTransparent.

As the basis for Foundry 4.0, it is mandatory to create an accurate digital image of the part and the involved manufacturing process. This is the foundation of all future activities. This must include all resources required for production. In addition, it maps the operational organization - the structural levels generate feedback points and respective storage information.


When this is achieved: automatic evaluation with cost rates = calculation (= “cost to cast” / “C2C”) the FRP®.DTG can, with only a few inputs, generate your complete casting part with all materials and operations (=digital twin) in a structured way up to the calculation (cost to cast). Use the FRP®.DTG to optimize your work preparation, to protect the company know-how and establish a connection between your design and development (CAD / CAE) with the corporate level (ERP/ FRP®).

The FRP®.DTG has standardized and easy to complete input-parameters leading directly to “C2C” in an instant. PPC and sales persons can collaborate easier and understand faster their manufacturing planning needs!

Here is one example of Input Parameters (Example for Sand Casting)



FRP® - DIGITAL TWIN GENERATOR STANDALONE RGU CAST IN SOFTWARE



THE “DIGITAL TWIN GENERATOR” (a.k.a. DTG) functions as the CENTRAL area when it comes to a company organisation with the benefit of a C2C at the planning stage
The DTG in a standardized world is a simple start to get your PPC organized → STRUCTURE
It can be deployed STANDALONE or INTEGRATED

Work preparation	CENTRAL AREA	Backend
CAD CAE others	DIGITAL TWIN GENERATOR (DTG)	FRP® ERP EXCEL OTHERS

解决方案:

通过几个容易访问的信息字段（甚至自动从 CAD / 模拟解决方案）和数据输入，FRP®.DTG 可以快速产出完整的数字孪生方案（即 FRP®- 资源计划 = 物料清单 + 工作计划 + 人力计划 + 材料 + 采购项目 + 设备计划 + 计时方案 + 任何其他主数据）！

你所使用的 FRP®.DTG 主数据将由 FRP® 团队预先建好。

制造方案可以得到轻松运用。

不含假设 / 估计（除非它们是主数据的一部分）

前期工作准备部门的工作量减少了高达 80%，并建立了一个稳健的定价方案，以确保盈利空间的始终存在，即使过程中发生了不可预见的障碍。

该过程是：电子化、快捷、安全和透明的。

作为铸造 4.0 进程的基础，必须首先创建要生产的铸件和其制造过程的准确的数字图形。这是未来所有工作的基础。其中必须包括生产过程所需的所有资源。此外，它还映射了操作组织——即结构层级，在其中可以生成信息反馈点和独立的存储信息。

如何具体实现：成本率的自动评估 = 计算（= “从成本看铸造 / 即 C2C”）的 FRP®.DTG 可以通过少量的输入，生成完整铸件与所需材料和操作（= 数字孪生）的结构化方式，直到计算铸件成本。使用 FRP®.DTG 来优化工作准备过程，保护公司的专利与知识产权，并在设计和开发工具（CAD / CAE）与公司管理层级软件（ERP/ FRP®）之间建立联系。

FRP®.DTG 已经实现标准化，且输入参数过程简易，这直接使“成本指导铸造”。生产流程控制人员和销售人

Input parameters

Customer number: 100003 - RGU ASIA Pte. Ltd.	Description: housing	
Pattern number: 001	Drawing number: abc123	Alloy number: 1.4581 - Alloy Steel
Heat treatment: 02 - Heat Treating	Product group: 11.2 - GJS Moulding Facility 1	Delivery status: 11 - Raw Part
Lot size: 100 Piece(s)	Net weight: 10 kg	Circuit weight: 5 kg
Part length: 200 mm	Part width: 200 mm	Part height: 200 mm
Moulding box length: 1000 mm	Moulding box width: 1000 mm	Moulding box height: 500 mm
Pieces per mould: 10 Piece(s)	Moulding box portion: 100 %	Number of cores: 3 Core(s)
Acceptance: 1 - internal, without Acceptance {15}	Surface: 8 - Surface-treated	Colour: 0 -

