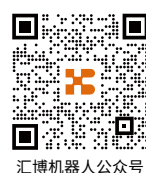汇博机器人
HUIBO ROBOTICS

敞篷火车车厢余料清扫解决方案
Open-top Train Carriage Residual Coal Cleaning Solution

车厢智能清扫机器人
Product Introduction of Intelligent Carriage Cleaning Robot

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HUIBO ROBOTICS

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汇博机器人
HUIBO ROBOTICS

科技向善
TECHNOLOGY FOR GOOD

求真务实
SEEKING TRUTH

包容开放
INCLUSIVITY AND OPENNESS

开拓创新
PIONEERING INNOVATION

目录

关于我们

—

ABOUT US

➤ 公司介绍Company Profile

广东汇博机器人技术有限公司是汇博机器人集团工业板块全资子公司，是中国若干细分行业领先的智能制造技术和装备供应商。建有国家级博士后科研工作站，在全国设有一个研究院、两个制造基地、多家子公司及服务中心，形成了覆盖全国的营销、技术与服务网络。

公司专注于智能制造领域，以技术创新为引领，以场景应用为驱动，为客户量身打造智能仓储物流、智能产线、光伏电站智能运维、火车车厢余料清扫、数字孪生等整体解决方案，提供方案规划、系统集成、装备研发生产、软件开发、电气控制、安装调试、培训及售后的一站式全流程服务，赋能机械制造、仓储物流、半导体、新能源、通信光缆等行业的数字化转型与智能化升级。

Guangdong Huibo Robotics Technology Co., Ltd., a wholly-owned subsidiary of Huibo Robotics Group, is a leading supplier of intelligent manufacturing technology and equipment in China. With a national-level postdoctoral research station and a comprehensive network of research, manufacturing, and service centers, the company specializes in providing customized solutions for intelligent warehousing, photovoltaics, robotics, train residential cleaning, and digital twins. Its one-stop service covers planning, integration, R&D of equipment, software development, electrical control, installation, training, and after-sales support, empowering industries' digital transformation and intelligent upgrading.

公司共荣获 106 项企业荣誉资质

The company has received a total of 106 corporate honors and qualifications

荣获国家级发明专利 43 项

43 national-level invention patents

实用新型专利 193 项

193 utility model patents

荣获 30 余项政府及社会单位荣誉称号

over 30 government and social organization honor titles

荣誉资质
HONORARY QUALIFICATION

国家级高新技术企业
国家专精特新"小巨人"企业
国家创新人才推进计划"先进机器人技术"重点领域创新团队（全国唯一）

National High-tech Enterprise

National Specialized and Innovative "Little Giant" Enterprise Honor

National Innovation Talent Promotion Plan's "Advanced Robotics Technology" Key Area Innovation Team (The only one nationwide)

**连续入围工信部
"中国机器人 TOP10"标杆企业**

Consistently listed among the Ministry of Industry and Information Technology's "China's Top 10 Robotics" benchmark enterprises

发展历史
DEVELOPMENT HISTORY

启程初创 `2001 - 2008` **STARTUP**

2001　汇博前身哈尔滨工业大学博实精密测控有限责任公司成立，致力于运动控制、精密定位和精密测量领域产品的开发

Huibo Robotics, formerly known as Harbin Institute of Technology Bo Shi Precision Measurement and Control Co., Ltd., is dedicated to the development of products in the fields of motion control, precision positioning, and precision measurement.

汇博成立 `2009 - 2010` **ESTABLISHMENT OF HUIBO**

2009　初创团队南迁苏州
苏州博实机器人技术有限公司在苏州成立
重点布局高等院校教学仪器集成开发

The startup team relocated to Suzhou and established Suzhou Bo Shi Robot Technology Co., Ltd., with a primary focus on the integration and development of teaching instruments for higher education institutions.

2010　荣获"江苏省创新团队"称号

Honored with the title of "Innovation Team of Jiangsu Province."

进军工业 `2011 - 2014` **ADVANCING INTO INDUSTRY**

2011　重点布局工业制造领域，深耕陶瓷卫浴等细分领域智能制造升级

Focusing on industrial manufacturing, with a special emphasis on the intelligent upgrade of subsectors such as ceramic sanitary ware.

2013　广东汇博机器人技术有限公司在佛山正式成立

Guangdong Huibo Robot Technology Co., Ltd. is officially established in Foshan.

2014　荣获"国家重点领域创新团队"称号

Holds the title of "National Key Area Innovation Team."

**初步产教融合
布局国际工业版图** `2015 - 2017` **INITIAL INTEGRATION OF INDUSTRY AND EDUCATION
EXPANDING INTO THE INTERNATIONAL INDUSTRIAL LANDSCAPE**

2015　正式更名为"汇博机器人"
开始承办国家职业教育技能大赛

Officially renamed as "Huibo Robotics,"the company started hosting the National Vocational Education Skills Competition.

2016　被工信部授予
"中国机器人综合实力 TOP10"
"江苏省研究生工作站"

Honored by the Ministry of Industry and Information Technology with "China Robot Comprehensive Strength TOP 10" and recognized as a "Graduate Workstation of Jiangsu Province."

获评"中国专利优秀奖"

"China Patent Excellence Award"

获评"智能制造综合标准化与新模式应用示范项目"

"Comprehensive Standardization and New Model Application Demonstration Project for Smart Manufacturing."

