

·陆缆系统

Land cable system

·海缆系统

Subsea cable system

·海洋工程

Offshore Engineering



1th Edition 2021

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宁波东方电缆股份有限公司
 NINGBO ORIENT WIRES & CABLES CO.,LTD.

Contents

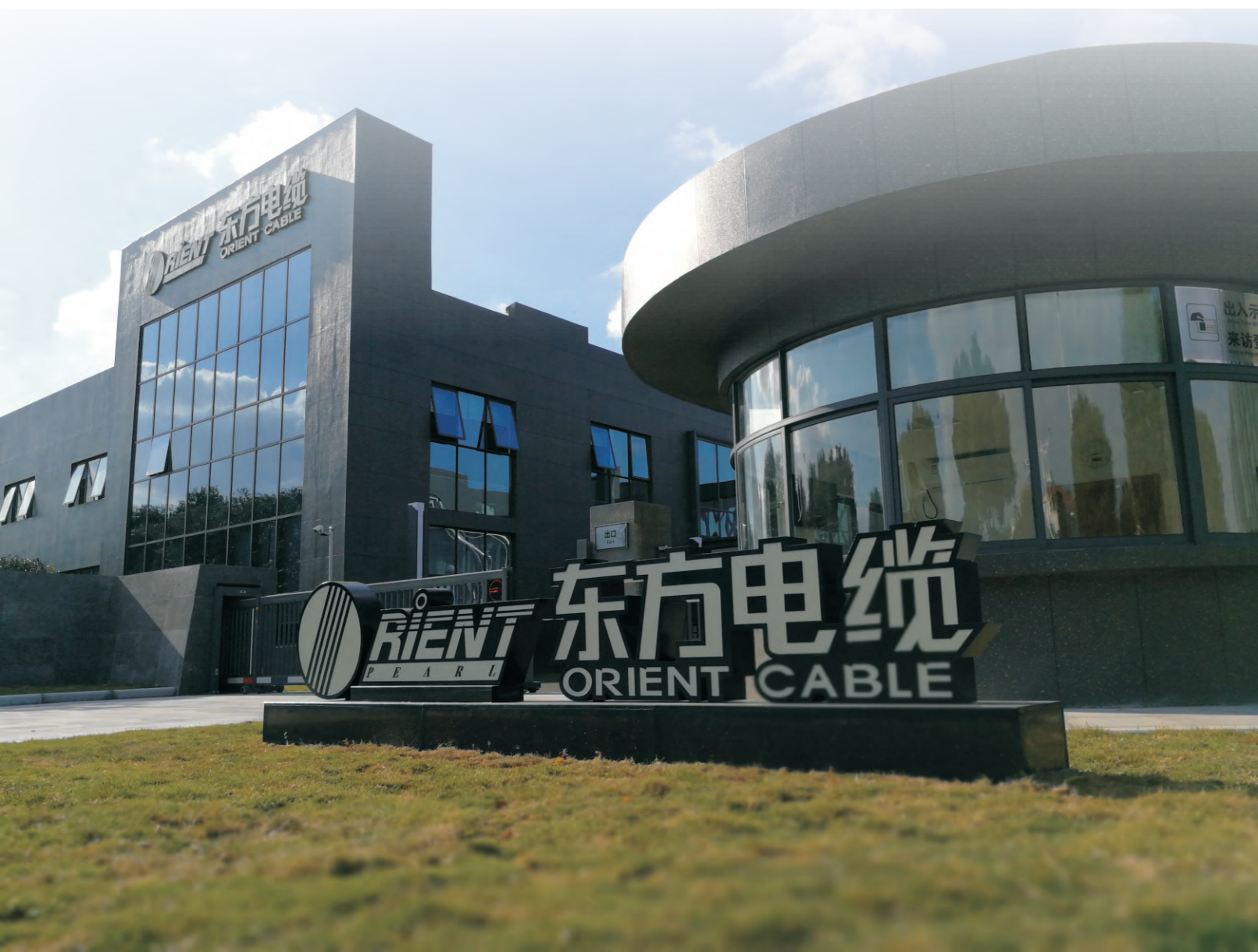
目录

01	公司简介 About Us	03	发展历程 Development History
05	企业相册 Enterprise Album	06	主板上市 Going Public
07	资质荣誉 Qualifications and Honours	09	国家项目 National Projects
10	产学研用 Research and Development	11	检测报告 Test Report
13	鉴定证书 Certificates	15	专利证书 Patents and Licenses
16	四大产品/服务系统解决方案 Four Major System Solutions	17	工装设备/检测设备 Tooling Equipment/Testing Equipment
27	专业设计 Professional Cable Design	30	尖端技术 Top-level Technology

37-52	电线电缆 Wires & Cables
37	智能电网用电缆 Cables for Smart Grid
41	智能家居用电线 Wires for Smart Home
43	轨道交通用电缆 Cables for Rail Transit
44	特种用途用电缆 Cables for Special Purposes

53-70	海底电缆 Subsea Cables
53	交流(光电复合)海缆 AC Subsea Cables Composite with O.F.
57	直流(光电复合)海缆 DC Subsea Cables Composite with O.F.
59	海底光缆 Subsea Optical Fiber Cable
60	附件产品 Accessories

71-76	深海脐带缆 Umbilical System
71	水下生产系统脐带缆 Subsea Production System Umbilical
72	海洋动态电缆 Dynamic power cable
73	装备用脐带缆 Subsea Umbilical for Equipment
74	综合生产脐带缆 Integrated Production Umbilical





Company Profile

Ningbo Orient Wires & Cables Co Ltd., also known as Orient Cable, is an established comprehensive cable solution provider. We have been leading the Chinese cable manufacturing industry, particularly in terms of the safety, quality management, as well as innovation, which makes us become the top 10 subsea cable company and top 100 Chinese main listed company. At present, we have formed 3 major business sectors: land cable system, subsea cable system and offshore engineering.

We are able to provide the design, manufacturing, installation and maintenance service for different cable products, including up to 500kV AC subsea/land cable and ± 535 kV DC subsea/land cable, which can be widely used in smart power grid, building, telecommunication, petrochemistry, railway, renewable wind farm, offshore oil & gas field, military etc.

We are honored with titles of National Hi-tech Enterprise, National Innovation Enterprise and National Intellectual Property Enterprise, owning National Enterprise Technology Center, Postdoctoral Working Station and Academician Expert Working Station. We have also undertaken many national R&D projects, such as National High Technology R&D Program (863 Program), National R&D Support Project, National Marine Economy Innovation and Development Regional Demonstration Project, etc., and led the draft of national subsea cable standards. Besides, we are the only company with the ability to produce umbilical cable in China. In 2019 we won the Individual Champion in Manufacturing Industry and selected as the 'future digital factory' by Zhejiang Province.

Our mission: link land and sea. Our strategy: High-end Manufacturing & Healthy Development. Our vision: to be a world-class enterprise with independent intellectual property rights and core competitiveness.