Structure

#	Element No.	Description	Consumption	Unit Of Consumption
282274	N0300		0	
282276	A1010	Pattern/Tool Ready Positioning	0	min
282276	1050-00001	Moulding Sand	0	kg
282277	A2000.01	HWS - Drag Box Moulding	0	min-C
282278	A2000.02	HWS - Cope Box Moulding	0	min-C
282279	1100-00251	housing	0	Number
282280	1100-00252	housing	0	Number
282281	1100-00253	housing	0	Number
282282	A2000.09	HWS - Core-Setting	0	min-C
282283	A2000.07	HWS - Assembling and Closing	0	min-C
282284	A2000.08	HWS - Seal	0	min-C
282286	1300-00001	Alloy Steel	0	1000 kg
282286	1390-00001	RM.1.4581	0	kg
282287	A2000.12	HWS - Pouring	0	min-C

GIFA22		Calculation of Raw Item				22.06.2023	
No.	230000097	Customer	100003	Calc. group	501	References	Order
Date	22.06.2023	Item	1590-00099	Calc. type	0	Lot size	1
Level: 1590-00099 - Turbocharger - - Status: RM - Lot size: 1 - modified: 22.06.2023							
Pattern No.	3443			Last offer	Offer		
Drawing No.	343223			Last order	Order		
Material No.	1.4581	Alloy Steel		All. lot sizes	0	0	0
ProductGr	GJS Moulding						
kg-raw/Pc.	100.00	MF-Portion %	100.00	No. of Cores	2.00		
kg-kg/Pc.	220.00	Pieces/Flask	1.00	kg Cores	0.00		
kg kg/MF	220.00						
Pattern production		Pouring system		Test Costs			
Material	€ 0.00	Assembly	€ 0.00	Test Costs	No		
Expense	h 0.00	Assem.Add	€ 0.00	Calc. Costs	€ 0.00		
Hourly rate	€ 0.00	Calc. Costs	€ 0.00				
Calc. Costs	€ 0.00	Calc. Target	€ 0.00				
Packaging							
Description	1590-00102	Packing Instruction	-	Unit	Quantity	C	
Material tariff <i>Current information referring to material and item master data</i>							
Material	1.4581	Alloy Steel					
List type		Not any					
Planned targets		Sales targets		MSC/ESC €/kg			
Circuit	0.15	Material €/kg		MSC-target	0.00		
Basis	0.70			Costing	0.00		
Plan Price	0.00	Preview	0.00	ESC-target	0.00		
Balance	0.00	Balance	0.00	Costing	0.00		

Example of Digital Twin generated (the FRP® - Resource Plan) with structure Level “Raw-Cast” leading to “Cost to Cast” (right picture):

Registration for free usage: Book a DEMO (rgu-asia.com). ■

员可以更顺畅地合作，更好地互相理解制造计划与生产需求！

下面是一个输入参数示例（以砂型铸造为例）

数字孪生的结构级别（“FRP®资源计划”）为例，“原始成本”导致“铸造成本”（右图）：

免费注册体验：预约演示（访问 rgu-asia.com）。■

Reduce Emissions And Win Business: Norican Helps Mat Group Profitably Drive Sustainable Emission Reductions

减少排放并赢得生意：诺瑞肯助力 MAT 集团推动可持续减排并实现盈利

As lower emissions become a major competitive advantage for foundries, global casting giant MAT Group is preparing to commit to the Science Based Targets initiative (SBTi).

To measure its emissions, optimise its process and move towards setting science-based emissions reduction targets, MAT Group's EURAC foundry in Poole, UK is working closely with four of Norican's global brands: Monitizer, DISA, Simpson and Wheelabrator. Norican signed up to the Science Based Targets initiative (SBTi) in 2021 and recently saw its carbon reduction targets validated by the SBTi.

"Customer interest in emissions has increased hugely, even in the last six months," says Luke Batter, Process Development Manager at MAT Group. "Our own sustainability initiatives began some years ago but now we are definitely being driven by our customers. We plan to commit to Science Based Targets in the near future."

The world moves to cut carbon

As markets like automotive comply with increasingly stringent environmental legislation, so their suppliers must follow. MAT must calculate how much carbon is embedded in each casting it produces because almost every quotation form it receives demands it.

"To be able to quote for new business now, you have to know your product carbon footprint," says Luke. "All our largest customers will not accept a new RFQ without it. One of our largest customers has said that sustainability is just as important as purchase price, although they still want the lowest price per part too."

At their UK site in Poole MAT currently calculates a per-ton figure for embedded scope 1 and 2 carbon, based on its total casting output and energy consumption. Adding in product-specific metrics like weight and yield produces a carbon footprint for each individual casting.

