

志合越山海 聚力共前行

With Shared Aspirations and Joint Efforts

高质量推动港口行业韧性发展

Promoting High-Quality Development of the Port
Resilience

山东港口青岛港集团有限公司 李涛
SPG Qingdao Port Group Co., Ltd. Li Tao

2024年10月
October 2024

港口基本情况

Overview of Ports

港口是服务性、先导性、战略性基础资源，作为供应链重要一环，港口韧性的提升与高质量共建“一带一路”时代要求高度契合。

Ports are pioneering infrastructures of strategic importance in providing services. As a crucial link in the supply chain, ports are in urgent need of resilience enhancement, which is in perfect alignment with the requirement for high - quality “Belt and Road” cooperation.



步入21世纪后,全球气候变暖趋势明显,自然灾害、极端天气事件频发,网络攻击、生产事故等其他问题仍然存在。港口韧性的提升更加依赖于智慧化、绿色化技术应用,以确保港口内部环境稳定,更好的适应外部环境变化,为港航供应链完整高效运行提供有利的基础保障。

Entering the 21st century, we have witnessed an unmistakable trend of global warming, an increase in natural disasters and extreme weather events, as well as a rise of challenges such as cyberattacks and industrial accidents. Therefore, the improvement of port resilience increasingly relies on the application of intelligent and green technologies. This is essential to ensure a stable internal environment for ports, enabling better adaptation to external fluctuations and providing a solid foundation for the comprehensive and efficient operation of maritime supply chains.



港口基本情况

Overview of Ports



“要更加注重经略海洋，加快建设世界一流的海洋港口。”

“Attaching greater importance to seeking strategic development of the marine industry, accelerating building world-class marine ports”



大港港区

Dagang Port Area



黄岛油港区

Huangdao Oil Port Area



威海港区

Weihai Port Area

山东港口青岛港始建于1892年，是世界第四大港、中国第二大外贸口岸，管理五大港区。

Established in 1892, SPG Qingdao Port ranks as the fourth-largest port globally and the second-largest foreign trade port in China.



前湾港区

Qianwan Port Area



董家口港区

Dongjiakou Port Area

港口基本情况

威海港区
Weihai Port Area

面积**37**平方公里
37 square kilometers

泊位**128**个

128 specialized deep-water berths

集装箱航线**223**条
223 container liner routes

航线密度**北方港口首位**
the highest route density
among northern Chinese ports

黄岛油港区
Huangdao Oil Port Area

大港港区
Dagang Port Area

40万吨
矿石码头
400,000-ton ore
terminal

45万吨
原油码头
450,000-ton crude
oil terminal

2.4万标箱
集装箱码头
berths capable of
accommodating the world's
largest **24,000**-TEU
container ships

前湾港区
Qianwan Port Area

董家口港区
Dongjiakou Port Area

世界上有多大的船，青岛港就有多大的码头

No matter how large ships are in the world, Qingdao Port has the corresponding berths to accommodate them.

2023年，吞吐量超过**7亿吨**、全球**第四位**，集装箱超过**3000万标准箱**、全球**第五位**

In 2023, Qingdao Port completed over 700 million tons of cargo throughput, the fourth largest in the world, and handled over 30 million TEU containers, ranking fifth globally.



国际领先的智慧绿色港

Internationally Leading Smart and Green Port

山东港口成立以来，始终将“国际领先的智慧绿色港”作为“五个国际领先”发展定位的首要任务，青岛港按照集团公司总体部署，全面规划智慧绿色港口“总蓝图”

Since its establishment, Shandong Port Group has always put the objective of becoming an “**internationally leading smart and green port**” on top of the “Five International Leading” development objectives. Qingdao Port has consistently upheld this objective, comprehensively planning the “general blueprint” for the construction of a green and smart port.

国际领先的智慧绿色港

Internationally Leading Smart and Green Port

国际领先的物流枢纽港

Internationally Leading Logistics Hub



国际领先的产城融合港

Internationally Leading
Industry-city Integration Zone



国际领先的金融贸易港

Internationally Leading Financial and
Trade Center



国际领先的邮轮文旅港

Internationally Leading Cruise Culture
and Tourism Destination

在“新”上借力 用绿色转型赋能清洁低碳发展

Leveraging Innovative Technologies: Empowering Clean and Low-Carbon Development Through Green Transformation

聚焦“碳达峰、碳中和”战略目标

Focusing on the strategic goal of dual-carbon

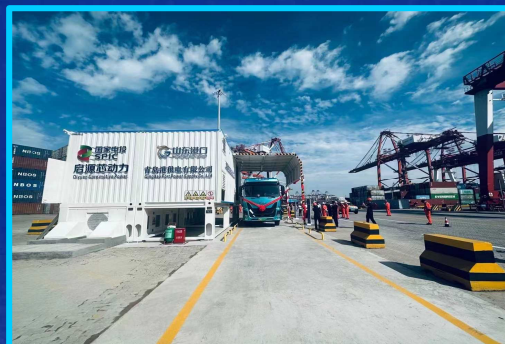
运输模式更优化

Optimize transportation modes



用能结构更清洁

Ensure cleaner energy structures



能源供应更低碳

Provide low-carbon energy supplies



绿色品牌更典型

Establish exemplary green brands



深度融入“双碳”战略，制定“零碳港口”建设方案，把生态环境保护放在港口发展布局优先位置，聚焦运输模式更优化、用能结构更清洁、能源供应更低碳、绿色品牌更典型等重点方向，全方位、高标准打造绿色韧性港口

In alignment with dual-carbon goal, a comprehensive “Zero Carbon Port” development plan that prioritizes environmental protection has been formulated. To develop a resilient green port to the highest standards, efforts have been made to optimize transportation modes, ensure cleaner energy structures, provide low-carbon energy supplies, and establish exemplary green brands.

