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以绿色转型赋能高质量发展





【封面故事】以绿色转型赋能高质量发展 【行业观察】还在烦恼抢车位?智慧停车了解下 【社会责任】大山里的小艺术家 【海外故事】"海外人才中心"巧解卸船"难题"



《大展宏"兔"》作者:阮婵娟



《洁净美丽》作者:彭清甫

Foreword 卷首语

拥抱双碳时代主旋"绿"

文 / **薛韦**慧

绿色映底蕴,山水见初心。

应对气候变化, 掀起一场全球性的绿色低碳革命 已成为时代趋势。2020年9月,中国正式向世界承 诺, 力争 2030 年前二氧化碳排放达到峰值, 努力争 取 2060 年前实现碳中和目标。

牵一发而动全身。"双碳"目标如一根指挥棒, 重塑着中国未来的经济格局。驱动新旧能源结构转换, 可再生能源代替化石能源已成为大势所趋; 引领传统 产业转型升级,改变"高能耗、高污染"的产业结构, 在电力、交通等行业引入低碳排放技术和新能源供给 体系是当务之急; 倡导绿色低碳生活, 加快构建绿色 消费政策体系是题中之义。这些改变,既给我国带了 挑战,也带来了机遇。

制造业是国民经济的主体,是立国之本、强国之

基。作为制造业大国,如何推动传统制造业积极融入 "双碳"发展战略, 向高端化、智能化、绿色化发展, 是当下的重要课题。这不仅是未来推进新型工业化的 重要任务,也是实现中国式现代化的有力支撑。今年 1月11日召开的全国工业和信息化工作会议提出, 要实施先进制造业集群发展专项行动,支持制造业高 端化发展: 要统筹抓好智能制造工程、制造业数字化 转型行动和中小企业数字赋能行动,出台促进装备数 字化政策措施;要加强绿色低碳技术改造,支持制造 业绿色化发展。这一系列的顶层设计,都为传统制造 业向绿色低碳转型升级提供了方向指引和保障措施。

踏遍大江大河,奔赴山川湖海。中国制造业正以 坚定的信念,拥抱双碳时代主旋"绿",以生态绿色 描绘发展底色,用责任担当践行初心使命,让"绿水 青山"颜值更高,让"金山银山"成色更足,描画出 新时代中国的锦绣山河!



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以绿色转型赋能高质量发展

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文/薛韦慧

绿色发展是永恒的主题。近年来, 国家提出"3060"碳达峰、碳中和的战 略目标,开启了重塑未来经济格局的绿 色发展"新篇章"。振华重工积极践行绿 色发展理念,持续加强绿色低碳科技创 新和产品研发、推动绿色智慧港口建设、 开发绿色能源、探索绿色智造,以绿色 转型赋能高质量发展,以实际行动贯彻 党的二十大精神。

振华重工还发布了《振华重工碳达峰 碳中和行动方案》,明确了企业绿色低碳 发展的总体要求、战略目标、重大行动 和保障措施。绿色转型的步履更加坚定, 方向也更加明确。

Cover Story 封面故事

绿色产品创新硕果累累

振华重工在港机、海工、新兴业务领域都有绿色 产品和科技创新的布局。

随着绿色港口发展提速,环保节能型港机产品的 市场需求日益增加。振华重工将绿色理念融入产品开 发的全生命周期,创新研制了 3E 级岸桥、配备太阳 能光伏电站的节能型岸桥、节能型轮胎吊、环保型散 货机械、全锂电 AGV/IGV、应用 LNG 混合动力跨运车、 港机大功率高效投光灯等产品。同时,对码头用户推 出场桥"油改电"改造业务,帮助用户改善环保绩效, 打造绿色港机产品"一揽子"方案,为生态环境的可 持续发展提供装备支撑。

2017 年,国务院发布《关于促进建筑业持续健 康发展意见》,明确提出要大力发展装配式混凝土和 钢结构建筑。振华重工发挥钢结构制造优势,成功打 造绿色装配式建筑,节能环保方面成效高于传统建筑, 符合建筑业可持续发展的战略。

振华重工自2018年4月开始对接南极建设项目, 利用自身优势在模块化移动建筑领域积极探索研究, 先后打造了极地抗风抗雪安全屋、模块化发电机房等 产品,可拆卸重复使用,为践行"绿色科考"奠定基础。

振华重工的绿色研发之路硕果累累,自主研发的 多系列海上风电安装施工平台、无焊接装配、岸桥"漆 后不动火"绑扎方案、绿色涂装体系等,均已实现产 业应用,并在相关领域引领行业发展。





绿色智慧港口与时俱进

为顺应绿色低碳港航发展新趋势,建设"资 源节约型、环境友好型"绿色智慧港口的需求与 日俱增。早在1998年,振华重工就开始着手研究 自动化集装箱码头设备。经过近二十年的技术研 发和砥砺前行,振华重工实现了厚积薄发。截至 目前,振华重工参建了厦门远海、青岛港、上海 洋山港四期等多个国内自动化码头,拉开了世界 第四代自动化码头的序幕。同时,振华重工还参 与了意大利瓦多港、阿布扎比哈里发港、印度阿 达尼等海外自动化码头的建设,自动化码头的"中 国时代"正式来临。ZPMC向世界贡献了低成本、 短周期、全智能、高效率、零排放、可复制的"中 国方案",在自动化码头领域完成从跟跑欧美到 领跑世界的嬗变。

在政策扶持和港口资源的加持下,转型成为氢 能港口正成为一股潮流。振华重工不断加大氢能产 品的研发力度,力争研发出适用于港机市场的节能 环保设备,目前,已自主研发全球首台氢燃料电池 轮胎吊、氢燃料电池跨运车。未来,振华重工将不 断创新开发以氢能作为动力能源的港口智慧能源 解决方案,将氢能的应用覆盖到AGV和IGV等更 多产品,助力绿色智慧港口建设。

绿色能源领域多点发力

近年来,我国大力开发海上风电产业,将其作为 可再生能源开发利用的重要方向之一。振华重工自 2007年起进入海上风电行业,可承建包括设计、采购、 施工等全过程在内的(EPC)总承包风机基础工程与 海上升压站基础工程,同时具备自主研发大型风电安 装船,制造、运输及安装大型风电管桩与海上升压站 的能力。十余年间,振华重工完成了多个重大海上风 电工程,施工版图辐射全国,南到广东、北到大连, 完成了三峡如东、中广核阳江、三峡大连庄河、福建 莆田南日岛、大唐滨海等一个个标志性项目,为我国 海上风电建设贡献"振华力量"。

2016年起,振华重工顺应社会经济发展潮流, 涉足光伏领域,共投资建设31个项目,总装机容量 近100兆瓦,截至2022年12月底,已累积产生绿 色电力 2.66 亿度。同时,投资运营电站数量 2200 多 个,并为客户提供光伏发电系统的评估、设计、实施、 运营等一站式解决方案。振华重工还创新研发了集装 箱式移动光伏电站,打造综合能源解决方案、配售电 示范项目、港口智慧能源解决方案等,继续提升在绿 色能源领域的影响力和品牌知名度。

此外,为减少船舶靠港期间的大气污染物排放, 振华重工于 2016 年开始提供船舶岸电业务,为多种 类型的港口及船舶提供岸电整体方案规划设计、岸 电系统机电总承包、船舶受电改造及入网等。目前, 项目已成功在上海、启东、南通、福建等多个码头 落地。

绿色"智"造彰显社会责任

《中国制造2025》明确提出,把"绿色制造工程"

作为重点实施的五大工程之一,部署全面推行绿色 危废管理等方面成效显著。振华重工还主动承担社 制造,努力构建高效、清洁、低碳、循环的绿色制 会责任,投资建设了能够覆盖厂区及周边敏感区域 造体系。"十三五"期间,振华重工开展多种多样 的六个环境空气质量监测站和一个信息化监控中 的节能减排技术改造工作,不断优化能源消费结构, 心,对挥发性有机物、颗粒物、噪声等进行实时监测。 全面推进企业高端制造、智能制造转型升级。 在智能制造领域, 振华重工引入先进的自动化 近年来,电力、天然气等清洁能源在振华重工 生产技术,对生产设备进行升级改造,打造了台车 的能源消费结构比重逐年增加,已达到总能耗的 装配线、平衡梁焊接生产线、箱梁智能生产线等一 92.8%。振华重工还高度重视节能技术改造,通 批自动化生产线。此外,建立了吊耳重磅板、横隔 过"变频电源取代柴油发电机组""空压站余热 板等机器人焊接工作站,充分发挥了其高效、环保、 回收替代柴油锅炉"等改造项目的实施,减少柴 无返修、低能耗等优点。

近年来,电力、天然气等清洁能源在振华重工 的能源消费结构比重逐年增加,已达到总能耗的 92.8%。振华重工还高度重视节能技术改造,通 过"变频电源取代柴油发电机组""空压站余热 回收替代柴油锅炉"等改造项目的实施,减少柴 油发电机组和柴油锅炉的使用,进一步降低柴油 等化石能源的消费,从而减少废气污染和噪声污 染,实现年节约标准煤1054 吨、减少二氧化碳排 放量 1634 吨。 同时,振华重工先后对厂区环保设施进行升级

同时,振华重工先后对厂区环保设施进行升级 改造,经过几年努力,在废气治理、水污染治理、

"振华 27"轮装载摩洛哥丹吉尔码头两台 3E PLUS 岸桥发运



(供图/各单位)

上海洋山四期自动化码头

www.zpmc.com

"氢装"上阵,打造"纯绿色"动力

文/薛韦慧



"看着调试成功的氢燃料跨运车, 心里激动极了,一块石头终于落了地。" 振华重工电控设计工程师李凯如是说。 一段时间以来,他和同事们的所有心 血都凝聚在这台蓝色机器上。

近年来,我国港口除了港机设备 的常规性"油改电"外,液化天然气 (LNG)、氢能、风能、太阳能等新 能源体系都在加快构建并尝试扩大应 用。振华重工在节能减排的道路上紧 跟时代步伐,积极探索绿色环保技术, 将自主研发的一过一混动跨运车换代 升级, 由原先"柴油机和锂电池"的 混合动力系统成功升级为"氢燃料电 池与锂电池"的纯绿色动力系统。

该款氡燃料跨运车是通过氡气和 空气中的氧气将化学能转化成电能进 行驱动, 整个循环只产生水和热, 不 产生任何有害物质,真正实现"零碳 排放",填补了全球跨运车在"零碳" 领域的空白。同时氢燃料电池运行非 常安静,大约55分贝的噪声,相当干 人们正常交谈的水平,大大降低了整 个港口的环境噪音。

"这次系统升级是一次全新的尝 试,没有经验可以借鉴。"作为项目 主要负责人, 邵诚佳携手团队成员开 始攻克这一技术难题。他带领大家杳阅诸多氢能源技 术资料和国内外文献,前往氢能源厂家观摩,和厂家 就氢能源特点、混动机型改造中氢气技术规程等问题 进行深入探讨,经过反复的设计和修改,完成设计初 稿。但是一项技术革新仅有理论研究是远远不够的, 实际运用才是最终目标。

电气调试的工作就是发现问题、解决问题,再 优化系统设计的过程。但是调试还没开始, 电气工 程师李凯就被难住了,基地工人不敢安装氢燃料电 池。"人们印象中氢气是易燃易爆气体,非常危险, 其实不然, 氢气密度很小, 万一发生泄露将快速挥 发, 危险系数比天然气还要低。"李凯介绍道, "跨 运车的氡燃料电池也不在密闭空间,是安装在跨运 车上部开放的平台上,并装有压力检测装置,能及 时感应到氢气泄漏。"所以,公司氢燃料跨运车的 安全性是有保障的。

经过一个多月的准备, 2021年12月初, 氢燃 料跨运车正式进行上电调试。寒风凛冽的冬日,调 试工程师们在紧张忙碌着。然而第一次调试,很快 就被叫停。

氢燃料电池发电机组启动时,瞬时输出功率远远 达不到整机所需功率,而且要花费很长时间。"好比 这边马上要用跨运车,它还在那边慢悠悠起步,太影 响效率了。"工程师姚辉解释说。根据这次调试情况, 姚辉重新计算能量需求,修改相应程序,然后再次试 验。一次试验不行,又进行了第二次、第三次,最后 连他自己都不记得程序究竟修改了多少次。在严格的

计算与反复测试下,通过合理的能量分配,调节锂电 池组和氢燃料系统功率分配输出,达到二者的能量平 衡,最终实现跨运车平稳运行。

调试过程中,移动加氢也是一个难点。目前,该 台氢燃料跨运车采用联系加氢车到基地加氢的方式, 加氢成本高。"我们调试的次数很多,能不能想办法 节约氢气的使用量?"邵诚佳问道。"可以采用充电 机充电调试方案""注意跨运车上要配备电池充电插 座",大家你一言我一语,想了不少点子。最终,通 过使用盲充模式给跨运车充电,用于恢复设备功能, 节约了每次调试中的氢气使用量。

"加氢也是用户特别关心的问题。"邵诚佳说。 氢能的运用是港口能源结构变革的重要方向,加氢站 建设也会成为港口的必要工程。而且、跨运车具备较 高的机动灵活性,比起其它港口设备,氢燃料跨运车 能自行开到码头加氢站加氢, 40 公斤的氢量只需要 10至15分钟就可以加满,加满一次能跑9至10个 小时。

经过无数次的现场调试,所有团队成员的努力 得到了回报, 氢燃料跨运车成功试车, 也吸引了相 关用户、大学科研团队等前来参观,世界权威杂志 英国《WORLDCARGONEWS》也第一时间报道了 该产品。

"振华重工正以实际行动助力国家双碳目标的实 现,打造绿色低碳港口有咱们的一份力量!"项目成 员自豪地说道。 🕺

(供图/李凯)

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长滩港的"绿色承诺"

