



ZPMC's cipher for automated terminals

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SHANGHAI ZHENHUA HEAVY INDUSTRIES CO., LTD.

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倾听 ZPMC 的声音

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振华重工

SHANGHAI ZHENHUA HEAVY INDUSTRIES CO., LTD.

自动化码头的“ZPMC 密码”



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- 【海外故事】挪威初印象

内部资料，免费交流



《儿时的夏天》
作者：李亭杉



《清风廉韵》
作者：茆治

智慧码头 未来已来

文 / 薛韦慧

巨轮到港，装卸繁忙；大船远航，劈波斩浪。港口是全球物流通道的重要枢纽，是国际贸易货物的集散中心，是全球产业链供应链的重要环节，对全球经济运行起到至关重要的作用。为提升港口核心竞争力，世界一流港口纷纷走向自动化、信息化、智能化，作为港口最重要的组成部分，码头自动化是应有之义。

1993年，全球第一个自动化集装箱码头在荷兰鹿特丹 ECT 码头建成。30年间，自动化码头在全世界的各大港口蓬勃发展。据相关数据统计，目前，全球自动化码头已超百座。其中，中国已建和在建规模均居世界首位，亚洲的日韩、新加坡、阿联酋自动化码头建设也较为领先；欧洲除鹿特丹港、伦敦港、利物浦港等传统知名大港外，更多小型港口如爱尔兰贝尔法斯特港、波兰格但斯克港、爱沙尼亚塔林港等也开始自动化码头改造；美洲、大洋洲自动化码头数量已超15个，非洲目前也已有第一个自动化码头。

自动化码头数量突飞猛进，技术进步是主要原

因。进入21世纪，随着岸桥、轮胎吊以及跨运车等主要港口作业机械的自动化技术发展，第一个十年间自动化码头新增数量突破两位数；第二个十年间，得益于远控技术、能源技术发展，自动化技术改进，自动化码头新增数量占比接近35%。2020年以来，疫情冲击凸显了自动化码头优势。相对于传统码头，自动化码头可以减少人员数量和人员接触，提高码头的效率 and 安全性。因此，自动化码头得到更多关注和投资，近三年来全球新增自动化码头超过30个。

据了解，未来两年，全球将再新增自动化码头近20个，自动化码头已成趋势。开发新码头时，考虑引入自动化码头成为常态；改造传统码头时，自动化升级成为新浪潮。

回望过去，自动化码头发展的三十年熠熠生辉；展望未来，自动化码头“智慧绿色”的美好画卷已徐徐展开。作为全球自动化码头建设的引领者，振华重工将与港口合作伙伴们同心同向同行，见证智慧港口时代的来临。





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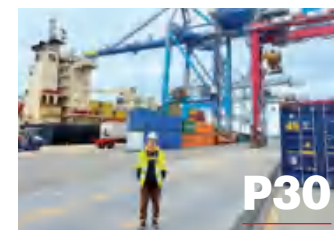
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振华重工

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编辑部联络方式：
地 址：上海市浦东新区东方路 3261 号
邮 编：200125
电 话：+86 21 58396666#83337、83838
传 真：+86 21 58399555
电子邮箱：news@zpmc.com

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自动化码头的“ZPMC 密码”

文 / 薛韦慧

北部湾港钦州自动化码头

浩瀚的大海,长长的码头岸线,来自世界各地的集装箱船舶进出频繁,岸边一排高耸入云的自动化岸桥正在流畅高效地抓取集装箱,一辆辆自动导引运输车穿梭不息,后方堆场上的自动化轨道吊行云流水般吊起放下集装箱。空无一人的自动化码头,万箱云集货如轮转,实现全流程“安全绿色智能高效”作业。

多年来,振华重工不懈探索自动化码头领域,在国内外打造了近 60 个自动化码头项目,掀起低成本、短周期、全智能、高效率、更安全、零排放的自动化码头浪潮。通过厦门远海自动化码头、青岛前湾自动化码头、上海洋山四期自动化码头、广州南沙四期自动化码头、北部湾港钦州自动码头等,振华重工开启第四代自动化码头新纪元;通过阿布扎比哈里发二期自动化码头、意大利瓦多港自动化码头、以色列海法自动化码头、美国长滩港自动化码头、新加坡大士港自动化码头、英国利物浦港自动化码头等,振华重工在世界自动化码头制造的舞台绽放异彩。

“魔鬼码头” 抒写港口奇迹

早在 20 世纪 80 年代中期,受人口递减、劳动力成本大幅上升和熟练劳动力匮乏等因素影响,集装箱码头的自动化受到港口的关注。经过长期的准备,位于荷兰鹿特丹港的欧洲联合码头公司(ECT)的 DS 集装箱码头于 1993 年投入运营,这是第一代自动化集装箱码头。此后经过发展又诞生了第二代和第三代自动化集装箱码头,分别以欧洲第二大贸易港汉堡港的 CTA 码头以及荷兰鹿特丹港的 EURO-MAX 码头为代表。

自动化码头以科技手段实现集装箱岸边装卸、水平运输、堆场装卸全过程自动化,码头作业由原先的码头操作员现场操作变成监控室电脑操作完成。相较于传统码头,自动化码头有诸多优势。首先,自动化码头能减少天气等原因对操作的影响,实现全天候 24 小时作业,提升码头岸线利用率;能利用信息技术提高装卸系统的可靠性和稳定性,提高设备利用率,避免设备无效运行,实现节能减排;能通过人机分离、远程监控等操作手段,提高生产安全性、降低人员劳动强度,极大地改善职业卫生条件。其次,自动化技术的应用还能大量减少较低技术水平的人力资源需求,降低劳动力成本。最后也是很关键的一点,目前自动化码头一般采用电力或者其他清洁能源驱动,能有效改善港口环境,助推绿色港口发展。

自动化码头颠覆了传统码头的作业方式,掀起一场“码头革命”,给港口的运作模式、航运经济和贸易发展等带来巨大影响。

作为世界上最大的港口机械装备制造厂商之一,振华重工通过向国外自动化码头提供单机设备,着手学习、研究自动化码头技术。1998 年,振华重工自主研发 EZ 电控系统,让公司港机设备摆脱对国外电控系统的依赖。2007 年,振华重工自主研发并在上海长兴岛基地以 1:1 实物建成世界首创的立体轨道式自动化码头示范线。该示范线在装卸效率、节能减



青岛前湾自动化码头

排、降低噪音污染、可靠性、安全性等方面优势明显，是振华重工在自动化码头建设道路上的一次有益探索。2011年，振华重工负责香港 HIT 码头堆场自动化改造，这是公司首个自动化改造项目。通过该项目，振华重工打磨了自动化码头软、硬件系统的开发与集成能力，培养了自动化码头业务领域的核心技术骨干，为振华重工打造第四代自动化码头奠定技术、人才基础。

堆场布局“唤醒”码头活力

装卸工艺布局是码头的灵魂，如果规划不合理，建成投产后会直接影响运营效率、安全和成本。

振华重工为青岛港和上海洋山港打造的全自动化码头采用垂直布局，这是世界上自动化码头普遍采用

的布局方式。垂直布局中，堆场可以将 AGV 与外集卡有效隔离，提高作业安全性。

但是，振华重工并没有拘泥于垂直布局。早在 2012 年，厦门远海自动化码头建设时，振华重工考虑新旧码头的统筹协调，降低建造成本等问题后，为用户提供了平行布局方案。该方案沿用原有的基建布置基础，让堆场与码头岸线平行布置，采取“集装箱端装卸 + 无悬臂轨道吊”的作业模式，降低成本的同时，让 AGV 与外集卡不必进入堆存区中作业，增加堆场作业安全性。

广州南沙四期自动化码头的定位是集装箱中转港，在规划工艺布局方案的时候，考虑到大湾区港口水转水（海运转驳船水运）比例高的集疏运特性，振华重工突破性地向用户提供与传统码头一样的堆场水平布局方案，配合单小车自动化岸桥与低速自动化轨道吊

的全新组合，能极大提高码头整体装卸效率，提升码头货物中转率。

北部湾港钦州项目中，振华重工再次与用户合作全球首创 U 型工艺布局，让外集卡和 IGV 能够直接进入箱区作业。外集卡通过三段式智能闸口后，直达堆场目标贝位，完成抓放箱后沿 U 型车道出港；IGV 沿相邻的 I 型车道从海侧到堆场作业，实现内外交通分流、安全高效。此外，U 型布局装卸点多，出箱灵活，后续可根据堆场作业需求增加轨道吊设备，能显著提高堆场作业效率。

不论是垂直布局，还是平行布局、水平布局、U 型布局，振华重工都是立足用户视角，力争为用户提供低成本、高效、安全的自动化码头装卸工艺布局方案。“振华重工自主研发的码头智能仿真系统 Smart Sim 系统，能根据用户需求、码头情况、集疏运方式为用户码头提供最合适的工艺布局方案。”振华设计研究总院总工程师赵斌介绍道。在 Smart Sim 系统中自定义想要的设备类型、岸线长度、码头纵深、道路长度等参数，就能一键生成工艺布局方案，并可查看方案的地面箱位数和设备数量。

未来，振华重工会继续秉持“用户至上”原则，不仅在装卸工艺布局方面为用户提供独创的“振华方案”，更会面向码头前期规划设计、中期测试和后期优化提供全生命周期服务。

智能制造助力“机器换人”

自动化码头实现岸边装卸、堆场装卸、水平运输环节的全过程无人化操作，离不开自动化港机设备。振华重工的港口机械遍布全世界主要码头，随着自动化码头从第一代发展到第四代，振华重工将自动化、智能化理念融入装备制造，研发自动化港机设备并不断进行技术革新、新机型研发，保持创新内生动力。同时，建立自动化工作站、智能化生

U 型工艺布局的北部湾港钦州自动化码头



厦门远海自动化码头



广州南沙四期自动化码头



以色列海法自动化码头



阿布扎比哈利发二期自动化码头



双悬臂自动化轨道吊

产线和智能制造示范车间等,提高港机设备生产制造水平。

在自动化岸桥的选择上,振华重工占据大部分市场份额。振华重工不仅为美国长滩港、新加坡大士港、厦门远海港、上海洋山港等自动化码头提供双

小车自动化岸桥,也为广州南沙四期项目、天津港北疆港区 C 段智慧码头项目打造了自动化单小车岸桥。双小车有利于提升自动化岸桥的作业效率,单小车则更能满足传统码头自动化改造降低建设成本的需求。

紧跟自动化码头建设布局,振华重工自动化轨道吊产品持续进行技术升级。针对上海洋山四期自动化码头的垂直布局,振华重工世界首创双箱自动化轨道吊,一次可同时起吊两个集装箱,让堆场效率提高一倍;针对北部湾钦州自动化码头的 U 型布局,振华重工在全球范围内首次应用自动化双悬臂轨道吊,支持一侧集卡作业、另一侧 IGV 作业,有效满足边装边卸需求,提高堆场作业效率。

自动化码头水平运输工具有集装箱卡车、跨运车、AGV 等,其中 AGV 应用最为广泛。2000 年,振华重工研制出第一代 AGV 原型机,并结合自动化码头项

目进行迭代升级。厦门远海项目中,振华重工提供的 AGV 全部采用锂电池作为动力,一改以往普遍采用内燃机驱动会排放污染物的状况,使码头真正做到无污染零排放,属世界首创。青岛港项目中,振华重工再次自主研发了最新一代有提升功能的自动化引导小车



全球首创北斗导航无人驾驶智能导引车

(L-AGV),可自行提升集装箱,节约小车等待时间,提高小车作业效率。

随着自动驾驶技术的发展,AGV、跨运车开始与自动驾驶技术融合。振华重工全球首创无人驾驶智能导引车 IGV,创新融合诸多识别定位技术,提高作业精度和效率,广州南沙四期项目、北部湾钦州项目均采用 IGV 方案。此外,振华重工还全球首创自主驾驶无人跨运车,搭载摄像头、毫米波雷达传感器等最新技术,远销瑞典斯德哥尔摩和黄诺维克码头和丹麦奥胡斯码头。

自动化码头全过程无人化操作,还需要解决一个关键流程问题,即集装箱拆装锁。集装箱从货船卸到运输车上在岸边转运时,需要拆掉其在船上用于固定的集装箱锁,称之为“拆锁”。集装箱船在进行海运时,为保证安全,需要用锁具将集装箱连成一体。集装箱从运输车准备装运到货船上时,安装集

上海洋山四期自动化码头





全球首台全自动拆装锁销平台

装箱锁,称之为“装锁”。传统模式是由人工在集装箱箱角下手动拆卸锁销,不仅耗费大量人力,更存在种种安全隐患。2022年,振华重工自主研发世界首台独立平台式自动拆装锁销机,以机器人为载体,应用人工智能技术,实现自动拆装锁销,打通自动化码头作业“最后一公里”。

“科技芯”赋能智慧运行

从岸桥、轨道吊到AGV小车,如何让如此多的设备有条不紊的运行,实现彼此间的良好衔接? 自动化码头软件系统给出答案。自动化码头区别于传统码头

最重要的一点,就是自动化码头设备要通过软件系统实现自主感知与自主决策,这些感知和决策系统在自动化码头起到关键性作用,是自动化码头的“科技芯”,赋能码头智慧运行。

自动化码头主要有三大“科技芯”,第一个是各类自动化子系统,直接作用于单机设备。岸桥、轨道吊、AGV等设备接收来自TOS的作业指令和ECS的调度指令,并在解析指令后,通过单机设备上的自动化控制模块,实现设备的自动化运行。进入自动化码头领域后,振华重工持续开展港机单机自动化关键子系统核心技术攻关,优化单机设备自动化功能,提升单机设备运行的稳定性,减少故障率,降低


设备维护成本。2022年,公司开展的“揭榜挂帅”项目,就是对岸桥吊具-负载轨迹规划与运动控制、场桥小车-吊具运动控制等12项关键核心子系统进行研发。

第二个“科技芯”是码头设备控制系统ECS。它是自动化码头的“神经中枢”,负责码头所有设备的全方位自动化管控。振华重工自主研发的ECS由生产管理系统接口、岸桥管理系统、车队管理系统、堆场管理系统和智能调度系统等模块组成,它从TOS获取任务后,自动指挥设备安全、高效地把集装箱转运至目标任务位置。振华重工ECS实现了自动化码头装卸设备的调度及设备间的协调,用“电脑”代替“人脑”全流程操控码头设备完成集装箱的装卸与转运。目前,振华重工ECS已在国内外数个大型自动化码头项目中成功应用。

第三个“科技芯”是码头生产管理系统TOS,它被称为自动化码头的“大脑”,主要负责自动化码头的生产控制及信息管理。振华重工汇聚多年自动化码头建设经验,充分调研用户需求,自主研发了码头智能一体化生产管控系统PORTMANUS,为用户提供

新的选择。

“作为一款国产TOS系统,PORTMANUS从底层架构到上层应用全部技术自主可控。”振华设计研究院创新院前沿技术所所长叶军自豪道。振华重工研发的PORTMANUS优势明显,不仅精简了系统架构层级,整合管理和控制业务,实现码头管控一体化,还打通了码头上下游数据链路,突破资源利用不充分的困局,改变生产管控分离、操作繁难等现象,从而全面提升码头生产质效。“振华重工PORTMANUS的未来是让码头从自动化向智能化转变,这是振华重工想做的。”叶军表示。