Tianjin Innovation Base established, marked an expansion into advanced manufacturing applications such as intelligent service robots.

2017　天津创新基地成立，向智能服务机器人等先进制造应用领域拓展

In the industrial sector, the company expanded its presence to countries including Vietnam, Malaysia, Bangladesh, Indonesia, Thailand, Madagascar, Niger, and the Democratic Republic of the Congo.

2018　工业板块布局越南、马来西亚、孟加拉、印尼、泰国、马达加斯加、尼日尔、刚果（金）等国

DEEP INTEGRATION OF INDUSTRY AND EDUCATION LAYOUT IN THE FIELD OF INTERNATIONALIZED INDUSTRY-EDUCATION INTEGRATION `2018 - 2023` **深度产教融合
布局国际化产教融合领域**

Huibo Institute was established

2018　汇博学院在苏州工业园区正式成立

Foshan training base established

2019　佛山培训基地建立

Awarded as "the first batch of industry-education integration pilot enterprises in Jiangsu Province", "National High-skilled Talent Training Base", "Jiangsu Province High-skilled Talent Public Training Base", "National Key R&D Plan Undertaker" and "Vocational Education School-Enterprise Cooperation Project Undertaker" "Industry-university cooperation collaborative education project support company"

被授予"江苏省首批产教融合试点企业"
"国家高技能人才培训基地"
"江苏省高技能人才公共实训基地"
"国家重点研发计划承担单位"
"职业教育校企合作项目承担单位"
"产学合作协同育人项目支持单位"

Awarded as "Guangdong Province Industry-Education Integration Pilot Enterprise" and "'Little Giant' Enterprise"

2020　被授予"广东省产教融合型试点企业"
"专精特新'小巨人'企业"

Awarded as "National Innovation Award" and "Jiangsu Province Science and Technology Progress Award"

获评"全国创新争先奖""江苏省科技进步奖"

Awarded as "China's Top Ten Scientific and Technological Progress in Intelligent Manufacturing" and "National Hidden Champion of Nanhai Manufacturing Industry"

2022　获评"中国智能制造十大科技进展"
"南海制造业全国隐形冠军"

Awarded as "National Postdoctoral Research Workstation"

2023　被授予"国家博士后科研工作站"

Awarded as "First Prize of Guangdong Machinery Industry Science and Technology Award"

获评"广东省机械工业科学技术一等奖"

Taking the lead in establishing the "National Robot and Intelligent Equipment Industry Industry-Education Integration Community"

牵头成立"全国机器人与智能装备行业产教融合共同体"

Taking the lead in establishing the "National 'Robot +' International Industry-Education Integration Community"

牵头成立"全国'机器人+'国际化产教融合共同体"

Huibo Robot Thailand Institute of Technology "Digital Workshop" intelligent manufacturing training base was launched

汇博机器人泰国理工大学"数智工坊"智能制造实训基地挂牌启动

让科技学以"智"用

HUIBO ROBOTICS

敞篷火车车厢余料清扫解决方案

Open-top Train Carriage Residual Coal Cleaning Solution

门式结构

半门式结构

桥式结构

方案介绍

SOLUTION INTRODUCTION

在能源领域，汇博机器人直击行业痛点，推出敞篷火车车厢余料清扫智能解决方案，可实现翻车机、螺旋卸车机、天车卸车后车厢内湿粘煤、板结煤（轻微）等余料的智能清扫，适用于钢厂、火电厂、选煤厂、冶金、港口、化工等领域，打造工业机器人在能源领域的典型应用场景，推进智能制造示范工厂建设。

Huibo Robotics addresses industry challenges by introducing an intelligent cleaning solution for open-top train carriages residual coal. The solution enables the automated cleaning of residual coal such as wet sticky coal and lightly compacted coal left in carriages after unloading by dumpers, screw unloaders, and overhead cranes. It is suitable for use in steel plants, thermal power plants, coal preparation plants, metallurgic plant, ports, and chemical industries. The solution exemplifies the application of industrial robots in the energy industry and promotes the development of smart manufacturing demonstration factories.

方案价值
VALUE OF SOLUTION

节省成本
Cost Savings
节省人力投入及提升物料回收率
Reduces labor costs and improves material recovery rates

优化管理
Optimal Management
人员投入减少，降低人员管理难度
Decreases personnel requirements, reducing the complexity of workforce management.

更加安全
More Safe
无人化作业降低人身安全事故风险
Unmanned operations lower the risk of personal safety incidents

符合政策
Policy Compliance
国家深化重点领域"机器人+"应用
The state will deepen the application of "robot +" in key areas