文 / **李天意**



2022年10月15日,由振华重工参建的北美首个全自动化码 头——美国长滩集装箱码头 LBCT 迎来了全面开港一周年。从 2012 年至今,历时十年,振华重工设计建造了全部的核心设备,其中,三期设 备共包括 14 台双起升双小车自动化岸桥、69 台自动化轨道吊和 5 台 自动化铁路轨道吊。

码头"的切入点。

针对"设备能源消耗问题",项目团队提出了优化电控系统的方案, "港机设备电控系统具备'能量回馈'的功能。港机设备在'拎'集装箱 时消耗电能,但在放置集装箱时,电机处于发电状态,产生的电能可以 把能量回馈到电网中加以循环利用,从而实现节能减排。"项目电气工 程师袁奕介绍道。

实现电能的循环利用后,接下来要解决液压吊具渗漏油污的问 题。为此,项目部组织了标书研读会,在标书中用户提出了"应用全电 动型吊具"的要求。十年前,岸桥吊具市场的主流产品是液压型吊具, 液压吊具依靠液压油驱动设备运行,有泄漏油污的风险。电动型吊具 虽然拥有无油污、低能耗等优点,但当时这类产品在市场中的应用非 常少。项目设计人员热烈地讨论起来:"为了满足用户需求,将环保进 行到底,我们就当第一个'吃螃蟹'的人。"有了方向后,项目组立即着

落日时分,美国长滩港彩霞满天,置身繁忙的生产作 业区,环境如同公园般舒适,一台台岸桥向外伸展着"手臂", 稳固而有力。"十年了,看着这些岸桥,就像看自己的孩子!" 正在调试设备的工程师赵文飞说道。

"长滩港是美国最环保的码头之一,这让我们很自豪。新码头的建 成,兑现了长滩市对可持续性发展和绿色技术应用的承诺。"美国长滩 市市长罗伯特・加西亚在码头完工仪式上说道。

美国长滩港作为绿色码头的标杆,采用了一系列环保措施,使用 了货轮靠岸接插岸电系统和推行绿色节能的管理模式等,这些措施不 仅实现了港区"零排放",也提高了对振华设备的环保要求。项目团队 从设计之初就将环保理念嵌入项目方案中,并根据长滩港用户的需求 设计了定制方案,把解决"设备能源消耗问题""液压吊具渗漏油污问 题" "照明灯具耗电问题" 和构建 "新型低能耗电气房" 作为打造 "环保 手查阅资料,一边摸索一边实践。最终,电动吊具成 功应用于长滩港,彻底杜绝了油污泄漏问题,设备能 耗也大大降低。

降低耗电量,该如何发力?关键在于解决"照明灯 具耗电"这一问题。"LED 灯在当时是个新玩意,才刚 刚被研制出来。长滩项目真的是非常'赶时髦'的!" 项目成员回忆道。以往,岸桥和轨道吊一直采用钠灯 来照明,与钠灯相比,LED 灯既节能又环保。项目团 队发现,单台设备就有 120余盏大功率投光灯,而 300 瓦的 LED 灯完全满足原先 1000 瓦的钠灯提供的照明 电量,于是立刻给岸桥们戴上了 LED"小帽子"。"LED 投光灯越照越亮,不夸张地说,夜晚在五十多米高的岸 桥下都可以看报纸。"赵文飞回忆起此事感慨道。大功 率 LED 投光灯的使用,不仅仅满足了亮度的设计要求, 减轻了整体设备重量,更将港区照明耗电节约了 50% 以上,可谓是项目的点睛之笔。

除此之外,振华重工的新型低能耗电气房,让长滩港 再次迎来一抹绿色。在长时间的集装箱装卸过程中,岸 桥的电气房和 PLC 房内的驱动器和模块对温度和湿度 要求极高,因此房间必须完全密封。如何让一个 50 平 米的房间完全密封呢?这就要求项目团队更加严谨,在 设备设计和施工中下足绣花功夫,技术总监陈鹏介绍说: "在电气房底部机房框架结构上,我们进行了气密性焊接 和穿线孔内电缆间空隙的密封,并且进行了严格的气密 性测试,确保了高水平的密封效果。"可靠、高效、环保的 电气房为长滩港持续"添绿",使节能举措更加出彩。

"环境保护无小事,有了这些举措,码头的环保绩效'更上一层楼'了。"望着面前这些倾注心血精心培育,如今成为"栋梁"的"孩子们",袁奕十分自豪。

漫漫长滩路,三期设备交付后,美国长滩 LBCT 码 头在 2021 年又向振华重工增订了 4 台岸桥和 1 台自 动化铁路吊,其中第一批已于 2023 年 2 月 28 日从长 兴分公司发运。"这是对振华重工设备最大的认可!" 赵文飞坚定地说,"打造绿色环保的码头是长滩市长对 城市的承诺,也是振华对长滩用户的承诺。" ☑ (供图 / 刘阳)





在岛上打造"绿色工厂"

文/**薛韦**慧

上海长兴岛,沿着 5.5 公里的长江岸线,12 个泊 走进箱梁智能车间,会看到一块块钢材在这里实 位上停满五彩的岸桥。作为振华重工最大的生产基地,现自动化搬运、焊接、柔性拼装和翻身,旁边只有少 长兴分公司平均每年可以生产 200 台岸桥和 50 万吨数工人在操作和巡检。 锅结构。长兴分公司箱梁智能车间是国内首条针对大型起

沿着防汛路往前走,会看到干净整洁的路面,一 排排翠绿的树木,绵延1.5公里鲜艳夺目的月季,各 角落里的姹紫嫣红……很难想象这样一个装备制造业 的生产基地竟如此绿意盎然。长兴分公司十分重视厂 区环境绿化美化,投入大量人力物力进行厂区绿化改 造升级。

"外在的绿只是其次,内在的绿才是主角。"长 不兴分公司党委书记傅勇平说,公司持续推动绿色制造, 资为力打造"绿色工厂",助推长兴岛实现生态岛建设 的目标。

长兴分公司箱梁智能车间是国内首条针对大型起 重机箱梁结构制造的智能生产线,主要焊接制造岸桥 门框联系梁和立柱直分段。车间长 369 米、宽 30 米, 总计 1.1 万平方米,年产量可达 600 到 900 根。

"箱梁智能车间的理念是打造精益化、智能化、 绿色化、数字化的车间。"长兴分公司钢构制造部经 理陈永刚介绍说。车间配备拼板 FCB 焊接工作站, 可以自动焊接 8 至 10 毫米的板材,一次成型,还能 减少拼板过程中的碳刨清根;配备角钢组队工作站, 可以实现自动搬运角钢,寻找安装位置,自动组队焊 接;配备板单元焊接机器人,集焊接和随时调整焊缝 的路径于一体;箱梁三面内焊焊接机器人可以一键启 动自动焊接,还能自动纠偏,解决产品组装偏差。箱 梁智能车间整个环节全部实现自动化,相比传统车间 减员 26.7%,产品能耗降低,项目制造总周期缩短约 7天,产品良品率达 99% 以上。车间还使用了公司 自主研发的大型箱梁内部焊接烟尘处理系统,大大降 低了焊接烟尘颗粒物浓度。

在传统车间,长兴分公司也进行了环保设施改造。 如重型装备制造车间,焊接作业点上方悬挂着可移动 的"吸气臂",能吸走焊接时产生的烟尘。经检测, 通过加装"吸气臂"等设施,整改后车间焊烟浓度整 体下降约60%。镀锌车间采用了新一代烟尘喷淋塔、 酸雾喷淋塔,增加了顶送风设备,全面升级了综合废 水处理设备,改变了老式的吸风模式,并在车间内增 加了防酸雾隔断。涂装车间配置了国内最先进的废气 末端治理设施,可以实现超百米长的大型构件室内涂 装,室内有组织油漆使用比例由当初的40%提升到 了85%,从根本上杜绝了露天喷漆和调漆。

除此之外,长兴分公司还在大气治理、水污染治

理、固废危废管理等方面做了诸多努力。如落实初期 雨水收集治理,针对7块主要拼装场地,建设调蓄池 和总长约5.4公里的雨水收集明渠,将前15分钟雨 水收集汇入调蓄池,再泵入处理系统后达标排放。为 加强环境空气监测,建设6个自动监测站、1个信息 化监控中心,对污染因子实时跟踪、监控、分析,各 项数据实时直传市环境监测中心。

"说到空气监测站,有项有意思的案例。去年夏 天,有阵子监控中心经常自动'报警',大家特别紧张, 去各车间检查都没发现问题,甚至考虑是不是监测仪 器坏了。最后发现,是天气太热,厂区周围树上蝉鸣 个不停,让监测仪器监测到了。"长兴分公司安监部 经理苗卫华笑着说。

厂区内,流动铲车和平板车是运送机械的主要交 通工具,若是调度无序,柴油便会在路途中不知不觉 被浪费。长兴分公司采用工时定额通用管理系统,用 车部门只需在手机 App 上申请,信息便能同步到集 控中心电脑显示屏上。之后,集控中心工作人员会在 自己分管的区域内,根据就近原则安排车辆,节省了 空跑的油量。据集控中心调度负责人许鹏介绍,通过 数字手段在集控中心就近派车、智能调用,平均一年 可以减少 63.96 万公升的柴油消耗。

除了节能减排,长兴分公司还在持续稳步优化 能源结构。早在2018年,长兴分公司便开始建设分 布式光伏发电站,并投产发电。据统计,长兴分公 司21兆瓦分布式光伏发电站平均每年可为厂区提供 1738万度电,消纳比例达到98%。光伏发电站总计 使用约20万平方米车间屋顶,涉及13个车间屋顶, 不但帮助公司合理利用屋顶闲置资源,在节省公司用 电成本的同时,还将清洁电能用于生产运行,为公司 绿色转型注入清洁动能,一举多得。近年来,长兴分 公司还逐步以53台空气源热泵和2台电加热开水炉 替代原有的12台燃油锅炉和2台燃油开水炉,使用 电力替代柴油,更加节能环保。

绿色是高质量发展的底色。长兴分公司打造"绿 色工厂",把绿色发展新理念贯穿于生产制造全过程, 是振华重工绿色转型发展的重要"窗口"。 (供图/季学卿)





环境空气质量监测站



吊耳重磅板焊接机器人工作站

还在烦恼抢车位? 智慧停车了解下

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文 / **陈剑刚**

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近年来,随着大数据、云计算、人工智能等前 沿技术的应用,数字中国、智慧城市建设上升为国 家战略,成为各个城市面向未来布局发展的共识。 智慧停车作为现代城市新型基础设施,成为数字中 国、智慧城市建设的重要入口与抓手。 1

2017 年,振华重工开始涉足智慧停车业务领 域,秉承自主创新理念,瞄准城市建设和更新过程 中的痛点,深耕智慧停车全场景解决方案、全产业 链服务模式,致力于成为国内领先的智能停车设备 提供商、城市公共停车服务商和公共停车设施投资 运营商。在停车业务领域,公司荣获相关奖项6个, 各类专利及软件著作98 项,获授权57 项,其中发 明专利3 项,软件著作19 项。





忙碌了一周的小王开车回家,进入小区后绕了两圈,愣是找不到车位。不禁感叹, 找个停车位,咋就这么难?



大型商品汽车自动化立体仓库



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据公安部统计,2022年全国机动车保有量达4.17 亿辆,其中汽车3.19亿辆,占机动车总量的76.49%。 我国汽车保有总量持续增长,"停车难""停车乱"现 象也日益凸显。

如何缓解停车难? 智慧停车应运而生,它以停车 位资源为基础,将人工智能、无线通信与 GPS 定位、 移动终端等技术综合应用于城市停车位状态的采集、 管理与查询、预定、支付与导航服务,从而实现停车 资源的最大化利用与车主服务最优化的现代化停车服 务模式。

随着智慧停车的应用和推广,停车管理正逐渐走 向智能化、精细化。这既减少了车主到处找车位的时 间,也让停车秩序得到明显改善。目前,智慧停车已 经在超一线及一线城市陆续落地,形成区域范围内的 行业示范效应,并逐步向全国范围辐射。

智慧停车发展势头如此强劲,得益于国家多项引 导性政策支持。2022年1月,国务院出台《"十四五" 现代综合交通运输体系发展规划》,提出加快智能技 术深度推广应用,推动互联网、大数据、人工智能、 区块链等新技术与交通行业深度融合,创新运营管理 模式,推动智慧停车发展等。2021年5月,国家发改 委、住房城乡建设部等发布《关于推动城市停车设施 发展意见》,提出到2025年,全国大中小城市基本建 成配建停车设施为主、路外公共停车设施为辅、路内 停车为补充的城市停车系统,社会资本广泛参与,信 息技术与停车产业深度融合,停车资源高效利用,城 市停车规范有序,依法治理、社会共治局面基本形成。

在政府大力支持智慧停车的同时,不少互联网企 业也开始介入停车行业,其中就包括腾讯、阿里巴巴、 百度等大公司。但是,面对蓬勃发展的智慧停车行业, 有几点问题需要特别注意。 首先是智慧停车平台还未实现充分利用。随着 5G 时代的到来,数字技术水平不断提升,全国近300 个市县已建成或正在建设城市级停车平台,行业数字 化转型效果显著,共享停车平台化趋势日渐明显。智 慧停车行业正处于资源、技术、平台整合的重要发展 阶段。但是,涌入停车行业的企业与企业之间并没有 真正实现信息联通,出现"数据孤岛"现象,导致很 多资源价值尚未全面挖掘,智慧停车平台和对应 APP 未被充分利用等。下一步,如何深入整合产业资源, 打破数据孤岛是智慧停车行业发展亟待解决的问题。