在“新”上借力 用绿色转型赋能港口清洁低碳发展

Leveraging Innovative Technologies: Empowering Clean and Low-Carbon Development Through Green Transformation

(一) 深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

(二) 构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

(三) 创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

(四) 打造高品质绿色低碳示范区

Establishing a Diversified and Efficient Modern Energy System





深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

散货扬尘管控 Dust Control Measures



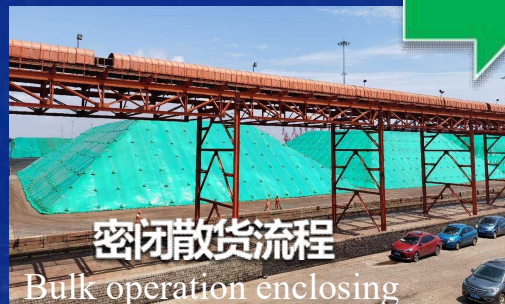
自动抑尘料斗
Truck hopper enclosing



抑尘墙
Dust control fences



洗车台
Washing station



密闭散货流程
Bulk operation enclosing



货垛苫盖
Material covering



吸尘车
Vacuum sweeper



强化散货作业抑尘“**六个100%**”，结合散货堆存周期，采用“**苫盖+结壳剂+喷淋**”的抑尘模式
建设**13公里**抑尘墙、**22座**洗车台，配备清扫及洒水等环保车辆**80余台**
2024年港区粉尘三项指标较2022年下降超过**30%**

We have implemented stringent controls over dust emissions in the port areas, ensuring compliance with the “**Six 100%**” requirements for bulk cargo operations and in construction sites. Considering the bulk storage cycle, we employ a dust control model combining “**material covering + crusting agents + water spraying**”. Besides, we have constructed **13 kilometers** of dust control fences and **22** washing stations, and equipped the port with over 80 new energy vehicles for cleaning and watering. By 2024, the three key dust indicators have declined over **30%** compared to those in 2022.



深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

挥发性有机物管控

Emission Control of Volatile Organic Compounds



装车线、装船码头配备**18套**油气回收设备，实现全覆盖，处理能力达到**2万立方米/小时**
年度可回收油气**3100余吨**

The loading dock and truck loading lines are equipped with **18 sets** of oil vapor recovery units, achieving a processing capacity of **20,000 cubic meters per hour**. These units are projected to capture **more than 3,100 tons** of oil vapor annually, significantly reducing pollutant emissions.

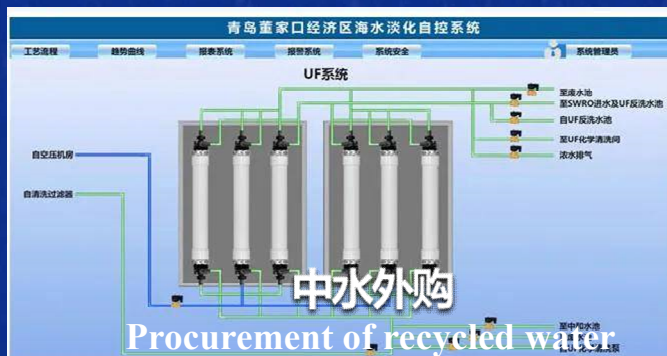


深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

港区污水管控

HSE Compliance in Wastewater Management



多方取水
Multi-channel collecting water



处理达标
Meeting wastewater treatment standards



中水回用
Reclaimed water reuse

循环利用
Recycle



含尘污水、生活污水收集
Collecting dusty sewage and domestic sewage



坚决落实“雨污分流”原则，配套2座生活污水和20余处含尘、含油污水处理设施
年度自产回用中水约120万吨，减少水费650万元

We are firmly committed to the principle of “separating rainwater from wastewater” and equip the port with two domestic wastewater treatment plants and over 20 units for treating dust and oil-contaminated wastewater. Annually, we recycle approximately 1.2 million tons of treated water, resulting in a cost reduction of RMB 6.5 million in water expenses.



深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

环境应急能力

Environmental Emergency Response Capability



港区试点建设海上溢油**应急联防体**，高标准建设环境应急物资储备库，定期开展应急演练
实现**物资共享、联勤联动**，大幅提升环境应急能力

A **pilot project** for handling marine oil spills has been established. We have built environmental emergency resource reserves with high standards. We conduct regular emergency drills to ensure **resource sharing** and **coordinated action**. This has significantly enhanced our capacity for environmental emergency response.

在“新”上借力 用绿色转型赋能港口清洁低碳发展

Leveraging Innovative Technologies: Empowering Clean and Low-Carbon Development Through Green Transformation

(一) 深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

(二) 构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

(三) 创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

(四) 打造高品质绿色低碳示范区

Establishing a Diversified and Efficient Modern Energy System





构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

集装箱海铁联运

Container Sea-Rail Intermodal Transport

班列线路**83**条，内陆港**50**个

发运量从2014年起步时的20万发展到现在**220.8万**标箱，连续**9**年位居全国沿海港口**第一位**

2023年减少柴油货车**110万**辆次，降低公路碳排放**30万吨**

The Qingdao Port boasts **83** container sea-rail intermodal routes and **50** inland ports. Since 2014, the volume of shipments has expanded from 200,000 TEUs to an impressive **2.208 million TEUs** in 2023, positioning Qingdao Port as the **leading coastal port** in China for **nine consecutive years**. A reduction of **1.1 million diesel truck trips** per year leads to a decrease of **300,000 tons** in on-road carbon emissions.