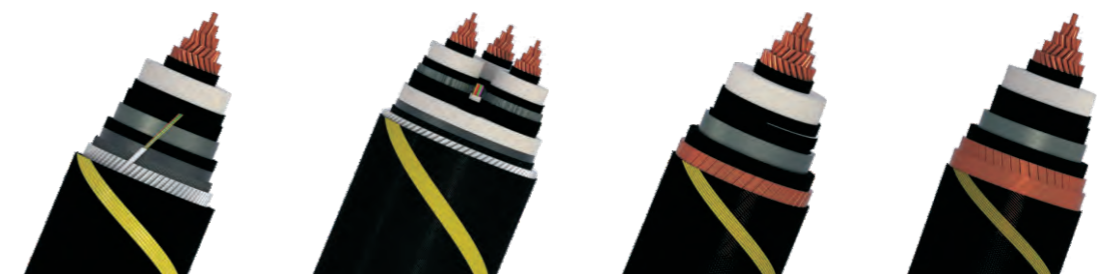
宁波东方电缆股份有限公司（股票简称：东方电缆，股票代码：603606）是中国海陆缆核心供应商，多年来一直在科技创新、质量管理、核心技术突破等方面处于行业领先地位，位列全球海缆最具竞争力企业10强、中国上市公司价值评选主板价值100强。目前公司已形成陆缆系统、海缆系统和海洋工程三大产业板块。

公司拥有500 kV及以下交流（光电复合）海缆、陆缆， ± 535 kV及以下直流（光电复合）海缆、陆缆系统产品的设计研发、生产制造、安装和运维服务能力，并涉及海底光缆、智能电网用电线电缆、核电电缆、通信电缆、控制电缆、电线、综合布线、架空导线等一系列产品，广泛应用于电力、建筑、通信、石化、轨道交通、风力发电、核能、海洋油气勘探、海洋军事等多个领域。

公司是国家级高新技术企业、国家技术创新示范企业、国家创新型企业、国家知识产权优势企业，拥有国家级企业技术中心、国家级博士后工作站、院士专家工作站，承担了多个国家高技术研究发展计划（863计划）、国家科技支撑计划项目和国家海洋经济创新发展区域示范项目，并牵头起草海底电缆国家标准，是国内唯一实现海洋脐带缆产业化的企业。2019年获评国家制造业单项冠军，并入选浙江省首批数字化未来工厂。

公司秉承“让陆地与海洋互联”的使命，遵循“东方制造·高端引领；健康东方·成就未来”的战略思路，力争早日实现“成为拥有自主知识产权，具备世界先进水平，具有国际核心竞争力的现代企业”的愿景。

About Us 公司简介

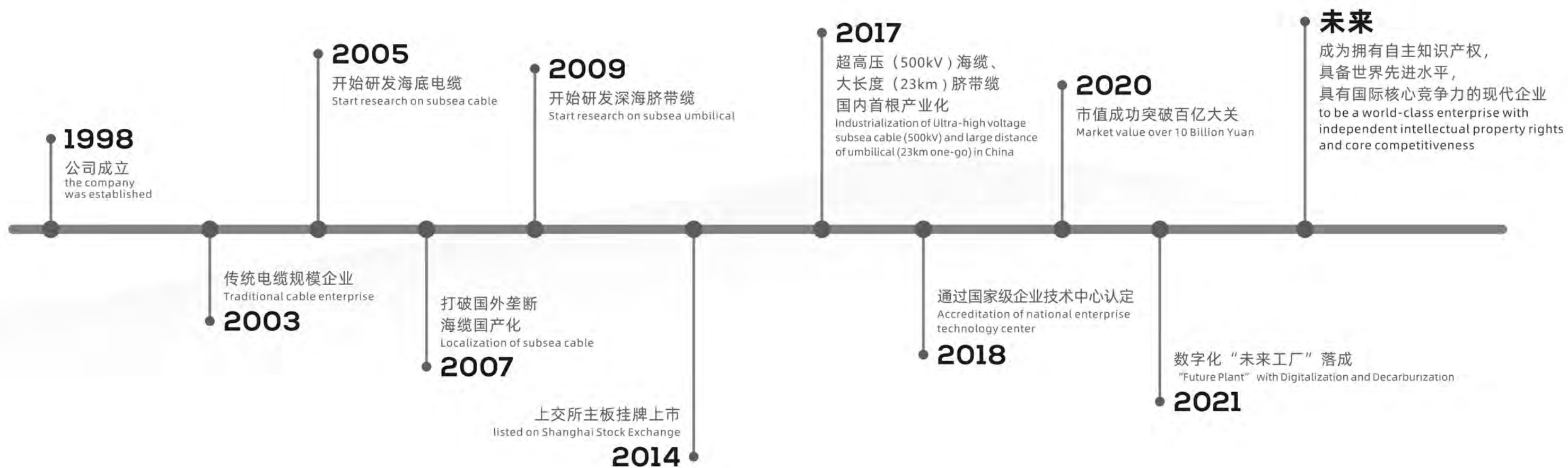


Development History

发展历程

Development History

发展历程



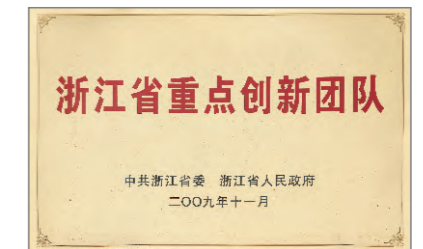
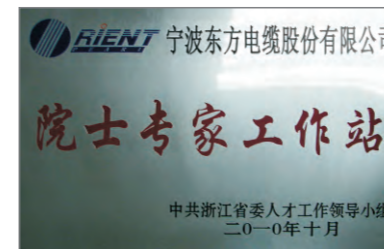
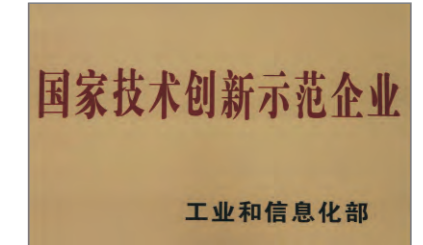
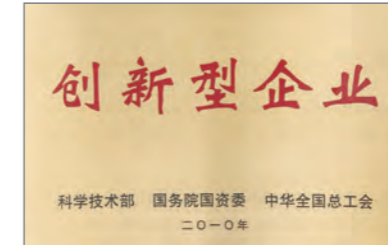
Qualifications and Honours

资质荣誉



Qualifications and Honours

资质荣誉



National Projects 国家项目

★2007年，承担行业首个国家科技支撑计划项目“220kV及以下光电复合海底电缆、海底交联电缆及生产装备开发”，开启了高压海底电缆国产化之先河。

Orient Cable had participated in the State Technology Supporting plan in 2007, the submarine composite cable upto 220 kV production equipment development which realized the HV subsea cable industrialization.

★2008年，“水下生产系统脐带缆关键技术研究”课题被列为国家863计划。

The subject “Key Technology Research on Subsea Production System Umbilical” was listed as National 863 Program in 2008.

★2012年，“水下勘测与作业装备用脐带缆系统产业化”入选国家海洋经济创新发展区域示范项目。

Industrialization of umbilical system for subsea survey and operation was selected as offshore economy innovation demonstration project in 2012.