其次是县级城市停车难问题日渐凸显。中共中央 办公厅、国务院办公厅印发的《关于推进以县城为重 要载体的城镇化建设的意见》中提出,到2025年,以 县城为重要载体的城镇化建设取得重要进展,县城短 板弱项进一步补齐补强。据浙江最新的统计年鉴数据 显示,浙江十大强县私人汽车保有量均处于较高水 平,但汽车保有量的激增令各县"停车难"矛盾升温, 停车场地缺口较大,各县对缓解"停车难"的需求更 为迫切。停车位缺口补齐补强也是县城城镇化建设的 重要一环,智慧停车行业要紧跟国家政策和城市实际 需求,向县级城市拓展。

最后是 PPP 停车项目存在隐形风险。智慧停车 PPP 是基于政府与社会资本方通过建立长期合作关 系,将智慧停车系统等高新技术应用于城市停车位管 理服务,实现车位资源利用率最大化和停车服务最优 化的新型停车服务模式。自2015年财政部推进 PPP 项目起,成功签约的 PPP 停车项目逐年递增,社会资 本参与停车场的投资、建设与运营已成为各地推动停 车场建设的重要途径。通过与政府合作,社会资本可 以迅速抢占各地市场资源,盘活和整合城市级智慧停 车平台。然而,目前 PPP 项目仍存在资金回收周期长、 运维成本较高、短期内经济效益不明显等风险。因此, 在建立健全回报机制和保证充足资本的基础上,各相 关方应加大在商业模式、发展定位、核心技术、市场 研究等层面的投入并开展深入调研。



首先要加强与地方政府的合作。加大对国家尤 其是地方政府持续优化调整的多元使用者付费和财 政补贴机制的关注力度。从兼顾政府公益性诉求与 社会资本合理回报的角度找准切入点,与当地政府 或城投等对口部门、企业开展项目建设、产业投资 和运维、商业配套等方面的战略合作和业务合作。

其次要提升技术研究水平。停车产业的智慧化、 信息化对实现停车设施存量的高效共享和停车产业 运行效率的提高有着至关重要的作用。一方面,重 视5G应用等现代化技术,探索搭建以智慧停车产 品为基础、智能服务为引领的智慧停车科研平台, 打造差异化优势。另一方面,积极搭建城市级智慧 停车云平台,推动停车与互联网融合发展,实现全 市停车信息全面联网,提高停车资源的利用效率。

再次要优化产业布局。停车产业相关政策红利 集中爆发,各省市从多角度出台政策,其中经济发 达地区的政策更为积极,也更具系统性。对于京津 冀、长江经济带、粤港澳大湾区、长三角、成渝双 城经济圈等政策支持力度大、经济基础好、支付条 件优的区域,企业可以全方位拓展智慧停车市场, 推动经营资源下沉,实现产业格局优化。

最后要推进县域级智慧停车建设。中国百强县 经济水平高,汽车保有量高,停车需求高,停车位 缺口大,智慧停车行业可以逐步由一线和中心城市 向周边百强县(区)城市拓展,实现停车行业县城 级发展。

"智慧停车"为停车产业插上智慧的翅膀,让 市民实现"智慧出行"。智慧停车将是未来城市基 础设施的重要构成,抓住智慧停车这个风口,才能 引领停车行业未来趋势。

(供图 / 沈漪 王泽)



给桩腿穿上私人定制"靴"

文/**薛韦慧**

"桩腿桩靴能不能差异化设计,实现平台减重?"

"应该按照传统方法设计桩腿桩靴,毕竟有经验有数据……"

"差异化设计,没有先例,需要大量试验来论证,耗 时很长还不一定成功。"

这是中交海峰 2500 吨自航自升式海上风电安装 平台项目内部讨论会上的一幕,项目设计团队正在针 对桩腿桩靴是否差异化设计展开讨论。

近年来,海上风机深水化、大型化发展趋势显著, 在增加海上风电施工难度的同时,也对风电安装平台 提出了更高要求。2500吨自航自升式海上风电安装 平台具备运输、打桩、吊装等多种功能,能够满足未来 深远海大容量风机一体化的施工作业要求,由振华重 工设计建造,且主起重机、升降系统等核心配套设备均 为振华重工自主研制。该项目标志着振华重工正式开 启大吊重深水桁架绕桩式风电平台设计的新篇章,具 有里程碑式的意义。

"平台综合性能开创国内之最,是我国海上风电作 业从近海走向深远海的关键利器。"项目总体设计工程 师晁世方表示。平台能进行无限区航行,并可同时运 载 2 套 15 兆瓦风机机组设备;同时具备高超的起重能 力,可以满足 150 米轮毂高度、15 兆瓦级大功率海洋 风机的安装需求;桩腿为三角桁架式,总长 120 米,最 大作业水深达 70 米。

桩腿承载着风电安装平台的自重、作业载荷和环 境载荷,是平台最重要的承载结构之一。桩靴设置在 桩腿底部,具有大尺寸、高承载等特点,能够提高风电 安装平台的地质适应性和稳定性。传统设计中,为了 保证桩腿桩靴结构的安全,会留取较大的结构冗余度, 但过强的结构设计往往带来成本和施工难度的提升, 尤其自升式风电平台的重量控制要求极为苛刻。为此, 一些团队成员提出桩腿桩靴差异化设计,但随着设计 深入,逐渐发现差异化设计会降低桩腿能力,不利于平 合举升和某些特殊作业模式。

一时间,差异化设计理念再次受到大家质疑。"桩 腿不能动,但穿的靴子还可以试着变一变,创新的过程 要胆大心细,不能因为有所顾虑就停滞不前。"项目核 心团队逐渐达成共识。工程师们重拾信心,开始研究 桩靴差异化设计方案。

桩靴设计的决定工况之一就是平台站立吊重作业 时,桩靴受到的垂直载荷达到极值。经过初步计算,平 台站立工作情况下,主吊机所在的桩靴最大垂直载荷 相比其他桩靴明显增加。能不能在满足实际能力需要 的情况下,进行差异化设计,并且保证相同的设计安全 余量呢?一场头脑风暴又开始了。

"给桩腿穿靴子难度不大,但要为桩腿定制合适的 靴子就要花很多心思了。"项目结构计算工程师金 晶坦言。

"仅仅考虑平台站位情况下桩靴受到的载荷 是不够全面的,我们这个平台采用对角压桩,还 需要考虑压桩的时候,和主吊机对角的桩靴载 荷。""要考虑地基不平有倾斜的情况下,桩腿桩 靴也能保证安全。""桩腿下放的时候船体晃动, 会导致桩靴快要接触泥面的时候产生冲击载 荷,这个也要考虑。"大家热火朝天地讨论 着。最后,大家一致认为要拿数据说 话,哪怕优化 10% 的重量也是成 效。最终通过详细的计算分 析,差异化设计方案可行,桩 靴减重效果十分可观。

桩靴差异化设计完成后,桩靴 回收孔外板的设计形式成了新的难题。 "2500 吨风电安装平台设计航速不小于 9 如今,为2500吨自航自升式海上风电安装平台桩 腿私人定制的"靴子"已完成建造安装,待平台交付使 用后将大显身手。 🔀

(供图/张家齐)



2500吨自航自升式 海上风电安装平台



中蒙口岸迎来智能无人跨境"搬运工"

文 / **陆怡艳**

甘其毛都,中蒙最大的货运公路口岸。寒冷的西 北风从这里呼啸而过,尽管2月份当地气温低至零下 十几摄氏度,却丝毫不影响这里呈现出一派繁忙火热 的景象:大量的货车正依次排队等待入关,满载货物往 返于中蒙两国。

其中,有几辆蓝白色车辆极为显眼,它们是由振华 重工为蒙古国设计制造的 AGV 智能无人驾驶跨境运 输车。相较于普通的大货车,它们有着无法比拟的优 势:人工成本低、无需各类通关手续,能边运行边实时 报关,大大提升了口岸的通关过货效率。

"本周,我们正式将这6台设备交付蒙古国用户, 这也意味着 ZPMC 的产品正式进入全球第106 个国 家和地区。" 中蒙 AGV 项目经理祝发林激<u>动地说道。</u>

此次跨国合作源于近几年来中蒙边境的矿产运输 业务受疫情影响,通关量受到冲击。当地政府和用户 为了解决这个问题,找到振华重工寻求自动化运输的 解决方案,公司提出使用混动 AGV 进行跨境货物运输的方案,全程封闭运行,实现无接触作业。而当时,自动化陆路跨境运输在全球尚无先例。

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"近年来, ZPMC 的无人驾驶技术,早已成熟应用于 青岛港、洋山港、南沙港等多个自动化码头,但像这样用 于跨境运输货物在国内乃至全球尚属首次。" 祝发林补 充道。相较于常规码头上大块区域的应用场景,甘其毛 都口岸只有两条单独的 AGV 运行通道,因此对运行和调 度的控制精准度要求更高。此外,设备在交互区作业的 安全性也是一个巨大挑战:在自动化码头现场, AGV 都 是与岸桥、轨道吊之间进行无人交互作业,而这批跨境 AGV 则需要与人工驾驶的正面吊和叉车进行交互作业。

该项目的车队管理系统负责人魏鑫说道:"为此, 我们特地增加了自动化系统安全联锁功能,区域内一 旦出现任何人或物体,AGV都会自动停止进入相关区 域,等清理干净或是现场人员检查确认没有问题才会 自动恢复运行。"

此外,考虑到甘其毛都口岸恶劣的自然环境,振华 进行 重工特地为这批 AGV 研发了"柴油机+锂电池"的混 更是 合动力系统,同时其主要器件都采用了隔热、保暖技术, 往常 相当于给车辆穿上了"防护服"。

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"我们研制了电池智能加热系统,合理配置电池与柴 油机的工作状态,大幅缩短电池低温带来的停车等待时 间。同时,液压系统也配置了快速热车功能,这就保证 了车辆能在 –40℃至 40℃的极端气温下正常运行。"项 目设计总负责人胡文辉介绍道。



"口岸通关是每晚8点结束,留给我们新一批AGV 进行各项测试的时间也只有这段,所以忙到凌晨1、2点 更是'家常便饭'。"2022年12月31日那晚,祝发林如 往常一样将各项调试问题反馈至工作微信群里时,微信 上显示"凌晨00:16",这时他才意识到已进入2023年 了,他笑称,AGV在中蒙跨境,而自己在中蒙跨年。

努力付出,终结硕果。今年1月18日,蒙古国副总 理实地视察了正在蒙古国境内作业的AGV运输车,同 时还连线视察了尚处于中方园区内的6台新车情况,对 AGV车况及运行状态表示肯定和赞赏。消息传来,祝发 林和团队成员都备受鼓舞。

如今,这6台蓝白色AGV已经投入试运行,后续还 将有24台AGV"同伴"一起加入跨境运输行列中,为助 力甘其毛都口岸打造成高效通关过货、智能绿色安全的 现代化口岸贡献振华力量。 <mark>%</mark>

(供图 / 祝发林)

焊花照耀下的工匠之路

文 / **李天意**



"我们老家把打家具盖房子的木工称为匠人,社会 上对他们是很尊敬的。"小时候的憧憬为魏钧长大后成 为一名焊匠种下了一颗种子。

2007 年,29 岁的魏钧进入振华重工长兴分公司, 16 年弹指一挥间,如今,他已成功获得国务院特殊津 贴、全国技术能手称号、上海市五一劳动奖章、上海市 劳模称号、上海工匠称号、中央企业"百名杰出工匠"、 港珠澳沉管隧道贯通"第三战役""个人特等功"、中交 集团首批特级技师等诸多荣誉,成为一名技术"大咖"。 同时,他还是魏钧劳模技术创新工作室领衔人,早已成 为公司的"明星焊匠"。

但是"明星焊匠"的成长历程也不是一帆风顺的。 在成为焊工的第二年,他的焊接技艺已经和老师傅们不 相上下,"毛头小伙"对待工作有些"飘飘然"。在执行一 次焊接任务时,他胸有成竹,却突然接到通知,说检验要 求提高了,要进行超声波探伤。"结果显示我的合格率很 低,但老师傅的焊缝合格率却和平时一样,稳如泰山。"

这件事给魏钧的心灵带来很大的震动。"无论干 什么事,都要尽最大的能力把它干好,不能自己认为这 件事不重要就不认真做,要认真对待每道焊缝。"从此 以后,他在工作中树立起认真做事的态度,把每一个焊 缝都焊的漂亮整齐。

机会总是垂青有准备的人。2013年,在乌克兰焊 接学会主办的第十届"BENARDOS"杯国际焊接大赛 中,魏钧代表中国交建参赛。他一举夺魁,获得了该项 目唯一的一张国际焊工证书,被评为"最佳焊件优秀选 手"。2015年,"魏钧劳模创新工作室"成立。他总结 归纳的"焊接十步操作法",应用到了多个海内外重大 项目中,有效提升了焊接质量。 十年淬炼,锻铁成钢。魏钧入职十年时,迎来了世 纪工程——港珠澳大桥的焊接任务。不同于以往的焊 接形式,此次焊接任务在水下密闭空间进行。在沉管 实现最终接头后,虽然有止水装置能够使其连接处不 漏水,但要做到"滴水不漏"双保险,就必须将接口处 焊得"天衣无缝"。

水下焊接,怎么焊? 舱内湿度高达 80% 以上,会 使焊缝内部产生肉眼无法观察到的气孔,出现变形、裂 纹甚至断裂。湿度无法躲避,最好的解决办法就是降 低湿度避免气孔出现,这需要在 10 分钟内将焊接连接 处加热到 150 度的高温进行预热。

但 150 度的高温随即带来的是橡胶止水带烫伤断 裂的风险,"门外面就是 27 米深的海水。"止水带就像 汉堡包中的面包紧紧保护着每一节沉管,距离焊缝仅有 20 厘米,只能承受 150 度的高温。"在 28 毫米厚的钢 板上共焊 7-8 层,我和兄弟们在每一层焊接时都要对 焊接温度精准控制。"一旦止水带被烧穿,后果不可想 象,这使得魏钧和工友们每一次焊接作业,都如履薄冰, 伴着千百倍的小心。好在魏钧及团队之前通过 1:1 的 最终截图模拟段,在仿真现实工作环境中演练过 50 多 个日夜,他们采用"焊接先进操作法",完成了这一挑战。 超极限环境对人的体能消耗也是巨大的,"当时项目部 发的水壶是 3 升的,一个人一天就要喝两三壶水。"