Tackling Scope 3—with Monitizer|DISCOVER

MAT uses the Monitizer|DISCOVER IIoT platform to improve its process, sustainability performance, and reduce direct emissions.

DISCOVER's dashboards already report their energy

低排放正成为铸造厂的首要竞争优势，全球铸造巨头 MAT 集团正准备致力于“科学碳目标”倡议 (SBTi)。

为测量排放量、优化流程并朝着设定的科学减排目标迈进，MAT 集团位于英国普尔子公司 EURAC 铸造厂正与诺瑞肯旗下四个全球品牌密切合作：Monitizer、迪砂、辛普森和维尔贝莱特。诺瑞肯于 2021 年签署了科学碳目标倡议 (SBTi)，最近碳减排目标已经过 SBTi 验证。

"最近 6 个月，客户对减排的兴趣大大增加，" MAT 集团工艺开发经理 Luke Batter 表示。"早在几年前我们就启动了自己的可持续发展计划，但现在确切说，我们是受客户驱动的，我们计划在不久的将来致力于科学碳目标。"

全世界都在致力减少碳排放

随着汽车等市场的环境法规愈发严格，其供应商也必须践行。MAT 必须计算生产的每个铸件中包含多少碳，因为几乎收到的每一份报价单都需要这个数据。

"现在您必须了解产品的碳排放量，才能够为新业务报价，" Luke 说道，"我们的所有大客户都不再接受没有该数据的新报价请求。其中一位大客户表示可持续性跟采购价格同等重要，尽管他们也希望获得零件的最低价。"

MAT 位于英国普尔的工厂目前根据铸件总产量和总能耗，计算出每吨含有范围 1 和 2 碳的数据。添加重量和产量等产品特定指标将会生成每个铸件的碳排放量。

解决范围 3 – 使用 Monitizer|DISCOVER

MAT 使用 Monitizer|DISCOVER IIoT 平台，改进其工艺、可持续发展绩效并减少直接排放。DISCOVER 的仪表盘可实现对于每吨能耗的实时报告。"我们的目标是获得每个子工艺的实时碳指标，并通过 Monitizer 数字仪表盘为我们提供每种产品生产时的每批次排放数



范围 1:	范围 2:	范围 3:
公司拥有或控制的温室气体直接排放源, 如铸造炉。	报告公司消耗的发电、蒸汽、热量和冷却所产生的间接温室气体排放。	公司客户和供应商的间接温室气体排放。对诺瑞肯而言, 这是指我们的客户使用诺瑞肯的产品和服务。

consumption per ton in real time. “What we’re aiming for is a real-time carbon metric for every sub-process and a Monitizer digital dashboard that gives us a per-batch emissions figure for each product as it’s produced,” says Luke.

Measuring scope 3 emissions is the next big challenge. MAT is gathering data as fast as it can but, with data on only 10% of supplier emissions, it still doesn’t have quite enough to get an accurate figure. First, it wants to be ready to commit to SBTi.

“We need to walk before we can run,” says Luke. “We want to calculate our base emissions very accurately so we can then set targets correctly.”

Partners for a profitable, sustainable future

From reclaiming green sand to consuming 100% renewably generated electricity and piloting the Monitizer|PRESCRIBE AI-driven process optimisation solution, MAT’s Poole facility is blazing a trail for the rest of the Group to follow. The global shift to sustainability is a huge opportunity to win new business--for foundries that are ready.

“All of our customers are looking at reshoring some or all of their casting production closer to where their products are assembled and sold,” says Luke. “Emissions are definitely a big part of what’s driving that.”

“Norican is quite far along in its emissions journey and its experience of SBTi will be really helpful,” continues Luke. “Data is key and at the moment, Norican is the one with the most emissions data. We already have a close relationship with DISA, Monitizer, Simpson and Wheelabrator and I expect that to grow further as we commit to SBTi.” ■

据,” Luke 说道。

测量范围 3 排放是下一个重大挑战。MAT 正在以最快的速度收集数据, 但仅凭借 10% 的供应商排放量数据, 仍然不足以获得准确的数据。首先, MAT 准备致力于 SBTi。

“我们需要先走起来, 然后才能跑起来,” Luke 说道, “我们希望非常准确地计算我们的基本排放量, 以便设定合适的目标。”

合作共创盈利、可持续发展的未来

从回收湿型砂到完全使用可再生电力并试行 Monitizer|PRESCRIBE AI 驱动的工艺优化解决方案, MAT 的普尔工厂正为集团其他工厂开辟了一条可以效仿的道路。全球范围的可持续发展转变对于准备就绪的铸造厂而言, 是赢得新生意的巨大机遇。