★2013年，“±320kV及以下柔性输电用直流海缆关键技术研究”课题被列为国家863计划。

The subject “Key Technology of HVDC Flexible Subsea Cable Research up to ±320kV” was listed as the National 863 Plan in 2013.

★2014年，“水下生产系统脐带缆关键技术研究II期”课题被列为国家863计划。

The subject “Key Technology Research on Subsea Production System Umbilical II” was listed as National 863 Plan in 2014.

★2016年，“±500kV直流电缆及附件设计与制造关键技术”课题被列入国家重点研发计划项目。

The subject “±500kV DC Cable and Accessories Design & Manufacturing Technology” had been listed in National Key R & D Projects in 2016.

★2016年，“深海动态动力脐带缆与综合脐带缆系统产业(滚动项目)”入选国家海洋经济创新发展区域示范项目。

The deep sea dynamic power umbilical and integrated umbilical system industry (as the scrolling project) was selected as the regional demonstration project of National Marine Economic Innovation and Development in 2016.

★2017年，“超深水强电复合脐带缆系统研制与作业示范”课题被列为国家重点研发计划。

The ultra-deep water heavy electricity composite umbilical system Application R&D project is listed as National Key R&D Plan in 2017.

★2017年，“1500米水深大孔径中心管式脐带缆系统产业链构建”入选国家海洋经济创新发展区域示范项目。

The umbilical system industrialization with large diameter of central tube for water depth over 1500m was selected as the regional demonstration project of National Marine Economic Innovation and Development in 2017.

★2018年，“深水动态脐带缆研制及应用”被列为工信部高技术船舶科研项目。

The "Development & Application of Deepsea Dynamic Umbilical" was listed as Hi-tech Ship Scientific Research Project of Ministry of Industry & Information Technology in 2018.

★2019年，“高端海洋能源装备系统应用示范项目”被列为智慧海洋项目。

In 2019, Successful delivery of “Cutting edge marine equipment system application demonstration project”.

★2020年，“柔性海底管道、水下生产系统脐带缆及浮式平台应用和转化”被列为“科技助力经济2020”重点专项。

In 2020, “application and transformation of flexible subsea pipelines, umbilical for subsea production systems and floating platforms” were listed as 'key projects'.

Research and Development 产学研用

公司多年来一直倡导“产、学、研、用”相结合，以国家科技支撑计划项目、国家863计划、国家重点研发计划和国家海洋经济创新发展区域示范项目等项目为载体，积极开展与大学院校、科研院所和大型央企的互动和合作，取得了丰硕成果：

★与清华大学、浙江大学、大连理工大学、浙大宁波理工学院和哈尔滨理工大学等就各个科研项目涉及的电气、机械、力学和环境适应性等问题进行基础理论分析和支持。Orient Cable analyzing and supporting the projects involved in electrical, mechanical and environmental adaptability issues with Tsinghua University, Zhejiang University, Dalian University of Technology, Zhejiang University of Technology (Ningbo) and Harbin Science and Technology University.

★与中国电力科学研究院、南方电网科学研究院、上海电缆研究所、全球能源互联网研究院、中海油研究总院、中石化新材料研究院、中科院材料所等就各个科研项目涉及的试验流程、标准、装备及产业应用方面进行了深入分析、探讨，并同时进行相关延伸合作。Orient Cable had extended the cooperation with China Electric Power Research Institute, the Southern Grid Research Institute, TICW, the Global Energy Internet Research Institute, CNOOC Research Institute, Sinopec new materials research institute, the Chinese Academy on various projects involved in the test process, standards, equipment and industrial application.

★引入（中国）润慈公益基金会在宁波大学设置“宁波大学东方电缆——海洋技术助学金”用于奖励海洋高技术装备产业的专业人才，并建立宁波大学海运学院的实习基地，为宁波大学子提供实习的机会。Orient Cable had offered internship opportunities to Ningbo University students and established Ningbo University Maritime College intern base. We introduced (China) Runci Public Welfare Foundation and set up "Ningbo University Orient - Offshore Technology Grants" encouraged the professional talents.

Orient Cable had achieved fruitful results through cooperated with university, institute and central enterprises. Werelied on National 863 Plan and Key R & D Projects, initiated the thought of "to produce, to learn, to research and then applied in the industry."