车厢智能清扫机器人

汇博车厢智能清扫机器人（简称"清车机器人"）是全国首台敞篷火车车厢余料清扫智能设备，集清扫、收集、回收等功能于一体，具有多项核心专利技术，可实现"一键启动"，自动完成敞车车厢内底部、车厢四壁及边沿的全方位清扫。清扫过程安全、环保、智能、高效。
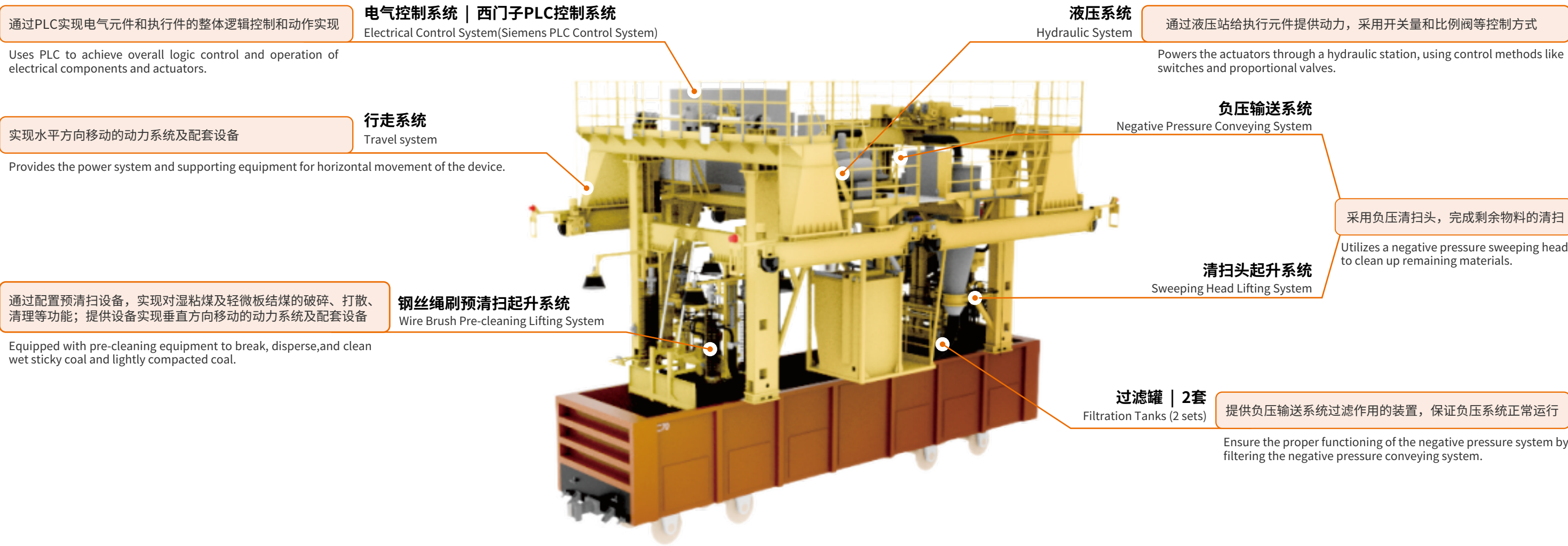
安全 Safe

环保 Environmentally

智能 Intelligent

高效 Efficient

PRODUCT INTRODUCTION OF INTELLIGENT CARRIAGE CLEANING ROBOT

The Train carriage residual coal cleaning robot is the world's first intelligent device designed for cleaning residual coal from open-top coal train carriages. It integrates sweeping, collecting, and recycling functions and features multiple core patented technologies. With "one-click start," it can automatically perform comprehensive cleaning of the bottom, walls, and edges of the carriage. The cleaning process is safe, environmentally friendly, intelligent, and efficient.

通过PLC实现电气元件和执行件的整体逻辑控制和动作实现

电气控制系统 ｜ 西门子PLC控制系统
Electrical Control System(Siemens PLC Control System)

Uses PLC to achieve overall logic control and operation of electrical components and actuators.

实现水平方向移动的动力系统及配套设备

行走系统
Travel system

Provides the power system and supporting equipment for horizontal movement of the device.

通过配置预清扫设备，实现对湿粘煤及轻微板结煤的破碎、打散、清理等功能；提供设备实现垂直方向移动的动力系统及配套设备

钢丝绳刷预清扫起升系统
Wire Brush Pre-cleaning Lifting System

Equipped with pre-cleaning equipment to break, disperse,and clean wet sticky coal and lightly compacted coal.

液压系统
Hydraulic System

通过液压站给执行元件提供动力，采用开关量和比例阀等控制方式

Powers the actuators through a hydraulic station, using control methods like switches and proportional valves.

负压输送系统
Negative Pressure Conveying System

采用负压清扫头，完成剩余物料的清扫

Utilizes a negative pressure sweeping head to clean up remaining materials.

清扫头起升系统
Sweeping Head Lifting System

过滤罐 ｜ 2套
Filtration Tanks (2 sets)

提供负压输送系统过滤作用的装置，保证负压系统正常运行

Ensure the proper functioning of the negative pressure system by filtering the negative pressure conveying system.

行业现状及痛点
INDUSTRY STATUS AND PAIN POINTS

车厢清洁现状

我国火车散装物料卸车设备有翻车机、水平螺旋卸车机、链斗式卸车机、天车卸车机、挖机卸车等，这些卸车设备卸车后车厢仍残留大量物料；来装车站的敞篷火车车厢内存在一些杂物，例如稻草、编织袋、球团、煤等，为了保障装车物料的品质，同样需要进行清车，现阶段国内普遍采用的是打开车厢侧门，人工爬上车厢清扫的方式。

Current State of Train Carriage Cleaning

The unloading equipment for bulk materials on trains in China includes car dumpers, horizontal screw unloaders, chain bucket unloaders, overhead crane unloaders, and excavator unloaders. However, after unloading, a significant amount of material still remains in the carriages. The open-top train carriages arriving at loading stations often contain sundries such as straw, woven bags, pellets, coal, and more. To ensure the quality of loaded materials, it is necessary to clean the carriages as well. Currently, the common practice in China is to open the side doors of the carriages and manually climb on board to clean them.