2017 年 5 月 25 日,是个值得纪念的日子。在持续 20 天的倒班作业后,港珠澳大桥的焊接任务全部完成。由于工作需要,第二天一早他们就踏上归程,在珠海驶向上海的大巴上,这群焊接"完美主义者"七扭八 歪地坐着就睡着了。

知重负重,砥砺前行。魏钧多次在公司承建的重 大项目中攻坚克难,先后带队完成了美国旧金山 – 奥 克兰海湾大桥、7500吨起重船、美国机械工程协会压 力容器生产资质认证、28000吨浮吊臂架返修、比利时 闸门项目、港珠澳桥隧最终接头项目、6000吨起重铺 管船项目、亚洲最大海上风电换流站等国内外重大项 目的焊接任务。





2017年,魏钧参与港珠澳大桥项目建设

魏钧带徒情景

如今,魏钧在攻关焊接工艺疑难杂症的同时,还花 更多的精力在工作室的"传帮带"上。看着徒弟们就 像回望曾经的自己,他加倍用心,加倍用情,帮助他们 实现人生的成长和蜕变。"看他们获奖,比我自己获奖 都开心!"2021年,俸春林、赵传俊获得嘉克杯焊接技 能比赛三等奖,耿超安、张美龙获得优秀选手奖,他们 都有一位共同的师父——魏钧。"我只有一双手,焊的 再好也只是我一个人焊,但我教出了这么多徒弟,以后 他们会实现更大的价值。"作为一名师父,魏钧在不断 实现人生价值的同时,为"中国制造"培养出一个又一 个技能扎实、精业敬业的"焊匠"。让自己,也让他们立 于平凡之中演绎着不平凡的彪"焊"人生。

(供图/陈红军 刘颖)



大山里的小艺术家

文 / **李天意**

"大家看一看,我们5个摊位售卖的工艺作品全部 来自云南小朋友,有他们自己动手创作的黏土画、手工 布袋、背篓、草鞋……"2月9日,在庆祝公司成立30 周年文化创意集市上,振华重工总部一楼大厅热火朝 天,文创"摊主"们开启了"带货"模式。

这些手工艺品作为爱心义卖品,连同 30 周年文 创商品的销售收入,将捐赠给公司定点帮扶地区云 南省怒江州兰坪县永安社区幼儿园、兰坪县兔峨乡 振华幼儿园的小朋友们。孩子们的作品与千里之外 的振华员工产生了奇妙的"联接",暖暖的情谊在活 动中传递着,孩子们的手工才艺也在集市上得到了 充分的展示。 千里之外的云南,"小艺术家"们很早就开始准备 这些手工艺作品了。精美的黏土画是如何制作出来 的?永安社区幼儿园的黄秋香老师介绍道:"孩子们从 幼儿园小班就开始学习黏土画,从最基本的搓揉压粘 学起,到了中班,就能将云南特色服饰通过黏土画的形 式表现出来了。"

啦玛族,是白族支系,也是云南特有的民族。黄老师是汉族人,她在教孩子们用黏土画展示啦玛族的传统服饰时犯了难。"老师,明天我把我奶奶的民族特色衣服带过来给您看,您就知道啦玛族的衣服是什么样子啦!"5岁的小朋友杨启馨说道。

啦玛族服饰以红蓝黑三色为主,蓝色毛巾缠头,无

领麻布对开长褂,黑色红色拼接成伞状裙子。服饰有 了雏形,接下来开始给人物捏脸,小朋友们踊跃讨论 着:"老师,鼻子单独做,它就会挺起来了。"除了人物立 体,妆容也不能少,"我们买了最便宜的腮红,让小朋友 们给娃娃化妆。"黄老师说道。3天后,黏土画"啦玛女 孩"诞生,一双灵动的大眼睛,让人不禁好奇她的心里 在想些什么。

幼儿园的外面,是层峦叠嶂的山,这副景象被5岁小 女孩余秀春看在眼里,画在纸上;她平时较为内向,但是 美术表现力很强。她用麻布做底,将麻布一层层包在纸 板上,细致作画,2节课的时间就完成了一幅作品。

云南传统织布工艺流传千年。在兔峨乡振华幼儿 园,身穿红色园服,梳着双马尾的6岁小朋友徐姝彤正 在运用儿童织布机编织五颜六色的线,将线从织布机 的左侧缠绕到右侧,她做的异常认真,此刻她的小目标 是制作一个精美的布袋。"线放出来一点。"张玉梅老 师在一旁指导着,"小朋友们使用改良后的织布机是比 较难的,有时线会打结,但是她们学的很努力。徐姝彤 一节课才能织1厘米左右的布,她的奶奶和妈妈都十 分擅长使用最传统的怒族织布工具,放学后家长们也 会帮忙在布上刺绣。"四个多月后,一个充满一家人浓 浓心意的布袋诞生,这份心意跨越千里,来到了振华重 工的 30 周年文化创意集市。

在筹备义卖作品的过程中,孩子们也收获了满满 的成就感,"小朋友们觉得自己好厉害,可以把作品拿 到外面展示了。"据张老师回忆,小男孩李健勇在织的 过程中很骄傲地和小女孩说:"昨天我看到我奶奶在家 里织布,奶奶会的我也会了!"

小小工艺品,却凝聚着大爱。本次爱心义卖共持续5天,义卖所得三万余元善款将全部用于改善幼儿园孩子们的学习和生活。此次活动让振华员工们感受彩云之南民族文化的同时,也联动着沪滇的温暖情谊。 未来,振华重工将会持续履行央企社会责任,为美好生活赋能,为社会创造更大价值。

(供图/陈迪)



杨启馨小朋友认真制作纸浆画



彝族女孩、赶集的情景跃然纸上



在兔峨乡振华幼儿园,小朋友们用儿童版织布机编织布袋



徐姝彤山间游戏



《啦玛女孩》

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"海外人才中心" 巧解卸船"难题"

文 / **李天意**

"阿文德,你可是振华重工'海外人才中心'的骨干工程师,这次巴新项目卸船'化险为夷', 多亏了你和其他兄弟们!" 振华重工印澳区域中心澳洲子公司的巴新项目经理莫非在电话那头难掩 兴奋。一场"有准备之仗"打赢了,这背后,"海外人才中心"作为人才储备库的优势逐步显现。



2022年11月下旬,振华重工为巴布亚 新几内亚建造的2台岸桥,漂洋过海,即将到 达用户码头。"岸桥马上到岸了,你们的卸船 和调试团队还过不来,这可怎么办?"用户焦 急地询问道。由于疫情影响,原本计划来卸 船的团队被卡在国内无法成行,现场工作迫 在眉睫,一时间,大家都有点焦灼。

"我们建立的'海外人才中心'正是派上 用场的时候!"莫非得知消息,立刻启动了 plan B。通过与印澳区域中心印度子公司相 关负责人的沟通协调,振华重工"海外人才 中心"抽调 11 名卸船工程师和5 名调试工 程师,组成"卸船救火队",前往巴新参与卸船 工作。

原来,早在2014年,刚刚成立的振华重 工印度子公司就开始着手建立本地化人才 库。一方面是为了积极与国内工程师配合, 提高交机工作效率;另一方面,是为了培养属 地化工程师,进行人才储备。经过近十年的 历练,印度子公司在积极开拓市场、高效完成 项目任务的同时,也建立了一支专业素质过 硬的本地工程师团队。

立足印澳,放眼全球。依托当地丰富的



卸船团队正在商讨卸船事宜

人力资源、振华重工的技术优势以及澳洲的 国际化地位,"海外人才中心"的建立可谓"天 时地利人和"。振华重工通过专业招聘网站、 人才中介公司、合作项目现场等渠道,招聘了 大量工程技术、项目管理、等专业人才。

对于这些人才,印度子公司进行了政策 法规、专业技能等全方位的培训,这些属地 化人才通过学习和实践相结合的方式,迅速 融入子公司的工作氛围之中。在振华重工 总部工程师无法出国的情况下,通过远程在 线指导,可以顺利完成各项交机和项目服务 工作。阿文德就是这些人才中的一员,这次 参与巴新卸船项目,从接到通知到拿到签 证,再从孟买出发辗转3个机场,历经35个 小时,阿文德和项目团队成员终于赶在岸桥 靠岸前顺利入境。

2022年11月29日,许多海外媒体记 者齐聚南太平洋国际码头,与阿文德和其他 卸船、调试工程师们一起,翘首以盼,等待着 岸桥运输船的到来。

下午3点,一艘大型集装箱船缓缓驶入 巴内亚新几内亚 SPICTL 港。振华重工总部 的工程师们通过实时摄像头"云指挥",与现



夜幕下的项目现场

场的工程师们联动起来,开始了"卸船大作战"。随着 "第一台岸桥已经顺利完成卸船"的声音传来,相隔几 千公里的视频两端,大家的疲惫中难掩兴奋。通过远 程协作配合,项目团队仅用5天就完成了2台岸桥的 卸船工作,为后续的交机工作奠定了良好基础。"这趟 巴新之旅,让我学习到了新的技术点,我的专业技能又 提升了!"阿文德兴奋地说,"希望以后有机会能到中 国去进修学习,与总部的工程师们一起交流。"

迄今为止,"海外人才中心"不仅独立承接过东帝 汶卸船交机项目,印度子公司团队还受到了东帝汶总 理的接见。工程师们还被派至美国、澳大利亚、缅甸、 泰国、马来西亚等多个国家的多个项目现场参与过调 试交机工作,期间还完成了5个海外临时交机团队的 组建。后续在这些整团队的设备卸船交付工作之外, 海外人才中心还会分别安排调试工程师前往马来西亚 进行 CPS 调试、沙特售后服务、肯尼亚现场调试、澳大 利亚售后服务等各项海外工作。 创新之道,唯在得人。"'海外人才中心'以培养员 工为己任。"振华重工印澳区域中心负责人李强说道, "我们希望打造一支完全由本土化人员组成的集技术 生产经营于一体的综合性团队。"振华重工不仅为外籍 员工提供系统性的培训,还为海外"萌新"们独家定制 了线上课程,由中方工程师进行岗前培训,"专业人才 授课,资深'大佬'带队,让我们归属感满满"。刚刚加 入海外人才中心的工程师帕尔特说。

如今,振华重工"海外人才中心"已成为海外人才 建设的一个创新性标杆,巴新卸船项目的完美收官就 是"海外人才中心"优势展现的成果。"海外人才中心" 作为中交集团国际化战略培育人才的建设试点,未来 将逐步完善科学的海外人才管理制度,全力推进"业务 国际化"向"公司国际化"的转型升级。"我们要持续 推动海外人才属地化布局,建立高素质的国际化人才 队伍,实现真正的合作双赢。"李强说道。

(供图 / Swathy Sasidharan)

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《妇女撑起半边天》作者:方雨

着 R.

《玉兔迎春 红梅祝福》作者: 茆治

Embrace "green" in the era of realizing "dual carbon goals"

by Xue Weihui

ush mountains and lucid rivers witness our initial aspiration.

In the fight against climate change, the global green low carbon revolution has become a trend of the era. In September, 2020, China officially pledged to peak its carbon dioxide emissions before 2030 and strive to achieve carbon neutrality before 2060.

A slight move in one part may affect the whole situation. The "dual carbon goals" is like a baton that reshapes the future economic structure of China. To drive the transformation of old and new energy structures and replace fossil energy with renewable energy has become an irresistible trend. Therefore, it is urgent to lead the transformation and upgrading of traditional industries, change the industrial structure featuring "high energy consumption and high pollution", and introduce low-carbon emission technologies and new energy supply systems into industries such as electricity and transportation; in addition, it is essential to advocate low-carbon life and accelerate the construction of a green consumption policy system. These changes have brought both challenges and opportunities to China.

The manufacturing industry is the main body of the national economy and the cornerstone to build a powerful country. As a big manufacturing country, how to promote the traditional manufacturing industry to actively integrate into the "dual carbon" development strategy and move towards high-end, intelligent and green manufacturing is an important

industry.

era!

topic of China at present. This is not only an important task to promote new industrialization of China in the future, but also a strong support to realize Chinese modernization. According to the National Conference on Industry and Informatization held on January 11th, 2023, China will launch a special campaign to develop clusters of advanced manufacturing industry to support the development of high-end manufacturing industry, will comprehensively promote intelligent manufacturing projects, digital transformation of manufacturing industries and digital empowerment for small and medium-sized enterprises, and issue policies and measures to promote equipment digitalization, and will strengthen transformation with green and low-carbon technologies and support the green development of the manufacturing industry. The series of top-level designs aforementioned provide direction guidance and safeguard measures for the green and low carbon transformation and upgrading of traditional manufacturing

Cross over great rivers, lakes and mountains to attain great ambitions. China's manufacturing industry is embracing "green" in the era of realizing "dual-carbon goals" with firm belief. Taking green ecology as the foundation of development, let's fulfill the initial mission with responsibility, make "lucid waters and lush mountains" more beautiful, produce more "gold and silver mountains", and paint a more splendid blueprint for China in the new



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Empower high-quality development with green transformation

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by Xue Weihui

Treen development is an eternal Utheme. In recent years, China has put forward the strategic goals of peaking its carbon dioxide emissions before 2030 and achieving carbon neutrality before 2060, which has opened a "new chapter" of green development to reshape its future economic structure. **ZPMC** actively practices the concept of green development, continuously strengthens green and low-carbon scientific and technological innovation and product R&D, promotes the construction of green and smart ports, develops green energy, explores green intelligence, empowers high-quality development with green transformation, and implements the spirit of the 20th National Congress of the Communist Party of China with practical actions.