“我们所有的客户都在考虑将部分或全部铸件生产迁回至更靠近其产品组装和销售的地方,” Luke 说道, “排放绝对是推动这一转变的重要因素。”

“诺瑞肯在减排方面已经取得了相当大的进展, 其 SBTi 经验将对我们产生很大帮助,” Luke 继续说道, “当前数据是关键, 诺瑞肯是拥有排放数据最多的公司。我们已经与迪砂、Monitizer、辛普森和维尔贝莱特建立密切合作, 希望随着我们致力于 SBTi, 我们的合作之路会越来越远。” ■

Hüttenes-Albertus, Laempe And Magma: Together On The Way To Digital Core Production

欧区爱、兰佩和迈格玛：携手研发型芯生产数字化工艺

Three leading technology providers in their respective fields, have successfully continued their long-standing partnership to develop digital core production: MAGMA Gießereitechnologie GmbH (MAGMA), specialist in the virtual optimization of foundry processes, Hüttenes-Albertus Chemische Werke GmbH (HA), leading supplier of foundry chemicals, and Laempe Mössner Sinto GmbH (Laempe), renowned manufacturer of core making equipment. The impressive progress attracted a lot of attention at GIFA.

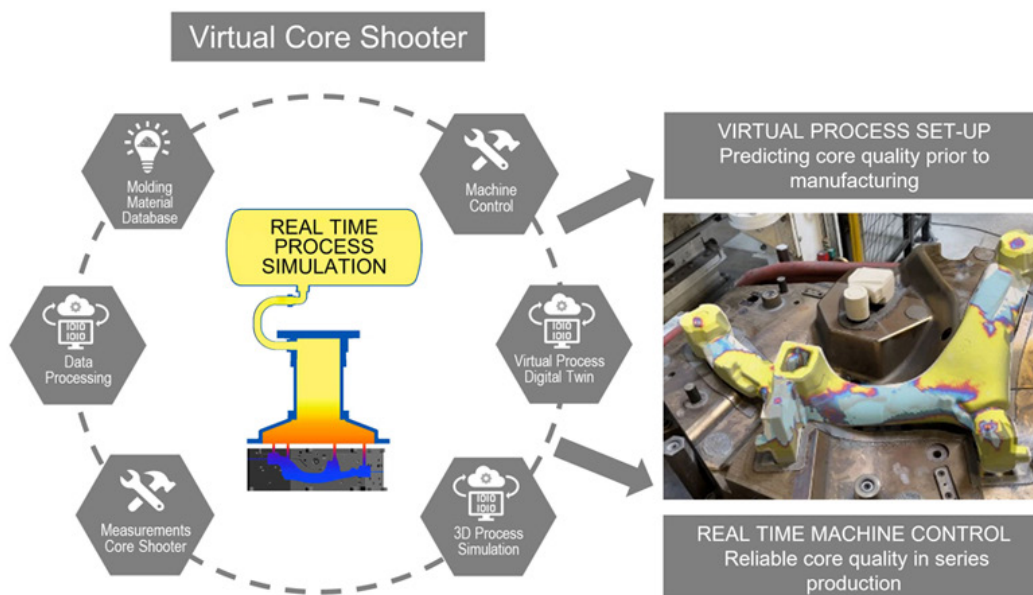
Consistent quality during core production

In the production of modern, complex castings, it is important to achieve consistent quality in core production, which involves the interplay of several influencing factors and process variables. However, it is only at the end of the production process - when you have a finished casting - that you can determine whether the process can deliver 100% of the required quality. Foundries would certainly benefit from being able to identify potential deviations in advance, as this