Test Report

检测报告

序号 S/N	检测类型 Type	报告货物名称 Product Description	规格型号 specification	报告编号 Report No.	检测报告单位 Issued by	报告出具日期 Issue Date
交流海底电缆 HVAC SUBSEA CABLE						
1	预鉴定试验	500kV海底电缆系统 (含工厂接头)	HYJQ71-F 290/500 1×1800+2×16(14D+2A)	CEPRI-EETC08- 2017-2024	电力工业电气设备质量检验检测中心	2018-9-13
2	预鉴定试验	220kV海底电缆系统 (含工厂接头)	HYJQ71-F 127/220 1×1600+2×12B1	CT14-3063	国家电线电缆质量监督检验中心	2016-4-6
3	预鉴定扩展试验	500kV海底电缆系统	HYJQ71-F 290/500 1×1800+2×12B1	CEPRI-EETC08- 2021-0130	电力工业电气设备质量检验检测中心	2021-4-7
4	型式试验	500kV海底电缆系统 (含工厂接头)	HYJQ71-F 290/500 1×1800+2×16(14D+2A)	EETC2016DL545J	电力工业电气设备质量检验检测中心	2017-7-11
5	型式试验	220kV海底电缆系统 (含工厂接头)	HYJQF41-F 127/220 3×1200+3×12B1	CEPRI-EETC08- 2020-0343	电力工业电气设备质量检验检测中心	2020-9-18
6	型式试验	220kV海底电缆系统 (含工厂接头)	HYJQ41-F 127/220 1×1600+12B	CEPRI-EETC08- 2017-0843	电力工业电气设备质量检验检测中心	2019-5-20
7	型式试验	110kV海底电缆 (含工厂接头)	HYJQF41-F 64/110 3×800+24B1	CT14-3506	国家电线电缆质量监督检验中心	2015-4-3
8	型式试验	66kV海底电缆系统 (含工厂接头)	HYJQF41-F 38/66 3×630+12B	CEPRI-EETC08- 2017-0845	电力工业电气设备质量检验检测中心	2019-7-12
9	型式试验	35kV海底电缆系统 (含工厂接头)	HYJQF41-F 26/35 3×400+2×36B1	CT15-1481	国家电线电缆质量监督检验中心	2016-4-1
10	型式试验	35kV海底电缆系统 (含工厂接头)	HYJQF41-F 26/35 3×500+2×24B	TN21-2375	上海慧检测技术有限公司	2021-5-28
11	型式试验	15kV海底电缆 (含工厂接头)	HYJQF41-F 8.7/15 3×400+2×12B1	CT16-2666	国家电线电缆质量监督检验中心	2016-8-29
直流海底电缆 HVDC SUBSEA CABLE						
12	预鉴定试验	200kV柔性直流电缆系统 (含工厂接头)	DC-HYJQ41-F ±200 1×500+2×12B1	HYSD2019001	国网舟山供电公司海洋输电技术研究中心	2019-2-18
13	预鉴定试验	±160kV直流电缆系统 (含工厂接头)	DC-HYJQ41 ±160 1×500	CT13-3678	国家电线电缆质量监督检验中心	2015-05-15
14	型式试验	±320kV直流海底电缆系统 (含工厂接头)	DC-HYJQ41-F ±320 1×1600+1×12B1	EETC2016DL008J	电力工业电气设备质量检验检测中心	2016-1-15
15	型式试验	±210kV直流海底电缆系统 (含工厂接头)	DC-HYJQ41 ±210 1×1000	CT13-1491	国家电线电缆质量监督检验中心	2013-5-30
16	型式试验	±210kV直流海底电缆系统 (含工厂接头)	DC-HYJQ41 ±210 1×500	CT13-3164	国家电线电缆质量监督检验中心	2013-10-14
17	型式试验	±160kV直流海底电缆系统 (含工厂接头)	DC-HYJQ41 ±160 1×1000	CT12-2668	国家电线电缆质量监督检验中心	2013-5-31
18	型式试验	±160kV直流海底电缆系统 (含工厂接头)	DC-HYJQ41 ±160 1×500	CT13-2272	国家电线电缆质量监督检验中心	2013-8-22
交流电力电缆 HVAC LAND CABLE						
19	预鉴定试验	500kV电力电缆系统	YJLW03-Z 290/500 1×2500	CEPRI-EETC08- 2020-2004	电力工业电气设备质量检验检测中心	2020-9-1
20	预鉴定试验	220kV电力电缆系统	YJLW03 127/220 1×2500	QITC2016-03A	电力工业电气设备质量检验检测中心	2017-12-20
21	型式试验	500kV电力电缆系统	YJLW03-Z 290/500 1×2500	CEPRI-EETC08- 2017-0242	电力工业电气设备质量检验检测中心	2017-12-18
22	性能试验	500kV电力电缆 (阻水、阻燃C类)	ZC-YJLW03-Z 290/500 1×2500	CEPRI-EETC08- 2020-1003	电力工业电气设备质量检验检测中心	2020-10-30
23	型式试验	220kV电力电缆系统	YJLW03 127/220 1×2500	CT20-05378	国家电线电缆质量监督检验中心	2021-1-11
24	性能试验	220kV电力电缆 (阻燃B类)	ZB-YJLW03 127/220 1×2500	CEPRI-EETC08- 2019-0683	电力工业电气设备质量检验检测中心	2019-11-4
25	型式试验	110kV电力电缆系统	ZC-YJLW03-Z 64/110 1×2500	CEPRI-EETC08- 2019-0210	电力工业电气设备质量检验检测中心	2019-5-21
26	型式试验	35kV电力电缆 (阻燃A类)	ZA-YJV22 26/35 3×500	CEPRI-EETC08- 2019-0500	电力工业电气设备质量检验检测中心	2019-9-12
27	型式试验	35kV电力电缆 (阻燃A类)	ZA-YJVS 26/35 1×800	CEPRI-EETC08- 2019-0499	电力工业电气设备质量检验检测中心	2019-9-12
28	型式试验	35kV电力电缆非磁性金属带铠装 (无卤低烟阻燃B1类防鼠蚁)	WDZB1-FSY-YJY63 26/35 1×400	(2018)GJYDX-XT0253	国家电线电缆质量监督检验中心 (江苏)	2018-12-21
29	型式试验	20kV电力电缆 (阻燃A类)	ZA-YJV22 18/20 3×400	(2019)GJYDX-XT0117	国家电线电缆质量监督检验中心 (江苏)	2019-4-17

Test Report

检测报告

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30	型式试验	15kV电力电缆	YJV8.7/15 1×630	(2017)GJYDX-XT0060	国家电线电缆质量监督检验中心 (江苏)	2017-5-19
31	型式试验	10kV电力电缆优质 (阻燃C级)	ZC-YJV22 8.7/15 3×400(优质)	202121000515	国家电子电器安全质量监督检验中心	2021-5-7
32	型式试验	10kV电力电缆 (阻燃A类耐火)	WDZAN-YJV23 8.7/10 3×400	CT16-5615	国家电线电缆质量监督检验中心	2016-10-21
33	型式试验	10kV电力电缆 (低烟无卤阻燃B1级)	WDZB1-YJV23 8.7/10 3×400	(2019)GJYDX-XT0245	国家电线电缆质量监督检验中心 (江苏)	2019-6-26
34	型式试验	10kV电力电缆 (阻燃A级)	ZA-YJV22 6/10 3×500	CT21-01557	国家电线电缆质量监督检验中心	2021-5-14
35	型式试验	3kV电力电缆 (低烟无卤阻燃A类防鼠蚁)	WDZA-FSY-YJV 1.8/3 1×400	CT18-07637	国家电线电缆质量监督检验中心	2019-3-29
36	型式试验	低压电力电缆 (无卤低烟阻燃A类耐火)	WDZAN-YJV 0.6/1 4×400+1×240	CT20-07192-2	国家电线电缆质量监督检验中心	2020-12-30
37	型式试验	低压电力电缆 (无卤低烟阻燃B1类)	WDZB1-YJV23 0.6/1 4×300+1×150	(2019)GJYDX-XT0230	国家电线电缆质量监督检验中心 (江苏)	2019-6-27
38	型式试验	变频电缆 (阻燃A类)	ZA-BPJV22 0.6/1 3×400+3×35	TN19-1489	上海慧检测技术有限公司	2019-6-3
39	型式试验	10kV铝芯架空绝缘电缆	JKLYJ-101×240	(2016)GJYDX-XS0147	国家电线电缆质量监督检验中心 (江苏)	2016-4-22
40	型式试验	1kV铝芯集束导线	BS-JKLYJ 0.6/1 4×120	(2016)GJYDX-XS0400	国家电线电缆质量监督检验中心 (江苏)	2016-6-24
41	型式试验	1kV架空绝缘电缆	JKYJ-1 1×300	(2017)GJYDX-XT0061	国家电线电缆质量监督检验中心 (江苏)	2017-5-22
42	型式试验	1kV架空绝缘电缆	JKLGYJ-1 240/30	(2019)GJYDX-XS0262	国家电线电缆质量监督检验中心 (江苏)	2019-12-6
43	型式试验	布电线	60227IEC-01(BV) 450/750 1×70	(2019)GJYDX-XT0127	国家电线电缆质量监督检验中心 (江苏)	2019-4-28
44	型式试验	布电线	BVR 450/750 1×70	(2019)GJYDX-XT0128	国家电线电缆质量监督检验中心 (江苏)	2019-4-28
45	型式试验	布电线	BVVB 300/500 2×4	(2019)GJYDX-XT0129	国家电线电缆质量监督检验中心 (江苏)	2019-4-28
46	型式试验	电线 (无卤低烟阻燃B类耐火)	WDZBN-BYJ 450/7501×16	(2017)GJYDX-XT0297	国家电线电缆质量监督检验中心 (江苏)	2017-6-1
47	型式试验	布电线 (耐热105°C无卤低烟阻燃B类耐火)	WDZBN-BYJ-105 450/750 1×16	CT20-07193-2	国家电线电缆质量监督检验中心	2020-12-23
48	型式试验	控制电缆 (无卤低烟阻燃A类耐火)	WDZAN-KYJYP 450/750 19×2.5	(2017)GJYDX-XT0298	国家电线电缆质量监督检验中心 (江苏)	2017-6-12
49	型式试验	控制电缆 (无卤低烟阻燃B1类)	WDZB1-KYJYP2-23 0.6/1 37×2.5	(2019)GJYDX-XT0231	国家电线电缆质量监督检验中心 (江苏)	2019-7-2
50	型式试验	柔性矿物绝缘防火电缆	BBTRZ 0.6/1 4×240	CT18-05455	国家电线电缆质量监督检验中心	2018-10-11
51	委托试验	矿物绝缘电缆	(NG-A) BTLY0.6/1 4×120+1×70	CT18-04741	国家电线电缆质量监督检验中心	2018-9-26
52	型式试验	矿物电缆	RTTYZ 0.6/1 4×95+1×50	CT18-07853	国家电线电缆质量监督检验中心	2019-1-19
直流电力电缆 HVDC LAND CABLE						
53	预鉴定试验	±160kV直流电缆系统	DC-YJLW03 ±160 1×500	CT13-3678	国家电线电缆质量监督检验中心	2015-05-15
54	型式试验	±535kV直流电缆系统	DC-YJLW03-Z ±535 1×3000	CT17-05377	国家电线电缆质量监督检验中心	2018-8-21
55	型式试验	±210kV直流陆地电缆系统	DC-YJLW03 ±210 1×1000	CT13-0797	国家电线电缆质量监督检验中心	2013-5-30
56	型式试验	±160kV直流陆地电缆系统	DC-YJLW03 ±160 1×500	CT13-2272	国家电线电缆质量监督检验中心	2013-8-22
57	型式试验	直流1500V电力电缆 (低烟无卤阻燃A类防鼠蚁防紫外线)	WDZA-FSYZ-EPR DC1.5 1×240	CT18-07636	国家电线电缆质量监督检验中心	2019-3-27
58	型式试验	直流1500V电力电缆 (低烟无卤阻燃A类防鼠蚁)	WDZA-FSY-YJV DC1.5 1×400	CT18-07638	国家电线电缆质量监督检验中心	2019-3-29