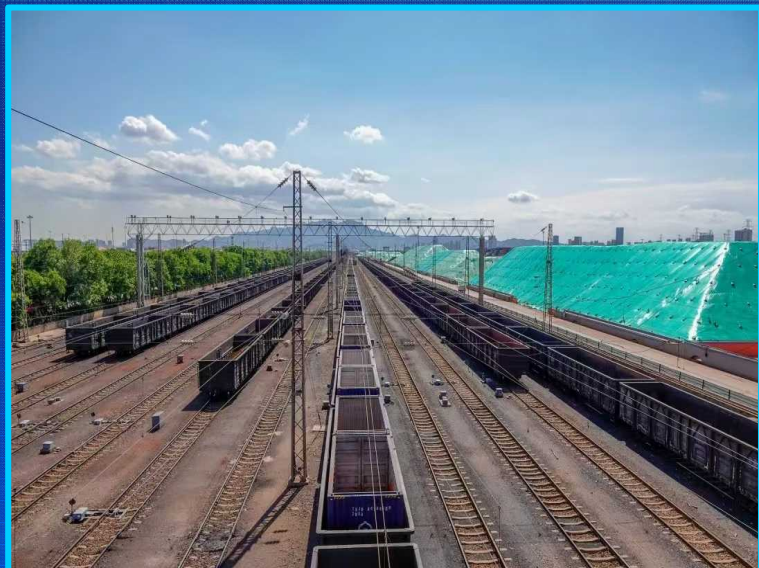


构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

大宗干散货清洁输运

Clean Transportation of Dry Bulk Cargo



2023年，大宗干散货“铁路+水路”输运量**1.18亿吨**，占比达到**86.6%**

减少柴油货车**390万辆次**，降低公路碳排放**120万吨**

In 2023, the volume of dry bulk cargo transported via railway and waterway reached **118 million tons**, accounting for **86.6%** of the total. This shift has eliminated **3.9 million truck trips**, subsequently reducing on-road carbon emissions by **1.2 million tons**.



构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

油品清洁运输

Clean Transportation of Oil Products

建设长输管道**972.3公里**，覆盖山东**60%**的规模以上炼厂

2023年，原油“铁路+水路+管道”输运量**8900万吨**，占比**92.7%**

减少柴油货车**290万辆次**，降低公路碳排放**60万吨**

We have developed an extensive long-distance pipeline network spanning **972.3 kilometers**, covering **60%** of Shandong's large-scale refineries. In 2023, the transport volume of crude oil through railway, waterway, and pipeline reached **89 million tons**, representing **92.7%** of the total. This shift has eliminated **2.9 million diesel truck trips**, reducing **600,000 tons** of on-road carbon emissions.



在“新”上借力 用绿色转型赋能港口清洁低碳发展

Leveraging Innovative Technologies: Empowering Clean and Low-Carbon Development Through Green Transformation

(一) 深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

(二) 构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

(三) 创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

(四) 打造高品质绿色低碳示范区

Establishing a Diversified and Efficient Modern Energy System





创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

“零排放” 自动化码头

Automated Terminal with “Zero Emission”



全球首创 **“氢+5G”** 全自动化集装箱码头，设备全电驱动、零排放，综合应用风、光、氢等
新能源技术，桥吊效率**60.2自然箱/小时**，荣获全国首个智慧、绿色**“双五星”** 港口

We have pioneered the world's first fully automated container terminal powered by **“hydrogen + 5G”**, featuring entirely electrified equipment with zero emissions. By integrating wind, solar, and hydrogen energy technologies, the bridge crane operations have achieved an impressive efficiency of **60.2 units per hour**. This innovation has earned us the distinction of being the first port in China to attain the **“Double Five-Star”** rating in both the smart and green categories.



创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

“氢能港口” 综合示范

Comprehensive Demonstration Zone of “Hydrogen-Powered Port”



国内港口首座加氢站
The first hydrogen refueling station in the port nationwide



行业率先开展氢能集卡应用
Pilot application of hydrogen-powered vehicles



全球首创“氢+5G”轨道吊
The industry's first hydrogen-powered automated rail crane

聚焦“氢进万家”国家重点研发计划，建成**全国港口首座加氢站**，行业率先开展**氢能集卡**试点应用，首创**氢动力轨道吊**，试点应用**氢能AGV**，氢能设备规模达到**68台**
启动**氢电拖轮**建造，2025年建成投用

Focusing on the key research and development initiative, “Hydrogen for All”, we have established the **first hydrogen refueling station in the port nationwide**. We are pioneering the pilot application of **hydrogen-powered vehicles**, featuring the industry's first **hydrogen-powered automated rail crane**, and piloting **Automated Guided Vehicles (AGVs)** using hydrogen energy, with a total of **68** hydrogen-energy equipment units. Moreover, we have commenced the construction of **hydrogen-electric tugboats**, which are slated for completion and operation by 2025.



创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

新能源综合推广应用

Comprehensive Promotion and Application of New Energy



屋顶光伏
Rooftop PV
system



桥吊光伏
Bridge crane PV
system



风电规划
Wind energy
planning

港区光伏、风电统筹规划、有序推进，助力打造“零碳”码头

已建和在建光伏年发能力达到**1500万kWh**，规划**4座大型风机**，建成后年发电量**7000万kWh**

The port areas are orderly advancing photovoltaic and wind energy planning in a coordinated manner to establish a “zero-carbon” terminal. Currently, we have constructed and are developing photovoltaic systems with an annual power generation capacity of **15 million kWh**, and are planning for **4 large wind turbines** that will generate an additional **70 million kWh** annually upon completion.