1 www.zpmc.com

ZPMC also issued the "ZPMC's Peak **Carbon Dioxide Emissions and Carbon** Neutralization Action Plan", which defined the overall requirements, strategic goals, major actions and safeguard measures for its green and low-carbon development. Thus, ZPMC sets off a firm pace towards green transformation with a much clearer direction.

Cover Story 封面故事

Fruitful results derived from green product innovation

ZPMC has made layout of green products and technological innovation in fields such as port machinery, offshore engineering and emerging business.

With the rapid development of green ports, there is an everincreasing market demand for environmental protection and energy-saving port machinery products. By integrating green concepts into the whole life cycle of its product development, ZPMC has innovatively developed 3E STS cranes, energysaving STS cranes equipped with solar photovoltaic power station, energy-saving RTG cranes, environment-friendly bulk cargo machinery, all-lithium AGV/IGV, LNG hybrid power straddle carriers, high-power efficient floodlight for port machinery and other products. At the same time, ZPMC launched RTG transformation business of "replacing oil with electricity" for terminal users to help users improve their environmental protection performance, and created a "package" scheme for green port machinery products to provide equipment support for the sustainable development of ecological environment.

In 2017, the State Council issued "Opinions on Promoting the Sustainable and Healthy Development of Construction Industry", which clearly proposed to vigorously develop prefabricated concrete and steel structure buildings. According to the Opinions, ZPMC, by giving full play to the advantages of steel structure manufacturing, successfully built green prefabricated buildings, showing better energy saving and environmental protection performance than traditional buildings and conforming to the strategy of sustainable development of the construction industry.

Since April 2018, ZPMC has been undertaking the construction projects in Antarctic. Using its advantages, ZPMC actively explores and researches in the field of modular mobile buildings, and has successfully developed products such as polar-purpose wind-resistant and snow-resistant safe houses and modular generator rooms, which can be disassembled and reused.





These products laid a foundation for practicing "green scientific investigations" in polar areas.

ZPMC has achieved fruitful results along the green R&D road. For example, its self-developed multi-series offshore wind power installation and construction platforms, welding-free assembly, its "no welding after painting" binding solution for STS cranes and green painting system have put into industrial applications and are leading the development of the industries in related fields.

Green and smart ports keep pace with times

In order to follow the new trend of green and low-carbon development port and shipping industry, there is an everincreasing demand for building "resource-saving, environmentfriendly" green smart ports. As early as in 1998, ZPMC began to develop equipment used for automated container terminal. After nearly 20 years of technical R&D and hard work, ZPMC has achieved a lot of results. Up to now, ZPMC has participated in the construction of a number of domestic automated terminals such as Xiamen Ocean Gate Termina, Qingdao Port and Shanghai Yangshan Port (Phase IV), which has opened the curtain for the fourth generation of automated terminals in the world. At the same time, ZPMC also participated in the construction of overseas automated terminals such as Port of Salvador in Italy, Khalifa Port in Abu Dhabi, India's Adani project and other automated terminal projects. The "Chinese era" of automated terminals has formally arrived. ZPMC contributed a low-cost, short-cycle, allintelligent, high-efficiency, zero-emission and reproducible

"Chinese Approach" to the world, and completed its evolution from following Europe and America to leading the world in the field of automated terminals.

With the support of policies and port resources, it is becoming a trend for ports to transform into a hydrogen energy port. ZPMC continuously increases the R&D of hydrogen energy products, strives to develop energy-saving and environmental protection equipment suitable for the port machinery market. At present, it has independently developed the world's first hydrogen fuel cell RTG crane and hydrogen fuel cell straddle carrier. In the future, ZPMC will continue to innovate and develop smart energy solutions with hydrogen energy as power source for ports and will apply hydrogen energy to more products such as AGV and IGV to help the construction of green smart ports.

Seek multiple development in the field of green energy

In recent years, China has been vigorously developing offshore wind power industry and takes it as one of the important directions for the development and utilization of renewable energy. As early as in 2007, ZPMC entered the offshore wind power industry. Now it can undertake EPC of wind turbine base projects and offshore booster station base projects (including the whole process of design, procurement and construction), and can independently develop large wind power installation vessels. manufacture, transport and install large wind power pipe piles and offshore booster stations. In the past decade, ZPMC has accomplished a number of major offshore wind power projects and its construction layout spread across China. From Guangdong in the south to Dalian in the north, ZPMC has accomplished a series of landmark projects such as Three Gorges Corporation's Rudong Project, CGNPC's Yangjiang Nuclear Power Plant, Three Gorges Corporation's Dalian Zhuanghe Project, Fujian Putian Nanri Island Project and Datang International Power Generation's Binhai Project, contributing "Zhenhua Strength" to China's offshore wind power construction.

Since 2016, ZPMC has followed the trend of social and economic development and set foot in the PV power field and invested in 31 projects with a total installed capacity of nearly 100 MW. By the end of December 2022, these projects have generated 266 million kWh of green electricity in total. At the same time, ZPMC has invested in and operated more than 2,200 power stations and provided customers with one-stop solutions (including evaluation, design, implementation and operation) for PV generation systems. ZPMC also innovated and developed container-type mobile PV power stations, created comprehensive energy solutions, power distribution and sales demonstration projects and port smart energy solutions, and will continue to enhance its influence and brand awareness in the field of green energy.

In addition, in order to reduce air pollutant emissions of vessels during their berthing, ZPMC began to provide shore power connection services for vessels in 2016, providing overall planning and design of shore power supply for various types of ports and vessels, electromechanical EPC of shore power supply systems, transformation of vessel power receiving system and network access, etc. At present, the projects have been successfully implemented at terminals in Shanghai, Qidong, Nantong, Fujian and other places.

Green "intelligence" manufacturing highlights social responsibility

"China Manufacturing 2025" clearly puts forward that

"green manufacturing" should be one of the five key projects. China will fully promote green manufacturing and make efforts to build an efficient, clean, low-carbon and circular green manufacturing system. During the "13th Five-Year Plan" period, ZPMC carried out a variety of energy-saving and emission-reduction technological transformation measures, continuously optimized its energy consumption structure, and comprehensively promoted the transformation and upgrading of its high-end and intelligent manufacturing processes.

In recent years, the proportion of clean energy such as electricity and natural gas in the energy consumption structure of ZPMC has increased year by year, soaring to 92.8% of its total energy consumption. ZPMC also attaches great importance to energy-saving technical transformation. By completing the transformation projects such as "frequency conversion power supply replaces diesel generator set" and "recovered air compressor station waste heat to replace diesel boiler", the use of diesel generator set and diesel boilers have been reduced, which reduced the consumption of fossil energy like diesel, thus lowering down waste gas pollution and noise pollution, saving 1,054 tons of standard coal and reducing 1,634 tons of carbon dioxide emissions annually.

At the same time, ZPMC successively upgraded the environmental protection facilities in the plant area. After several years of efforts, it has achieved remarkable results in waste gas control, water pollution control and hazardous waste management. ZPMC also takes the initiative to undertake social responsibilities. It invested in the construction of six environmental air quality monitoring stations and one information monitoring center, which can cover the plant areas and sensitive areas around and monitor volatile organic compounds, particulate matters and noise in real time. In the field of intelligent manufacturing, ZPMC introduced advanced automated production technology, upgraded its production equipment, and built a number of automated

"Lucid waters and lush mountains are invaluable assets." In the future, ZPMC will continuously practice President Xi Jinping's ecological thought, strengthen self-innovation, speed up low-carbon transformation, and integrate green production and lifestyles into the whole process of its production and operation and other fields to empower its high quality development to a new stage.

Zhen Hua 27 loaded with two 3E PLUS STS cranes set off to the Port of Tangier of Morocco.



In the field of intelligent manufacturing, ZPMC introduced advanced automated production technology, upgraded its production equipment, and built a number of automated production lines, such as trolley assembly line, welding production line for balance beams and intelligent production line for box girders. Moreover, ZPMC also established robot welding workstations for welding lifting lug plate for heavy components and diaphragm plates, featuring advantages of high efficiency, environmental protection, repair–free and low energy consumption.

(Photo by relevant units)

Shanghai Yangshan Phase IV Automated Container Terminal

Hydrogen fuel cell ensures "pure green" power

by Xue Weihui



Seeing that hydrogen fuel cell-powered straddle carrier has been debugged successfully, I was so excited and finally felt relieved," said Li Kairu, ZPMC electronic control design engineer. For some time, he and his colleagues devoted all their efforts to this blue machine.

In recent years, apart from conventional "replacing oil with electricity" for domestic port machinery, China has been speeding up building new energy systems such as liquefied natural gas (LNG), hydrogen energy, wind energy and solar energy and trying to expand their applications. On the way of energy saving and emission reduction, ZPMC keeps pace with the times, actively explores green technology and upgrades its self-developed "one over one" hybrid straddle carrier. For this purpose, the original hybrid power system of "diesel engine + lithium battery" was successfully upgraded to a pure green power system of "hydrogen fuel cell + lithium battery".

This type of hydrogen fuel cell-powered straddle carrier is driven by electric energy converted from chemical energy of hydrogen reacting with oxygen in air. The whole cycle only produces water and heat without any harmful substances, which truly realizes "zero carbon emission" and fills the gap in the field of "zero carbon" for straddle carriers in the world. At the same time, hydrogen fuel cell-powered straddle carrier operates very quietly, with a noise of about 55 decibels, which is equivalent to the normal conversation of people. As a result, this new type of straddle carrier greatly reduces the environmental noise of the whole port.

"This system upgrade is a brand new attempt, so we have no experience to be learned from." Shao Chengjia, as the main person in charge of the project, started to overcome this technical problem together with his team members. He led his team members to consult a lot of data on hydrogen energy technology and domestic and foreign literature, visited hydrogen energy manufacturers, and conducted in-depth discussions with them about hydrogen energy characteristics and hydrogen technical specifications during the transformation of hybrid models. After repeated designs and revisions, he drafted the first type of hydrogen fuel cell-powered straddle carrier. However, theoretical research is far from enough for a technological innovation, and practical application is its ultimate goal.

Electrical debugging is the process of finding problems, solving problems and optimizing system design. However, before starting debugging. Li Kai, electrical engineer, was stumped by the fact that the workers at the base were afraid to install hydrogen fuel cells. "People think that hydrogen is a kind of very dangerous gas due to its flammable and explosive nature. In fact, it is not so dangerous. The density of hydrogen is very small. In case of leakage, it will evaporate quickly, and its risk factor is lower than that of natural gas," said Li Kai said. "The hydrogen fuel cell of straddle carrier is not installed in a confined space but on an open platform at its top. It is also equipped with a pressure detection device, which can sense hydrogen leakage in time." Therefore, the safety of hydrogen fuel cell-powered straddle carrier is guaranteed.

After more than a month of preparation, the hydrogen fuel cell-powered straddle carrier was officially powered on for debugging in early December 2021. In the cold winter, debugging engineers were as busy as bees. However, the first debugging was quickly halted.

When the hydrogen fuel cell power generator set was started, the instantaneous output power was far from the power required by the whole machine, and it took a long time to start the machine. "It's like that when we need to use the straddle carrier soon, it still starts slowly there, which drags down the efficiency too much," engineer Yao Hui explained. According to the result of the debugging, Yao Hui recalculated the energy demand, modified the corresponding program, and carried out experiment again. The first experiment failed, they tried the second time and the third time. In the end, he could not

remember how many times he modified the program. After strict calculation and repeated testing, Mr. Yao adjusted the power distribution output of lithium battery pack and hydrogen fuel system to achieve energy balance between them, and finally realized the stable operation of the straddle carrier.

"Hydrogen refueling is also a special concern of users." Shao Chengjia said. The application of hydrogen energy is an important direction of port energy structure reform, and the construction of hydrogen refueling station will also become a necessary project for a port. Moreover, straddle carrier has high mobility and flexibility. Compared with other port equipment, hydrogen fuel cell-powered straddle carrier can move to the hydrogen refueling station at the terminal to refuel hydrogen by itself. It only takes 10 to 15 minutes to refuel 40 kilograms of hydrogen, which enables the straddle carrier to run 9 to 10 hours per fill-up. After numerous on-site debugging, the efforts of all team members were paid off. The trial operation of the hydrogen

During debugging, mobile hydrogenation was also a difficult point for the new straddle carrier. At present, to refuel hydrogen to this type of hydrogen fuel cell-powered straddle carrier, a hydrogen refueling vehicle will be contacted to the base, so the hydrogen refueling cost is high. "We have debugged many times. Can we find a way to save the amount of hydrogen?" Shao Chengjia asked. "You can try the battery charger for debugging," someone suggested. "You'd better install a charging socket on the straddle carrier," another one said. The team members thought of various ideas. Finally, the blind charging mode was adopted to charge the straddle carrier to restore the function of the equipment, which saved the amount of hydrogen used in each debugging.

fuel cell-powered straddle carrier succeeded. Relevant users and university research teams were attracted to visit it, and the world famous magazine WORLDCARGONEWS also reported the product immediately.

"ZPMC is helping realize China's 'dual carbon goals' with its practical actions, and we have contributed our strength to building a green and low-carbon port!" the project members said proudly.

(Photo by Li Kai)

"Green commitment" at the Port of Long Beach

by **Li Tianvi**



the equipment.

On October 15th, 2022, LBCT, the first fully automated terminal built by ZPMC in North America celebrated the first anniversary of its full opening. From 2012 to now, ZPMC designed and built all the core equipment for LBCT over ten years, among which the equipment (phase III) includes 14 automated dual lifting and dual-car STS cranes, 69 ARMG cranes and 5 railway-mounted ARMG cranes.

the terminal completion ceremony.

As the benchmark of green seaport, the Port of Long Beach has adopted a series of environmental protection measures, such as shore power for cargo ships and green energy-saving management mode. These measures not only achieved "zero emission" in the port area, but also improved the environmental protection requirements for ZPMC's equipment. The project team embedded the concept of environmental protection into the project plan from the very beginning of project design, and designed a customized plan according to the needs of the user LBCT. The plan took solving the problems such as "energy consumption of equipment", "oil leakage of hydraulic spreader", "power consumption of lighting lamps" and building "new type of low-energy consumption electrical room" as the breakthrough point to build an "environmentally-friendly port".