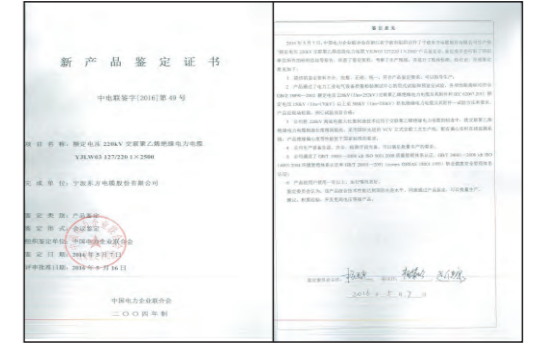
35kV海缆(产品)



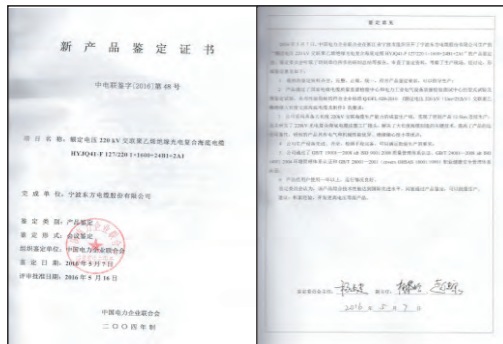
110kV海缆(产品)



110kV陆缆(产品)



220kV陆缆(产品)



220kV海缆(产品)



220kV海缆含工厂接头(产品)



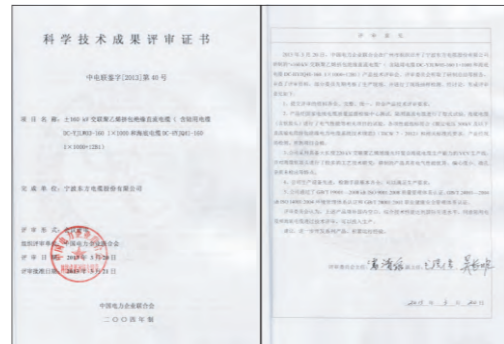
500kV陆缆(产品)



±535kV直流陆缆(技术)



500kV海缆含工厂接头(产品)



±160kV直流海缆(技术)



柔性矿物绝缘防火电缆(产品)



±200kV直流海缆(产品)



±320kV直流海缆(技术)



低烟无卤阻燃电缆(产品)

Tooling Equipment 专利证书

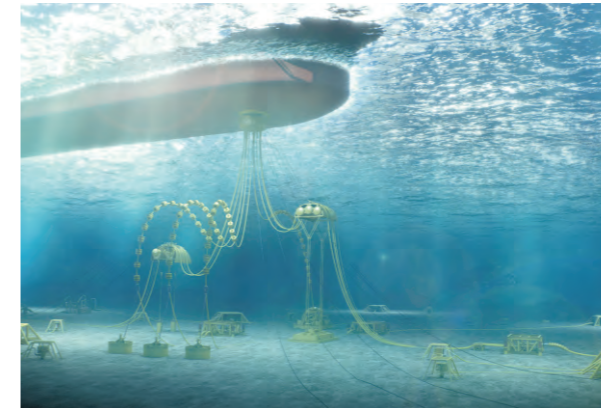
拥有专利82项，其中发明专利20项，海洋缆专利国内第一



Four Major System Solutions 四大产品/服务系统解决方案

深远海脐带缆和动态缆系统解决方案

Deep Sea Umbilical and Dynamic Cable Systems Solution



聚焦深海油气开采和远海浮式风电开发等领域，攻克了超深水动态化设计等核心技术，在海洋脐带缆和动态缆系统领域形成了定制化设计、生产、测试、集成、敷设、运维的全寿命整体解决方案，实现多项“卡脖子”技术的成果转化并实现产业化应用，为我国全面推进深远海能源开发进程注入了新动能。

超高压电缆和海缆系统解决方案

Extra-high Voltage Land Cable and Subsea Cable Systems Solution



专注大规模海上风电集中开发和容量海陆电力传输等领域，依托自主研发和国际国内的科研合作，具备了500 kV交流海陆缆系统、±535 kV直流海陆缆系统高端能源装备的设计、制造及工程服务能力，各项技术达到领先水平，并在多个国家级重大能源工程项目中实现了产业化应用，为国家发展海洋经济、开发清洁能源、尽快实现“3060”双碳目标提供了有效支撑。

智能配网电缆和工程线缆系统解决方案

Intelligent Power Distribution Network Cable and Engineering Wire Systems Solution