随着新一轮科技革命和产业变革深入发展,5G和F5G等信息技术逐步渗透到港口各个领域,智慧港口作为现代港口运输新业态,已成为全球港口创新转型理念共识。振华重工拥有提供自动化码头一站式解决方案的能力、强大的港口机械技术研发水平、丰富的自动化码头建设经验,未来将以党的二十大精神为指引,坚持“高端化、智能化、绿色化”发展路径,助力全球智慧港口建设。 

(供图/各单位)



振华重工码头自动化系统的发展历程



中谷钦州集装箱多式联运物流基地项目效果图

智慧“大脑”的减负之路

文 / 陈泓钊

在近两年的港口软硬件一体化总集成市场上,一个名为“PORTMANUS”的新商标“抢滩登陆”,落地中国西部陆海新通道,助力中谷钦州集装箱多式联运物流园区成为除国家铁路集装箱中心站外,我国自动化水平最高的“无水港”。

PORTMANUS 是振华重工倾力打造的“新一代”码头智能一体化生产管控系统。作为全球智慧港口“大脑”家族的“新人”,PORTMANUS 的诞生,不仅让振华重工实现真正意义上的自动化码头系统总承包,也为工业智能制造轻量化发展提供了新的可能。

“第二代自动化码头系统如何升级优化,需要我

们重新颠覆自己。”曾任厦门远海自动化码头项目第二项目总经理的叶军说道。传统的自动化码头系统主要由 TOS(码头生产管理系统)和 ECS(设备控制系统)组成。也就是说,即使是“无人码头”,控制室内也需要两块大屏、两班人马分别操作两套不同的系统,而由此产生的作业指令卡顿、资源配置分散、数据接口不统一等影响效率的“烦恼”一直困扰着码头工作人员。如何将 TOS 和 ECS 深度融合,为智慧港口“大脑”减负,实现“一键式”传令作业,是 ZPMC 软件工程师新的“赶考路”。

2019 年,为打通公司自动化码头全产业链的“最

后一公里”,叶军牵头组建振华港口管理创新筹备小组,着手自主研发 TOS 系统。“振华此前是一个设备制造商与设备控制系统的供应商,并没有码头运营经验。”从 ECS 转型到 TOS 研发团队的软件工程师吴乐说道,“了解码头业务及运营模式是我们必须解决的难点。”吴乐负责业务和需求分析,她与同事翻阅大量文献资料,赴各个码头实地交流,一边整理码头业务资料,一边在实践中总结经验,最终完成系统 Demo 版开发。2021 年,振华重工与上海中谷物流股份有限公司成功签约,振华 TOS 的“蓝图”终于有了载体,研发也随之进入加速期。

“中国多个港口在全球前十榜上有名,但国产 TOS 系统在海外的市场占有率还很低。”致力于自动化码头系统工程研究的振华设计研究总院创新研究院副院长王岩说。振华重工拥有参与全球 70% 以上的码头建设经验,比任何一家企业都具有一体化系统研发和供应的优势。“我们在系统领域起步较晚,要更努力去追赶。”在用户的信任下,研发团队从无到有,从校企联合开发到建设国际化人才队伍。研发路上,连一个命名

规范都要论证六遍之多,只为了让振华重工出品的 TOS 不是简单模仿市场上的同类产品,而是为码头用户实现从底层架构到上层应用全部技术的自主可控。

研发团队通过精简系统架构层级、赋予动态资源配置决策、提供标准化数据对接平台等,并注入“一网通办”、“港口编辑器”等拓展化、个性化服务,用一个“智慧大脑”为码头建设提供全生命周期的一站式解决方案。全新的 PORTMANUS 将改变生产管控分离、操作繁难等痛点,助力实现港口作业“智能化、自动化、无纸化、集成化”的目标,进而实现整个项目业务流程的自主规划、自动运转和智能管理。

“每天下午用户都会派人坐在我旁边‘切磋技艺’。”项目系统工程师杨磊笑着说,这是振华重工对用户团队进行的交付前预培训。帮助用户尽快熟悉新产品也是高质量创新的举措之一。

目前,在“智慧大脑”的指挥下,中谷钦州集装箱多式联运物流基地项目正在高效、稳定地试运行,即将迎来正式开港运营。 [图]

(供图 / 吴乐)



AI 视觉赋予码头“智慧之眼”

文 / 陈泓钊

“经测算,与传统激光 CPS 对比,岸桥改造应用 ICPS 可节省约 70% 的成本。”振华重工机器视觉研发工程师张俊阳激动地说。今年年初,他与团队攻关实现了基于人工智能(AI)视觉识别技术的新一代“智能集卡定位系统”(ICPS),并在天津太平洋国际集装箱码头 3 台岸桥改造项目中完成“首秀”。

这是振华重工首个智能起重机构架下的 AI 视觉子系统产品,独立自主研发并推动其成功落地运行是 ZPMC 在智慧港口智能感知应用上迈出的重要一步。由公司“揭榜挂帅”集结而来的研发团队,以“港机单机自动化关键子系统自主研发”为题,集中攻克一系列技术瓶颈,为后续智能识别场景落地、自动化改造项目降本增效提供了新的技术支撑。



岸桥改造项目中 ICPS 系统首秀

“集卡定位系统”是码头主流装卸起重机中配备最多的子系统之一,是提升港口装卸效率、自动化水平的重要环节。相较于上一代由激光技术发展而来的子系统,新一代基于 AI 视觉的“智能集卡定位系统”产品硬件结构简单、功能强大,具备多车道同时引导功能。“以往的激光技术,要实现多车道同时引导要配置多套设备,而 AI 视觉解决方案只需要‘一套配置 + 深度学习视觉技术’,即可实现多车道同时引导功能,目前最多可支持 7 车道同时引导,大大降低了设计和采购成本。”张俊阳介绍道。

同时,该产品具备集卡姿态检测、集卡移动和车头防砸保护、双箱识别、箱间隙测量、电子围栏等功能,且在大、小车方向检测误差小于 3 厘米,旋转角度检测误差小于 0.1°,双箱识别准确率高达 99% 以上。应用 AI 视觉定位系统,不仅能为码头提供稳定可靠的安全防护,也能为自动化岸桥陆侧集卡自动化提供高效、精准的定位数据。

首个 AI 视觉产品落地后,研发团队趁热打铁,成

功研发“起重器智能着箱系统”,这是智能感知与自主控制技术在起重机智能控制领域深度融合的产品。该产品包含“场桥小车 - 吊具运动控制系统”和“起重机吊具位姿实时检测系统”两项关键子系统,能实现吊具和目标偏差的直接检测,平均检测误差小于 10 毫米,系统检测实时性高,检测频率大于 10 赫兹,标定简单,降低现场调试工作量。

这个产品最大的优势在于具有主动防摇、防扭的功能,检测和控制精度不受堆场地面、起重机结构变形等因素的影响,是降本增效“破局”的重要技术。“比如早期的轮胎吊机械防摇不足,较大风速下,等待摆幅减小的时间长,影响作业效率。”振华重工研发项目揭榜人江灏说。随着智慧港口建设的快速发展,传统码头对现存设备的自动化升级改造要求逐步提高,宁波梅山港轮胎吊改造项目就是其中之一。团队在疫情爆发最严重的

时期临危受命,开发新型智能着箱系统,并逆行现场与用户开展方案论证与测试工作。“加载‘起重器智能着箱系统’后,通过 AI 主动防摇,原本四绳的稳定性能接近最新的八绳,获得用户高度认可。”江灏欣慰地说。

在 6 月 28 日的技术验收答辩上,受邀出席的三位用户方专家与公司评审们共同签署了评审意见,“技术指标达到了配套厂商同等水平。”目前,这两项基于 AI 视觉技术的关键子系统已随着“揭榜挂帅”百万奖金兑现而正式上线。

接下来,揭榜团队还将持续对 12 项核心子系统开展研发,将多年在激光技术方面积累的项目经验,与新兴的 AI 视觉技术优势有效融合创新,及时响应用户对现代化智能化一体化码头整体解决方案的迫切需求。

(供图 / 吴翔)

天津太平洋国际集装箱码头





上海临港超远程智慧指挥操作中心

F5G 助力洋山港超远程智能化装卸

文 / 都莹莹

在上海临港超远程智慧指挥操作中心,如巨幅画卷般的大屏上显示着世界上智能化程度最高的自动化集装箱码头之一——上海洋山四期自动化码头的实况,六位岸桥司机和三位场桥司机正在宽敞而简约的驾驶台上推动着操作杆,控制着一个又一个集装箱完成装卸……

上港集团超远程智能控制中心项目是振华重工与合作伙伴以上海洋山四期自动化码头为应用场景,在全球港口领域首次使用 F5G(第五代固定网络通信技术),控制中心自投入使用以来已经高效稳定地运行了 1700 多天。

“F5G 的应用拓宽了港口原有的网络,使其由‘乡间小道’变为‘高速公路’。”项目总体实施负责人、振华设计研究总院智慧院副院长马矜表示。利用 F5G

超低时延、高带宽等属性,超远控中心的网络传输距离可达上百公里,网络时延在 1 毫秒以内,数据传输实现 0 丢包,满足了超远距离工业控制对网络提出的各项要求,实现港口装卸设备超远程智能控制常态化作业,让装卸控制走上了“智慧高速”。

超远控中心的落地与应用之所以能够“弯道超车”,离不开振华重工的“有备而来”。公司作为上海洋山四期自动化码头全套设备的供应商与系统总集成商,对原有的设备层网络非常熟悉,对港口装卸远控的需求也更加清晰,因此在将 F5G 引入港口设备远控系统的过程中,能够及时、精准为用户提供一站式定制化方案。

但两个月的超短周期还是给团队带来了压力。如何帮助技术供应商理解港口生产网络与传统园区

网络对通讯协议的不同技术要求,如何合理规划电网光网硬件链路及控制、视频等应用协议的数据流向,如何使 F5G 同设备层原有网络进行完美适配等,都是在创新实践中需要解决的问题。“基本每周要去现场三四次,”负责推广实施的闻佳华说道。为了使 F5G 技术完美适用于港口远程操控作业的需求,振华重工与合作伙伴在一系列沟通和讨论中修改方案,在一系列现场调试和验证中发现问题、解决问题,优化项目功能,最终实现超远控中心在码头现场环境中稳定有效地投入使用。

超远控带来作业环境的改善和通勤时长的缩短,为港口行业人才招聘带来新气象。在以往港口作业中,上海洋山四期自动化码头的员工往往早上五点半就要坐班车前往码头,通勤时间长,“我看到他们基

本是带着枕头在班车上继续睡觉。”马矜说。超远控中心建成后,岸桥与场桥操控从码头内转移至 30 多公里外的临港同盛物流园区,位于上海市五大新城之一,同时在 100 多公里外的上海市区商务楼内也配有控制室,大大降低了远程操作员上下班的通勤时间,作业环境也更加安全舒适。操作效率和工作幸福感大幅提高,使得更多人才愿意来、愿意留。马矜欣慰地说:“这也是振华重工技术创新和应用能够给行业带来的社会效益”。

目前,深圳盐田国际集装箱码头超远程智慧指挥操作中心正在建设中。未来,振华重工将继续推广和迭代 F5G 在港口智能化中的创新和应用,助力打造世界一流智慧港口,推动港航数字化转型。 [4]

(供图 / 黄志伟)

实现“加梯自由”有多难？ 聊聊加梯那些事儿！

文 / 戴 巍

民以居为安。老旧小区住宅加装电梯作为提升城市生活品质的民生实事工程,承载着人民群众对美好生活的向往和追求。它被列入城镇老旧小区改造工作内容,对于改善居民的居住环境、提高居民的生活品质和促进城市发展具有重要意义,政府未来将进一步有序推进加梯工作。

2019年,振华重工进入加装电梯民生业务领域,至今已成功在上海市多个区开展加梯业务,加梯总签约达182台。2021年,振华重工推出15年电梯全生命周期维修管理模式,通过与物业公司加强合作,真正覆盖民生加装电梯工程自居民意向起至竣工后运维的全生命周期,确保电梯后续安全使用。截止到8月底,公司已承接101台加装电梯的维修、维保服务。





政策出台，释放哪些利好？

随着老龄化社会到来和居民生活需求进一步提高,全国各地都在探索老旧小区加装电梯,这对于完善老旧小区住宅使用功能、促进无障碍环境建设、适应老龄化社会需求和提升城市生活品质都具有重要意义。为落实 2023 年《政府工作报告》要求,近日,住房和城乡建设部、国家发展改革委、工业和信息化部、财政部、市场监管总局、体育总局、国家能源局印发《关于扎实推进 2023 年城镇老旧小区改造工作的通知》(建办城〔2023〕26 号),部署各地扎实推进城镇老旧小区改造计划实施,靠前谋划 2024 年改造计划,有序推进城镇老旧小区改造计划,扎实推进“楼道改革”,大力推进有条件的楼栋加装电梯。

人民城市人民建,人民城市为人民,上海一直将“能加尽加、愿加快加”作为民生加梯工作推进的总基调。据不完全统计,2011 年至今,上海出台的加梯意见、指南、规定达十余个,在不同时期起到推动作用。2011 年出台《本市既有多层住宅增设电梯的指导意见》,理顺了各部门之间的职责分工;2016 年出台《关于本市既有多层住宅增设电梯建设管理相关建设审批的通知》,将原来 46 个审批事项缩短到 15 个;2017 年出台《上海既有多层住宅加装电梯建设指南》,为有意向的“小白”业主们提供加装说明书;2019 年出台的《关于进一步做好既有多层住宅加装电梯工作的若干意见》,将财政补贴标准提至最高 28 万,并允许提取住房公积金用于支付加装电梯费用。2020 年,将既有多层住宅加装电梯列为上海市民心工程,并成立加装电梯专项办公室,聚焦加装电梯的审批办理、资金筹措、居民意愿统一、安全监管等关键问题,想办法、拿措施。

这些政策简化明确了办理加装电梯的手续流程,为上海加梯工作按下“加速键”。相关部门的数据显示,截至今年 5 月底,上海已累计完工的加装电梯共计 5538 台,今年计划加装 3000 台。



振华重工在静安临汾街道的加梯项目



民生加梯行业为何呼声高、落地难，又要如何解决？

作为“为群众办实事”重点项目,民生加梯行业虽然形势向好,但各地老旧小区“加装电梯难”仍较为突出,与应对人口老龄化趋势和人民群众需求还有差距。


首当其冲的“老大难”问题是居民意向不统一。虽然在法理上已经为原来“一票否决”难题做了定性,但在实际操作中,如何解决邻里关系是加梯有序进行的关键。各地应当积极探索通过基层协商、纠纷调解、民事诉讼等方式,依法解决居民意见问题。对群众有意愿、具备加装条件,但居民暂未形成加装共识的,基层政府要积极推进工作,保障群众的知情权、参与权和监督权,对适合加装电梯的楼栋,要耐心细致开展群众工作。