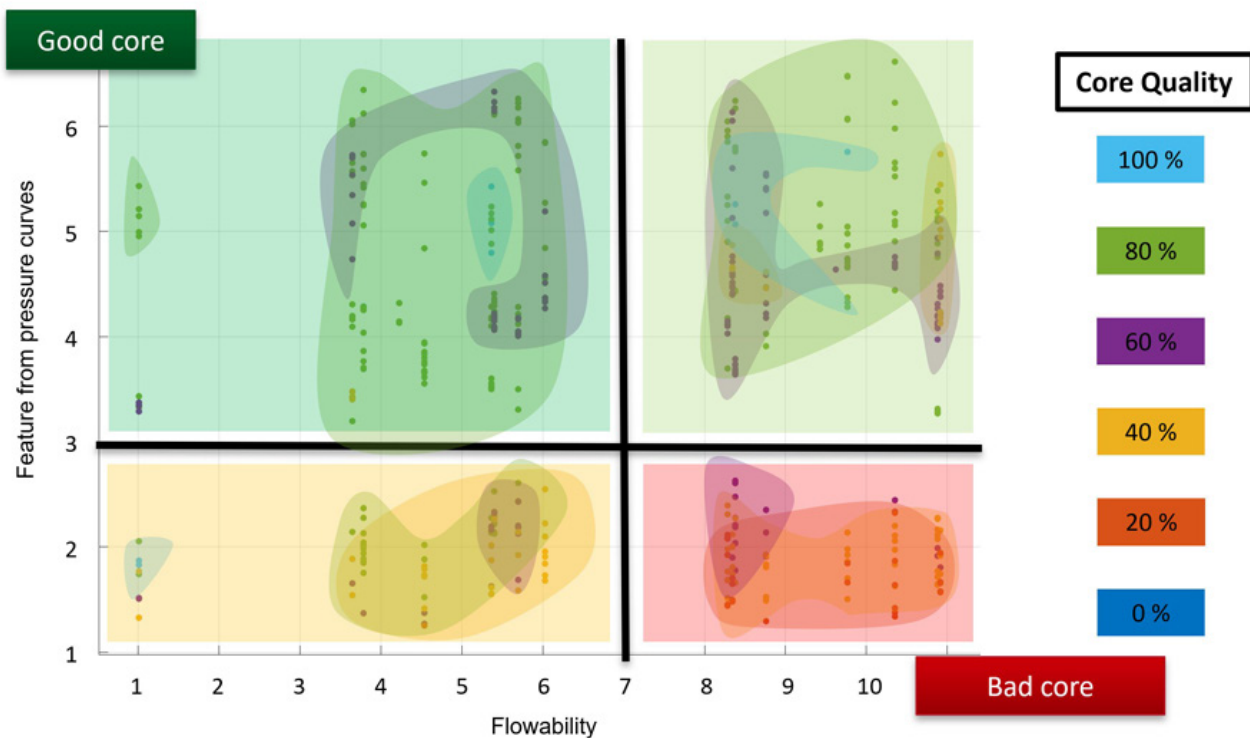
这三家来自不同专业领域的领先技术服务商，一直以来达成并将持续长期合作伙伴关系，共同开发数字化型芯生产：迈格玛，是一家专注于虚拟优化铸造过程的企业；欧区爱，是一家专业提供铸造用化学品的领先供应商；以及兰佩，一家著名的制芯设备制造商。这一合作关系的新进展，令人印象深刻，并在德国 GIFA 展会上引起了广泛关注。

型芯生产过程质量稳定

在如今复杂铸件的生产过程中，保持型芯生产的质量稳定性十分重要，这和影响生产的诸多要素和生产过程中存在的变量之间的相互作用息息相关。然而，只有在生产过程结束时，即铸件生产完成的时候，你才能确定这次生产是否能百分百地达到预期的质量要求。因此，如果能够提前识别出来潜在的生产偏差情况，铸造厂将大大收益，



The integrated concept of the Virtual Core Shooter is linking expertise of three market leading companies. 虚拟型芯模拟器的集成概念是将三家公司的领先于市场的专业知识和技术结合而成。



would give them the opportunity to intervene in the process at a very early stage.

Simulation-based mapping of core production This is exactly what simulation-based mapping of core production does. It makes the process transparent and predictable, considering as many process parameters as possible. Integrating these methods into the production environment is the vision that drives the partnership between HA, MAGMA and Laempe.

Digitally retrace the production of a core

The three partners introduced their revolutionary concept for the first time four years ago. At the leading international trade show GIFA in June 2023, the three partners presented the progress: The concept was illustrated on an extended machine control console of a Laempe core shooter. Visitors were able to digitally follow the production of a core on three interactive screens.

Core quality can be better assessed and controlled

Various parameters of the core making process are continuously monitored and linked to real-time measurements taken in the machine. The data is processed in real time by a unique simulation software that predicts pressures and mass flows for the sand and air throughout the machine and core box system. As a result, the impact on core quality can be evaluated and controlled by making adjustments to the shooting process, answering questions such as: What is the effect of sand height in the shooting unit on the process?