创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

清洁化装卸生产模式

Clean Loading and Unloading Production Models



油电混合动力拖轮
Oil-electric hybrid" tugboats



电动集卡
Electric vehicles



电动正面吊
Electric reach stackers

能源清洁化水平持续提升，“油电混合”智能拖轮投用，建成5座换电站

推广电动车辆400余台，全面开展正面吊、空箱叉、装载机大功率燃油机械电动化替代

The level of energy cleanliness continues to improve, marked by the deployment of “oil-electric hybrid” intelligent tugboats. We have established 5 battery swapping stations and promoted over 400 electric vehicles. Additionally, we are comprehensively advancing the electrification of high-power fuel machinery, including reach stackers, forklifts, and mechanical loaders.



创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

岸电应用实现新跨越

Significant Advancement in Shore Power Applications



集装箱高压岸电

High-voltage shore power applications for container ships



客滚高压岸电

High-voltage shore power applications for ro-ro ships

投入2亿元，建设高压岸电20套，低压岸电60余套，实现泊位**100%全覆盖**

全面推动集装箱船舶高压岸电应用，2024年1-8月份接电量**623万kWh**，同比提升**235%**

200 million yuan was invested in the construction of 20 sets of high-voltage shore power and over 60 sets of low-voltage shore power systems, achieving **100% coverage** across all berths. This initiative has greatly enhanced high-voltage shore power applications for container ships, with power consumption reaching **6.23 million kWh** from January to August in 2024, a remarkable **increase of 235%** compared to that in the previous year.



创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

2023年**清洁用能**占比达到66%，较2019年上升13个百分点

万吨吞吐量直接二氧化碳排放1.85吨，较2019年下降15%

In 2023, the proportion of **clean energy utilization** reached 66%, an increase of 13 percentage points compared to that in 2019. The **direct carbon dioxide emissions for every 10,000 tons of throughput** are now reduced to 1.85 tons, marking a 15% decrease since 2019.

清洁用能上升
13个百分点
Clean energy is
up 13%



万吨吞吐量直接碳排放强度
direct carbon dioxide emissions for every 10,000 tons of
throughput decreased by 15%

下降15%

在“新”上借力 用绿色转型赋能港口清洁低碳发展

Leveraging Innovative Technologies: Empowering Clean and Low-Carbon Development Through Green Transformation

(一) 深入打好污染防治攻坚战

Further Promoting the Battle to Prevent and Control Pollution

(二) 构建清洁化货物集疏运模式

Establishing a Clean Cargo Collecting and Dispatching Model

(三) 创建多元高效现代能源体系

Establishing a Diversified and Efficient Modern Energy System

(四) 打造高品质绿色低碳示范区

Establishing a Diversified and Efficient Modern Energy System





打造高品质绿色低碳示范区

Establishing a High-Quality Green and Low-Carbon Demonstration Zone

“绿色港口” 典型示范 Green Port



山东港口青岛港下属董矿、QQCTN、QQCT三家单位获评 **“亚太绿色港口”** 荣誉称号
港口绿色发展能力不断增强。

The three subsidiaries of SPG Qingdao Port, QQCTN, Qingdao Port Dongjiakou Ore Terminal Co., Ltd, and QQCT have been granted the honorable title of **“Asia-Pacific Green Port”**, showing the continuous enhancement of the port's green development capabilities.



打造高品质绿色低碳示范区

Establishing a High-Quality Green and Low-Carbon Demonstration Zone

“园林港口” 典型示范 Garden-like Port



优化港区环境，设置**口袋公园**，打造**重点景观**

2024年投资2.1亿，打造“**三季花成片，四季绿色浓**”的“**园林式港口**”

To create a better environment in port areas, the SPG Qingdao Port has established **pocket parks** and developed **key scenic spots**, with an investment of RMB 210 million in 2024 to construct a “**garden-like port**” characterized by “**flowers thriving in three seasons and greenery flourishing throughout the year**”.



打造高品质绿色低碳示范区

Establishing a High-Quality Green and Low-Carbon Demonstration Zone

“生态港口” 典型示范 Ecological Port



规划前
Before



规划后
After

开展“退港还城”生态保护工程，通过功能置换、业态重塑、生态修复等方式
有序推进老港区更新改造，打造城市新地标

We have implemented the “conversion of ports back to the city” ecological protection project, and systematically advanced the renewal and transformation of old port areas through functional replacement, business restructuring, and ecological restoration, aiming at establishing new urban landmarks.

在“质”上发力 用智慧技术护航安全高效发展

Focusing on Development Quality: Ensuring Safe and Efficient Development through Smart Technologies

依托云港通、玉衡两大平台 “QINGDAO-PORT.NET” and “Yuheng” platforms



云港通
QINGDAO-PORT.NET



玉衡
Yuheng

四大数字化场景国际领先 Internationally leading in four digital scenarios



集装箱 containers



干散货 dry bulk cargo



件杂货 general cargo



液体散货 liquid bulk

依托“云港通”、“玉衡”两大平台，聚焦集装箱、干散货、件杂货、液体散货四大数字化场景，通过传统产业改造升级，实现关键核心技术突破，提升服务管理水平，提高生产效率，打造本质安全型环境，提升外部环境应对能力，创建智慧韧性港口。

We are concentrating on four major digital scenarios of containers, dry bulk cargo, general cargo, and liquid bulk based on the “QINGDAO-PORT.NET” and “Yuheng” platforms. By transforming and upgrading traditional industries, we aim to achieve breakthroughs in key core technologies, enhance service levels and management skills, improve production efficiency, create an intrinsically safe environment, and strengthen external environmental response capabilities, ultimately building a smart and resilient port.