聚焦电力配网及建筑、石化、轨道交通等工程市场领域，以智能环保、精益制造和快速响应为目标导向，实现了从满足单一市场需求向提供可示范推广的解决方案创新，研发了非交联环保聚丙烯电缆、无卤低烟阻燃B1级线缆等智能配网和工程领域创新产品，集绿色、安全、节能、环保等优势于一体，用革新的工艺装备，助力国家在建筑工程、石油化工、轨道交通等领域电力建设开拓新局面。

海陆工程服务和运维系统解决方案

Onshore/Offshore Engineering Service and O&M Systems Solution



依托领先的海陆工程服务平台和一流的运维服务团队，以全流程、多维度、高质量服务为宗旨，完成从海缆软接头到高压陆缆接头的衍生及革新，推动了含多省市电力配网、轨道交通电力线路连接可靠性的提升；建立了集敷设安装、工程运维为一体的海陆工程服务体系，为东方电缆从单一产品制造商向系统解决方案供应商的转型升级奠定了坚实基础。



127盘框绞机/127-framestranding machine

设备可满足铜、铝、铝合金、镁铜合金的圆型、铜铝及铝合金异形单线的圆形紧压、分割股块等导体的绞制、绕包、阻水材料填充等生产。圆形紧压和异形导体最大截面3500 mm²，分割导体最大截面3500 mm²。具备分层填充和绕包阻水材料功能，确保海缆导体优良阻水性能。同时配备了大长度导体收线装置(50km以上)。



大拉机/Copper wire Break-down machine



91盘框绞机/91-frame stranding machine



盘绞机/Cable assembling machine



VGV立塔交联生产线/VGV production line

公司拥有2座立塔，采用德国TROESTER公司产品，塔高分别为168米和157米，配备导体前置和后置预热装置、SIKORA和ZUMBACH同心度测偏仪，机筒和机头采用特别设计，具备长时间(30天)开机不产生老胶等缺陷的特点(通过25天连续开机验证)。绝缘加料采用重力落料系统，加料环境达到100级净化，屏蔽加料环境达到1000级净化。



HCCV悬链交联生产线/HCCV production line

Tooling Equipment 工装设备



金属护套挤出机
Metal Sheath Extruder

配备在线监测系统，可实时监控金属套的厚度、缺陷等现象，可适应交联芯线最大外径160mm。



托盘式烘房/Carrousel drying house

托盘直径20米，承重2000吨，安装大型热风交换机，装置上、中、下部位多点采用PLC进行测温控制，温度控制在±3°C范围内，控制准确。



氩弧焊/Argon arc welding

可生产Φ180mm及以下直径铝管，铝管壁厚范围1.0~3.5mm，焊接后将经过涡流探伤仪检测，确保焊接质量。

Testing Equipment 工装设备

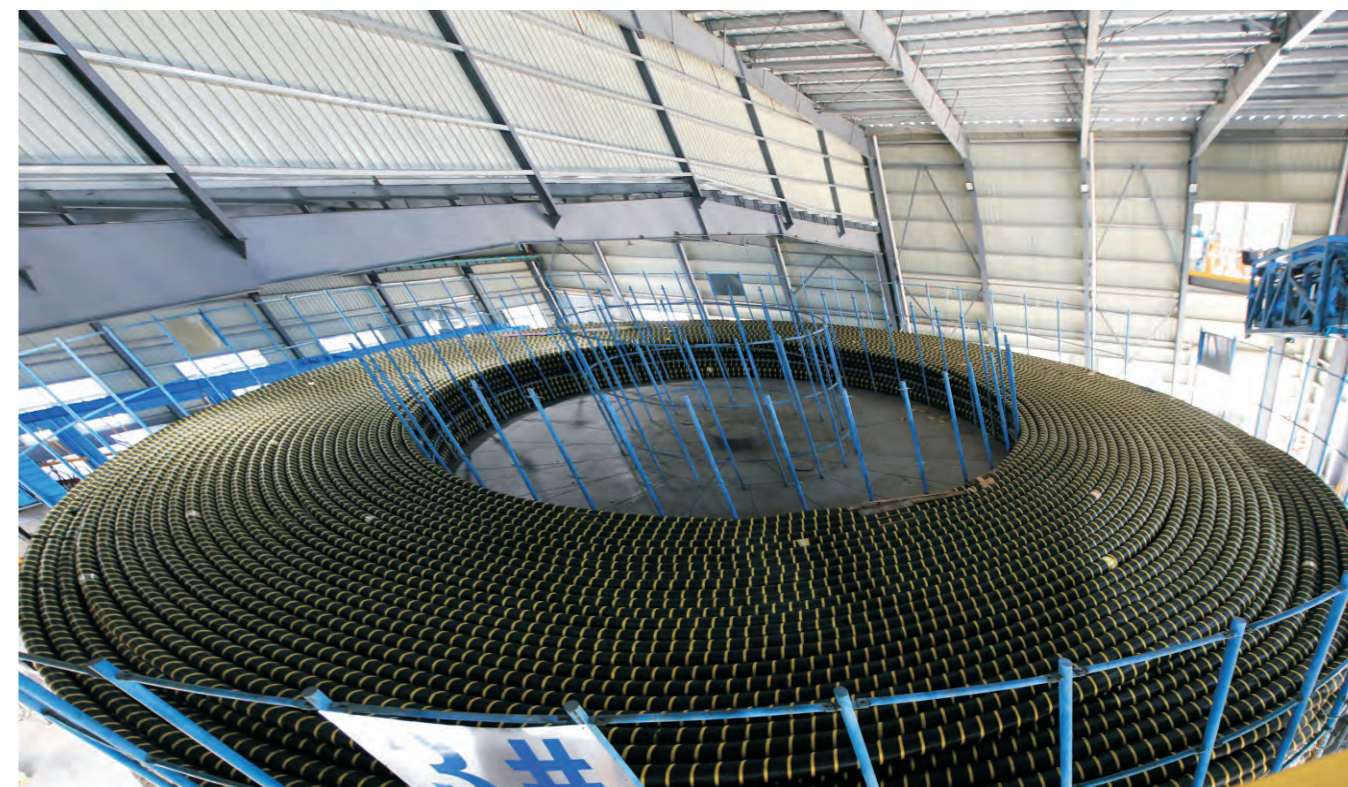


200型挤塑机
200 type plastic extruder



海缆立式成缆机
Subsea cable vertical cabling machine

成缆机配备最大转盘为15000 mm，具有3个8800 mm和3个3000 mm(共6个)带退扭主动放线架。同时有130盘钢丝铠装设备与成缆机联动，铠装前后配有128盘PP绳绕包装备。采用六面履带式牵引装置，确保整缆圆整性。最大成缆外径达300 mm。