此外,老建筑结构安全、空间条件限制也是各相关方需要在加装电梯前评估和关注的。相关方需广泛开展加装电梯可行性评估,确定适合加装、较难加装、不适合加装的楼栋底数。因地制宜,结合勘察院数据,设计院需优化加梯方案,对有条件加装的楼栋进行梳理。同时,结合不同楼层居民的不同心理和需求:高楼层住户对加装电梯需求迫切,低楼层住户则担心其住房的通风、采光、噪音、出行等受到影响,优化设计方案,从设计之初就充分考虑实际安装环境,根本上解决实际加梯困难和尽量满足低楼层居民的诉求。

现场施工质量和施工周期往往是楼栋居民最为关心的问题。要积极推行安

全文明施工标准化,与居委、物业确定安全文明施工方案再进场施工,制定标准的《加装电梯工程管理指导书》。根据《上海市既有多层住宅装装配式加装电梯技术指南》的要求,施工单位要加大电梯安装和材料的研发力度。“求木之长者,必固其根本”,严守产品质量,要通过技术不断创新进一步提高施工质量和缩短现场施工周期,减少对居民生活的影响。

还需要特别重视的一点是,要解决“不仅装得上,还要用得好”的问题,做好管理的“后半篇文章”,让居民用得安心、放心,避免电梯因无使用管理、无维护保养产生安全管理、运行维护等隐患,这也是目前加装电梯过程中居民普遍关注的问题。振华重工在加梯业务上确定了“全生命周期管理”的模式,聚焦居民加装电梯后维修、维保无保障的痛点,通过与保险公司合作,推出 15 年电梯全生命周期维修、维保服务和相关安全责任保险项目,并得到政府管理部门和居民的广泛欢迎和认可。同时,为确保管理受控,设立梯联网监控中心和大数据中心,进一步降低服务成本。

“民生加梯,让幸福一梯直达!”不单单是一个口号。一部小小的电梯,既是民生工程又是民心工程,政府、企业和居民各方加强合作,共同推动加梯事业的发展,才能让居民们在电梯的“小空间”里享受上上下下的“大幸福”。

(供图 / 吴文财)

为“大力水手”打造“机械臂”

文 / 周 侃

望着码头上即将走向“深蓝”的4000吨全回转起重船“海峰2001”，振华设计研究总院浮吊所所长王鑫百感交集：“从设计到建造，经历了疫情、高温、台风，耗时18个月，这艘大船终于顺利‘毕业’了！”

这是一艘由振华重工建造的大型海上施工船舶，也是目前交付的国内起升高度最高、DP动力定位能力最强的用于风电桩基础作业的专用大型起重船，船上的起重机、定位绞车、锚链机等关键海工装备均由振华重工自主设计。“即使在国际上也属于主流船型行列。”振华重工副总工程师严兵十分自豪。

项目伊始，为了配合生产进度，合同生效后，振华设计研究总院机械院浮吊所的工程师们就马不停蹄的开始了4000吨全回转起重船关键设备——起重机的设计工作，“这个项目的起重机在技术设计参数上实现了多个突破！”王鑫说道。

大胆创新，先行先试。根据用户在风场的实际使用需求，为了拓宽4000吨级别起重机的使用范围，工程师们大大提升了起重机的起重幅度，将吊幅从3000吨@40米提升到了3000吨@45米，“这在行业内属于首次！”王鑫自豪地说道。与其他起重船相比，同样幅度下可以吊起更重物体，同样吨位下可以吊更远距离，同样幅度和吨位下可以吊得更高。4000吨全回转起重船的回转能力甚至可以和5000吨级的起重船一较高下！“简而言之，就好比一个人在体重不变的情况下，胳膊更长更有力，就可以拿更远、更重的东西。”王鑫解释道。

起重机的吊钩部分也不容小觑。通常，4000吨起重船上会配置2套2000吨或1套2500+1500吨的吊钩。为了应对海上大型风电桩的翻桩作业，此次项目设计团队大胆创新，首次在4000吨级别的起重机

上配置了2套3000吨的缠绕系统和吊钩，“主钩2套3000吨的强大吊重能力甚至让许多第一次看到设计参数的人都以为这是一台标准的6000吨起重机。”王鑫笑着说。

茫茫大海中，风电管桩像一根根细长、巨大的“铅笔”，运输时水平堆放在驳船上，抵达安装地点时需要通过两个吊钩将它直立起来，也就是“翻桩”。翻桩过程中两个吊钩一个“重头”，一个“轻头”；翻桩结束时，整根桩腿的重量最终会全部落在“重头”一侧的吊钩上，因此“重头”一侧的吊重能力决定了可以起吊管桩的大小。如果2个吊钩不能同时满足“重头”的吊装能力，实际作业中起重船就需要不断地移泊来调整吊装位置。“这个设计不仅大幅提高了海上风电吊装的便利性，减少起重船在风场作业时的移泊次数，也极大提高了作业效率。”项目设计团队和用户充分交流沟通后，并经过多次可行性分析、精细化的建模计算，最终完成创新设计。

由于国内桥梁的通航高度大多在60米左右，而4000吨级别起重船的船体通航高度约为78米，因此无法到达一些作业海域。项目设计团队勇于突破极限，首次将4000吨级别起重船的船体通航高度降低到55米，能更安全地从大型桥梁

下通过，使起重船具备到更广泛水域作业的能力，也使用户具备承接特殊水域作业项目的能力，极大拓展了起重船的作业范围。

目前，4000吨全回转起重船“海峰2001”已交付。投产后，将显著提升我国海上风电的深远海作业能力，在市场上占据一席之地，彰显其“大力水手”的本色。“这个项目的成功对于风电装备进一步实现‘中国制造’具有深远的战略意义。”王鑫说道。

（供图 / 张爱峰）

振华重工为中交海峰风电打造的4000吨全回转起重船“海峰2001”顺利交付

打造光伏电站“贴身管家”

文 / 陆怡艳

振华重工长兴分公司厂区
21 兆瓦分布式光伏电站

夏季阳光充足,气温攀升,这对光伏电站来说是一个发电的“黄金季节”。在振华重工长兴分公司车间屋顶上,21 兆瓦的屋顶分布式光伏电站电池板正在吸收着强烈的太阳光照。与此同时,其实时发电数据在位于振华重工新产业事业部的绿色能源管理平台上不断刷新着。

“这里能实时监测到我们各地电站的状态,可以说是光伏电站的‘贴身管家’!”新产业事业部技术研发部副总经理、绿色能源综合管理平台项目负责人刘宇介绍说。

随着国家“双碳”目标的提出,光伏逐渐成为全球能源转型的重要支撑。2016 年起,振华重工开始布局光伏业务,共投资建设 32 个项目,总装机容量近 100 兆瓦。截至 2023 年上半年,已累积产生绿色电力 2.88 亿度,累计减少二氧化碳排放量超 20 万吨,相当于种

树 1 千 5 百万棵。

有了分布在全国各地的光伏电站,如何更好地进行管理和运维是一大难题。“最初,我们使用厂家配备的管理平台,功能十分有限,缺乏光伏场站的运维管理功能。后来找了一家专门从事光伏电站监控的企业合作,无奈费用远超预算,”新产业事业部副总经理顾锦表示,“这也让我们下定决心,做一个 ZPMC 自己的绿色能源管理平台。”

2018 年起,刘宇和她的团队开始着手搭建 ZPMC 线上管理平台。在最初开发的 1.0 版本中,由于电站数据传输的采集器能力有限,难以满足平台服务器所需,只得推倒重来。“那段日子真的很煎熬,我们开了无数次的会议,白板上密密麻麻地写了一遍又一遍,最终确定了 2.0 版本的架构和功能。”回想起那段经历,刘宇不禁感慨道。最终,团队通过增强采集器的边缘

计算能力,让平台数据传输的数量及性能有了质的飞跃,同时也保障了数据传输的安全性,绿色能源管理平台才算是真正搭建了起来。

今年 6 月,由 ZPMC 自主研发打造的绿色能源综合管理平台正式上线,各地的光伏电站正在陆续接入中,目前正处于试运行阶段。

在刘宇看来,这一管理平台最大的亮点在于其中的运维、分析模块。“常规的监控功能,在厂家销售光伏设备时就有配备,只能查看一些数据。然而作为电站的建造方和拥有者,我们希望得到一位‘贴身管家’,能帮助电站持续的、长久的运行发电,所以我们在运维管理功能上花了很大的力气。”

作为一名合格的“管家”,“眼观六路”是必不可少的功能。平台的

监控页面内,每一台接入设备的状态及发电数据都被清晰记录在案,后续新的光伏电站也将接入视频监控;处理并解决问题也是“管家”的重要职责。当设备发生故障时,平台会即时出现告警信息,管理员通过及时处理告警从而形成一个工单,在将工单派发给所在区域运维人员的同时,规定计划用时,待问题解决后该工单就会进入审批确认,最后显示完成状态,至此形成闭环。

在平台网页版上线的同时,项目团队也同步开发了微信小程序版本,目前尚处于内部测试阶段。团队成员顾健平介绍说,“目前两个渠道的平台都在试用阶段,运维人员通过已接入电站进行日常管理监控,发现问题后反馈给我们,我们及时进行修改完善,计划于 10 月份正式上线。”

光伏电站运维只是绿色能源管理平台建设的第一步。“我们将以光伏电站的监控为起点,加速光储充管理一体化,实现‘发电 – 储能 – 用电’闭环的全局纵览,精准把控能源转化率与利用率,为园区碳管理注入数字化、智能化力量,助力园区内企业运行更加绿色低碳。”对于下阶段计划,公司新产业事业部总经理项旭东这样说道。

(供图 / 季学卿 顾健平)



绿色能源综合管理平台主界面

深耕海洋的追梦人

文 / 薛闻远 李天意

5月30日,是第七个全国科技工作者日,首届浦东新区科技精英表彰大会在浦东群众文化艺术馆举行,首批49名“浦东新区科技精英”获颁奖杯,奏响浦东科创最强音。振华重工振华设计研究总院总工程师、海工设计研究院院长黄翌宇便是其中之一。领奖台上,黄翌宇戴着一副方片眼镜,只一眼便能感受到他身上博学、儒雅的气质。

2008年,黄翌宇从上海交通大学机械设计理论专业毕业,进入公司博士后站,开始自升式海上钻井平台的振动、计算分析和桩腿的研究工作。当时,公司才进军海洋工程市场2年,国内专家对该领域了解甚少。黄翌宇带领团队反复研究论证,从平台核心技术“总体与结构的计算分析”入手,实现了从0到1的突破,在2011年成功摘得这颗海工领域“皇冠上的明珠”——300英尺海上自升式钻井平台“振海1”号,开启振华重工高端海工的新纪元。

“振海1”号的研发让黄翌宇及其团队积累了经验,也坚定了他们在海工领域深耕的决心。此后,黄翌宇团队又相继完成1000吨自升式风电安装平台、2000吨风电安装平台,以及国家重点工程港珠澳大桥建设的抛石整平船和管节沉放船的研发。

走向高端海工是当时一代振华重工海工人共同的呼声与目标。2019年之前,超深水铺管船的核心技术一直掌握在少数欧美公司手中。为了填补国内这一空白,黄翌宇带领100余人的团队与国内外专家反复研讨,开展科技攻关,最终攻克多项“卡脖子”难题,并将相关技术应用在3000米深水铺管船的研发与建造中,打破国外在深水大型铺管船设计制造及其装备技术领域的垄断,他也被授予“上海市优秀技术带头人”称号。

工作中运筹帷幄的他,生活中酷爱象棋,认为下棋与工作的道理可以融会贯通:“你给团队带来什么,对未来有什么贡献,要想得长远一点,这跟下象棋的思路一样,深谋远虑者胜。”因此,黄翌宇总是说,创新要找准市场方向提前研究,进行技术储备。“没有提前一步的研发,就没有明年的订单。”同时,多年的工作经验也让黄翌宇知道,不能盲目创新,要结合企业发展实际。

9月19日,振华重工设计建造的国内起重能力最大的2500吨自升自航式风电安装平台“海峰1001”正式交付。“这个项目的成功对于风电行业装备进一步实现‘中国制造’具有深远的战略意义!”作为项目总设计师的黄翌宇笑着说道。

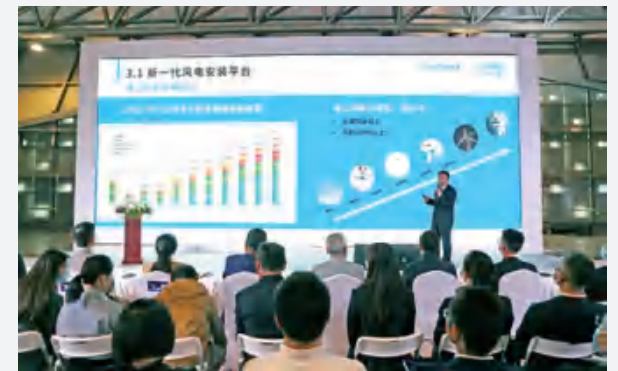
选择海洋工程,就意味着要追逐深海,不停踏浪前行!工作15年,黄翌宇伴随振华重工的海洋工程业务共成长,从对海工的未知探索到大展身手,从一名博士后到正高级工程师,再到科技带头人。他先后参与了10余项国家级和省部级科研项目,主持过“深水铺管船双铺管系统与起重机协同作业技术研究”、“自升式水上起重机动态效应机理与抑制研究”等上海市重点科技创新课题,先后获授权专利20余项,也获得过中国交建十大杰出青年称号……这些成绩代表过去的足迹,黄翌宇将保持始

终如一的初心,步履不停,继续朝振华重工海洋工程装备的高端化、智能化、绿色化方向努力。

(供图 / 陈泓钊 季学卿)



黄翌宇在2023年中国品牌日活动上发言



2023年中国品牌日,黄翌宇就振华重工研发的新一代风电安装平台及关键核心装备进行发布演讲



黄翌宇(右三)在领奖台领奖



黄翌宇荣膺首届“浦东新区科技精英”称号



崇明区平安小学爱心暑托班办班点

孩子们的“别样”暑假

文 / 李天意

“今天参观后,我大受震撼,发现这些设备很大很先进,而且它们居然分布在世界 107 个国家!以前,我听到爸爸公司的新闻很惊讶,现在才知道这些都是真的。”

“我爸在钢构部门,以前我来过长兴岛,但是我不了解我爸爸做些什么,今天看到了这些设施,就觉得我爸挺厉害的。”

“我爸爸是起重船的设计师,今天是我第一次看到起重船,没想到起重船那么大!”