车厢清洁场景
Current State of Train Carriage Cleaning

余煤（干煤） Dry Coal

余煤（湿粘煤） Wet Sticky Coal

余煤（冻煤） Frozen Coal

行业现状及痛点
Industry Status and Pain Points

湿粘/板结煤清车效率低
Low Efficiency in Cleaning Wet Sticky/Compacted Coal

清理时间长、工作效率低
Long Cleaning Time, Low Efficiency

人工成本高
High Labor Costs

日益上升的用工成本
Increasing Labor Cost

"3D岗位"招工难
Difficulty in Hiring for "3D" Jobs(Dirty、 Difficult、 Dangerous)

工作环境差、劳动强度大、安全隐患多
Dirty working environment, high labor intensity,numerous
safety hazards

铁路火车延期占用费高
High Railway carriage Delay Fees

铁路延时出车，延时费用高
Delays in train dispatching and extended use of
railwaycarriages result in high penalty fees.

产品优势
PRODUCT ADVANTAGES

激光传感器 ＋ 超声传感器

车厢位置

目 安全 Safety 01
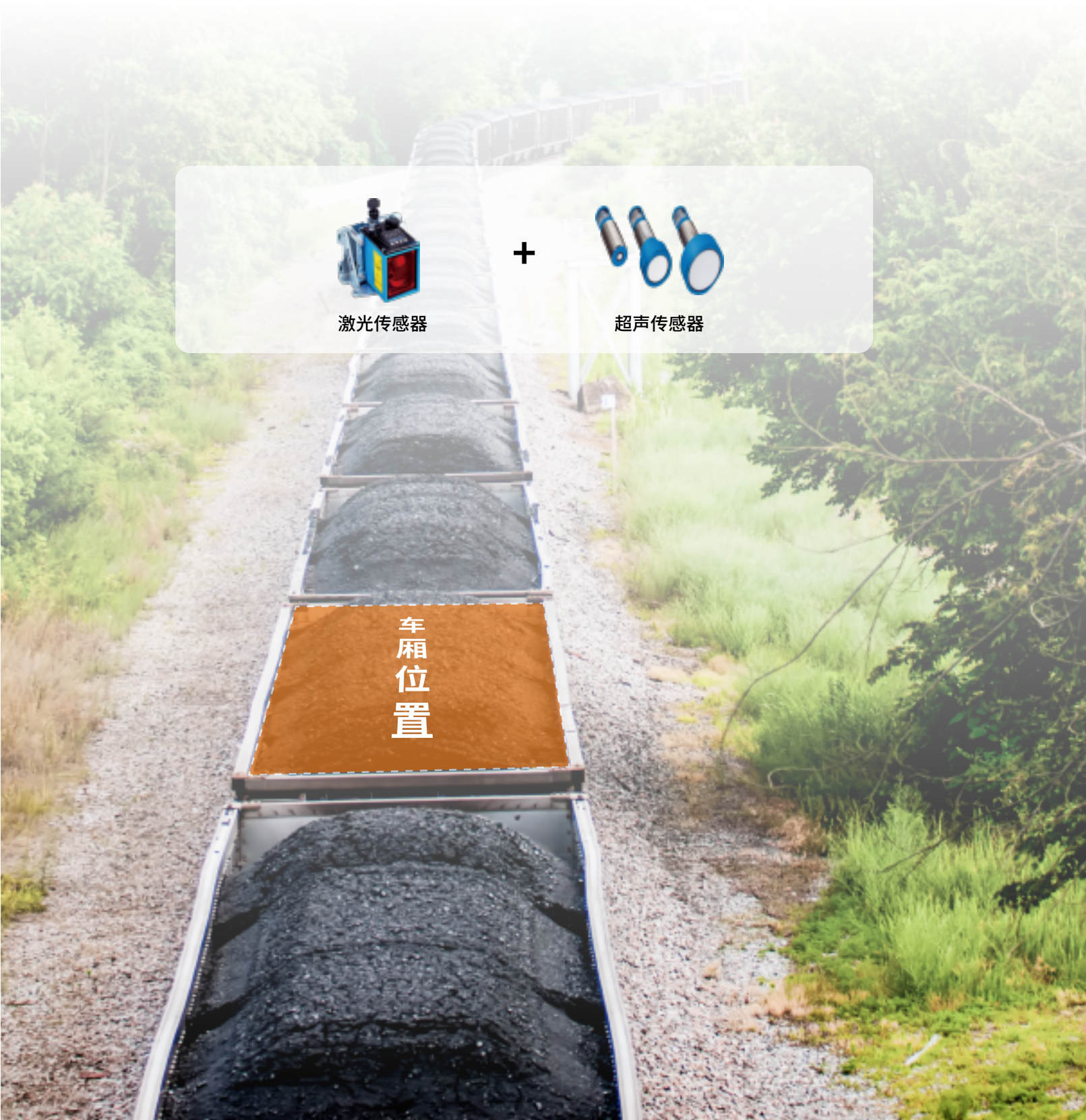
智能无人化操作 Intelligent Unmanned Operation

车厢位置自识别
Carriage Position Self-recognition

远距离激光测距传感器配合近距离超声传感器，实现对车厢轮廓的精确识别定位。

Long-distance laser range sensors is used to combine with short-distance ultrasonic sensors to accurately identify and locate the carriage outline.