Φ32米智能托盘，承重5000T
Φ32m intelligent carrousel, loading 5000T

Tooling Equipment 工装设备



1250成缆机
1250 vertical cabling machine



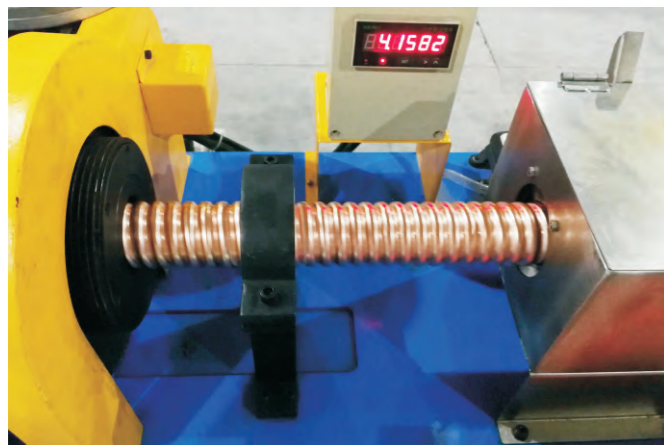
90+65挤塑机
90+65 extruding machine



70+35自动挤出包装机
70+35 automatic extrusion packaging machine



54盘框绞机
54-frame stranding machine



DAG10/60氩弧焊生产线
DAG10/60 argon arc welding production line



19盘成缆机
19 reel cabling machine

Testing Equipment 检测设备

电气性能/Electrical Performances



超高压海缆检测中心
EHV Test Center

超高压海缆检测中心拥有工频串联谐振耐压设备（满足最高电压1600kV，电流单节最大50A）、直流耐压试验（满足最高电压直流±2600kV长期运行试验要求）、雷电冲击设备（满足交直流最高电压4200kV试验要求）等检测设备。

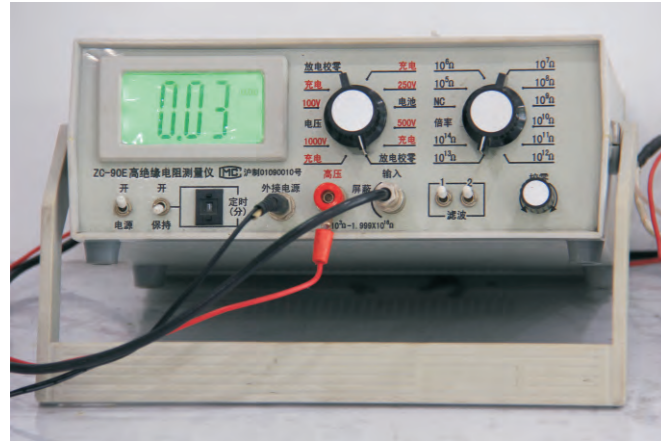


大长度1200kV直流耐压测试设备
Large length 1200kV DC voltage withstand test equipment



大长度500kV交流耐压试验系统
Large length 500kV AC withstand voltage test system

电气性能/Electrical Performances



高压绝缘电阻测试仪
High voltage insulation resistance tester



直流电阻电桥
DC resistance bridge



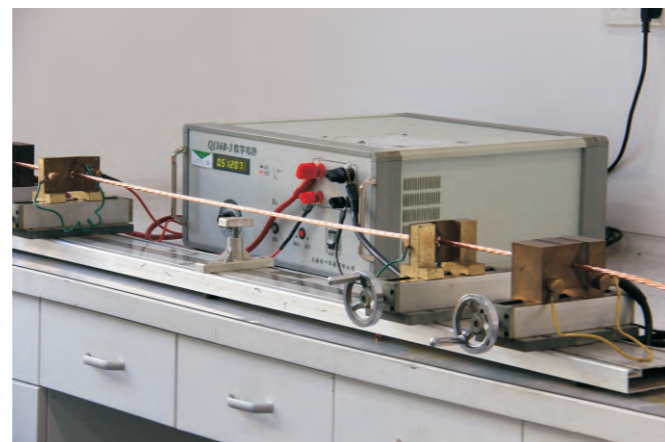
数字高压兆欧表
Digital HV megger



便携式直流高压试验器
Portable HVDC tester



时域反射仪
TDR



直流电阻测试仪
DC resistance tester

机械物理/Mechanical and Physical Performances

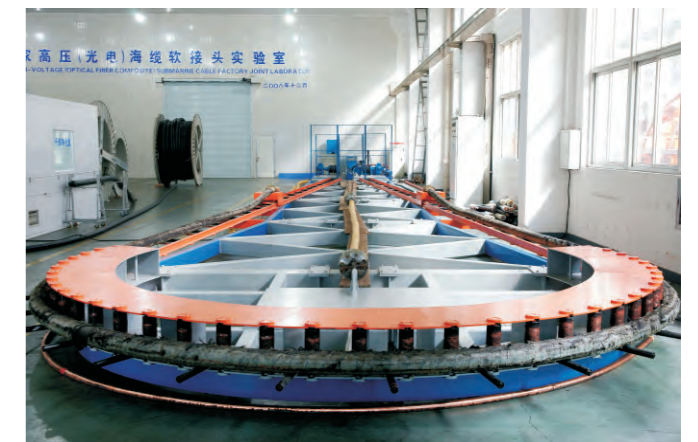


疲劳试验系统
Fatigue testing system

公司具备电缆的全系列机械性能装置，另有海缆专用试验装置，如疲劳、张力弯曲(拉力30T)、阻水(压力4MPa)、卷绕等试验装置。



阻水试验装置
Water resistance test device



张力弯曲试验装置
Tension bending test device

机械物理/Mechanical and Physical Performances



拉力试验机/Tensile testing machine



在线测偏仪/Online bias



卷绕扭转试验机/Winding torsion testing machine



电子天平/Electronic balance

环境性能/Environmental performance



热老化试验箱/Thermal aging test chamber



炼塑机/Molding machine



颗粒计数器/Particle counter



氧指数测试仪/Oxygen index tester

光学仪器/Optical instrument



光时域反射仪/OTDR



光纤熔接机/Fiber splicer



连续变倍体视显微镜/Continuous zoom microscope



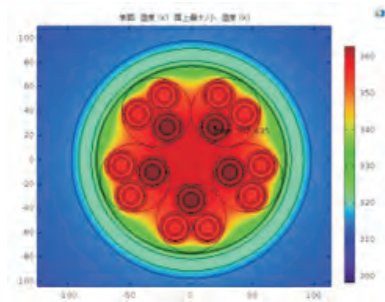
高倍投影仪/High-power projector

局部分析软件/Local Analysis Software

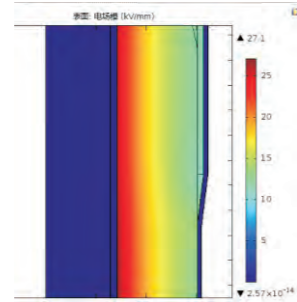
电气分析/Electrical Analysis

- 通过有限元仿真模拟,实现高压电缆的电/磁/热耦合优化设计。
- 通过热电耦合分析,对电缆的载流量进行多种应用场景模拟分析。
- 通过结构尺寸和材料的敏感性分析,对超高电压等级软接头材料选择和应力锥结构开展持续优化设计。
- 根据电缆各层的尺寸,建立对应电缆的结构模型。
- 模拟电缆运行时的工况,进行载流量等相关电气性能分析。

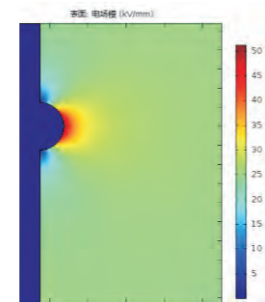
- A finite element program that combines the electrical/magnetic/thermal properties of the electrical systems (power cables, control quads and other element) was used.
- Current-carrying capacity design using the thermal-electrical coupling FEA software.
- Structure and insulating material sensitivity analysis for HV submarine cable' factory joint.