在“质”上发力 用智慧技术护航安全高效发展

Focusing on Development Quality: Ensuring Safe and Efficient Development through Smart Technologies

(一) 数字驱动，提升智慧化服务能力

Digitalization driven to enhance intelligent service capability

(二) 科技赋能，打造高效自动化码头

Technology empowered to create an efficient automated terminal

(三) 数智可信，助力全要素平安稳定

Reliable digital intelligence: Securing the safety and stability of the total factor



数字驱动，提升智慧化服务能力

Digitalization Driven to Enhance Intelligent Service Capability

建设国际领先的链式生态港

Build an Internationally Leading Integrated Ecological Port

云港通平台

“QINGDAO-PORT.NET”

Platform

成立口岸服务公司，**创新关港协同机制**，拓展智能追踪、船港通等**九大功能**，实现平台专业化运营。

We have established a port service company, built **innovative coordination mechanisms** between customs and ports, and expanded **nine major functionalities**, including intelligent tracking and the “Ship Port Connection”, thereby achieving specialized operation of the platform.

开放·通融

打造东北亚国际航运枢纽中心



关港·联动

打造一流口岸营商环境



数字·赋能

打造中国北方最大的“千万”吨级
油气贸易集散中心



创新·驱动

打造现代化智慧绿色港口样板



打造国际先进港口的数字化平台

Build an Internationally Advanced Digital Platform for Ports

数字驱动，提升智慧化服务能力

Digitalization Driven to Enhance Intelligent Service Capability

建设国际领先的链式生态港

Build an Internationally Leading Integrated Ecological Port

云港通平台

“QINGDAO-PORT.NET”

Platform

- 平台注册企业1万多家，个体用户40多万人，车辆30余万辆，年均网上支付金额8亿余元，实现进口单证电子化率**95%**。
- Currently, the platform has completed the registrations of more than 10,000 enterprises, more than 400,000 individual users, and more than 300,000 vehicles, achieving an average annual online payment amount exceeding RMB 800 million and a **95%** digitization rate for import documentation.
- 提供一站式业务办理和信息查询服务，真正实现“让数据多跑路、客户少跑腿”，业务办理时间由4小时缩短至**5分钟**，节约物流成本**10%以上**。
- We offer one-stop business processing and information inquiry services, reducing processing time from 4 hours to **5 minutes** and saving logistics costs by over **10%**, truly realizing the objective of letting data do the work and reducing the need for customers to run around.



数字驱动，提升智慧化服务能力

Digitalization Driven to Enhance Intelligent Service Capability

建设国际领先的链式生态港

Build an Internationally Leading Integrated Ecological Port

云港通平台

“QINGDAO-PORT.NET”
Platform

- 通过口岸监管和港口生产资源融合，实现全程“无感”式查验，单箱查验时间节省20小时，物流周转效率提高30%。
- By integrating port supervision and production resources, we facilitate a seamless inspection process, saving 20 hours on single container inspections and enhancing logistics turnover efficiency by 30%.
- 加入全球商业网络（GSBN）区块链服务网络，运用区块链技术实现进口集装箱提箱时间缩短24小时。
- Furthermore, we have joined the Global Shipping Business Network (GSBN) blockchain service network, employing blockchain technology to shorten the time for picking up imported containers by 24 hours.



数字驱动，提升智慧化服务能力

Digitalization Driven to Enhance Intelligent Service Capability

云边协同数智化平台（玉衡）

Cloud-edge Collaborative Intelligent Platform—"Yuheng" Platform



打造行业首个全货种数字孪生仿真港

Build the industry's **first digital twin simulation port** for all cargo types

建设“**口袋港口**”，实现**一屏观全港，一网管全域**

Create a “**Pocket Port**” that offers a **comprehensive view of the entire port on one screen** and effectively manages the entire region on one network

打造港口行业特色**工业互联网平台**

Build a specific **industrial internet platform** for ports

在“质”上发力 用智慧技术护航安全高效发展

Focusing on Development Quality: Ensuring Safe and Efficient Development through Smart Technologies

(一) 数字驱动，提升智慧化服务能力

Digitalization driven to enhance intelligent service capability

(二) 科技赋能，打造高效自动化码头

Technology empowered to create an efficient automated terminal

(三) 数智可信，助力全要素平安稳定

Reliable digital intelligence: Securing the safety and stability of the total factor



科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

全自动化集装箱码头保持全球领先地位

Globally Leading Automated Container Terminal

建成全球智能化程度最高、效率最快的**自动化码头**，连续10次刷新世界纪录，荣获中国智能制造十大科技进展、山东省科学技术进步一等奖、青岛市科技进步特等奖等，为自动化码头建设提供了“中国方案”。

We have established the world's most advanced and efficient **automated container terminal**, breaking world records consecutively ten times. It has won China's Top Ten Scientific and Technological Advances in Intelligent Manufacturing, the first prize of the Shandong Provincial Science and Technology Progress Award, and the special prize of the Qingdao Science and Technology Progress Award, etc., providing a “Chinese solution” for the construction of automated terminals.



科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

全自动化集装箱码头智能管控系统A-TOS

An Intelligent Management and Control System for Fully Automated Container Terminals (A-TOS)

自主打造 算法更智能、功能更丰富、架构更先进、运行更敏捷、界面更友好

全自动化集装箱码头智能管控系统 (A-TOS)

Smarter algorithms, richer functionalities, advanced architecture, agile operations, and user-friendly interfaces, focusing on service upgrading and efficiency enhancement.