自主平滑运动控制
Autonomous Smooth Motion Control

结合Adaptive control算法，通过PLC控制变频器实现清扫机加减速控制，借助变频器自带斜坡发生器，实现加减速控制过程的平顺性。

Utilizes adaptive control algorithms combined with PLC to control the frequency converter, achieving smooth acceleration and deceleration of the cleaning machine.

清扫效果自存储
Self-storing Cleaning Results

借助多视觉系统，实现车厢清扫结果的自拍照、自存储和自回传。

Employs a multi-vision system to capture, store, and transmit the cleaning results of the carriage.

运行更安全 Safer Operation

多传感器融合碰撞检测 Multi-sensor Fusion Collision Detection

配置多传感器感知系统(激光、超声)，避免清车机器人与车厢发生碰撞。

Equipped with a multi-sensor perception system laser,ultrasonic,difuse refection,travel switch,proximity switch) to prevent he cleaningrobot from coliding with the camiage.

作业互锁软件 Operational Interlock Software

配置软件作业互锁通讯模块，避免清车机器人与翻车机同时动作造成的车厢碰撞。

Includes a software interlock communication module to prevent simultaneous actions of the cleaning robot and the dumper, avoiding carriage collisions.

多急停配置 Multiple Emergency Stop Configurations

在PLC控制柜、电源控制柜、驾驶室、车体钢结构、中控室分别安装了急停按键，保证设备在出现异常的第一时间被终止运行。

Emergency stop buttons are installed in the PLC control cabinet, power control cabinet, driver's cabin, vehicle steel structure, and central control room to ensure the equipment can be immediately halted in case of anomalies.

无死角监控 No Blind Spot Monitoring

车厢内以及清车机器人运动范围内，进行全方位监控，及时发现潜在风险。

Comprehensive monitoring inside the carriage and within the movement range of the cleaning robot to promptly detect potential risks.

目|环保 02

设备采用密封负压输送过滤技术，余料回收过程无扬尘，0.3um以上粉尘过滤99.33%，达到超低排标准。

清扫更干净

自动物料聚拢结构设计配合大功率负压风机和纸质滤芯，清扫更干净更环保。

01 物料聚拢
锥形盘刷布局设计物料自动聚拢
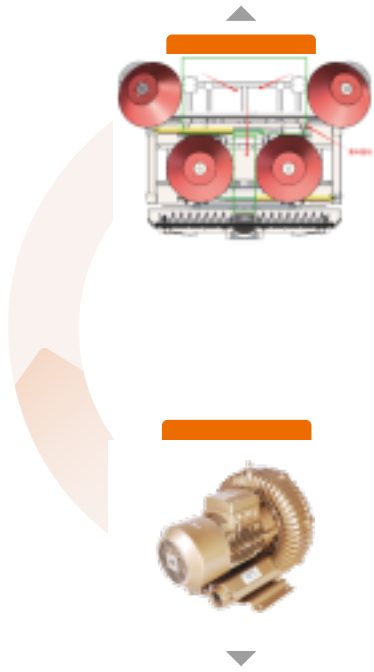
02 复合钢刷
钢丝+尼龙材质更耐磨、接触力大，清扫更干净
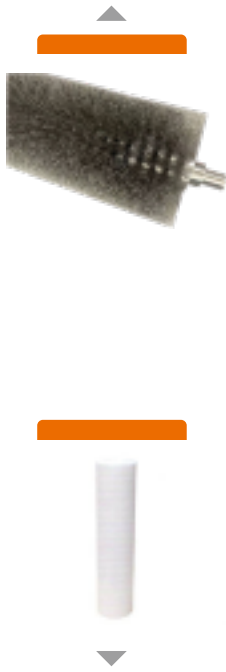
03 大吸力
大功率负压泵、吸料更强劲

04 环保
多折痕式滤芯，作业过程无粉尘更环保

目|Environmental Benefits 02

The device uses a sealed negative pressure conveying filtration technology, ensuring no dust during the residual material recovery process. It captures over 99.33% of dust particles larger than 0.3 microns, meeting ultra-low emission standards.

Cleaner Sweeping

The automatic material gathering structure design, combined with a high-power Roots blower and paper filter, ensures cleaner and more environmentally friendly sweeping.

01 Material Collection
The conical disc brush layout design automatically gathers materials.
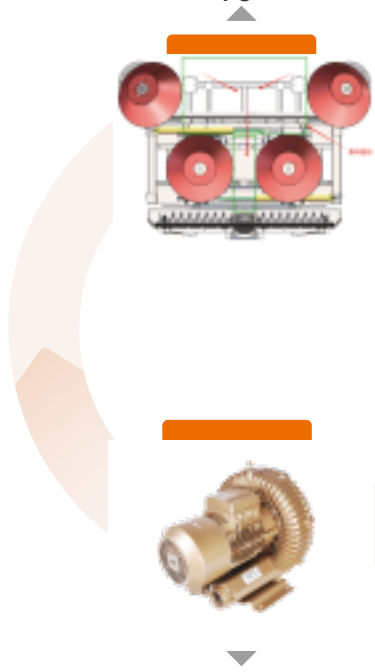
02 Steel Brush
Steel brushes are more wear-resistant, have greater contact force, and provide a cleaner sweep.
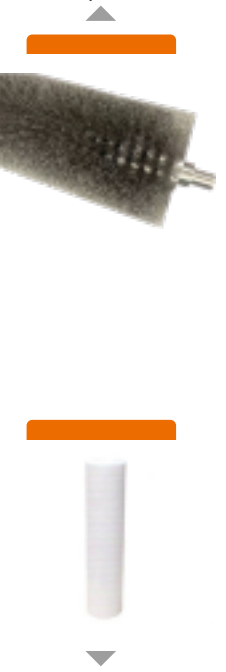
03 High Suction Power
High-power negative pressure pumps provide stronger material suction.