这些稚嫩的话语出自振华暑托班的孩子们。暑期

降临,如何让孩子们度过一个充实的假期,成为家长们最挂心的事情之一。为此,振华重工联合情商训练营、崇明区平安小学推出振华爱心暑托班,解决了职工家庭白天无人带娃的难题。7月3日,振华重工总部和长兴分公司两个爱心暑托班同时开班,204 名学生将在这里学习知识、结交益友,体验暑期时光。

7月13日,总部署托班的 28 位小朋友来到长兴分公司参观。孩子们乘坐大巴,在一排排“钢铁巨人”、一个个“大国重器”身旁缓缓经过;五颜六色的岸桥、建造港珠澳大桥海底隧道的沉管……途中,他们还聆听了振

华人在亚丁湾智斗海盗的故事。游览结束后,孩子们来到 29 楼观景台,俯瞰忙碌而有序的长兴基地,以及在钢铁设备中穿梭的员工,心中充满了好奇与喜悦。

“这么大的设备,只有通过合作才能建成,每个人都在贡献自己的力量。”振华暑托班的老师说道。为了让孩子们沉浸式领会“众人拾柴火焰高”的意义,老师带领孩子们做一个小游戏,游戏规则是不用手将气球从屋子的左侧运送到右侧。小朋友们立刻开动脑筋:有人将气球放在棒球帽里,用嘴叼住,有人用胳膊颠气球……“小机灵鬼”们想出了千奇百怪的点子,让课堂十分热闹。然而不一会儿,方法用尽的孩子们便束手无策了,现场一度陷入胶着。“老师,可以两个人配合吗?”一个小女孩满怀期待地看着老师的眼睛,认真地问道。“当然可以呀!”老师赞许地点了点头。得到启发的孩子们,马上开发出了“头碰头、背靠背”的运送方式,课堂里的氛围又重新活跃了起来。在这堂别开生面的课程中,孩子们共想出了 19 种运送气球的方法,明白了“1+1 > 2”的道理。游戏过后,他们还品尝到了别样的风味——长兴工会准备的盐汽水冰棍。就这样,一上午的暑托班课程完美落幕。

除了总部署托班,在崇明区平安小学,长兴暑托班的 116 名小朋友也在认真上课中。在这里,孩子们按照年龄共分为三个班,一班正在上安全课,二班正在体验“棋逢对手”,而三班正在学习“趣味数独”。他们的老师都是来自上海师范大学经济学、小学教育等专业的优秀学生,在这些志愿者老师的悉心指导下,孩子们收获了许多新知识。

走进振华暑托班的教室,映入眼帘的是公示栏里密密麻麻的表格,“振华小学生爱心暑托班公共安全事件应急预案”“紧急情况联络表”“定点供餐协议书”……这一份份文件,都是振华重工工会干事们全心全意为孩子们的安全保驾护航的见证。振华重工工会干事孙玮介绍,公司暑托班在选择第三方机构进行托管时,除了考虑开班资质这一基本条件,还会考察安全情况和出行距离,可以给孩子们最好的暑期体验。

长兴分公司工会干事寇晋瑜介绍,经过多年实践,长兴爱心暑托班也形成了“政府+学校+企业+志愿者”的四维服务模式,以及“有安全措施、有基本师资、有托管协议、有意外保险、有应急预案”的“五有”服务特色。今年暑托班开班前,长兴工会早早就排好了平安小学的早班值班表,从党工团战线征集优秀志愿者,每日早班,轮流去校门口执勤。暑托班要求孩子们 7 点半进校,负责又热心的寇晋瑜 5 点起床,6 点就抵达到校门口开始执勤任务。提起“早到岗”的原因,寇晋瑜说:“上次值班时,我 6 点 10 分到岗,可没想到才过 10 分钟,第一个小朋友就到了。所以,这次我要更早些,以免接不到孩子。”

随着暑托班的进程过半,小朋友们也在这里收获了友情。“这是我的两个朋友,我们还互通了联系方式。”隋寓安小朋友指着智能手表说道。不少家长表示,爱心暑托班不仅能够帮助孩子度过一个快乐的暑假,还解决了员工最关切的“托管难”问题。自 2017 年以来,振华重工长兴爱心暑托班累计开办五届,服务职工家庭 600 余家,并获得“2021 年度全国工会爱心托管班”荣誉。看着孩子们脸上天真烂漫的笑容,工会的干事们觉得这份工作十分有意义:“职工的孩子也是振华重工这个大家庭的孩子,未来,我们将继续为职工做更多的实事,做职工信赖的‘娘家人’!”

(供图 / 季学卿 寇晋瑜)



孩子们在长兴分公司 29 楼观光平台俯瞰基地全貌

挪威初印象

文 / 陈 航

2023年6月3日，当地时间晚上十点半，飞机刚刚着陆。跨越七千多公里、历经18个小时，我到达了地球最北端的国家——挪威。透过舷窗，橙金色的夕阳给地球上最冷的“万岛之国”盖上了一层温暖的被子。这是挪威首都奥斯陆带给我的第一印象。等待我的是挪威奥斯陆港一台岸桥的调试工作，这也是公司为奥斯陆港提供的第一台岸桥。



天主教奥斯陆大教堂

回想两个月前，我正在深圳妈湾港出差，收到了出国做售后调试的消息。在憧憬中，时间不知不觉地加速流转了起来。

由于交机团队即将回国，在到达奥斯陆的第二天，我和钳工同事陈水娃便来到了港口与用户见面，那是我第一次见到港口总经理埃斯彭和挪威港务局的总工程师埃迪文，他们很热情地与我们握手。在充分交流后，我们便立刻投入到日常调试工作中。

记得端午节的早晨，我刚到码头，就接到了码头主管莫滕的电话，得知岸桥发生了故障，小车速度和起升速度变得非常慢，便迅速到电气房查看数据，在岸桥数据均无异常的前提下，我又检查程序，很快便排查到了问题。原来，是用户操作员不小心按了“超载旁路”的按钮，使岸桥能够吊起超重的集装箱，同时也会降低运行速度。问题排查清楚后，我很快手动调整解决了。虽然只是一个小问题，没想到用户司机却发出了欢呼，并向我竖起大拇指。用户的认可与信任使我感觉美滋滋，这是端午节收到的最好的礼物。

通过3个月的工作与生活，让我对奥斯陆有了更直观的认识。我们的住宅区在一座山上，一打开窗户，松树的清香便扑面而来，天上是皎洁无比的蔚蓝色，只有几片薄纱似的云，连绵起伏的山坡环绕着大海，一切都是那么干净。

奥斯陆是一个全民运动的城市，每天我都会在马路上看见当地人带着耳机奔跑，也可以看到没有大人跟随的5岁左右的儿童带着安全帽骑行。在住宅区，



陈航在 ZPMC 为挪威奥斯陆港提供的第一台岸桥前留影纪念

他们会打开室内音响，播放舒适的音乐，高脚杯倒上葡萄酒，在院子里的躺椅上享受日光，十分惬意。后来在和埃迪文交谈中，我才知道，当地人非常珍惜六月和七月的时光，他们会在这段时间用上年假，和家人去海边、森林度假，所以挪威的七月被人们戏称为“消失的七月”。说到兴奋之处时，埃迪文还热情地邀请我们一起去海边游泳。但是我不会，只能作罢。

在工作之余，我还尝试教了埃斯彭几句汉语。他脾气很好，是个很有趣的人。除了“你好”这种打招呼的简单词汇，我还教他说了几句网络流行语，比如他喜欢说super，我就会向他做出6的手势，他现在和我聊天，就会说“666”来表达很厉害。我们还会时不时地碰一下拳表示友好。

时间飞逝，售后工作圆满完成，我也已返回国内，但挪威之旅已成为我难忘的记忆。✎

（供图 / 陈航）



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二手港口设备信息发布平台旨在将港口设备回收、利用、再循环,为生态环境保护贡献振华力量。未来,振华重工将持续践行绿色发展理念,为用户提供“绿色方案”。

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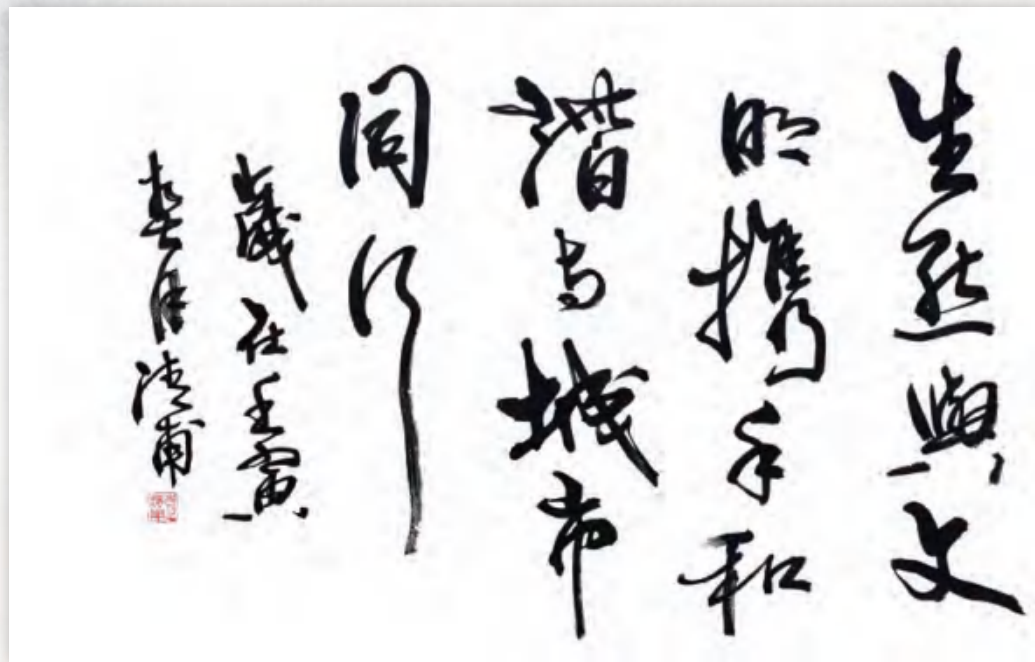
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Smart terminal has become reality

by Xue Weihui

When a large cargo vessel arrives after a long voyage, the port begins to hum immediately. As we all know, ports serve as important transportation hubs that facilitate logistics worldwide, as distribution centers of international trade goods, important links of the global industrial chains and supply chains, and play a vital role in the global economic operation. In order to enhance their core competitiveness, most of the world-class ports are shifting towards automation, informatization, and intelligence. As terminals are the most important component of ports, it is imperative to achieve their automation.

In 1993, the world's first automated container terminal was built at ECT Terminal in Rotterdam, the Netherlands. Over the next 30 years, automated terminals have flourished in major ports around the world. According to relevant data statistics, there are more than a hundred automated terminals worldwide at present. Among them, China ranks first in the world in terms of the scale of as-built terminals and terminals under construction, and the construction of automated terminals in Japan, South Korea, Singapore, and the United Arab Emirates in Asia also take a leading position; in addition to traditional well-known ports at Rotterdam, London, and Liverpool, more small ports in Europe, such as Belfast in Ireland, Gdansk in Poland, and Tallinn in Estonia, have also started automated terminal renovations; the number of automated terminals in America and Oceania has exceeded 15, and the first automated terminal has been completed in Africa.

As we all know, technological progress contributes a lot

to the rapid increase in the number of automated terminals. In the 21st century, with the development of automation technology involving major port operation machinery such as STS crane, RTG crane and straddle carrier, the number of new automated terminals exceeded double digits in the first decade; in the second decade, thanks to the development of remote control technology and energy technology, and the improvement of automation technology, the number of new automated terminals accounted for nearly 35% of the total new terminals. Since 2020, the impact of the COVID-19 pandemic has highlighted the advantages of automated terminals. Compared with traditional terminals, automated terminals can reduce the number of operating personnel and personnel contact, and improve the efficiency and safety of terminals. As a result, automated terminals have attracted more attention and investment, and more than 30 new automated terminals have been built worldwide in the past three years.

It is learnt that in the next two years, nearly 20 more automated terminals will be added globally and automated terminals will become a trend. It is common to consider the introduction of automated terminals when developing new terminals. Automation upgrades will become a new tide in the transformation of traditional terminals.

After thirty years of glorious development of automated terminals, the beautiful era of "smart and green" automated terminals is coming. ZPMC, as a global leader in the construction of automated terminals, will work with its port partners to witness the advent of the era of smart port.





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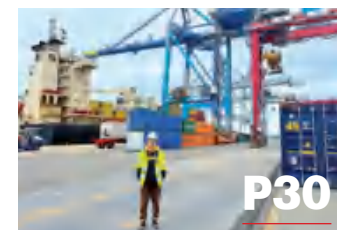
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Editor in Charge: Xue Weihui

Li Tianyi, Lu Yiyan

Address:

3261 Dong Fang Road, Shanghai, P.R.China

Post Code: 200125

Tel: +86 21 58396666#83337, 83838

Fax: +86 21 58399555

Email: news@zpmc.com

Please contract the ZPMC Editorial Office
with news and inquiries: news@zpmc.com

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ZPMC's cipher for automated terminals

by Xue Weihui

The Qinzhou automated terminal at Beibu Gulf Port



A lot of container vessels from around the world are moving in and out of the terminals along the long coastline of the vast ocean; a row of towering automated quay cranes on the coastline are smoothly and efficiently grabbing containers, and an endless stream of AGVs are shuttling here and there. The automated RMG cranes on the rear yard are naturally and smoothly lifting and dropping containers. At this unmanned automated terminal, tens of thousands of containers are being transported, achieving the whole-process "safe, green, intelligent, and efficient" handling operation.

Over the years, ZPMC has been continuously exploring the field of automated terminals, and has built nearly 60 automated terminal projects at home and abroad, which set off the wave of building low-cost, short-cycle, fully intelligent, high-efficiency, safer and zero-emission automated terminals. By building Xiamen Ocean Gate Automated Container Terminal, Qingdao Qianwan Automated Terminal, Shanghai Yangshan Phase IV Automated Terminal, Guangzhou Nansha Phase IV Automated Terminal, and Beibu Gulf Port Qinzhou Automated Terminal, ZPMC opened a new era of the fourth generation of automated terminals; ABU Dhabi Khalifa Phase II Automated Terminal, Italy's Vado Gateway, Israel's Haifa Automated Terminal, Long Beach Port Automated Terminal in the United States, Tuas Port Automated Terminal in Singapore, Liverpool Port Automated Terminal in the UK and other automated terminals, ZPMC debuted brilliantly on the world's automated terminal manufacturing stage.

A miracle at the "demon" terminal

In the mid-1980s, affected by the disadvantages such as declining population, sharply rising labor costs and a shortage of skilled labor, a lot of ports began to turn their eyes on the automation of container terminals. After a long period of preparation, the DS container terminal of Europe Combined Terminal (ECT) at the Port of Rotterdam in the Netherlands, as the first generation of automated container terminal, was put into operation in 1993. After that, the second and third generation of automated container terminals were born, represented by the CTA terminal in the Port of Hamburg, Europe's second largest trading port, and the EURO-MAX terminal in the Port of Rotterdam, the Netherlands, respectively.

The automated terminal realizes the automation of the whole process of handling containers at quay side, horizontal transportation and handling at container yard through scientific and technological means, and the operation at terminals is shifted from the original on-site manual operation to computer operation in the monitoring room. Compared with traditional terminals, automated terminal has many advantages. Firstly, it can reduce the impact of weather and other factors on operations, operate around the clock, and improve the utilization rate of dock shorelines; it can utilize information technology to improve the reliability and stability of handling systems. It can improve equipment utilization, avoid ineffective operation of equipment, save energy and reduces emission; with human-machine separation and remote monitoring, automated terminal can improve production safety, reduce labor intensity, and greatly improve occupational health conditions. Secondly, automation technology applied in automated terminals can also bring down dramatically the demand for human resources with a lower technical level and labor costs. Finally, electricity or other clean energy currently used for driving automated terminals can effectively improve the port environment and advance the development of green port.

Automated terminal reshapes the operation mode of traditional terminal and starts a "terminal revolution", bringing huge impact on the operation mode of port, shipping economy and trade development.