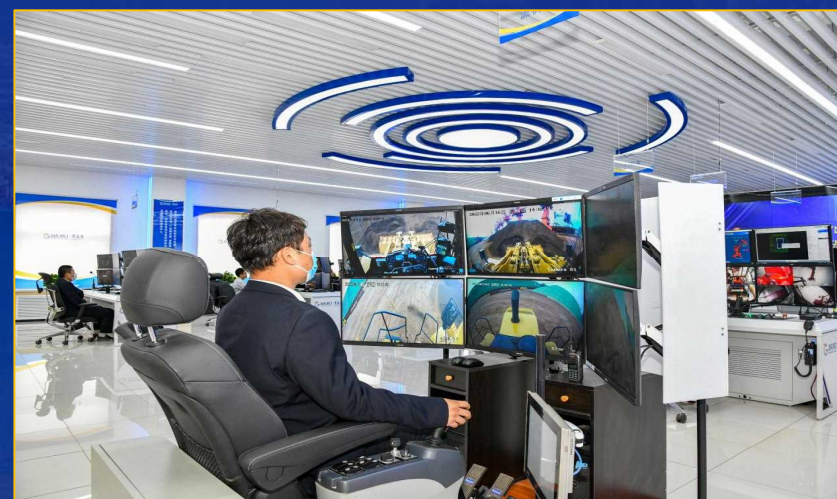
科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

全流程、全系统、全机种的干散货智慧码头

Smart Terminal for Dry Bulk Cargo That Encompasses All Processes, Systems, and Equipment Types

- 成功改造完成**中国首个**全流程、全系统、全机种的干散货智慧码头。
- We completed the transformation of China's first smart terminal for dry bulk cargo that encompasses all processes, systems, and equipment types.
- 完成**9大**作业机种、**32台**设备的自动化升级，实现覆盖**7种**作业工艺、**200多条**流程的自动化运行，克服了作业货种多、工艺流程复杂的难题，为老旧码头升级换代开辟了**新路径**。
- Automation upgrade of **9 major types** of machinery and **32 sets** of equipment, covering **7** processes and more than **200** workflows, leading to ten significant innovations in production technology. Ultimately, this initiative **paves the way** for upgrading outdated terminals.



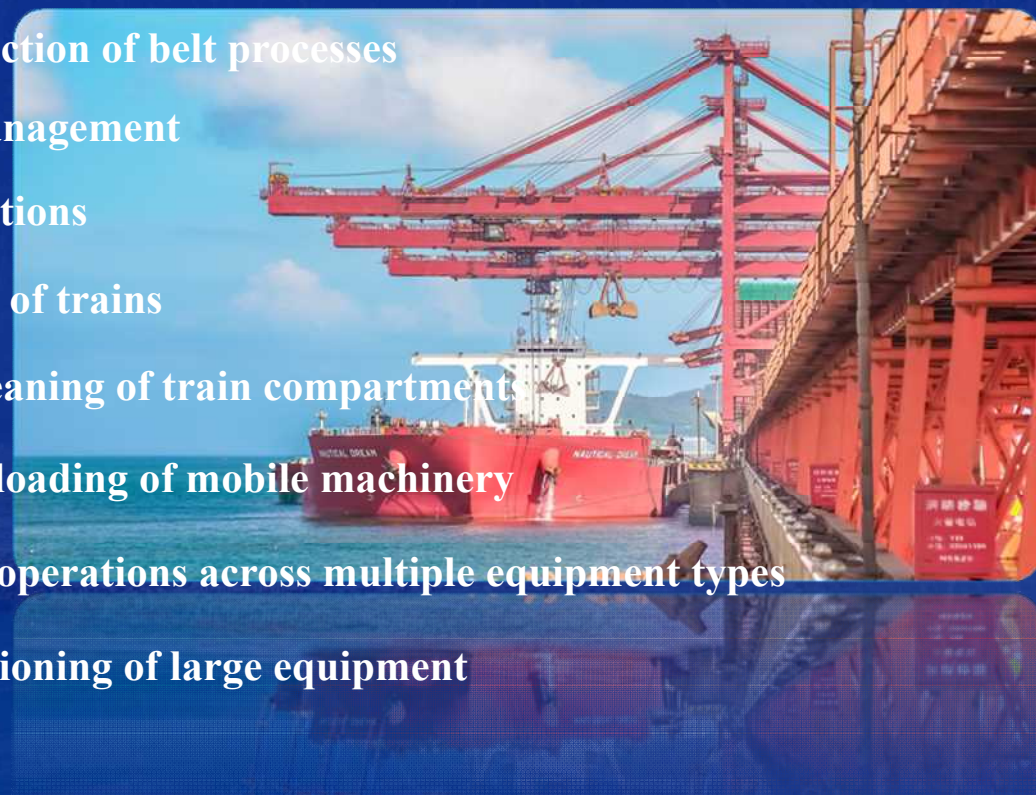
科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

全流程、全系统、全机种的干散货智慧码头

Smart Terminal for Dry Bulk Cargo That Encompasses All Processes, Systems, and Equipment Types

- 1.实现“全机种自动化” Full equipment automation
- 2.实现“皮带流程无人巡检” Unmanned inspection of belt processes
- 3.实现“堆场管理智慧化” Intelligent yard management
- 4.实现“铁路智慧运行” Smart railway operations
- 5.实现“火车装车自动化” Automated loading of trains
- 6.实现“火车车厢清扫自动化” Automated cleaning of train compartments
- 7.实现“流动机械清舱自动化” Automated unloading of mobile machinery
- 8.实现“多机种自动协同作业” Collaborative operations across multiple equipment types
- 9.实现“大型设备自动对位” Automated positioning of large equipment
- 10.实现“智慧安防” Intelligent security



码头主要生产工艺实现“十大创新突破”升级

Ten significant innovations in production technology



科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

件杂货智能码头国际领先

International Leadership in Intelligent General Cargo Terminals

行业首个全流程自动化件杂货纸浆码头

First fully automated general cargo pulp terminal
研制首套**纸浆智能吊具**和专用水平运输设备，首创**全场景全机种**纸浆协同作业模式。

We developed the industry's first set of **intelligent lifting gear for pulp** and specialized horizontal transportation devices, pioneering a collaborative operation mode for pulp across all scenarios and equipment types.