04 Environmentally Friendly
The bag filter ensures a dust-free operation process, making it more environmentally friendly.

目I智能 03

产品采用全电控液压技术，结合焦煤湿粘程度，动态调整动力输出，消除清扫过程中变速冲击，在保证清扫效果的同时，不伤害车厢。

车厢清扫无死角

包围式柱刷、平铺式盘刷保证机器人清扫机构能够更全面地接触到车厢各个角落。

2	2个柱刷	车厢壁全面清洁
4	4个盘刷	车厢底全面清洁
2	2个刮板	车厢边沿全面清洁
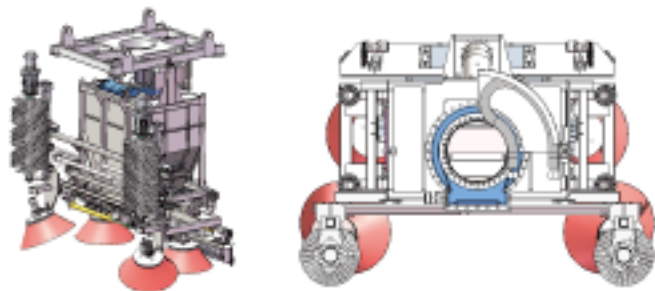
使用更省心

👍 不堵料连续作业

普通吸料管　　汇博吸料管

目I Intelligence 03

The product uses full electro-hydraulic control technology, dynamically adjusting power output based on the stickiness of the coking coal. This eliminates speed fluctuation impacts during cleaning, ensuring effective cleaning without damaging the carriage.

No Blind Spots in Carriage Cleaning

The surrounding column brushes and flat disc brushes ensure the robot's cleaning mechanism can thoroughly reach all corners of the carriage.

2	**2 Column Brushes** For comprehensive cleaning of the carriage walls.
4	**4 Disc Brushes** For thorough cleaning of the carriage floor.
2	**2 Scrapers** For complete cleaning of the carriage top.
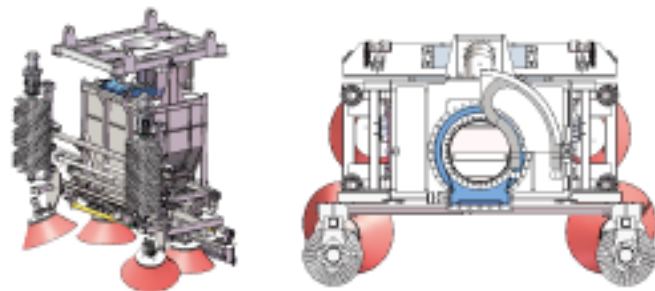
Ease of Use

👍 prevent blockages and allow continuous operation.

Standard Suction Pipe　　Huibo Suction Pipe

自清洁管道设计

自主知识产权的自清洁管道，能够更好地应对湿煤、黏煤。

湿粘散状物料在管道内运输过程中极易粘附在管道壁，造成管路堵塞，
影响物料输送效率和作业质量，严重者无法工作。
管道自洁技术，可实现管道自清洁、管道无堵塞，确保作业过程的流畅性。

湿粘散状物料气力输送管道自洁技术

多物料属性条件下的多参数最优匹配技术

安全、可靠、稳定的软硬件保护技术

核心技术

刷盘状态（刷盘角度、刷盘转速、刷盘预变形适应煤、块矿、铁精粉、球团等物料）、刷盘分布、负压参数、行进速度等参数严重影响清扫作业的作业效率和作业效果，加之物料种类和物料物理属性的多样性。采用多参数最优匹配技术，实现设备参数最优匹配，适应多种物料属性，确保作业效果的一致性。

铁路部门对外物介入车厢有严格要求（严禁设备搭、压车厢，严禁强电进入车厢，严禁设备与车厢发生碰撞），既要保证作业效果，又要满足相关要求。采用合理的硬件平台，并借助软件功能，实现车厢的冗余防护，有效降低和避免事故发生的概率。

Self-cleaning Pipeline Design

The proprietary self-cleaning pipeline design effectively handles wet and sticky coal, ensuring the system remains clog-free and operational.

Wet sticky bulk materials tend to adhere to the inner walls of pipelines during transportation, causing blockages that affect conveying efficiency and operational quality, potentially leading to a complete halt in operations. This self-cleaning technology ensures the pipeline remains clean and free of blockages, guaranteeing smooth operations.