ZPMC, as one of the world's largest manufacturers of port machinery and equipment, has started learning and developing automated terminal technology by providing single machine to foreign automated terminals. In 1998, ZPMC independently developed the EZ electronic control system, making its port machinery get rid of dependence on foreign electronic control systems. In 2007, ZPMC independently developed and built the world's first demonstrative 3D rail-mounted automated terminal line at Changxing Base in Shanghai



Automated equipment at Qingdao Port

at a scale of 1:1. This demonstration line has obvious advantages in handling efficiency, energy conservation and emission reduction, noise pollution reduction, reliability, safety, and other aspects, and it is a beneficial exploration by ZPMC on the construction way of automated terminals. In 2011, ZPMC was responsible for the automation renovation project of Hong Kong HIT Terminal yard, which was ZPMC's first automation renovation project. By completing the project, ZPMC polished its development and integration capabilities for the software and hardware systems of automated terminal, nurtured core technical talents for the business field of automated terminal, and laid a technical and talent foundation for building the fourth generation automated terminal.

The layout of storage yard "arouses" the vitality of terminal

The handling process layout is the soul of a terminal. An unreasonable planning will directly affect its operational efficiency, safety, and cost of production after completion.

The fully automated terminals built by ZPMC for Qingdao Port and Shanghai Yangshan Port adopted vertical layout, a common layout method for automated terminals in the world.

By using vertical layout, the AGV can be effectively insulated from the external container trucks in the storage yard to improve the safety of operation.

However, ZPMC does not limit itself to the vertical layout. As early as 2012, during the construction of the Automated Terminal for Xiamen Ocean Gate, ZPMC provided the user with a parallel layout scheme after considering the overall coordination of the new and old terminals and reducing construction costs. This scheme continued to use the original infrastructure layout, allowing the yard to be arranged in parallel to the terminal shoreline, adopting a "container end handling + non cantilever rail crane" operation mode, which not only reduced costs but also eliminated the need for AGVs and external trucks to enter the storage area for operation, thus increasing the safety of yard operations.

When planning the layout for Guangzhou Nansha Phase IV Automated Terminal, a container transfer terminal, ZPMC provided the user with the same horizontal layout as that of traditional terminal, taking into account of the high proportion of sea-to-river transfer characteristics of the terminal in the Greater Bay Area. With the new combination of single trolley automated STS crane and low-speed automated RMG crane,

the overall handling efficiency and the cargo transfer rate of the terminal is greatly improved.

As for the Beibu Gulf Port Qinzhou project, ZPMC once again cooperated with the user to create the world's first U-shaped process layout, which allowed external container trucks and IGV to work directly into the container area. After passing through the three-stage intelligent gate, external container trucks can reach the target storage location of the storage yard, and exit the port along the U-shaped lane after completing grabbing and release of containers; IGVs operate from the sea side to the yard along the adjacent I-shaped lane via internal and external traffic diversion to achieve safe and efficient operation. In addition, there are many handling sites in the U-shaped layout, and can handle containers flexibly. In the future, RMG can be added according to the needs of operation in the yard to significantly improve the operation efficiency.

No matter adopting the vertical layout, parallel layout, horizontal layout, or U-shaped layout, ZPMC always focuses on user's perspective and strives to provide users with low-cost, efficient, and safe automated terminal container handling process layout solutions. "The Smart Sim System, an intelligent simulation system independently developed by ZPMC, can provide the most appropriate process layout scheme for a user's terminal according to its needs, the situation of the terminal, and transportation methods," said Zhao Bin, chief engineer of the Design Research Institute of ZPMC. In the Smart Sim system, after customizing the desired equipment type, shore length, dock depth, road length and other parameters, you can generate the process layout plan by one click, and can view the number of ground containers and the amount of equipment in the scheme easily.

In the future, by continuously adhering to the principle of "user first", ZPMC will not only provide users with original "Zhenhua solution" in terms of handling process layout, but also provide full life cycle services for the pre-planning and design, mid-term testing and post-optimization of terminals.

Smart manufacturing advances "machine substituting man"

Automated port machinery is essential for the unmanned operation throughout the entire process of quayside handling, yard handling, and horizontal transportation at automated terminals. ZPMC has exported its port machinery to all major ports around the world. With the development of automated ports from the first generation to the fourth generations, ZPMC has integrated automation and intelligence concepts into equipment manufacturing, developed automated

The Qinzhou automated terminal with the U-shaped process layout at Beibu Gulf Port



Xiamen Ocean Gate Automated Terminal



Guangzhou Nansha Phase IV Automated Terminal



Israeli Haifa Automated Terminal



Abu Dhabi Khalifa Phase II Automated Terminal



Double cantilever automated RMG crane

port machinery equipment, and continuously carries out technological innovation and research and development, and maintains its endogenous momentum of innovation. At the same time, ZPMC established automated workstations, intelligent production lines and intelligent manufacturing demonstration workshops to improve the production level of port machinery.

With the majority of market share for automated STS crane, ZPMC not only provides double trolley automated STS cranes for automated terminals such as Long Beach Port of the

United States, Tuas Port of Singapore, Xiamen Ocean Gate Container Terminal, Shanghai Yangshan Port, but also creates automated single trolley STS cranes for Guangzhou Nansha Phase 4 project and Tianjin Port Bei Jiang Port Area C segment smart terminal project. The STS crane with double trolley is conducive to improving the operation efficiency of automated STS crane, while STS crane with single trolley can better meet the needs of the automatic transformation of traditional terminal to reduce the construction cost.

Following the layout of the automated terminal construction, ZPMC is continuously upgrading its automated RMG cranes. For the vertical layout of Shanghai Yangshan Phase 4 automated terminal, ZPMC pioneered the use of dual container automated RMG crane, which can lift two containers at the same time, doubling the operation efficiency of the storage yard; for the U-shaped layout of Qinzhou Automated Terminal in Beibu Gulf Port, ZPMC is the first in the world to apply automated double cantilever RMG crane, which supports operation of container truck on the one side and IGV operation on the other side, thus effectively meeting the needs of container handling at the same time, and improving the efficiency of yard operation.

At an automated terminal, there are various horizontal transport vehicles including container trucks, straddle carriers, AGV, and others, of which AGV is the most widely used. In

2000, ZPMC developed the first generation of AGV prototypes, which were upgraded iteratively in conjunction with the automated terminal project. As for the Xiamen Ocean Gate project, all the AGVs provided by ZPMC are driven by lithium batteries, which can eliminate the pollutants from internal combustion engines in the past, making the terminal truly pollution-free and zero-emission. Therefore, it was the first of its type in the world. As for the Qingdao Port project, ZPMC once again independently developed the latest generation of L-AGV with lifting function, which can lift containers by itself, save its waiting time and improve its operation efficiency.



The world's first unmanned intelligent IGV navigated by Beidou

With the development of automatic driving technology, AGV and straddle carriers have begun to integrate with automatic driving technology. ZPMC is a global pioneer of automated intelligent guided vehicle (IGV) with integrated many identification and positioning technologies to improve operation accuracy and efficiency, and it has been used in Guangzhou Nansha Phase 4 project and the Beibu Gulf Qinzhou Terminal project. In addition, ZPMC is also the developer of the world's first unmanned straddle carrier equipped with cameras, millimeter wave radar sensors and other latest technologies and has exported it to Stockholm Terminal in Sweden and Aarhus Terminal in Denmark.

In order to achieve the whole process unmanned operation of automated terminal, a key process has to be solved, i.e., the removal and installation of container locks. When a container is unloaded from a cargo vessel to a carrier vehicle for transfer on the quay side, it needs to remove the container lock for fixing the container on the vessel, which is called "lock removal". In order to ensure the safety of container vessels, it is necessary to use locks to connect containers together. When relocating a container from a carrier vehicle onto a cargo vessel, container locks will be installed, which is called "lock installation". In the traditional mode, lock pins are manually disassembled at the corners of container, which not only consumes a lot of manpower, but also poses various hidden

Shanghai Yangshan Phase IV Automated Container Terminal





The world's first fully automatic container lock removal and installation platform

safety hazards. In 2022, ZPMC independently developed the world's first independent platform-type automatic disassembly and assembly lock pin machine. With robot as the carrier, it uses AI technology to achieve automatic disassembly and assembly of lock pins and step over the "last mile" to achieving automated terminal operation.

"Technology core" enables intelligent operation

There are various types of equipment like STS crane, RMG crane and AGVs at a terminal, but how can we ensure their orderly operation to achieve the harmonious connection between each other? The automated terminal software system is the answer. The most important difference between an automated terminal and a traditional terminal is that the equipment of automated terminal can realize autonomous perception and autonomous decision-making with the aid of

its software systems. These perception and decision-making systems, as "technology cores", play a key role in automated terminals and enable the intelligent operation of terminals.

There are three main "technology cores" in automated terminals. The first core includes various automation subsystems, which directly act on single equipment. STS crane, RMG crane, AGVs and other equipment receive operation instructions from the TOS and scheduling instructions from the ECS, and realize the automatic operation of the equipment through the automation control module on the single equipment after analyzing the instructions.

Since entering the field of automated terminal, ZPMC has been constantly carrying out researches on the core technology of key subsystems of automation of single port machinery, optimizing the automation function of single equipment, improving the stability of single equipment operation to reduce the failure rate and equipment maintenance costs. In 2022, ZPMC's "Jiebang Guanshuai" project was a research project

dedicated to developing 12 key core subsystems such as STS crane spreader-load trajectory planning and motion control, and the RTG trolley-spreader motion control.

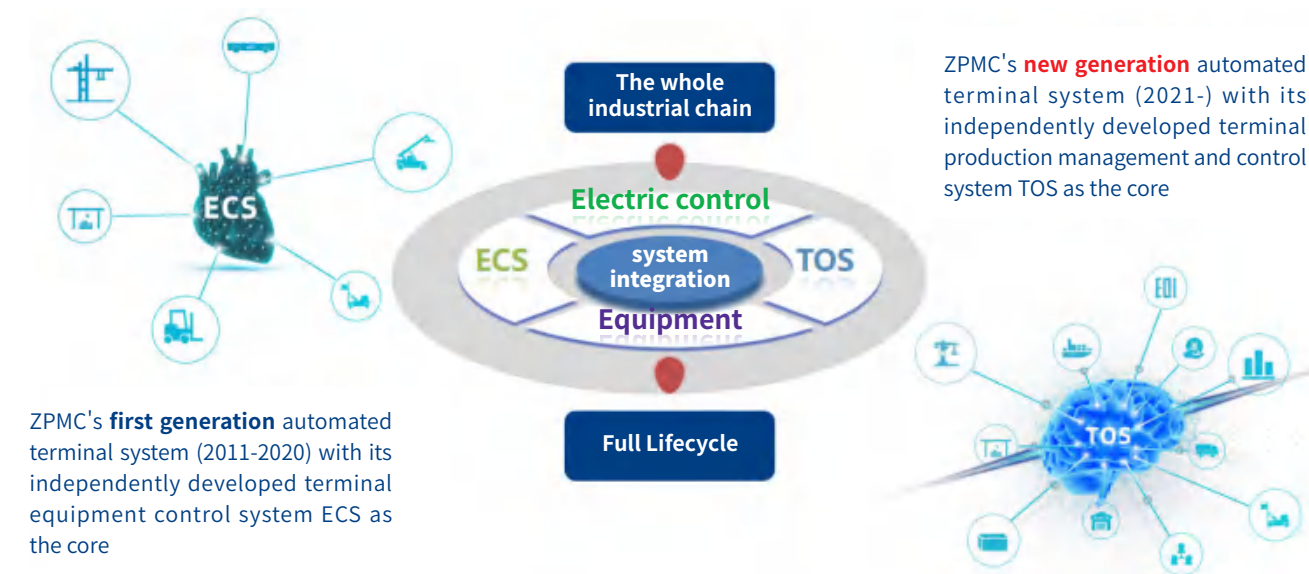
The second "technology core" is the terminal equipment control system (ECS), which is the "nerve center" of an automated terminal. It is responsible for the comprehensive automatic control of all equipment of the terminal. ZPMC's self-developed ECS consists of modules such as production management system interface, STS crane management system, fleet management system, yard management system and intelligent scheduling system. After receiving a task from the TOS, the ECS automatically instructs the equipment to safely and efficiently transfer containers to the target location. ZPMC's ECS can realize the scheduling and coordination of handling equipment of automated terminal, and uses "computer" instead of "human brain" to control terminal equipment to complete the handling and transfer of containers in the whole process. At present, ZPMC's ECS has been successfully applied in several large automated terminal projects at home and abroad.

The third "technology core" is the terminal operation management system (TOS), which is known as the "brain" of automated terminal. It is mainly responsible for the production control and information management in the automated terminal. With many years of experience in the construction of automated terminals, ZPMC fully investigated the needs of users, and independently developed an intelligent integrated production control system for terminals, i.e., PORTMANUS, to provide users with a new option.

"PORTMANUS is a homegrown TOS system, we self-developed all the technologies for its bottom architecture to its upper applications," proudly said Ye Jun, director of Frontier Technology Institute of the Innovation Institute, the Design & Research Institute of ZPMC. ZPMC's PORTMANUS features obvious advantages. It not only simplifies the system architecture level, integrates management and control services, and realizes the integration of terminal management and control, but also opens up the upstream and downstream data link of the terminal, breaks through the dilemma of insufficient resource utilization, changes the phenomenon of separation of production management and control, and difficult operation, so it can comprehensively improve the quality and efficiency of terminal production," said Ye Jun.

With the in-depth development of a new round of scientific and technological revolution and industrial transformation, information technologies such as 5G and F5G have gradually penetrated into all fields of port. Smart port, as a new business form of modern port transportation, has been universally accepted as the orientation of port innovation and transformation. ZPMC have the ability to provide one-stop solutions for automated terminals, strong port machinery technology R&D level, rich experience in automated terminal construction. In the future, guided by the spirit of the 20th National Congress of the Communist Party of China, ZPMC will adhere to the development path of "high-end, intelligent and green" and contribute to building global smart ports around the world. 🌐

(Photo by relevant units)



Milestones of ZPMC's Terminal Automation System



Rendering of Zhonggu Qinzhou Container Multimodal Transport Logistics Base

A burden-reducing journey of smart brain

by **Chen Hongfan**

In the past two years, a new trademark titled "PORTMANUS" has emerged in the port software and hardware integration market. Now it has landed at the new land-sea channel in western China, helping Zhonggu Qinzhou Container Multimodal Transport Logistics Park become the most automated "dry port" in China apart from the national central railway container station.

PORTMANUS is ZPMC's new generation intelligent integrated production control system for terminals. As the new member of the global smart port "brain" family, PORTMANUS not only allows ZPMC to gain the capability of general contracting of automated terminal system in the true sense, but also provides new possibilities for the lightweighted development of industrial intelligent manufacturing.

"The upgrade and optimization of the second generation automated terminal system requires us to overturn ourselves,"

said Ye Jun, former general manager of the second project of Xiamen Ocean Gate Automated Terminal Project. The traditional automated terminal system mainly consists of terminal operation management system (TOS) and equipment control system (ECS). That is to say, there are two large screens and two teams operating two different sets of systems even at an "unmanned terminal".

As a result, the "troubles" affecting terminal efficiency such as operation instruction delay, resource allocation dispersion and data interface disunity have been lingering among the operating staff. How to deeply integrate TOS and ECS to reduce the burden on the "brain" of smart ports and achieve "one click" signaling for operation is an urgent task that ZPMC software engineers have to solve.