全流程自动化件杂货纸浆码头

Fully automated general cargo pulp terminal

“四最”粮食枢纽中心（六大机种无人协同作业）

“Four Bests” grain hub (unmanned collaborative operations across six major types of equipment)

以“**最先进、最安全、时间最快、质量最好**”为目标，研制首台效率最高的自动化连续卸船机，首创自动清仓、自动开关箱门等新技术，研发行业领先的全流程管控系统。

To achieve the most advanced, safest, and quickest operation with the highest quality, we have developed a ship unloader with an efficient automated continuous unloading system. We are pioneering new technologies such as automated warehouse clearing and automated opening and closing of container doors, and creating an industry-leading holistic management system.



四最粮食枢纽中心

“Four Bests” grain hub

科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

件杂货生产管控系统 (iGTOS)

Production

Management Control System for General Cargo (iGTOS)

单证线上化

Online documentation

流程标准化

Standardized processes

调度智能化

Intelligent scheduling

库场数字化

Digital warehousing

管控一体化

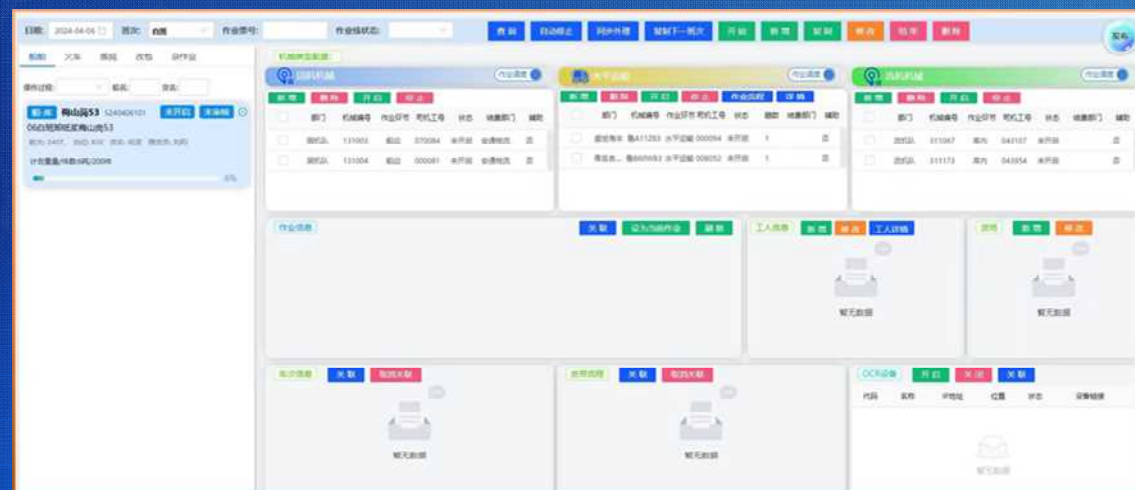
Integrated management control

运营智慧化

Smart operations

提升
六大能力

Enhancing Six Capabilities



科技赋能，打造高效自动化码头

Technology Empowered to Create an Efficient Automated Terminal

液体散货码头行业领先

Industry-Leading Liquid Bulk Cargo Terminal

- 实现全港油品业务**一体化运营管理**。
- We have achieved **integrated operation** management for the entire port's oil product business.
- 油品装车作业安全“**十大联锁**”系统，提升油品装车安全管理水平。
- The loading operation employs a “**ten interlocking**” system to enhance safety management standards.
- 通过输油臂自动对接、船舶靠泊精准定位、船海岸协同、机器人智能巡检等技术，实现码头船舶装卸、油品管输等作业精细化管理。
- Through technologies such as automatic docking of oil arms, precise berthing of ships, ship-to-shore coordination, and intelligent robotic inspections, we have achieved refined management of terminal vessel loading and unloading and pipeline transportation of oil products.



在“质”上发力 用智慧技术护航安全高效发展

Focusing on Development Quality: Ensuring Safe and Efficient Development through Smart Technologies

(一) 数字驱动，提升智慧化服务能力

Digitalization driven to enhance intelligent service capability

(二) 科技赋能，打造高效自动化码头

Technology empowered to create an efficient automated terminal

(三) 数智可信，助力全要素平安稳定

Reliable digital intelligence: Securing the safety and stability of the total factor



数智可信，助力全要素平安稳定

Reliable Digital Intelligence: Securing the Safety and Stability of the Total Factor

数字基础设施建设

Digital Infrastructures

- 累计建成**350套**5G基站，投入运营全国**首个港口自建5G专网**，建设港口高精度电子地图和5套北斗差分基准站。
- A total of **350** 5G base stations have been constructed, and the nation's **first port-based self-built 5G private network** has become operational, alongside a high-precision electronic map for the port and five Beidou differential reference stations.
- 搭建多云融合、高效计算的“三地六中心”数据中心架构，部署全国沿海港口**首套企业专有云平台**，强化网络安全管理与技术防范双提升，为智慧港口建设提供有力的基础保障。
- We have also built a “three places and six centers” data center architecture featuring multi-cloud integration and high-efficiency computing, deploying the country's **first enterprise proprietary cloud platform** for coastal ports, thus strengthening both network security management and technical defense, providing robust foundational support for smart port development.