Aiming at the problem of "energy consumption of equipment", the project team proposed a solution to optimize the electronic control system and equipped the electronic control system of port machinery with the function of 'energy feedback'. When the crane picks up a container, it will consume electric energy, but when it puts down a container, the motor turns into a generator to generate electric energy, which can be fed back to the power grid for recycling, thus achieving energy conservation and emission reduction," Yuan Yi, project engineer, explained.

After realizing the recycling of electric energy, they would solve the next problem of oil leakage of hydraulic spreader. To this end, the project department organized a meeting to study the tender, in which the user put forward the requirement of "applying all-electric spreader". Ten years ago, the mainstream products in the STS crane market were hydraulic type spreaders, which were driven by hydraulic oil and had the risk of oil leakage. Although all-electric spreader has the advantages

t sunset, the sky above the Port of Long Beach, **AUSA** was suffused with rosy clouds, and the environment was as comfortable as a park. STS cranes stretch out their "arms" in a line, looking so firm and powerful. "I have stayed with these STS cranes for ten years. They are like my own kids!" said engineer Zhao Wenfei, who was debugging

"The Port of Long Beach is one of the most environmentally-friendly seaports in the United States. We are really proud of it. The completion of the new terminal has fulfilled the commitment of Long Beach City to sustainable development and green technology application," Robert Garcia, Mayor of Long Beach, USA, said at

of no oil pollution and low energy consumption, it was rarely used in the market at that time. The project designers discussed hotly. "In order to meet the demands of users and fully achieve environmental protection, we will be a 'daredevil' to try it for the first time." By focusing on the direction, the project team immediately started to consult data, try and explore the new spreader. In the end, the all-electric spreader was successfully applied to the Port of Long Beach, which completely eliminated the problem of oil leakage and greatly reduced the energy consumption of equipment.

What is the leverage point to reduce power consumption? The key is to solve the problem of "energy consumption of lighting lamps". "LED light was a new thing at that time, and it was just launched not long before. The Port of Long Beach project was really 'fashionable'! " Project members recalled. In the past, STS cranes and ARMG cranes were illuminated by sodium lamps. Compared with sodium lamps, LED lamps are energy-saving and eco-friendly. The project team found that there are more than 120 high-power floodlights in a single device, and the 300-watt LED lamp has the same lighting power as the 1,000-watt sodium lamp has, so they immediately installed LED lights onto the STS cranes. "The longer LED floodlights work, the brighter they will be. It is no exaggeration to say that you can read newspapers at night under 50-meter-high STS cranes," sighed Zhao Wenfei when recalling it. The use of high-power LED floodlights not only met the design requirements of illumination, but also reduced the overall weight of equipment. At the same time, the power consumption of port lighting was saved by more than 50%, which was another highlight of the project.

In addition, ZPMC's new low-energy consumption electrical room brought a touch of green to the Port of Long Beach again. In the long-term container handling process, the drivers and modules in the electrical room and PLC room of STS crane have to endure extremely high temperature and humidity, so the rooms must be completely sealed. How to make a 50-square-meter room completely sealed? To this end, the project team had to work even more rigorously and make great efforts in equipment design and construction. "On the frame structure at the bottom of the electrical room, we carried out air-tight welding and sealed the gaps between cables in the threading holes, and conducted strict air-tightness tests to ensure a high-level sealing effect," technical director Chen Peng explained. These reliable, efficient and environmentally-friendly electrical rooms make constant contributions to the green Port of Long Beach, making energysaving measures more eminent.

"Environmental protection is not a trivial thing. With these measures, the environmental performance of LBCT attained a higher goal." Looking at these carefully cultivated "kids" that now have become "pillars", Yuan Yi was very proud.

After the delivery of equipment for the third phase project, LBCT ordered another four STS cranes and one railwaymounted ARMG from ZPMC in 2021, and the first batch of STS cranes was shipped from ZPMC's Changxing Branch on February 28th, 2023. "These orders are the biggest recognition of ZPMC's equipment!" Zhao Wenfei said firmly, "Building a green terminal is both the Mayor's commitment to the city and ZPMC's commitment to its user from Long Beach."

(Photo by Liu Yang)





Building a "green plant" on Changxing island

by Xue Weihui

n Changxing Island, Shanghai, 12 berths along the 5.5 km coastline of the Yangtze River stand colorful STS cranes. As the largest production base of ZPMC, Changxing Branch can produce 200 STS cranes and 500,000 tons of steel structures every year.

If you walk along the flood control road, you will see clean and tidy road surface, rows of green trees, dazzlingly beautiful Chinese roses stretching 1.5- kilometers long, and other colorful flowers in every corner ... It is hard to imagine that such an equipment production base looks so beautiful in spring. Changxing Branch attaches great importance to the environmental greening and beautification of the plant area and has invested a lot of manpower and material resources to upgrade the landscape greening of the plant area.

"Environmental greening is not we seek most. In fact, green manufacturing is our ultimate goal," said Fu Yongping, secretary of the Party Committee of Changxing Branch. ZPMC continues to promote green manufacturing and strives to build a "green plant" to help Changxing Island achieve the goal of building an ecological island.

Walking into the intelligent box girder workshop, you will

see pieces of steel automatically transported, welded, flexibly assembled and turned over, and only a few workers are operating and inspecting the production line.

The intelligent box girder workshop of Changxing Branch is the first intelligent production line in China designed for manufacturing box girders of large cranes, mainly used for welding and manufacturing gate frame connecting beam and straight section of column of STS cranes. The workshop (369 m L x 30m W) covers an area of 11,000 square meters in total, with an annual output of 600 to 900 pieces of components.

"The concept of intelligent box girder workshop is to build a lean, intelligent, green and digital workshop," said Chen Yonggang, manager of Steel Structure Manufacturing Department of Changxing Branch. The workshop is equipped with a splicing FCB welding workstation, which can automatically weld 8-10 mm sheets and form them at one time, and can also reduce use of carbon arc air gouging in the splicing process. In addition, the workshop is equipped with an angle steel grouping workstation, which can realize automatic handling of angle steel, find installation locations and conduct automatic grouping welding, and a sheet unit welding robot, which can integrate welding and adjusting weld path at any time. The welding robot for internal welding of three sides of box girder installed here can start automatic welding with one button and automatically correct deviation to solve product assembly deviation. The whole process of intelligent box girder workshop is fully automated. Therefore, the number of staff in the workshop has decreased by 26.7% compared with the traditional workshop, the product energy consumption also declined, the total manufacturing cycle of a product is shortened by about 7 days, and the pass–yield is over 99%. The workshop also adopts a welding fume treatment system independently developed by ZPMC, which can greatly decrease the concentration of welding fume particles.

Moreover, Changxing Branch transformed its traditional workshops with environmental protection facilities. For example, in the heavy equipment manufacturing workshop, a movable "suction arm" is hung above the welding point. The "suction arm" can suck away the smoke and dust generated during welding. After testing, after installing such facilities as "suction arm", the welding smoke concentration in the rectified workshop decreased by about 60%. The galvanizing workshop is equipped with a new generation of smoke and dust spray tower, acid mist spray tower, and top air supply equipment. At the same time, the comprehensive wastewater treatment equipment was upgraded, the old-fashioned air suction mode was improved, and an acid mist prevention partition was added in the workshop. The painting workshop is equipped with the most advanced waste gas end treatment device in China, which can paint over 100-meter-long large components indoor, and the proportion of indoor organized painting has increased from 40% to 85%, which fundamentally eliminated painting and paint mixing in open air.

In addition, Changxing Branch has made great efforts in treatment of air pollutants, water pollution control, and solid waste and hazardous waste management. For example, the initial rainwater collection and management has been implemented. As for seven major assembly sites, the Branch built a storage tank and a 5.4-kilomenter-long open channel for collecting rainwater. Rainwater in the first 15 minutes will be collected into the storage tank, then pumped into the treatment system and discharged after reaching the treatment standard. In order to strengthen monitoring the quality of ambient air, six automated air monitoring stations and one information monitoring center were built to track, monitor and analyze the pollutants in real time, and all the data are directly transmitted to the municipal Environmental Monitoring Center in real time.

"Speaking of the air monitoring stations, there's an interesting case. The monitoring center frequently sent alarms automatically last summer and everyone was particularly nervous. However, they went to various workshops to check but found no problems, so they even doubted that the monitoring instrument did not work. Finally, they found that the cicadas on the trees around the plant kept singing due to the hot weather, which was detected by the monitoring instrument," Miao Weihua, manager of the Safety Supervision Department of Changxing Branch, said with a smile.

In the plant area, mobile forklifts and flat cars are the main means used to transport machinery. If these vehicles are not dispatched orderly, diesel oil will be wasted unconsciously on the way. Changxing Branch adopts the general man-hour quota management system. If a department wants to use a vehicle, it only needs to apply for it on the mobile app, and the information can be synchronized to the computer screen of the Centralized Control Center. After that, the staff of the Centralized Control Center will arrange a vehicle in its managed area according to the principle of proximity, saving the amount of oil consumption during unloaded running. According to Xu Peng, dispatching head at the Centralized Control Center, using digital and intelligent means to dispatch vehicles near the center can reduce diesel consumption by 639,600 liters on average in one year.

In addition to energy conservation and emission reduction. Changxing Branch continuously optimizes its energy structure steadily. As early as in 2018, Changxing Branch began to build a distributed PV power station and put it into production. According to statistics, the 21 MW distributed PV power station of Changxing Branch can provide 17.38 million kWh of electricity for the plant area annually on average, and its consumption ratio is up to 98%. The PV power station occupies a total of about 200,000 square meters of workshop roofs, involving roofs of 13 workshops. The station not only helps the Company make rational use of idle roof resources, but also saves electricity cost. In addition, the green energy will also be used for production and operation, injecting clean energy into the Company's green transformation. Therefore, the power station has achieved multiple goals. In recent years, Changxing Branch gradually replaced the original 12 dieselfired boilers and 2 diesel-fired water boilers with 53 air source heat pumps and 2 electric heating water boilers, which are more energy-saving and environmentally friendly.

Green energy will underpin the high-quality development of ZPMC. The "green plant" built by ZPMC implements the new concept of green development throughout the whole manufacturing process, making a "window" of ZPMC's transformation for green development.

(Photo by Ji Xueqing)





Ambient air quality monitoring station



Robot welding workstation for welding lifting lug plate for heavy components



Still worrying about a parking war? Smart parking gets your troubles off!

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by Chen Jiangang

n recent years, with the application of cutting-edge technologies such as big data, cloud computing and AI, the construction of Digital China and Smart City has become a national strategy and reached consensus by all cities for their layout of future development. Smart parking, as a new infrastructure in modern cities, has become an important entrance and leverage for building Digital China and smart cities.

In 2017, ZPMC began to enter the field of smart parking business. Adhering to the concept of independent innovation, ZPMC aims at solving the pain points in the process of urban construction and renewal and explores the full-scenario solution of smart parking and the service model of the whole industry chain in depth. It is committed to becoming a leading smart parking equipment provider, urban public parking service provider and public parking facility investment operator in China. In the field of parking business, ZPMC has won 6 awards and applied for 98 patents and copyrights of software works, of which 57 were authorized, including 3 invention patents and 19 software work copyrights.





Xiao Wang drove his car home after a week of busy work. However, he could not find a parking space even circling the community twice. Why is it so difficult for a driver to find a parking space?

According to the statistics of the Ministry of Public Security, the vehicle parc in China reached 417 million in 2022, including 319 million cars, accounting for 76.49% of the total number of motor vehicles. As the total car parc in China keeps increasing, the phenomena of "parking difficulty" and "parking disorder" are becoming increasingly serious.

How can we alleviate parking difficulty? To solve this problem, smart parking emerges. Based on parking resources, AI, wireless communication and GPS positioning, mobile terminal and other technologies are comprehensively integrated for the status collection, management and inquiry, reservation, payment and navigation for urban parking space, thus realizing the modern parking service mode featuring maximized utilization of parking resources and optimized service for car owners.



Automated stereoscopic garage for large commercial vehicles



Mechanical stereoscopic garage for buses

With the application and promotion of smart parking, parking management is gradually intelligentized and refined. Smart parking not only saves time for car owners to find parking space, but also significantly improves parking order. At present, smart parking has been gradually put into operation in above tier 1 cities and tier 1 cities, forming an industry demonstration effect within the region and gradually promoted across the whole country.

Thanks to the support of many national guiding policies, smart parking ushered in strong development momentum. In January, 2022, the State Council outlined a Modern Comprehensive Transportation System during the 14th Five-Year Plan (2021-25) Period, proposing to accelerate the in-depth popularization and application of intelligent technology, promote the in-depth integration of new technologies such as Internet, big data, AI and blockchain with the transportation industry, innovate the operation and management mode, and advance the development of smart parking. In May 2021, the National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development issued the Opinions on Promoting the Development of Urban Parking Facilities. As stipulated in the Opinions, by 2025, an urban parking facility system will be basically established in all cities with parking lots as its focus, public offroad parking facilities as its support and on-road temporary parking areas as its supplement. The system will attract positive participation of social capital, realize an in-depth integration of information technology and parking industry and effective utilization of parking resources, and form orderly parking in cities, promote governance according to law and social participated administration of parking.

With the strong support from the government, many Internet companies, including Tencent, Alibaba, Baidu and other big companies have also begun to enter the parking industry. However, facing the flourishing development of smart parking industry, there are several issues of special attention.