In 2019, in order to connect the "last mile" of the whole industrial chain of ZPMC's automated terminal, Ye Jun led the formation of the Zhenhua Port Management Innovation Preparatory Group and began

to independently develop the TOS system. "ZPMC used to be an equipment manufacturer and supplier of equipment control systems, and had no experience in terminal operations, it was a challenge to understand the terminal business and its operating model, and we had to overcome it," said Wu Le, a software engineer who shifted from ECS to TOS. Wu Le was responsible for business and demand analysis. She worked with her colleagues and reviewed a large deal of literature and went to various ports for on-site communication. While organizing port business information, she summarized experience in practice and ultimately completed the system demo version development. In 2021, ZPMC successfully signed a contract with Shanghai Zhonggu Logistics Co., Ltd. which gave a carrier for ZPMC to complete its "blue print" and drove its R&D also into the period of acceleration.

"Several ports in China are ranked among the world's top 10 ports, but the homegrown TOS system still holds a small market share in the overseas market," said Wang Yan, vice president of the Innovation Research Institute of the Design Research Institute of ZPMC. The innovation Research Institute is committed to developing automated terminal system engineering projects. With more than 70% of the world's terminal construction experience, ZPMC boasts better advantages of integrated system development and supply than any other company. "We started relatively late in the field of systems and have to work harder to catch up," Wang Yan added. With the trust of users, the R&D team worked with universities and enterprises in the beginning and finally became an international talent team. On the R&D way, they demonstrated

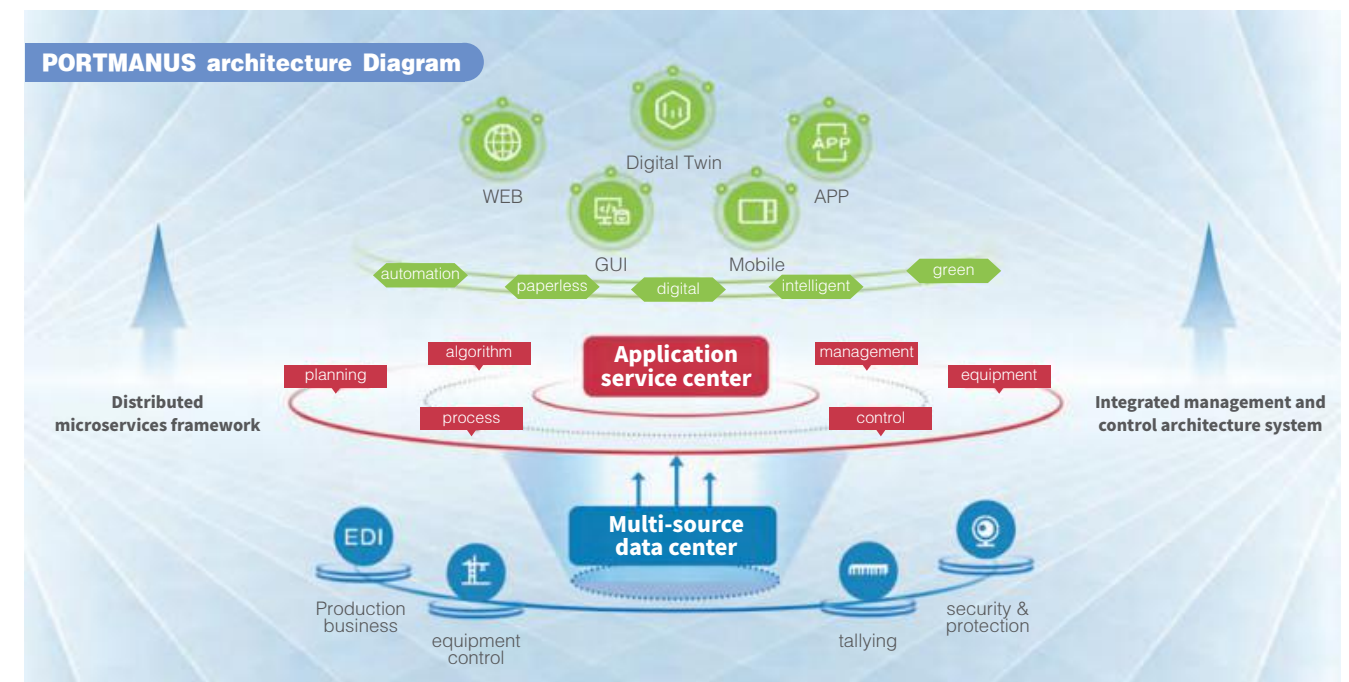
every detail even the naming specification six times. Their purpose was not to make the TOS produced by ZPMC merely a similar product on the market, but to achieve the autonomy of all technologies for all aspects from the underlying architecture to the upper application for terminal users.

The R&D team provides a one-stop solution for the entire life cycle of port construction with a "smart brain" by streamlining the system architecture hierarchy, enabling dynamic resource allocation decisions, providing a standardized data docking platform. At the same time, the solution also included expanded and personalized services such as "One Network Access" and "Port Editor". The brand new PORTMANUS will eliminate those pain points such as separation of production management and control, and difficult operation, and help achieve the goal of "intelligence, automation, paperless, and integration" in port operation, thereby achieving autonomous planning, automatic operation, and intelligent management of the entire project process.

"Every afternoon the user sends people to sit next to me to 'learn skills'," said Yang Lei, project system engineer, with a smile, "it was ZPMC's pre-delivery training for the user's team to help them get familiar with the new product as soon as possible, which was also one of the initiatives of high-quality innovation."

At present, under the command of "smart brain", Zhonggu Qinzhou container multimodal transport logistics base is carrying out pilot operation efficiently and stably, and will soon usher in the official opening of port operation. 📷

(Photo by Wu Le)



AI vision gives terminal "wisdom eyes"

by **Chen Hongfan**

It is estimated that compared with traditional laser CPS, the application of ICPS in the reconstruction of STS crane can save about 70% of the cost, " excitedly said Zhang Junyang, a ZPMC machine vision R&D engineer. At the beginning of this year, Zhang, together with his team, worked on a new generation of "Intelligent Container Truck Positioning System" (ICPS) based on artificial intelligence (AI) visual recognition technology, and the system was first used in the renovation project of three STS cranes at Tianjin Port Pacific International Container Terminal.

It is ZPMC's first AI vision subsystem product under the intelligent crane architecture. Its independent development and successful operation are important steps of ZPMC in the application of intelligent perception in smart ports. It was the result of overcoming a series of technical bottlenecks by ZPMC's "Jiebang Guashuai" R&D team focusing on "Independent technology R&D of key subsystems of single port machine", which provided new technical support for cost reduction and efficiency increase in subsequent intelligent identification scene implementation and automation transformation projects.

The container truck positioning system, one of the most



The ICPS system debuts in the STS crane renovation project

equipped subsystems in the mainstream handling cranes for terminals, acts as an important link to improve the efficiency and automation level of handling in ports. Compared with the previous generation of subsystem developed based on laser technology, the new generation of AI vision-based "intelligent container truck positioning system" features a simple product hardware structure and powerful multi-lane simultaneous guidance function. "When using previous laser technology, you have to configure multiple sets of equipment to achieve multi-lane guidance at the same time. With an AI visual solution, it only requires one set of configuration + deep learning visual technology to achieve multi lane simultaneous guidance function. Currently, it can support up to 7 lanes of simultaneous guidance. It greatly reduces design and procurement costs," introduced Zhang Junyang.

At the same time, this product has functions such as container truck posture detection, container truck movement and front anti-collision protection, dual container recognition, container gap measurement, electronic fence. Its detection error in the direction of gantry and trolley is less than 3 centimeters, and its rotation angle detection error less than 0.1°. In addition, the accuracy of its dual container recognition exceeded 99%. The application of AI visual positioning system can not only provide stable and reliable safety protection for terminals, but also provide efficient and accurate positioning data for container truck automation on the land side of

automated STS cranes.

Following the successful use of the first AI vision product, the R&D team successfully developed the "intelligent container engaging system", a product that deeply integrates intelligent perception and autonomous control technology in the field of crane intelligent control. The product consists of two key subsystems, i.e. "RTG trolley – spreader motion control system" and "crane spreader position and attitude real-time detection system". It can realize the direct detection of spreader and target deviation with an average detection error of less than 10 mm. The system features high real-time detection performance, with a detection frequency of greater than 10 Hz, its calibration is simple, which reduces the field debugging workload.

The biggest advantage of this product is that it has the function of active anti-swing and anti-torsion. Its detection and control accuracy is not affected by the factors such as the ground of the storage yard and the deformation of the crane structure. Therefore, it is an important technology to reduce cost and increase efficiency.

"For example, the early RTG crane had insufficient mechanical anti-swing function. If the wind speed is high, it will wait long until the swing decreases, which affects the operation efficiency," said Jiang Hao, ZPMC's R&D project manager. With the rapid development of smart port

construction, the requirements for automatic upgrading of existing equipment at traditional terminals have gradually increased, and the RTG crane renovation project for Ningbo Meishan Port is an example. The team was tasked with developing a new intelligent grasping system during the most severe period of the COVID-19 epidemic, and conducted on-site scheme demonstration and testing work with the user. After loading the 'intelligent container engaging system', through AI active anti-swing, the stability performance of four ropes is close to that of the latest eight ropes, which was highly recognized by users," Jiang Hao said happily.

In the technical acceptance reply on June 28, three experts of the user and ZPMC 's reviewers jointly signed the review opinion, declaring that "the technical indicators reached the same level of supporting manufacturers". At present, these two key subsystems based on AI vision technology have been officially launched after the million yuan prize of "Jiebang Guashuai" project was granted.

Next, the team will continue to carry out R&D of 12 core subsystems, combine years of laser technology project experience with emerging AI vision technology advantages to timely meet the urgent needs of users for modern intelligent integrated terminal solutions. 🌟

(Photo by Wu Xiang)

Tianjin Port Pacific International Container Terminal





Shanghai Lin-Gang Ultra Remote Intelligent Command and Operation Center

F5G enables the ultra-remote intelligent handling of Yangshan Port

by Du Yingying

In Shanghai Lin-Gang Ultra Remote Intelligent Command and Operation Center, the giant scroll like screen shows the real situation of Shanghai Yangshan Phase IV Automated Container Terminal, one of the most intelligent automated container terminals in the world. Six STS crane drivers and three RTG crane drivers are pushing the operation levers at the spacious and simple driving platform, controlling the handling of one container after another...

The project of Shanghai Lin-Gang Ultra Remote Intelligent Command and Operation Center of SIPG was developed by ZPMC and its partners. F5G (fifth generation fixed network communication technology) was used for the first time in the application scenario of Shanghai Yangshan Phase 4 Automated Terminal. The control center has operated efficiently and smoothly for over 1,700 days after being put into operation.

"The application of F5G has broadened the existing network of the port, turning it from a 'rural road to 'highway', "said Ma Jin, the overall implementation leader of the project and vice president of the Wisdom Institute of the Design Research Institute of ZPMC. Using the features of ultra-low delay, high bandwidth and other attributes of F5G, the Ultra-remote Control Center

can achieve a hundred kilometers of network transmission with a network delay of less than 1 millisecond and a zero package loss in the data transmission. The use of F5G meets the requirements of the ultra-remote industrial control of the network, realizes the normal operation of the ultra-remote intelligent control of the port handling equipment and an "intelligent and high-speed" control of container handling.

The landing and application of the Ultra Remote Control Center can't be achieved without ZPMC's sound preparation. As a complete set of equipment supplier and system integrator of Shanghai Yangshan Phase 4 Automated Terminal, ZPMC is very familiar with the original equipment layer network and the demand for remote control of handling of the port. Therefore, in the process of introducing F5G into the port equipment remote control system, ZPMC can provide users with one-stop customized solutions in a timely and accurate manner.

For all that, the short period of two-month for the project still pressured the team. How could they help technology suppliers understand the different technical requirements for communication protocols between port production networks and traditional park networks? How could they reasonably plan

the data flow of optical network hardware links and application protocols such as control and video? How could they perfectly fit F5G with the original network at the device layer? These were the problems that need to be solved in the practice of innovation. "I went to the site three or four times a week," said Wen Jiahua, responsible for the promotion and implementation of the technology. In order to perfectly adapt F5G technology to the needs of port remote control operations, ZPMC and its partners carried out a series of communication and discussions to modify the plan, and a series of on-site debugging and verifications to identify and solve problems, and optimize the project functions. Finally, the ultra-remote control center operates stably and effectively in the on-site environment of the terminal.

The ultra-remote control improves the working environment and shortens the commute time, which brings a new atmosphere for the recruitment of talents in the port industry. In the past, employees of Shanghai Yangshan Phase IV automated terminal often had to take a shuttle bus to the dock at 5:30 am, and the long commuting time was a pain point. "I saw many of them carrying pillows for sleeping on the shuttle bus," said Ma Jin. After the completion of the

ultra-remote control center, the control of the STS cranes and RTG cranes was transferred from the dock to the Tongsheng Logistics Park, which is located more than 30 kilometers from the dock, in one of the five major new urban areas in Shanghai. At the same time, a control room was also installed in the commercial building in the urban area of Shanghai more than 100 kilometers from the dock. This greatly reduced the commuting time of remote operators and brought a safer and more comfortable working environment for them. The greatly improved operational efficiency and work conditions attract more talents to come and stay here. "This is also the social benefits that ZPMC's technology innovation and application creates for the industry," Ma Jin said delightedly.

At present, the ultra-remote intelligent command and operation center of Shenzhen Yantian International Container Terminal is under construction. In the future, ZPMC will continue to promote and iterate the innovation and application of F5G for intelligence ports, help build world-class smart ports, and promote the digital transformation of ports and the shipping industry. 振

(Photo by Huang Zhiwei)

What a tough job to achieve the "freedom" of installing lifts!

-Stories about installing lifts in old residential areas

by Dai Wei

As the old saying goes that "only by living in a good house can one have a happy life". The installation of lifts for old residential area, as a practical project to improve the quality of urban living, carries the people's longing and pursuit for a better life. Therefore, it has been included in the renovation of old urban communities, which is of great significance for improving the living environment and the life quality of local residents, and promoting urban development. The government will further promote the work of installing lifts in an orderly manner in the future.

In 2019, ZPMC entered the field of installing lifts, and has successfully carried out lift installing business in multiple districts of Shanghai, with contracts of 182 lifts in total signed. In 2021, ZPMC launched the management model of 15-year lift full life cycle maintenance. Through strengthening cooperation with property companies, ZPMC truly covers the full life cycle of the lift installation project from residents' intention to install lifts to the operation and maintenance after installing, ensuring the subsequent safe use of the lifts. By the end of August, ZPMC has undertaken the maintenance and repair business for 101 lifts under the project.





What benefits will the policy bring?