Self-cleaning Technology for Pneumatic Conveying Pipelines with Wet Sticky Bulk Materials

Core Technologies
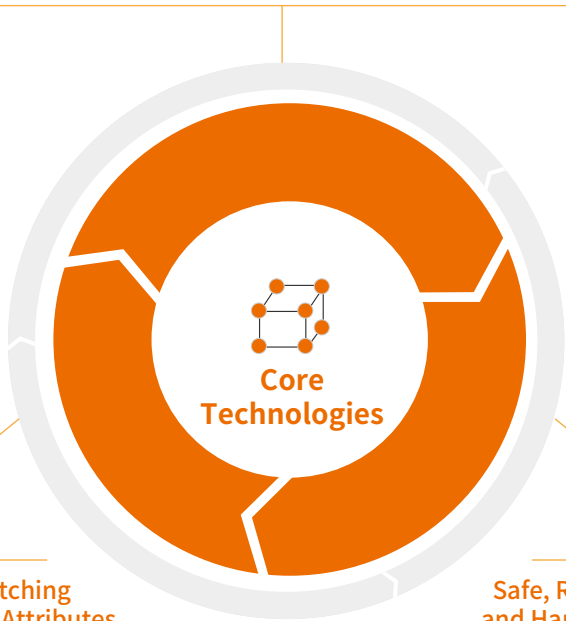
Multi-parameter Optimal Matching Technology for Various Material Attributes

The efficiency and effectiveness of the cleaning process are significantly affected by several parameters, including brush disc state (angle, rotation speed, pre-deformation suitable for materials like coal, lump ore, iron concentrate, pellets), brush disc distribution, negative pressure parameters, and travel speed. The diversity of material types and their physical properties further complicates this. By optimally matching equipment parameters to various material attributes, this technology ensures consistent and effective cleaning performance.

Safe, Reliable, and Stable Software and Hardware Protection Technology

The railway department has strict requirements for external equipment interfacing with train carriages (no equipment should mount or press on the carriage, no high-voltage electricity should enter the carriage, and no equipment should collide with the carriage). This technology ensures operational effectiveness while meeting these stringent requirements. By using an appropriate hardware platform and leveraging software capabilities, it provides redundant protection for the carriages, significantly reducing and preventing the likelihood of accidents.

目 高效 04

产品可实现联动作业，视余料量在3~5分钟内完成车厢清扫，可替代3~6名工人，助力企业机械化代替人工，自动化助推新旧动能转换，实现减员增效。

多车联动

为匹配多台翻车机作业节拍，通过多设备互锁及联动策略算法，实现多台清车机器人同时对多个车厢进行清洁。

清扫更高效

结合集中控制算法，实现运动系统与清扫系统的完美匹配，清洁完每节车厢只需要3-5分钟，车厢余料可控制在10公斤以内。

3 3分钟　　**10** 10公斤

目 Efficiency 04

The product can complete the cleaning of a carriage within 3 to 5 minutes depending on the amount of residual material. This high-efficiency cleaning can replace 3 to 6 workers, helping enterprises transition from manual labor to mechanization and automation, thereby reducing workforce and increasing efficiency.

Multi-car Coordination

To synchronize with the operational pace of multiple dumpers, the system uses multi-device interlock and coordination strategy algorithms, enabling multiple cleaning robots to clean several carriages simultaneously.

More Efficiency

Combining centralized control algorithms, the movement system and cleaning system are perfectly matched, allowing each train carriage to be cleaned in just 3-5 minutes, with residual material controlled to within 10 kilograms.

3 3mins　　**10** 10kgs

技术参数

	清理物料种类	干煤、湿粘煤（褐煤、烟煤[焦煤/肥煤]）
	敞车车厢类型	国铁常见敞车型号 （C60、C62、C64、C70、C70E、C70EH、C70EH-A）
	清车范围	能清理车厢内底部、车厢四壁及边沿的余料
	清车能力	日清理200节车厢以上
	清车效率	每节车厢3~5分钟（湿粘煤视余料量） 清扫效果优于人工
	高度&重量	≤9m & 30t
	连续作业时间	24小时连续作业
	自动化水平	配置视频监控系统、一键启动自动清扫
	安全性能	具备自动防护警示功能 设备同翻车机建立安全互锁机制
	故障平均修复时间	≤80min
	电源&功率	AC 380V & 250kw

TECHNICAL PARAMETERS

	Types of Materials Cleaned	Dry Coal、Wet Sticky Coal (Lignite, Bituminous Coal [Coking Coal/Fat Coal])
	Types of Open-top Carriages	Common China Railway Open-top Carriage Models （C60、C62、C64、C70、C70E、C70EH、C70EH-A）
	Cleaning Range	Capable of cleaning residual materials from the top, walls, and bottom of the carriage
	Cleaning Capacity	Can clean over 200 carriages per day
	Cleaning Efficiency	Each carriage can be cleaned in 3-5 minutes (depending on the amount of residual wet sticky coal) with cleaning results superior to manual labor
	Height & Weight	≤9m & 30t
	Continuous Operation Time	Capable of 24-hour continuous operation
	Automation Level	Equipped with a video monitoring system and one-click automatic cleaning for each carriage
	Safety Features	The equipment has automatic protection and warning functions and it establishes a safety interlock mechanism with the dumper
	Mean Time to Repair (MTTR)	≤80min
	Power Supply & Power Rating	AC 380V & 250kw

案例展示

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CASES

梁山港

济宁梁山港,位于山东省济宁市梁山县城北的梁济运河右岸,上通瓦日铁路,下达京杭运河,
占据了西煤东运咽喉要地,成为连接西部煤源产地和长江三角经济区的重要港口物流枢纽。

- **2019** 9月,汇博与济宁矿业集团物流有限公司正式开展智能清车机器人系统项目研发合作;

- **2020** 3月,汇博智能清车机器人系统安装调试完毕,并于4月20日正式投入使用;

  8月,济宁矿业集团物流有限公司再次购入汇博智能清车机器人,并于10月30日正式
  投入使用(可实现1名工作人员同时操控两台智能清车机器人作业);

- **2021** 7月,济宁矿业集团再次订购2台汇博智能清车机器人;

- **2022** 1月中旬,联机调试完成,实现1、2号线联动作业。

Liangshan Port

Jining Liangshan Port, located on the right bank of Liangji Canal in the north of Liangshan County, Jining City, Shandong Province, connects with Wari Railway upstream and Jinghang Canal downstream, occupying the strategic position of coal transportation from west to east, and becoming an important port logistics hub connecting the western coal producing areas and the Yangtze River Delta Economic Zone.