Firstly, the smart parking platform has not been fully utilized. With the advent of the 5G era, digital technology has been continuously improved. A city-level parking platform has been or is being built in nearly 300 cities and counties across China, and the digital transformation of the industry has achieved remarkable results, and shared parking platforms have become a mainstream trend. Now the smart parking industry has entered an important development stage integrating resources, technology and platform. However, as the enterprises rushing into the parking industry have no real connection between each other, there is a phenomenon of "isolated data island", resulting in the fact that a lot of resources

have not been fully tapped, and smart parking platforms and corresponding Apps have not been fully utilized. In the future, how to deeply integrate industrial resources and break the isolated data island will be an urgent problem to be solved to promote the development of the smart parking industry.

Secondly, parking difficulty in county-level cities has become very serious. The General Office of the CPC Central Committee and the General Office of the State Council issued the Opinions on Promoting the Urbanization Construction with County Town as an Important Carrier. As the Opinions proposed, by 2025, significant progress will be made in the urbanization construction with the county town as an important carrier, and the weak points of the county town will be further supplemented and strengthened. According to the data in the latest statistical yearbook of Zhejiang Province, the car parc of the top ten counties in Zhejiang stays at a high level, which has caused "parking difficulty" to rise in these counties, and there is a large gap in parking space, so the demand for alleviating "parking difficulty" in all of these counties is more urgent. Supplementing and reinforcing the weak points in parking space is also an important part of the urbanization of county towns. Enterprises engaged in the smart parking industry should closely follow the national policies and the actual needs of cities and expand their business to county-level cities.

Finally, there are hidden risks in PPP parking projects. Smart parking through PPP is a new parking service model, in which the government and social capital establish long-term partnership and apply advanced technologies like smart parking system in urban parking space management to realize maximum utilization of parking resources and optimized parking services. Since the Ministry of Finance promoted the PPP projects in 2015, the number of successfully signed parking projects through PPP has increased year by year, and the participation of social capital in the investment, construction and operation of parking lots has become an important channel for local authorities to promote the construction of parking lots. By cooperating with the government, social capital can be invested quickly to compete for local market resources, and revitalize and integrate city-level smart parking platforms. However, at present PPP projects still face risks such as long capital recovery period, high operation and maintenance cost, and low economic benefits in the short term. Therefore, based on establishing a sound return mechanism and ensuring sufficient capital, all stakeholders should increase more efforts to conduct in-depth investigation on business model, development orientation, core technology and market research.



Finally, promote the construction of county-level smart parking projects. As China's top 100 counties have high economic development level and high car parc, there is a high demand of parking lots and a large gap in parking space. Enterprises engaged in the smart parking industry can gradually expand their business from the tier 1 cities and central cities to the surrounding top 100 counties (districts) to realize the county-level development of the parking industry. "Smart parking" brings wisdom to the parking industry and



But how can the smart parking industry find a way to solve the problems aforementioned?

First of all, strengthen cooperation with local governments. More attention should be paid to the mechanism of multi-user payment and fiscal subsidies continuously optimized by the State, especially local governments. From the perspective of giving consideration to the government's appeals for public welfare and the reasonable return required by social capital, conduct strategic cooperation and business cooperation with local governments, urban investment companies, and other counterpart departments and enterprises in terms of project construction, industrial investment, operation and maintenance, commercial support and other aspects.

Secondly, improve technical research level. Intelligentization and informatization plays a vital role in realizing the efficient sharing of parking facilities and improving the operating efficiency of the parking industry. On the one hand, attach importance to modern technologies such as 5G applications. Explore and build a smart parking research platform based on smart parking products and guided by intelligent services to create differentiated advantages. On the other hand, actively build a city-level smart parking cloud platform, promote the integrated development of parking and the Internet, realize the comprehensive networking of parking information across the city, and improve the utilization efficiency of parking resources.

Thirdly, optimize the industrial layout. The dividend from parking industry-related policies has been released in a concentrated way. All provinces and cities have issued policies from various angles, among which the policies in economically developed areas are more active and systematic. For Beijing-Tianjin-Hebei Region, Yangtze River Economic Belt, Guangdong-Hong Kong-Macao Greater Bay Area. Yangtze River Delta, Chengdu-Chongqing Economic Circle and other regions with strong policy support, good economic foundation and excellent payment conditions, enterprises can expand the smart parking market in all directions, promote their operating resources to the market in small cities and optimize the industrial structure.

helps citizens realize "smart mobility". Smart parking will be a crucial component of urban infrastructure in the future. Only by seizing the development opportunity of smart parking can ZPMC lead the future trend of the parking industry. 🕻

(Photo by Shen Yi and Wang Ze)



Tailored "shoes" for the legs of offshore wind power installation platform

by Xue Weihui

Can we design differentiated legs and shoes to reduce the weight of the platform?"

"We should design the legs and shoes according to the traditional method. After all, we have experience and data available ..."

"We have never made differentiated design before. We have to do a lot of experiments to verify it, and it will take us a long time to do so, but we may not make a success."

That was a scene of the internal discussion about CCCC Haifeng's 2500-ton self-propelled self-elevating offshore wind turbine installation platform, and the project design team discussed whether the legs and shoes of the platform should be designed in a differentiated manner.

In recent years, the trend of developing large deep-water offshore wind turbines has clearly emerged, which not only increases the difficulty in building offshore wind power projects but also puts forward higher requirements for wind turbine installation platform. CCCC Haifeng's 2500-ton self-propelled self-elevating offshore wind turbine installation platform features multiple functions such as transportation, leg-driving and hoisting, and can meet the integrated construction requirements

of large-capacity wind turbines in open seas in the future. It was designed and built by ZPMC, and its main crane, hoisting system and other core supporting equipment were independently developed by ZPMC. The project shows that ZPMC has officially opened a new chapter in the design of large-crane deep-water truss structure round-leg wind turbine installation platform, which is of milestone significance.

"The comprehensive performance of the platform ranks first in China, and it is the powerful tool for China to move its offshore wind power operations from coastal waters to open seas," said Chao Shifang, overall design engineer of the project. The platform can sail to any navigable waters and carry two sets of 15 MW wind turbine units. At the same time, it has superb hoisting capacity and can meet the installation requirements of large power offshore wind turbines (hub: 150-meter-high hub; power:15 MW); the legs are of triangular truss structure, with a total length of 120 meters and a maximum working water depth of 70 meters.

The legs bear the dead load of the platform, the working load and the environmental load and are one of the most important bearing structures of the platform. Leg shoes, featuring large size, high bearing capacity, are arranged at the bottom of the legs

and can improve the geological adaptability and stability of the wind turbine installation platform. In the traditional design, in order to ensure the safety of the legs and the shoe structure, large structural redundancy will be reserved. However, if the structures are too strong, the cost and construction difficulty will rise correspondingly. Moreover, the weight control of self-elevating wind turbine platforms is extremely high demanding. For this reason, some team members proposed to design the legs in a differentiated manner. However, when they advanced the design, they gradually found that the differentiated design would reduce the leg capacity and go against the hoisting of the platform and some special operation modes.

For a time, the concept of differentiated design was questioned by everyone. "The design of the legs cannot be changed, but we can try to change the shoes on them. We should be bold and careful in making innovation and should not hesitate due to our concerns." The core team members of the project gradually reached a consensus. The engineers regained their confidence and began to study the differentiated design scheme for the leg shoes.

One of the decisive working conditions of leg shoes is that the vertical load on leg shoes will reach the extreme value when the platform is standing for hoisting. After preliminary calculation, when the platform operates while standing, the maximum vertical load of the leg shoes supporting the main crane are much higher than that of other leg shoes. Can we make differentiated design and ensure the same design safety margin while meeting the actual capacity needs? A brainstorm started again.

"It is not difficult to put shoes on the legs, but we have to consider a lot to customized shoes for the legs," Jin Jing, project structure calculation engineer, said frankly.

"It is not comprehensive enough to only consider the load on the shoes when the platform stands up. For this platform, we drive the legs with the diagonal method, and we should also consider the load of the leg shoes diagonally opposite to the main crane when driving the legs." "The legs and shoes should ensure safety when the foundation is uneven and inclined." "When the legs are lowered down, the hull will sway, which will cause impact load to the shoes when they touch the mud surface. This should also be considered." All of them discussed the design hotly. Finally, everyone agreed that they had to rely on data, and it would be effective to optimize the shoes by reducing even 10% of their weight. Finally, through detailed calculation and analysis, they believed that the differentiated design scheme was feasible, and the shoe weight reduction effect was very impressive.

After the differentiated design of leg shoes was completed, the design form of the outer plate for the shoe

recovery hole arose as a new problem. "The design speed of the 2,500-ton wind turbine installation platform is not less than 9 knots. The original design will produce great resistance when the platform sails," said Yan Shifang. Based on the analysis of hydrodynamic model conducted by the project team and external units, they think that the outer plate for the shoe recovery hole around the leg well can be closed and optimized to eliminate the steps and reduce the hole opening area, and keep the status of the "dead water area" in the well as much as possible, so as to effectively reduce the hull resistance and achieve the target speed. After the design optimization scheme of the outer plate for the shoe recovery hole was determined, the key of the design was to ensure its safety and feasibility. The project team immediately verified the design with the ship model test. "The results of the ship model test shows that the hull resistance can be significantly reduced after the design was optimized, which reached our expected goal." Chao Shifang said excitedly.

"Every time when our design team adjusted the scheme and optimized the design, we always considered it from the perspective of the overall interests of users and our company. We designers should work harder to take every detail seriously and strive for excellence." said Zhang Jiaqi, detailed design technical manager of the project. At present, the tailored "shoes" for the 2,500-ton selfpropelled self-elevating offshore wind turbine installation platform have been built and installed, and will show their advantages after the platform is delivered for use.

(Photo by Zhang Jiaqi)





China-Mongolia Port ushers in intelligent unmanned cross-border "porters"

by Lu Yivan

∩ anqimaodu port is the largest road port for freight between China and Mongolia. The cold northwest wind is sweeping degrees Celsius in February, it does not affect the hot busy scene

manufactured by ZPMC for Mongolia. Compared with ordinary and real-time customs declaration while running, which greatly improves the customs clearance efficiency at the port.

Mongolian user, symbolizing that ZPMC's products have officially China-Mongolia AGV project manager, said excitedly.

This transnational cooperation derived from the fact that the has been affected by the COVID-19 pandemic in recent years, thus decreasing the customs clearance volume between the two users hoped that ZPMC could provide a solution for automated transportation. ZPMC proposed to use hybrid AGV for crossthe whole process without any contact. At that time, there was no automated cross-border transportation vehicle in the world.

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"In recent years, ZPMC's AGV has been applied at many automated terminals such as Oingdao Port, Yangshan Port and Nansha Port, but it is the first time for ZPMC to use it for cross-Zhu Falin added. Compared with the application scenarios in of AGV's operation and scheduling has to be much higher. In addition, the safety of AGV working in the interactive area is also are interacting with STS cranes and RMG cranes. However, these cross-border AGVs need to interact with manually driven front

"To this end, we specially added the safety interlock function in the working area, AGV will automatically stop entering such area, and it will automatically resume operation until the area is

of the project.

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In addition, considering the harsh natural environment of Gangimaodu Port, the team of ZPMC specially developed a hybrid suit of "protective clothing" based on heat insulation and warm-

"We have developed an intelligent heating system for the lithium warming up function, which ensures the normal operation of the AGV designer of the project.

burying the first magnetic nail to the trial operation of the project. project site to check the conditions of AGVs to run on every day.

is no obstacle," said Wei Xin, head of the fleet management system monitor the operation of AGVs, and it is after 8 p.m. in the evening that he begins to handle various work independently.



so we have to test the batch of new AGVs after that time, so it is December 31, 2022, when Zhu Falin fed back various debugging problems to the WeChat group as usual, it was already "00:16 said with a smile that AGV crossed the border between China and

Efforts will be rewarded. On January 18th, 2023, the Deputy operating in Mongolia, and inspected the six new AGVs still in the Chinese park in an online manner. He expressed his affirmation When hearing that, Zhu Falin and other team members were very

operation. In the future, another batch of 24 AGVs will join the cross-border transportation fleet. Thus, ZPMC contributes its efficient customs clearance, intelligence, green and safety. 🕺

(Photo by Zhu Falin)

The welding spark illuminated road of craftsmen

by **Li Tianvi**



In our hometown, carpenters who make furniture and build houses are called craftsmen, and they are highly respected in the society." In his childhood, Weijun hoped to become a respectable craftsman, which inspired him to become a welder when he grew up.

In 2007, Wei Jun, who was 29 years old, joined ZPMC's Changxing Branch. 16 years have passed in an instant. Now he has become a famous technical expert and has won many honorary titles such as the State Council Special Allowance Expert, national technical expert, Shanghai May 1st Labor Medal, Shanghai model worker, Shanghai craftsman, "100 outstanding craftsmen" of central enterprises, "individual special merit" winner in the "third battle" for connecting Hong Kong-Zhuhai-Macao immersed tube tunnel, and one of the specialclass technicians of CCCC. At the same time, he also acts as the leader of Model Worker Wei Jun's Technology Innovation Studio, and has already become a "star welder" in ZPMC.

However, the growth journey of "star welder" Wei Jun is not as right as rain. In the second year after he became a welder, his welding skills were almost on a par with those of the old welders. Then, the young man had a swelled head in his work. When performing a welding task, he was full of confidence in the beginning. Later, he was informed suddenly that ultrasonic inspection would be carried out due to stricter inspection requirements. "The inspection results showed that my pass rate was very low, but the weld joint pass rate of the old welders was as good as usual."

This incident shocked Wei Jun greatly. "No matter what you do, you must try your best to do it well. You can't think that this matter is not important, so you need not take it seriously. You should take every weld joint seriously." Since then, he has a serious attitude in his work and tries his best to complete every weld joint beautifully and neatly.

Opportunities always favor those who are prepared. In 2013, Wei Jun, representing CCCC, participated in the 10th "BENARDOS" Cup International Welding Competition sponsored by Ukrainian Welding Society. He won the first prize and was granted the only international welder certificate "Best Welder". In 2015, "Model Worker Wei Jun's Innovation Studio" was established. The "10-step welding operation method" summarized by him has been applied to many major projects at home and abroad, effectively

improving the welding quality.