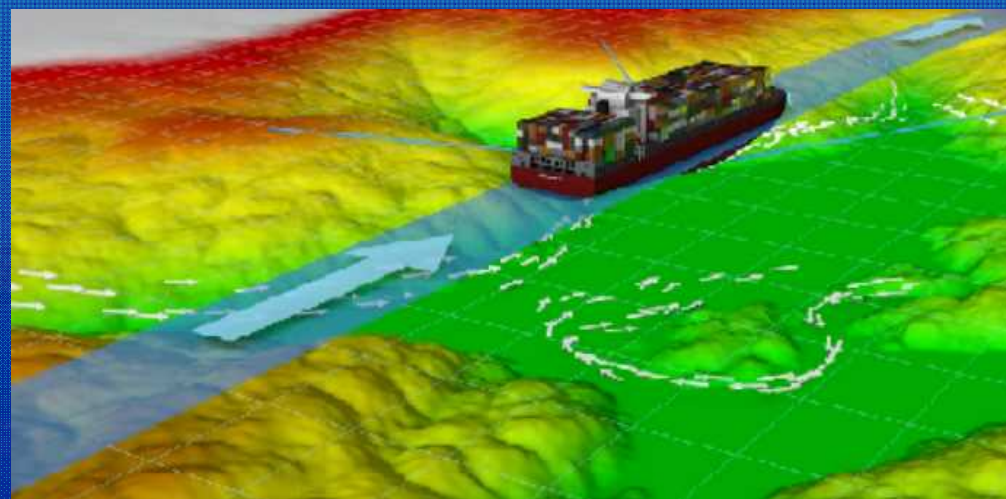
数智可信，助力全要素平安稳定

Reliable Digital Intelligence: Securing the Safety and Stability of the Total Factor

口岸智慧通航攻关

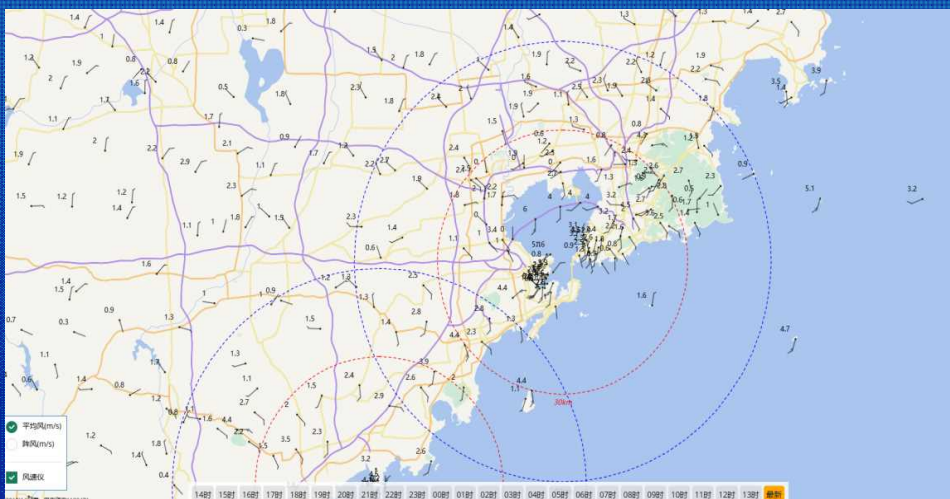
Smart Navigation Solutions at Ports

- 针对雾天影响港口船舶通航的世界难题，综合采用红外、光电、雷达、微波等技术手段，开展一体化智慧通航课题攻关，进一步释放现有航道的船舶通过能力，营造更优的口岸营商环境。
- To address the global challenge of vessel navigation affected by fog, we have applied integrated smart navigation research utilizing infrared, optoelectronic, radar, and microwave technologies, further enhancing the throughput capacity of existing waterways and fostering a more favorable business environment at the port.



防灾应急能力

Disaster Prevention and Emergency Response Capabilities



建立港口**气象监测平台**，大型设备全部安装**风速仪**，实时获取港区内外风速数据及天气信息
第一时间**落实防风、防汛措施**，确保港口平安稳定。

We have established a **meteorological monitoring platform** for the port, with all large equipment fitted with **anemometers** to obtain real-time wind speed data and weather information within and around the port area. To ensure the port's safety and stability, **proactive measures for wind and flood prevention** are promptly implemented.

尊敬的各位领导、专家，各位同仁，智慧山港，绿动未来。山东港口青岛港将积极拥抱全球港航业智慧绿色转型大势，坚持科技引领、创新驱动，以更大力度推动港口智能化升级，谋划切实可行的降碳路径，打造最智能、最清洁的“端到端”运输新模式，全方位提高港口韧性，实现行业高质量发展！

Distinguished leaders, experts, and colleagues, we are at a pivotal moment for building a smart and green Shandong Port in the near future. SPG Qingdao Port is poised to actively embrace the global maritime industry's intelligent and green transformation trends. We uphold technology and innovation as our driving forces, striving for a more robust advancement in port digitization. We are committed to devising practical carbon reduction pathways and establishing the most intelligent and environmentally friendly “end-to-end” transportation models, thereby enhancing port resilience comprehensively and promoting high-quality development within the industry.