因为这将使他们在非常早期的阶段对生产流程进行干预。

虚拟型芯模拟器的集成概念是将三家公司的领先于市场的专业知识和技术结合而成。

仿真生产流程的型芯生产模拟

这正是以生产流程为仿真模型的型芯生产模拟所做的。它可以让生产过程更加透明和可预测，并尽可能多地考虑到相关的变量和参数。将这些方法集成到生产环境中，是推动欧区爱、迈格玛和兰佩之间的伙伴关系共同愿景。

数字化追溯型芯的生产

三家合作伙伴在四年前首次提出了他们的革命性理念。而在 2023 年 6 月的铸造行业国际展 GIFA 上，三个合作伙伴展示了他们对于这个理念目前实施的进度：这一概念在兰佩展台上，以型芯模拟器和扩展机器控制台上进行了演示。访问者能够在三个互动屏幕上，数字化跟踪型芯的生产过程

型芯质量可以获得更好的分析和控制

型芯生产过程中的各项参数可以进行持续监测，并与机器内的实时生产指标同步。这些数据由单独的模拟软件进行实时处理，该软件可以预测设备和芯盒系统中的砂和

What is the effect of air vent blockage or cavity cleanliness? At what pressure is the sand shot into the mold cavity? How stable is the process and what parameters need to be changed if the set quality specifications are not met?

Combination of process simulation and real core production

"With this patented new tool, we have been able to combine process simulation and real core production. By coupling the properties of the sand-binder mixture over the time with the core shooter and current tooling, we can simulate the entire process holistically. In this way, we ensure a reliable core quality", says Dr Ingo Wagner, Product Manager Core Making Processes at MAGMA GmbH. "Due to the short computing times, it is even possible to integrate the simulation into the real-time operation of the machine. We are also implementing this technology as a front-end predictor into MAGMA C+M, our core making process simulation software".

Important building block for digitalisation

"For Laempe, this initiative is an important building block in our digitalization initiative, which we are supporting by our Laempe Digital Cockpit software suite and our Core Vision real time inspection system", comments Rudolf Wintgens, Managing Director of Laempe. "The now established link between process data, machine control and the final core distinguishes this approach from many Industry 4.0 activities in a foundry that lack the link to product quality."

Detect core defects that are not visible to the naked eye

And the next step has already been taken: HA has invested in a comprehensive series of fully instrumented core making experiments to link the behavior of sand-binder mixture to the virtual system. The latest AI technologies have been used to establish a robust predictive capability between the state of the sand system at different machine settings and the final core quality. "We can now identify core defects that are not visible to the naked eye, but cause problems further down the process chain", explains Amine Serghini, member of the HA management team.

"Deformation during core storage, core breakage during casting as well as casting defects are often not only caused by the binder itself, but also by parameters such as the storage time of the sand-binder mixture. A fresh sand mix flows better, has better compactability and ensures less tool deterioration and vent clogging". The virtual core shooter is used to predict whether a sand mix can still be used without causing downstream problems or how the production can be set to maintain good core quality.

With machine learning tools quantitative correlations between the behavior of the sand mixture, the process condition in the machine and core quality was established.

空气的压力和流量。因此，对射砂工艺进行调整，可以影响和控制型芯的质量，并解决以下问题：砂子进入工作区域的高度对射砂工艺的影响是什么？通风口堵塞或芯盒腔内清洁度会对生产产生哪些影响？在什么压力条件下，完成射砂进入芯盒的过程？生产过程如何稳定进行，以及如果不满足设定的质量要求，需要更改哪些参数？

模拟流程与型芯实际生产相结合

"通过这个专利新工具的辅助，我们已经能够将模拟的工艺和实际的型芯生产结合起来。通过将砂 - 粘结剂混合物的特性与射芯机和这一新工具进行整合，我们可以模拟整个生产过程。通过这种方式，我们确保生产出来的型芯质量可靠。" 迈格玛公司的型芯制造工艺产品经理 Ingo Wagner 博士说。"由于计算所需时间较短，我们甚至有可能将模拟集成到机器的实时操作中。我们还将这项技术作为前端预测器应用到迈格玛 C+M，也就是我们的型芯制造过程模拟软件中。"