- **2019** In September 2019, Huibo Robotics and Jining Mining Group Logistics Co., Ltd. officially started the research and development cooperation of the Intelligent Train Cleaning Robot System;

- **2020** In March 2020, the installation and debugging of the Huibo Intelligent Train Cleaning Robots System were completed and officially put into use on April 20th;

  In August 2020, Jining Mining Group Logistics Co., Ltd. purchased anothe Huibo Intelligent Train Cleaning Robot, and officially put it into use on October 30th (which can enable one staff member to operate two Intelligent Car Cleaning Robots simultaneously);

- **2021** In July 2021, Jining Mining Group Logistics ordered two additional units, which were installed on Line 1;

- **2022** completed the online debugging of Line 1 and Line 2 in mid-January 2022, realizing the linkage operation of the two lines.

一台设备可替代3~6名工人　　　　Each device can replace 3 to 6 workers.

华晋焦煤 Huajin Coking Coal Plant

华晋焦煤有限责任公司是由原国家计委、能源部和山西省政府联合组建,国务院生产办公室批准成立。

2001年2月改组为国有股份制企业,股东为中国中煤能源集团公司和山西焦煤集团有限责任公司。公司拥有丰富的优质煤炭资源,属于国家明确规定的"两区一种"保护性开发资源。

2022年5月,华晋焦煤有限责任公司引入汇博智能清车机器人系统。

Huajin Coking Coal Co., Ltd. was jointly established by the former State Planning Commission, Ministry of Energy, and the Shanxi Provincial Government, and approved by the State Council's Production Office.

In February 2001, it was restructured into a state-owned joint-stock enterprise with shareholders including China National Coal Energy Group Corporation and Shanxi Coking Coal Group Co., Ltd. The company has rich and high-quality coal resources, which belong to the "two areas and one kind" protective development resources clearly specified by the state.

In May 2022, Huajin Coking Coal Co., Ltd. introduced the Huibo Intelligent Car Cleaning Robot System.

汇博智能清车机器人系统为华晋焦煤公司减员清车工人4-5名,助力企业实现机械减人、自动化换人目标。

每年为企业节约人力成本过百万元,为企业大大节约时间成本,提高工作效率,提升企业产能。

The system has helped the company reduce 4-5 car cleaning workers, and helped the enterprise achieve the goal of mechanical reduction and automation substitution.

It saves more than one million yuan in labor costs for the enterprise every year, greatly saves time costs, improves work efficiency, and enhances enterprise production capacity.

宝武中南钢铁项目 Baowu Central-South Steel Project

广东中南钢铁股份有限公司(2022年10月22日由韶钢松山更名,以下简称"中南股份")是宝武集团中南钢铁有限公司控股子公司,具备800万吨钢产量生产规模,在岗员工5458人。2022年产钢802.4万吨,实现营业收入388亿元,位列《财富》中国500强第274位。

中南股份积极推进智慧工厂建设,行业首创的"钢铁智慧中心",实现了钢铁生产全流程的大规模集控、无边界协同和大数据决策,通过技术创新推动了组织变革,变经验生产为标准化、数字化、智能化生产。

Zhongnan Steel Co., Ltd. (renamed from Shaogang Songshan on October 22, 2022, hereinafter referred to as "Zhongnan Steel"), a holding subsidiary of Baowu Steel Group Zhongnan Iron & Steel Co., Ltd., has a production capacity of 8 million tons of steel and 5,458 employees on the job. In 2022, it produced 8.024 million tons of steel, generating revenue of 38.8 billion yuan, ranking 274th on the Fortune China 500 list.

Zhongnan Steel actively promotes the construction of smart factories, and its industry-first "Smart Steel Center" has achieved large-scale centralized control, borderless collaboration, and big data decision-making throughout the steel production process. Through technological innovation, it has driven organizational change, transforming empirical production into standardized, digital, and intelligent production.

一台设备可替代3~6名工人 Each device can replace 3 to 6 workers.

2023年7月,中南股份为消除"3D岗位",在原有卸车线的轨道基础上,引入汇博智能清车机器人系统,应用于2号卸车线清车。

产品应用后原班组6人减少至3人,助力企业机械化代替人工,自动化助推新旧动能转换,真正实现安全环保、减人增效。

In July 2023, Zhongnan Steel Co., Ltd.introduced the Huibo Intelligent Vehicle Cleaning Robot System on the basis of the original unloading line track to eliminate "3D positions" and apply it to car cleaning on the No. 2 unloading line.

After the application of the product, the number of original team members has been reduced from 6 to 3, helping the enterprise replace manual labor with machinery, and promoting the conversion of old and new kinetic energy through automation, truly achieving safe environmental protection, personnel reduction, and efficiency improvement.

合作企业

Partner enterprises