With the arrival of an aging society and the further improvement of residents' living needs, the relevant parties in many regions in China are exploring the installation of lifts in old residential areas. This is of great significance for improving the use functions of old residential areas, promoting the construction of barrier-free environments, meeting the needs of an aging society, and improving the quality of urban life. In order to implement the requirements of the Government Work Report 2023, recently, the ministries such as MOHURD, NDRC, MIIT, MOF, CMA, SSAC, and NEA jointly issued the Notice on Solidly Advancing the Renovation Work of the Old Urban Communities in 2023 (JBC (2023) No. 26). The Notice requires all regions to solidly promote the implementation of the renovation plan for old urban residential areas, make the 2024 renovation plan in advance, orderly promote the renovation plan for old urban residential areas, solidly promote the "corridor reform", and vigorously advance the installation of lifts for qualified buildings.

Based on the principle that people's city shall be built by people and for people, Shanghai has been adhering to the principle of "installing lifts for communities with suitable conditions and willingness as soon as possible." This has been always regarded as the overall tone for promoting people's livelihood improvement work. According to incomplete statistics, since 2011, Shanghai has issued more than 10 opinions, guidelines and regulations on lift installation, which have played a driving role in different periods. In 2011, the "Guidance on installing Lifts to Existing Multi-story Residential Buildings in Shanghai" was issued, which straightened out the division of responsibilities among various departments; in 2016, the "Notice on Construction Approval Related to the Construction Management of Lift installation in the City's Existing Multi-story Residential Buildings" was issued, which reduced the original 46 approval items to 15; in 2017, the "Guidelines for Installing Lifts in Existing Multistory Residential Buildings in Shanghai" was introduced, which provided installation instructions for interested homeowners without any knowledge on lift installation; in 2019, the "Several Opinions on Further Doing a good Job of installing Lifts in Existing Multi-story Residences" raised the financial subsidy standard up to RMB 280,000, and allowed the withdrawal of housing provident funds to pay for the installation of lifts. In 2020, the installation of lifts in existing multi-story residential buildings was listed as a popular project in Shanghai, and the special office for installing lifts was established. The office focuses on key issues such as approval, funding, unified residents' wishes, and safety and quality supervision for installing lifts, and seeks ways and measures for such purpose.

These policies simplify and clarify the procedures for installing lifts, and press the "acceleration key" for Shanghai's lift installing work. Data from relevant departments show that as of the end of May this year, Shanghai has installed a total of 5,538 lifts in old residential areas, and 3,000 will be installed this year according to the plan.



ZPMC's lift installation project in Linfen Street, Jing'an District



The residents in old residential areas have a strong desire to install lifts, but why it is difficult to implement it? How can we solve this problem?

As a key project of "doing practical things for the people", although the lift installation industry moves into the upturn, the difficulty of installing lifts in old residential areas in various regions is still prominent, and there is still a gap between responding to the trend of population aging and the needs of the people.

The first "big problem" is the residents' disunity of intention. Although the original problem of "one vote veto" has been qualitatively defined in legal theory, how to solve neighborhood relationships in practical operation is still the key to realize orderly installation of lifts. Each authority should actively explore ways to respond to residents' opinions in accordance with the law through grassroots consultation, dispute mediation, civil litigation, and other means. For communities where the public have the willingness and conditions to install lifts, but residents have not yet formed a consensus on it, the grassroots government should actively promote the work to ensure the people's right to know, participate in, and supervise the process. For buildings suitable for installing lifts, the relevant parties should promote it through patient and meticulous mass work.

In addition, the safety of the old building structure and the limitation of space conditions are also what all relevant parties shall evaluate and pay attention to before installing lifts. Relevant parties shall widely carry out the feasibility assessment of installing lifts, and determine the number of buildings that are suitable for installing lifts, difficult to install lifts, and not suitable for installing lifts. Based on local conditions and data from the survey institute, the design institute shall optimize the plan for installing lifts and sort out the target buildings. At the same time, combined with the different psychological and needs of residents on different floors: high-floor residents have urgent needs for installing lifts, while low-floor residents are worried about the impact on ventilation, lighting, noise, mobility, etc., the design institute shall optimize the design plan, fully consider the actual installation environment from the beginning of the design, fundamentally solve the actual difficulties in installing lifts and try to meet the demands of residents on low floors.

The quality and duration of on-site construction are often the top concerns of

residents living in the buildings. It is necessary to actively promote the standardization of safe and civilized construction, determine the safe and civilized construction plan with the neighborhood committee and property management before entering the construction site, and formulate the standard "Installation of Lift Engineering Management Guide". According to the Requirements of the Technical Guide for Prefabricated Installation of Lifts in Existing Multi-story Residential Buildings in Shanghai, construction units should increase the R&D of lift installation and materials. As the saying goes "if you want a tree to grow tall, you must make its roots firm". Construction units shall strictly adhere to product quality, further improve the construction quality and shorten the site construction duration through technological innovation to reduce the impact on residents' life.

It is also necessary to pay special attention to providing services after installing lifts so that the residents can use them at ease, and avoid hidden hazards due to the absence of management and maintenance of lift, a common concern of residents for lift installation. ZPMC has established a "full life cycle management" model for its lift installation business, which focuses on the pain points of no guarantee for maintenance and repair after lift installation. Through cooperation with insurance companies, ZPMC has launched a 15-year lift full life cycle maintenance services and related safety liability insurance project, which has been widely welcomed and recognized by the government management departments and residents. At the same time, in order to ensure the control of management, ZPMC has set up a lift network monitoring center and a big data center to further reduce service costs.

"Installing a lift to provide direct access to happiness" is not just a slogan. A small lift is both a project concerning people's livelihood and a heart-winning project. Only the government, enterprises and residents strengthen cooperation and jointly promote the development of the lift installation business can residents enjoy the "great happiness" when going up and down in the "small space" of lifts. 🌟

(Photo by Wu Wencai)

Creating "robot arm" for "Popeye"

by Zhou Kan

Looking at the 4,000-ton revolving floating crane "Haifeng 2001" to move towards the "deep blue" ocean on the dock, Wang Xin, director of the Floating Crane Institute of the Design Research Institute of ZPMC, had mixed feelings. "From design to construction, the vessel experienced the COVID-19 pandemic, high temperature, typhoons, it took us 18 months to complete its construction and now it finally successfully graduated!" sighed Wang Xin.

This is a large offshore construction vessel built by ZPMC, a special large crane vessel with the highest lifting height and the strongest DP capability for wind turbine pile foundation operation in China. The crane, positioning winch, anchor chain machine and other key marine equipment on board were independently designed by ZPMC. "Even internationally, it ranks among the mainstream vessel type," proudly said Yan Bing, Deputy Chief Engineer of ZPMC.

At the beginning of the project, in order to keep up with the production schedule, after the contract came into effect, engineers from the Floating Crane Institute of the Mechanical Institute of the Design Research Institute of ZPMC began the design of the crane, a key equipment for the 4000-ton revolving floating crane. "The crane of this project has achieved multiple breakthroughs in terms of technical design parameters!" said Wang Xin.

Engineers are bold in innovation and make trials first. According to the actual usage conditions of users in the wind farm, in order to expand the use range of the 4000-ton crane, they have greatly increased the lifting amplitude of the crane, increasing the lifting amplitude from 3000 tons @ 40 meters to 3000 tons @ 45 meters. "This is the first record in the industry!" Wang Xin said proudly. Compared with other lifting vessels, this revolving floating crane can lift heavier objects at the same amplitude, lift objects at farther distances at the same tonnage, and lift higher at the same amplitude and tonnage. The turning capacity of the 4000-ton revolving floating crane can even be compared to a 5000-ton crane vessel! "In short, it's like a person with longer and more powerful arms who can hold object farther and heavier without changing their weight," explained Wang Xin.

The advanced load hook of the crane is not to be underestimated. Usually, a 4,000-ton crane vessel will be equipped with 2 sets of 2,000-ton or 1 set of 2500+1500-ton load hooks. In order to cope with the pile overturning operation of large offshore wind turbine piles, the project design team boldly innovated, and for

the first time configured two sets of 3,000-ton winding systems and hooks for the 4,000-ton crane vessel. "The powerful lifting capacity of the two sets of 3,000-ton main load hook even makes many people who see the design parameters for the first time think that this is a standard 6,000-ton crane." Wang Xin said with a smile.

In the vast sea, wind turbine pipe piles look like slender, huge "pencils", and they are stacked horizontally on the barge for transportation. When the barge arrives at the installation site, the piles have to be raised upright by two hooks, that is called "pile turning". In the pile turning process, one hook hooks the "heavy end" and the other hooks the "light end"; at the end of the pile turning, the weight of the whole pile leg will eventually fall on the hook on the "heavy end" side. Therefore, the lifting capacity of the "heavy end" side determines the size of the pipe pile that can be lifted. If the two hooks cannot reach the lifting capacity of the "heavy end" at the same time, the crane has to constantly shift the berth to adjust the lifting position in the actual operation. "This design not only greatly improves the convenience of offshore wind turbine installation, reduces the number of shifts of the crane vessel when operating in the wind farm, but also greatly improves the efficiency of the operation." After full communication between the project design team and the user, and after several feasibility analyses and fine modeling calculations, the innovative design was finally completed.

As the navigation height of most bridges in China is around 60 meters, and the navigation height of the 4000-ton crane vessel's hull is about 78 meters, it is not possible for a 4000-ton crane vessel to reach some operational waters. With courage to break the limit, the project design team boldly reduced the hull navigable height of the 4,000-ton crane vessel to 55 meters for the first time. This enables

the crane vessel to pass through large bridges more safely and has the ability to operate in a wider range of water areas, greatly expanding the range of the crane vessel's operation.

At present, the 4,000-ton revolving floating crane "Haifeng 2001" has been delivered. Upon being put into operation, it will significantly enhance the operational capacity of China's offshore wind turbine in the deep open seas. It will demonstrate its powerful functionality as "Popeye" in the market. "The success of this project has far-reaching strategic significance for the realization of home-made wind power equipment," said Wang Xin.

(Photo by Zhang Aifeng)

The smooth delivery of the 4,000-ton revolving floating crane made by ZPMC for CCCC Haifeng Wind Power

A "close housekeeper" for photovoltaic power stations

by Lu Yiyao

ZPMC's 21 MW distributed photovoltaic power plant in Changxing Branch

With abundant sunshine and rising temperatures, summer is a "golden season" for photovoltaic power plants to generate electricity. On the roof of the workshop of ZPMC Changxing Branch, 21 MW rooftop distributed photovoltaic power plant panels are absorbing strong solar light. At the same time, real-time power generation data is constantly refreshed on the green energy management platform located in ZPMC's New Industry Business Division.

"Here, the green energy management platform can monitor the status of power stations in various regions in real-time, and we can say that it is a 'close housekeeper' of photovoltaic power stations," introduced Liu Yu, deputy general manager of the Technology Research and Development Department of New Industry Business Division and Project Leader of the Green Energy Integrated Management Platform.

With China's proposal of carbon peaking and carbon neutrality goals, photovoltaic power has gradually become an important support for the global energy transition. Since 2016, ZPMC has started to lay out its photovoltaic business, investing in 32 projects with a total installed capacity of nearly 100 MW. As of the first half of 2023, a total of 288 million kilowatt hours of green electricity

have been generated, reducing carbon dioxide emissions by over 200,000 tons, equivalent to planting 15 million trees.

With photovoltaic power stations distributed throughout the country, how to better manage and operate them is a major challenge. "Initially, we used a manufacturer-equipped management platform, which had very limited functions and lacked the operation and maintenance management functions of photovoltaic power station. Later, we found a company specializing in photovoltaic power station monitoring, but the cost is far beyond the budget," said Gu Jin, deputy general manager of the New Industry Business Division, "it also made us determined to build ZPMC's self-owned green energy management platform."

Since 2018, Liu Yu and her team began to build ZPMC online management platform. Version 1.0 originally developed could not be used due to limited capacity of the power station data transmission collector and difficulty in meeting the needs of the platform server. They had to start all over again. "It was a really hard time. We had countless meetings, and the whiteboard was densely written over and over again. Ultimately, the architecture and functionality of version 2.0 was determined," said Liu Yu. Finally, by enhancing the edge computing capability of the

collector, the team made a qualitative leap in the number and performance of data transmission on the platform, and also ensured the security of data transmission. The green energy management platform was truly set up.


In June this year, the green energy integrated management platform independently developed by ZPMC was officially launched, and photovoltaic power stations across the country are being connected one after another, and are currently in the trial operation stage.

In Liu Yu's view, the biggest highlight of this management platform lies in its operation and analysis modules. The conventional monitoring function equipped when manufacturers sell photovoltaic equipment can only view some data. However, as the builder and owner of the power station, we hope to have a 'close housekeeper' who can help our power station operate and generate electricity continuously for a long time. Therefore, we have put a lot of effort into the operation and maintenance management function."

As a qualified "housekeeper", the platform must have the ability to simultaneously monitor multiple photovoltaic power plants. In the monitoring page of the platform, the status and power generation data of each connected

device are clearly recorded, and subsequent new photovoltaic power stations will also be connected to video surveillance; dealing with and solving problems is also an important responsibility of the "housekeeper". When a failure occurs to the equipment, the platform will immediately show alarm information, and the administrator will form a work order by processing the alarm in time. When the work order is sent to the operation and maintenance personnel in the area, the work order will enter the approval and confirmation after the problem is solved, and the completion state will be displayed at last, so as to form a closed process loop.

When launching the website version of the platform, the project team also developed the Wechat mini program version simultaneously, which is still in the internal testing stage. Gu Jianping, a team member said, "at present, the two channels of the platform are in the trial stage. The operation and maintenance personnel conduct daily management and monitoring of the connected power station. Any problem they found will be reported to us, and we will make timely modifications and improvements. We plan to officially launch them in October."

Photovoltaic power plant operation and maintenance is only the first step in the construction of a green energy management platform. For the next phase of the plan, Xiang Xudong, general manager of ZPMC's New Industry Business Division, said: "We will start from the monitoring of photovoltaic power stations, accelerate the integration of photovoltaic power generation, energy storage battery, charging piles, reverse charging, to achieve a global overview of the closed-loop consisting of 'power generation, energy storage, and electricity consumption', accurately control the energy conversion and utilization rate, and inject digital and intelligent power into the park's carbon management to help the enterprises in the park operate in a greener and lower carbon manner." 

(Photo by Ji Xueqing and Gu Jianping)



The home screen of the green energy integrated management platform

A dream catcher engaged in marine engineering

by Xue Wenyuan and Li Tianyi

On May 30, the seventh National Science and Technology Workers' Day, the first Pudong New Area Science and Technology Elite Commendation Conference was held in Pudong Mass Culture and Art Museum, during which the first batch of 49 "Pudong New Area science and technology elites" won the prize cups, making the strongest voice of science and technology innovation in Pudong. Huang Zhaoyu, chief engineer of the Design Research Institute of ZPMC and president of Marine Engineering Design and Research Institute, is one of the prize winners. Huang Zhaoyu wore a pair of square glasses on the podium, and one could feel his erudite and elegant temperament at just one glance.

In 2008, Huang Zhaoyu graduated from Shanghai Jiao Tong University with a major in mechanical design theory and entered ZPMC's postdoctoral station, where he began research on vibration, computational analysis, and pile legs of jack-up drilling rig. At that time, ZPMC had only entered the marine engineering market for two years, and domestic experts nearly knew nothing about the field. Huang Zhaoyu led the team to conduct repeated research and argumentation. They started from the platform's core technology of "overall and structural calculation analysis", and achieved a breakthrough from 0 to 1. In 2011, they successfully won the "crown pearl" in the field of offshore engineering, i.e., 300-foot offshore jack-up drilling rig "Zhenhai 1", opening a new era of high-end offshore engineering.