数字化的重要组成部分

兰佩的执行总裁鲁 Rudolf Wintgens 总结认为："我们的数字驾驶舱软件套件和型芯视觉实时检查系统正在有力支持数字化计划。目前我们可以在过程数据、机器控制和最终型芯之间建立联系，通过这种办法，使得我们的解决方案实现了产品质量控制，与之前其他无法实现品控的铸造工业 4.0 方案区分开来。"

检测肉眼看不到的型芯缺陷

接下来的步骤已经获得实现：欧区爱公司已经全面投资了一系列全仪器型芯制作实验，将砂粘结剂混合物的加工过程与虚拟系统联系起来。最新的人工智能技术已用于，在不同机器设置下的砂系统状态和最终型芯质量之间，建立一个强大的预测能力。"我们现在可以识别出肉眼观察不出来的型芯缺陷，但会导致过程链效率变低。" 欧区爱管理团队阿 Amine Serghini 解释说。

型芯存过程中的变形、浇注过程中的型芯断裂以及铸造缺陷往往不仅是由粘结剂本身造成的，还由砂 - 粘结剂混合物的储存时间等参数造成的。新砂流动性更好，有更好的可压实性，确保更少的铸型缺陷和排气堵塞。" 虚拟型芯模拟器可用于预测是否仍然可以使用砂混合物，在不造成生产链下游问题的情况下，如何设置生产过程以保持良好的型芯质量。

利用机器学习工具在混砂行为之间的定量相关性，建立了机器的过程条件和型芯质量。

Prediction by means of virtual core shooter

The empirical data behind the direct simulations have been collected during tests at the HA Center of Competence (CoC) in Baddeckenstedt, Germany, on a state-of-the-art Laempe core shooter used there. This data allows important influencing parameters and their effects on the casting process to be accurately modelled in the machine and tooling. The CoC is equipped with a wide range of technical capabilities and provides a valuable platform for partners from different disciplines to systematically drive innovation in joint development projects.

Real-time and data-based core production control

The technical implementation of a real-time, physical and data-based core production control system has become reality thanks to the partnership between MAGMA, HA and Laempe and represents a revolutionary step towards Foundry 4.0. This approach opens a world of new possibilities for all three partners as they strive to provide their customers with intelligent solutions for optimized and robust core production at all times. ■

通过虚拟型芯模拟器进行预测

这些直接模拟背后的经验数据，是在德国 Baddeckenstedt 的欧区爱产品中心 (CoC) 对该中心使用的最先进的兰佩核心砂芯制造设备进行测试时收集的。这些数据把重要的影响参数及其对铸造过程产生影响，在机器和工具中准确进行了建模。CoC 中心具备全面先进的技术能力，为来自不同学科的合作伙伴提供了一个宝贵的平台，系统化推动联合开发项目中的不断创新。

实时和基于数据的型芯生产控制

基于迈格玛，欧区爱和兰佩之间的伙伴关系，实时、物理和基于数据的型芯生产控制系统的技术应用已获得实现，这是向铸造 4.0 革命性的进步。这种方法为三个合作伙伴拓展了新的可能性，帮助致力为客户提供智能优化和功能强大的型芯生产解决方案。■

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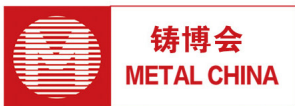


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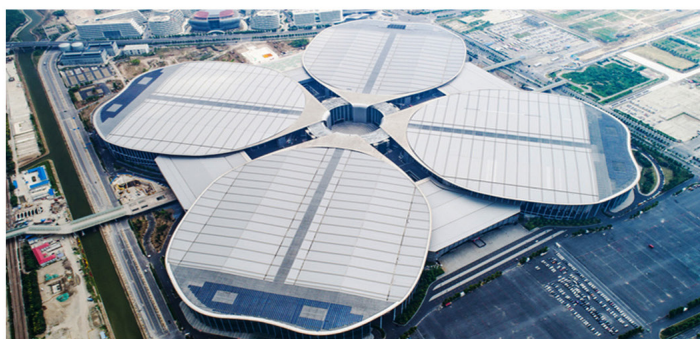
会议咨询：刘琼 18911227977

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第二十二届中国国际铸造博览会
The 22nd China International Foundry Expo (Metal China)
第十七届中国国际压铸工业展览会
The 17th China International Die Casting Industry Exhibition
第十七届国际有色及特种铸造展览会
The 17th International Nonferrous and Special Casting Exhibition



中国铸造协会展会微信平台

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