Expertise is the result of ten years of hard practice. When Wei Jun joined ZPMC for ten years, he received the task of welding for the Hong Kong-Zhuhai-Macao Bridge, a century project. Different from the previous welding forms, the welding task had to be carried out in a closed space underwater. After the final joint of the immersed tubes was completed, although there was a waterstop device equipped to make the joint watertight, the weld joint must be perfectly seamless to make sure that it was completely leakproof.

how to weld underwater? The humidity in the cabin was as high as 80% or more, which may cause pores, deformation, crack or even fracture in the weld joint that could not be observed by naked eyes. Since it was impossible to avoid humidity, the best solution was to reduce humidity to avoid pores, which requires preheating the part to be welded to 150 degrees Celsius within 10 minutes.

However, the high temperature of 150 degrees Celsius may burn the rubber waterstop and cause it to beak. "Outside the gate is 27-meter-deep seawater." The waterstop, like an outer wear tightly protecting each immersed tube, is only 20 cm away from the weld joint, and the highest temperature that it could withstand is 150 degrees Celsius. "We have to weld 7-8 layers on a 28 mm thick steel plate. My colleagues and I must accurately control the welding temperature when welding each layer." Once the waterstop was burned through, the consequences would be unimaginable catastrophic, which made Wei Jun and his workmates have to work extremely carefully during each welding operation. Thanks to Wei Jun and his team's welding practice for more than 50 days and nights in the simulated real working environment with a 100% simulated final joint section, they successfully completed this challenge by adopting the "advanced welding operation method". In such an extreme environment, they had a very huge physical consumption. "At that time the project department provided each of us a 3-liter kettle, and each of us had to drink two or three kettles of water a day."

May 25th, 2017 is really a memorable day. After 20 days of shift work, they finally completed the welding task for the Hong Kong-Zhuhai-Macao Bridge. Due to other work arrangement, they had to return to Shanghai early the next morning. On the bus from Zhuhai to Shanghai, this group of "perfectionists" of welding sat in fatigue and fell asleep.

Forge ahead with heavy burdens. Wei Jun has successfully completed difficult tasks for major projects undertaken by ZPMC. Under his leadership, the welding team completed a lot of welding tasks of major projects at home and abroad, such as San Francisco-Oakland Bay Bridge, 7,500-ton crane vessel, IME pressure vessel production qualification certification, 28,000-ton floating crane boom reworking, Belgian gate project, Hong Kong-Zhuhai-Macao Bridge tunnel final joint project, 6,000-ton derrick pipelay vessel,





and Asia's largest offshore wind power flexible transmission project. Today, apart from tackling difficult welding problems, Wei Jun spends more of his energy in mentoring other welders in his studio. Seeing his apprentices learning welding technology, he always recalls his own growth experience. He is determined to make more efforts to help them achieve growth and transformation in their life. "Seeing them win prizes, I am much happier than when I won a prize for myself!" In 2021, Feng Chunlin and Zhao Chuanjun won the third prize in the Jiake Cup Welding Skills Competition, and Geng Chaoan and Zhang Meilong won the Excellent Player Award. They all had a common teacher - Wei Jun. "I only have one pair of hands. No matter how good my welding is, I can only weld so by myself, but I have taught my welding skills to many apprentices, they will achieve greater value in the future." As a welding master, Wei Jun not only continuously realizes his value of life, but also cultivates a lot of dedicated "welders" with solid skills for "Made in China". In the ordinary life, Wei Jun shows an excellent self and helps his apprentices achieve a wonderful "welding" life.



In 2017, Wei Jun participated in the construction of the Hong Kong-Zhuhai-Macao Bridge project

Wei Jun is teaching his apprentices

(Photo by Chen Hongjun and Liu Yin)



Little artists from the mountain

by **Li Tianvi**

Welcome to our stall to have a look. The handicrafts sold on our five stalls were all created by the children from Yunnan. There are clay paintings, hand-made cloth bags, baskets and sandals..." On February 9, at the cultural & creative works fair celebrating the 30th anniversary of ZPMC, the lobby on the first floor of ZPMC headquarters was crowded with people, and the "stall owners" of cultural & creative works started to "sell goods".

The proceeds from selling the handicrafts for charity and the cultural & creative works for celebrating the 30th anniversary of ZPMC at the fair will be donated to the kids of Yong'an Community Kindergarten and Zhenhua Kindergarten in Tu'e Township, Lanping County, Nujiang Prefecture, Yunnan Province. There was a magic "connection" between the kids' handicrafts and ZPMC's employees thousands of miles away. With the warm friendship conveyed during the event, the kids' talents in making handicrafts were fully displayed at the fair.

The "little artists" in Yunnan prepared these handicrafts

long time ago. But how did they create these exquisite clay paintings? "Our kids have been learning clay paintings since they were in the youngest class of our kindergarten. They learned from the most basic skills of rubbing and pressing clay mud, when they studied in the middle class, they could express Yunnan's distinctive costumes in the form of clay paintings," said Huang Qiuxiang, teacher working at the Yong'an Community Kindergarten.

Lama nationality, as a branch of Bai nationality, is also a unique nationality in Yunnan. Because teacher Huang is a Han nationality, she had a hard time teaching the kids to present the traditional costumes of the Lama nationality with clay paintings. "Madam, I will bring you my grandmother's ethnic clothes here tomorrow, and you will know what the clothes of the Lama nationality look like!" Yang Qixin, a 5-year-old child, told her.

Lama costumes are mainly in red, blue and black, composed of a blue towel used for wrapping the head, a long collarless linen gown, and a skirt spliced with black and red

cloth. When the costume took shape, the kids began to mold the face of the character. "Madam, if we mold the nose separately, it will stand upright," the kids discussed enthusiastically. In addition to the three-dimensional characters, makeup was also indispensable. "We bought the cheapest cheek color so that the kids can make up the doll," Teacher Huang said. Three days later, the clay painting "Lama Girl" was born. Seeing her sparkling big eyes, people may wonder what's on her mind.

Outside the kindergarten are multiple ranges of green mountains. Yu Xiuchun, a 5-year-old girl, painted the beautiful scene on paper. As an introverted girl, she has excellent artistic skills. Taking linen as the bottom, she wrapped it on a piece of paperboard layer by layer, and painted on the paperboard carefully. It took her two periods to complete a work.

The local traditional weaving technology in Yunnan has been passed down for thousands of years. In Zhenhua Kindergarten in Tu'e Township, Xu Shutong, a 6-year-old girl with a pair of ponytails in a red garden uniform, was weaving colorful threads on a children's loom. She wound the thread from the left side of the loom to the right side very carefully. At that moment, she determined to make a beautiful cloth bag. "Let out the thread a little," Teacher Zhang Yumei was instructing. "It is rather difficult for the kids to use the improved loom. Sometimes the thread will be knotted, but they studied hard. Xu Shutong could only weave a piece of 1-cmlong cloth in one period. Her grandmother and mother are very good at using the most traditional loom of Nu nationality, and their parents will also help embroider on the cloth after she comes back from school," the teacher introduced. After more than four months of their efforts, a cloth bag filled with the family's deep affections was born. After crossing thousands of miles, it came to ZPMC's 30th anniversary cultural & creative fair.

In the process of preparing handicrafts for the charity sale. the kids also gained a sense of accomplishment. "Our kids feel that they are so powerful that they can show their works outside," Teacher Zhang recalled. "I saw my grandmother knitting at home yesterday, and I will have learned all the knitting techniques from my grandmother!" Li Jianyong, a little boy, said proudly to a little girl in the process of knitting cloth.

These small handicrafts symbolized great love. This charity sale lasted for 5 days, and all the proceeds of more than RMB30,000 will be used to improve the learning and living conditions for the kids from the kindergartens. By attending this charity activity, ZPMC's employees had a chance to feel the folk culture of Yunnan and experience the warm friendship between Shanghai and Yunnan. In the future, ZPMC, as a central enterprise, will continue to fulfill its social responsibility, empower for a better life, and create greater value for the society.

(Photo by Chen Di)



Yang Qixin is carefully making a paper pulp painting.



Yi girls are going to the fair.



In Zhenhua Kindergarten in Tu'e Township, the children are weaving cloth bags with children's looms.



Xu Shutong is playing a Lama Girl local game on the hill.



"Overseas Talent Center" skillfully addresses the ship unloading "crisis"

by **Li Tianyi**

WArvind, you are the backbone engineer of ZPMC's Overseas Talent Center. Thank you and your colleagues very much for helping us out of the unloading crisis of the PNG project!" Mo Fei, PNG project manager of the Australian subsidiary of ZPMC's Indo-Australia Regional Center said excitedly on the other end of the phone line. ZPMC just won a battle with "full preparations", behind which the advantages of its Overseas Talent Center as a talent pool gradually emerged.



In late November, 2022, ZPMC built two STS cranes for Papua New Guinea and shipped them towards the user's terminal soon. "The STS cranes will arrive at the shore soon, but your unloading and commissioning team have not come here. What can we do?" The user asked anxiously. Due to the influence of the COVID-19 pandemic, the ship unloading team was stuck in China, and the on-site work was imminent. At that time, everyone was a little anxious.

"It's time for our Overseas Talent Center to show its capabilities!" Mo Fei immediately started plan B when hearing that the team was unable to go abroad. After communicating and coordinating with the relevant person in charge at the Indian subsidiary of ZPMC's India-Australia Regional Center, ZPMC's Overseas Talent Center dispatched 11 unloading engineers and 5 commissioning engineers to form a "fire brigade" to fly to Papua New Guinea to participate in the ship unloading task.

In fact, ZPMC's newly established India subsidiary started to build a localized talent pool as early as in 2014 On the one hand, the talent pool will actively cooperate with domestic engineers to improve the efficiency of delivery; on the other hand, it will be used to train localized engineers and reserve talents. Apart from actively exploring the market and completing project tasks efficiently, ZPMC's Indian subsidiary has successfully established a team of local engineers with excellent professional quality through nearly ten years of hard work.

The talent pool, based on India and Australia,

On November 29th, 2022, two STS cranes arrived at the port of SPICTL in Papua New Guinea

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The unloading team members are discussing the unloading process.

aims to serve the world. Relying on the rich local human resources, ZPMC's technological advantages and Australia's international status, the Overseas Talent Center was established at "the right time and the right place with right persons". ZPMC recruited a large number of professionals in engineering technology, project management, etc. through professional recruitment websites, talent agencies and recruitment at the cooperation project sites.

For these talents, ZPMC's Indian subsidiary provided them with all-round trainings in terms of policies, regulations and professional skills. These localized talents quickly integrated themselves into the working atmosphere of the subsidiary through learning and practice. In case that the engineers from ZPMC's Headquarters can't go abroad, these localized talents can smoothly complete all kinds of delivery and project services through remote online guidance. Arvind is one of these talents, and he was invited to participate in the PNG project. After receiving the notice, he immediately got the visa, flew from Mumbai, transited at three airports and finally arrived at the destination. It took Arvind and the other project team members 35 hours to enter Papua New Guinea before the STS cranes docked.

On November 29th, 2022, many overseas media reporters, together with Arvind and other unloading and commissioning engineers, gathered at SPICTL's port, waiting for the arrival of the STS crane carrier.

At 3 p.m., a large container vessel slowly entered SPICTL Port of Papua New Guinea. The engineers at



ZPMC's Headquarters joined forces with the engineers acted as "Cloud Command" through the real-time camera and worked with the engineers at the site to unload the ship. "The first STS crane has been successfully unloaded!" Hearing this, the engineers working online at two places which are thousands of kilometers away from each other felt so happy although they were in fatigue. Through remote cooperation, the project team smoothly unloaded two STS cranes in only five days, which laid a good foundation for the subsequent delivery of cranes. "Thanks to the trip to Papua New Guinea, I learned new technical points and developed new professional skills!" Arvind said excitedly. "I hope to have the opportunity to study in China in the future and communicate with the engineers at the headquarters."

By far, the Overseas Talent Center has successfully completed some projects. For example, it independently undertook the unloading and delivery project in East Timor, and the team members of ZPMC's Indian subsidiary were received by the Prime Minister of East Timor. Moreover, the engineers were sent to the United States, Australia, Myanmar, Thailand, Malaysia and other countries to participate in the commissioning and delivery work for several projects, and established five overseas temporary delivery teams during the period when the worked there. In the future, apart from unloading and delivery of equipment, the Overseas Talent Center will also arrange its commissioning engineers to carry out overseas work such as CPS debugging in Malaysia, after–sales service in Saudi Arabia, on–site debugging in Kenya, and after-sales service in Australia.

The key to making innovation is to attract talents. "The Overseas Talent Center is committed to training employees," Li Qiang, head of ZPMC's Indo-Australia Regional Center, said. "We hope to build a comprehensive team that is completely composed of localized personnel specializing in technology, production and operation." ZPMC not only provides systematic training for its employees of foreign nationality, but also customizes online courses for overseas "rookies", and Chinese engineers provide pre-job training for new employees. "With trainings given by professionals and led by senior experts, we have a strong sense of belonging," said Parth Kansara, an engineer who just joined ZPMC's Overseas Talent Center.

Today, ZPMC's Overseas Talent Center has become an innovative benchmark for its overseas talent construction, and the successful completion of PNG unloading project demonstrated the advantages of the Overseas Talent Center. As the pilot project of CCCC's internationalized strategy of cultivating talents, the Overseas Talent Center will gradually improve its overseas talent management system in a scientific way and fully advance the transformation and upgrading of CCCC from a "company engaged in international business" to an "internationalized company". "We must continuously promote the localization of our overseas talents and establish a high–quality international talent team to achieve veritable win–win cooperation," said Li Qiang.

(Photo by Swathy Sasidharan)