The development of "Zhenhai 1" has provided Huang Zhaoyu and his team with experience and strengthened their determination to deepen their exploration in the marine engineering field. After that, Huang Zhaoyu's team successively completed the R&D of 1000-ton jack-up wind turbine installation vessel, 2000-ton wind turbine installation vessel, as well as the riprap leveling ship and pipe joint sinking ship for the construction of the national key project Hong Kong-Zhuhai-Macao Bridge.

Moving towards high-end marine engineering was the common call and goal of the generation of ZPMC people

engaged in marine engineering at that time. Prior to 2019, the core technology of ultra-deep water pipeline laying vessels had been monopolized by a few European and American companies. In order to fill the gap in China, Huang Zhaoyu led a team of more than 100 people to discuss repeatedly with Chinese and foreign experts to carry out scientific and technological research, and finally overcome multiple "bottleneck" problems in development and construction of the 3,000-meter deep water pipe laying vessel. He broke the foreign monopoly in the field of design, manufacture and equipment technology of deep-water large pipe laying vessels, and was also granted the title of "Shanghai Excellent Technology Leader".

He is a strategist in his work and loves playing Chinese chess in his life. He believes that playing chess and work can be integrated. "What do you bring to the team and what contributions you make in the future? You have to think in the long run, this is the same as the idea of playing chess. Only those who have foresight can win." Therefore, Huang Zhaoyu always said that for innovation you have to find the right direction of the market and research in advance for technical reserve. "Without advanced R&D, there will be no orders for next year". At the same time, years of work experience told Huang Zhaoyu that it is not necessary to make blind innovation but combine innovation with the actual development of the enterprise.

On September 19, the 2500-ton self-elevating self-propelled wind power installation vessel "Haifeng 1001" designed and manufactured by ZPMC was formally delivered to the user. This vessel boasts the largest lifting capacity in China. "The success of this project is of far-reaching strategic significance for further realizing 'Made in China' of the equipment for the wind power industry!" said Huang Zhaoyu, chief designer of the project, with a smile.

Choosing marine engineering means chasing the deep sea and constantly stepping on the waves! During his 15 years of work, Huang Zhaoyu grew with ZPMC's marine engineering business. He grew from unknown exploration of marine engineering to fully utilizing his talents, from a postdoctoral fellow to a senior engineer, and then to a technology leader. He has participated in more than 10 national and provincial level scientific research projects, presided over the "research on collaborative operation technology of double pipe laying system and crane in deep water pipe laying ship", "research on mechanism and inhibition of dynamic effect of jack-up floating crane" and other key scientific and technological innovation topics in Shanghai. He has been awarded more than 20 patents,

and won the title of China Construction Ten Outstanding Youth... These achievements represent the footprints of the past. Huang Zhaoyu will maintain the same initial intention and continue to strive towards the high-end, intelligent and green direction of ZPMC marine engineering equipment. 振

(Photo by Chen Hongfan and Ji Xueqing)



Huang Zhaoyu is speaking at the 2023 China Brand Day



On 2023 China Brand Day, Huang Zhaoyu is delivering a speech on the new generation wind power installation platform and key core equipment developed by ZPMC



Huang Zhaoyu (third from right) is accepting the award on the podium



Huang Zhaoyu won the title of the first "Science and Technology Elite of Pudong New Area"



Summer care class in Ping'An Primary School, Chongming District

Children's unique summer vacation

by Li Tianyi

“Today's visit gives me a great shock. I find that the machines very large and advanced, and they are actually distributed in 107 countries around the world! Previously, I was surprised to hear news about my father's company, but now I realize that these are all true.”

“My dad works in the steel structure department. I've been to Changxing Island before, but I don't understand what my dad does. Today, when I saw these facilities, I thought my dad was quite powerful.”

“My dad is a crane designer, today it is the first time I saw a crane vessel, I did not expect the crane vessel is so big!”

These childish words come from the children of Zhenhua Summer Care Class. With the advent of summer vacation, how the children spend a fulfilling holiday has become one of worries for parents. To this end, ZPMC jointly worked with

emotional intelligence training camp, Chongming District Ping An Primary School to launch Zhenhua summer care class to solve the problem that no one takes care of the children during the day time. On July 3, two summer care classes in ZPMC headquarters and Changxing Branch opened at the same time, 204 students came here to learn knowledge, make friends, and experience during the summer time.

On July 13, 28 children from the headquarters summer care class came to visit Changxing Branch. The children took the bus, slowly passed by rows of “steel giants” and “the Pillars of a Great Power”: colorful STS cranes, sinking tubes for building the Hong Kong–Zhuhai–Macao Bridge undersea tunnel etc. On the way, they also listened to the story of Zhenhua people outwitting pirates in the Gulf of Aden.

“Such a large machine can only be built through

cooperation, and everyone is contributing to it,” said Zhenhua summer care class teacher. In order to immerse the children in understanding the meaning of “everyone gathers firewood and flames high”, the teacher led the children to play a little game. The rules of the game were to transport balloons from the left side of the room to the right side without using their hands. The children immediately started using their brains: some people put balloons in baseball caps, held them in their mouths, and others flipped them with their arms... “Little downy birds” came up with a variety of strange ideas, making the classroom very lively. However, soon after, the children who had exhausted their methods were at a loss, and the scene was stuck in a stalemate. “Madam, can two people cooperate?” A little girl asked earnestly, looking into the teacher's eyes with anticipation. “Of course, you can!” The teacher nodded approvingly. The children who were inspired immediately developed a “head to head, back to back” transportation method, and the atmosphere in the classroom was revitalized. In this unique course, the children came up with 19 ways to transport balloons and understood the principle of “1+1>2”. After the game, they also tasted flavored salt soda popsicles prepared by Changxing Trade Union. In this way, the summer care class in the morning came to a perfect end.

In addition to the headquarters summer care class, Ping'An Primary School and Changxing summer care class in Chongming District had 116 children. They were taking classes seriously. Here, the children were divided into three classes based on their age. Class 1 was taking a safety course, Class 2 was playing a “diamond cut diamond” game, and Class 3 was learning “Funny Sudoku”. Their teachers were excellent students from economics, primary education, and other majors at Shanghai Normal University. Under the careful guidance of these volunteer teachers, the children have gained a lot of new knowledge.

When you enter the classroom of Zhenhua Summer Care Class, what you see is the dense forms on the bulletin board, “Emergency Plan for Zhenhua Primary School Students Care Class Public Safety Incident”, “Emergency Contact Form”, “Fixed-point Meal Agreement”... These documents are the testimony of the managers of ZPMC Trade Union who wholeheartedly escorted the children. Sun Wei, the secretary of ZPMC Trade Union, introduced that when choosing a third-party institution for ZPMC's summer care class, safety conditions and travel distance will be considered apart from the basic condition of class qualification, so as to provide the best summer experience for children. Kou Jinyu, secretary of the Trade Union of Changxing Branch, introduced that after years of practice, Changxing Care Class has also formed

a four-dimensional service model of “government + school + enterprise + volunteers”, as well as the “five having” service features, i.e., “security measures, basic teaching staff, custody agreements, accident insurance, and emergency plans”. Before the opening of this year's summer care class, Changxing Trade Union has already arranged the morning shift schedule for Ping'an Primary School. The Trade Union has recruited excellent volunteers from the Party, workers, and Youth League front lines to work in the morning shift every day and take turns to be on duty at the school gate. The summer care class required the children to enter the school at 7:30, responsible and enthusiastic Kou Jinyu got up early at 5 o'clock, and arrived at the school gate at 6 o'clock to be on duty. When it comes to the reason for “arriving on duty early,” Kou Jinyu said, “Last time I was on duty, I arrived at 6:10. But only 10 minutes later, the first child arrived. So, this time I had to get up earlier to avoid missing any child.”

As the summer care class progressed halfway, the children also gained friendship here. “These are my two friends, and we have exchanged contact information.” said Sui Yu'an, pointing to his smart watch. Many parents said that summer care classes can not only help children spend a happy summer vacation, but also solve the difficulty in caring that employees are most concerned about. Since 2017, ZPMC Changxing Summer Care Class has been opened for five sessions, serving more than 600 workers' families, and won the honor of “2021 National Trade Union Care Class”. Looking at the innocent smile on the faces of the children, the managers of the Trade Union feel that this job is very meaningful. “The children of our employees are also the children of ZPMC. In the future, we will continue to do more practical work for all employees and become their trusted family members!”

(Photo by Ji Xueqing and Kou Jinyu)



Children overlook the entire site from the sightseeing platform on the 29th floor of Changxing Branch

First Impressions in Norway

by Chen Hang

On June 3, 2023, at 10:30 pm local time, the plane landed. After a flight of over 7,000 kilometers for 18 hours, I arrived in Norway, the northernmost country on the earth. Looking through the porthole, the orange-gold sunset put a warm blanket on the coldest place in the world, the Land of Ten Thousand Islands. This is my first impression of Oslo, the capital of Norway. The work waiting for me was to debug the STS crane in Oslo Port, Norway, and it was also the first STS crane provided by ZPMC for the port of Oslo.



Catholic Oslo Cathedral

Two months ago, I was on a business trip to Shenzhen Mawan Port, and received a message that I would go abroad to do after-sales commissioning. During my expectation, the time flew soon.

As the delivery team was about to return home, the next day after my arriving at Oslo, I and Chen Shuiwa went to the port to meet the user. It was the first time I met Aspen, the port general manager, and Eddy Wen, the chief engineer of the Norwegian Ports Authority, who warmly shook hands with us. After full communication, we immediately started daily commissioning work.

I still remember the morning of the Dragon Boat Festival. As soon as I arrived at the dock, I received a phone call from Morten, the dock supervisor. I learned that the STS crane failed, the speeds of the trolley and the lift dropped sharply. I quickly went to the electrical room to check the data. On the premise that the STS crane's data were normal, I checked the program again and quickly identified the problem. It turned out that the operator of the user accidentally pressed the "overload bypass" button, which enabled the STS crane to lift the overweight container, which also reduced the operating speed. After the problem was cleared, I quickly manually adjusted it. This was just a minor problem, but I didn't expect that the user's driver exclaimed and gave me a thumb up. The user's recognition and trust made me feel good. This was the best gift I received on the Dragon Boat Festival.

I had a more intuitive understanding of Oslo during my three months of work and life there. Our residential area was on a hill. When we opened the window, the fragrance of pine trees came over to our faces. The sky looks brilliant blue, with only a few gauzy clouds, the rolling hills hug the sea, and everything is so clean.

Oslo is also a city of national sports. Every day, I saw local people running on the street with headphones, and I also saw children around 5 years old riding with safety helmets without adults. In residential areas, they



Chen Hang took a photo in front of the first STS crane provided by ZPMC for the Port of Oslo

turned on the indoor audio devices, played cozy music, poured wine into goblets, and enjoyed the sun on a patio chair. Later, talking to Eddie, I learned that the locals cherish June and July so much that they use their annual leave to go to the sea and the forest with their families, so July in Norway was nicknamed the "lost July". When talking in excitement, Eddie warmly invited us to go swimming at the beach together. But I am not skilled in swimming, so I had to give up.

In my spare time, I also tried to teach Espen a few words of Chinese. He had a good temper, and was a very interesting person. In addition to the simple vocabulary of 'Ni hao', I also taught him a few popular online phrases. For example, when he said 'super', I would make a '6' gesture to him. When chatting with me, he said '666' to express the meaning of greatness. We also occasionally touched our fists to show friendliness.

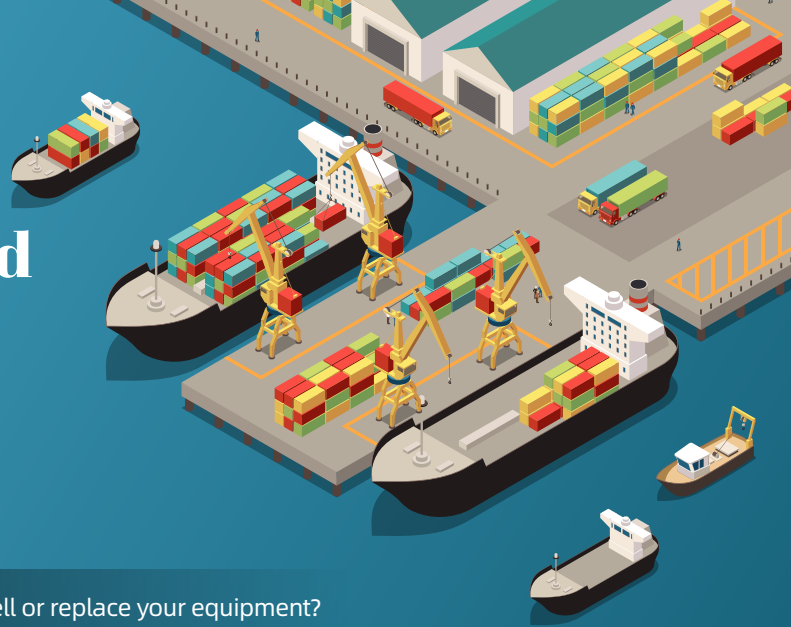
How time flies! The after-sales work was successfully

completed and I returned to my home country, but my trip to Norway is an unforgettable experience in my memory. 振

(Photo by Chen Hang)



Residential areas in Norway



ZPMC's Second-hand Port Equipment Information Release Platform Launched

Facing ever-changing port business, do you want to sell or replace your equipment?
ZPMC's second-hand port equipment information release portal was launched. ZPMC united global partners to provide you with a high-quality portal to sell or buy second-hand equipment!

Leveraging brand power to serve the future of the industry

ZPMC is a well-known company in the heavy equipment manufacturing industry and is one of the largest heavy equipment manufacturers in the world. As a leading enterprise in the global port machinery industry, ZPMC has always adhered to the service concept of "Everything for the Sake of Users", and is committed to promoting the overall development and prosperity of the port industry.

In order to further enrich ZPMC's marketing business types and diversify the port equipment business, based on ZPMC's traditional port machinery market, relying on industry resources and partners all over the world, ZPMC has launched a second-hand port equipment information service platform and carries out associated business to help provide the most valuable information services for the industry.

One stop information navigation, safe and save worry

Aiming to solve the problem of customer equipment redundancy and meet their purchase needs, the second-hand port equipment information release platform includes a variety of products, such as STS cranes, RMG cranes, gantry cranes, stackers, RTG cranes, mobile port cranes, and front cranes.

ZPMC's second-hand port equipment information release platform can effectively help users optimize equipment resources and promote the upgrading of port equipment. Specific services include global second-hand equipment information release and inquiry, assisting customers in selling or buying equipment, providing purchase guidance and equipment testing, transportation, commissioning, transformation and other value-added services.

The platform aims to recycle and utilize port equipment and contribute to ecological and environmental protection. In the future, ZPMC will continue to practice the concept of green development and provide "green solutions" for users.

Click "Second-hand Equipment"
at the upper right corner



The website of the platform

<https://www.zpmc.com/shebei/>

Contact

dongnan@zpmc.com

For Specific operation, please log into ZPMC's official website, click the "Second-hand Equipment" at the upper right corner to view the corresponding information about second-hand equipment!