热场分析
Thermal Field Analysis



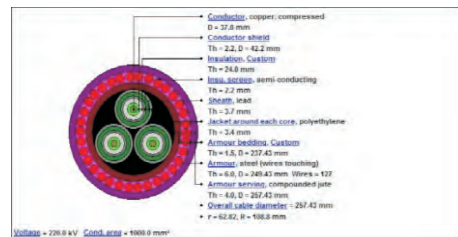
增厚绝缘模拟
Thickening Insulation Simulation



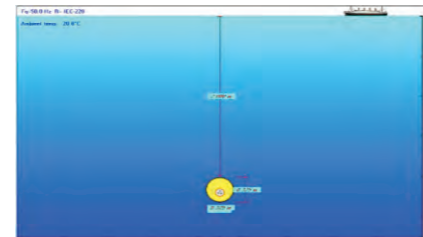
界面突起模拟
Interface Apophysis Simulation

- 根据电缆各层的尺寸,建立对应电缆的结构模型。
- 模拟电缆运行时的工况,进行载流量等相关电气性能分析。

- According to the size of each layer of the cable, the structure model of the corresponding cable was established.
- Simulation of the operating condition of the cable, carrying capacity and other related electrical performance analysis.



电缆建模
Cable Modeling

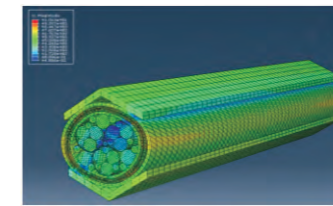


敷设工况模拟
Laying Condition Simulation

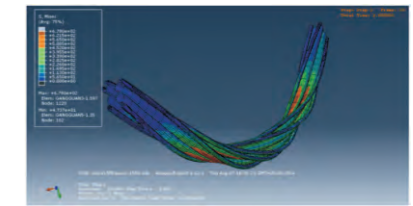
力学分析/Mechanical Analysis

- 充分考虑线性分析和非线性效应。
- 计算仿真聚焦于模拟缆绳三维纵向螺旋结构的滑移变形行为。
- 分析过程具备实时可视化,分析结构局部全域单元数据显示功能,以识别应力热点。

- All linear and non linear effects.
- Program focus on longitudinal 3D helix behavior.
- Allow plot of global parameters to present results in order to identify the stress hot point.



抗侧压分析
Crush load Analysis

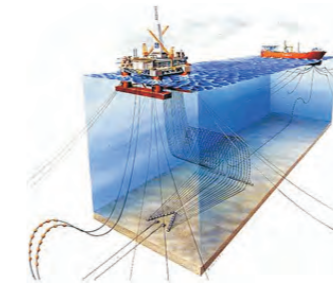


弯曲半径FEA分析
MBR FEA Analysis

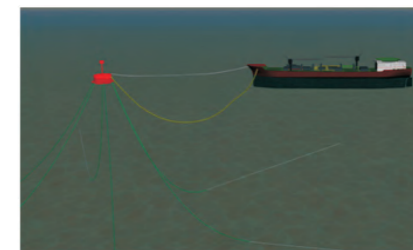
整体分析软件/Global Analysis Software

- 考虑浮体、锚泊系统和动态缆/脐带缆的耦合效应。
- 适用于FPSO、SPAR、TLP和多体浮式系统的整体分析。

- Floater/Mooring/Riser Coupling Effects.
- Be suitable for FPSO, SPAR, TLP and multi-body analysis.



系统分析
System Analysis

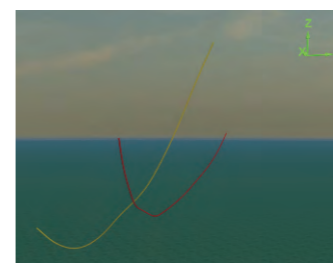


水动力分析
Hydrodynamic Analysis

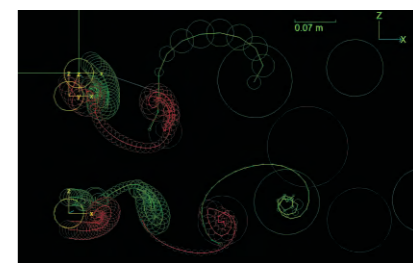
在位分析/In-place analysis

- 线型分析用以确定动态端长度和空间位置分布。
- 干涉分析用以避免动态缆与周边管线以及结构设施发生碰撞。
- 为防弯器、限弯器、水下连接器、中水浮筒等设计提供关键设计基础参数。
- 得到动态缆全长的最小张力、最小张力\曲率\张力VS曲率等关键控制参数。
- 涡激振动分析以确定是否需要增加涡激振动抑制器或改变脐带缆震动模式。

- Riser configuration design to Specification of dynamic length and Displacement range.
- Perform interference analysis between Dynamic umbilical adjacent lines & structures.
- Specify requirements (type, quantity) & provide design inputs for any further ancillary equipment provided and installed by others (if any).
- Specify minimum and maximum tension/ curvature/ tension vs curvature across entire length of Dynamic cable/umbilical.
- Perform VIV analysis to confirm if need to add the Vortex - Induced Vibration Suppression accessory or adjust the Umbilical mode of vibration.



干涉分析
Interfere Analysis

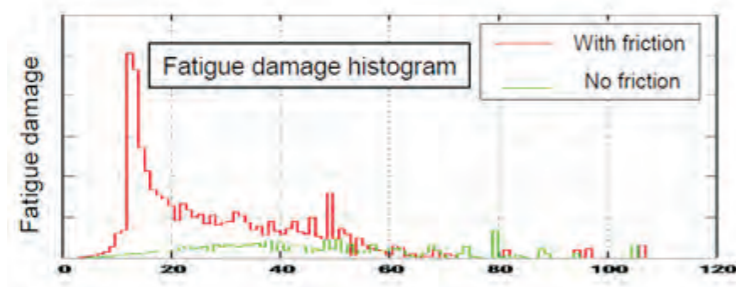


涡激振动
VIV Analysis

疲劳分析/Fatigue Analysis

- 将风、浪、流等环境条件离散化为波浪散布图。
- 采用雨流计数法进行疲劳分析。

- Purpose: Calculate fatigue life and damage of risers or mooring lines. Combines a number of environment conditions, based on discretizations of the scatter diagram.
- This often requires a high number of analysis to be executed Rain flow counting.



疲劳损伤分布图
Fatigue Damage Distribution

其他设计软件/Other Design Software

安装分析/Installation Analysis

- 海缆/脐带缆安装工况进行校核。

- Check the installation load case such as tension vs bending /tension vs Crush.

稳定性分析/Stability Analysis

- 海底稳定性分析将遵循DNV RP F109规范，采用 stableline软件进行完全稳定/5D稳定/10D稳定的计算。

- Seabed stability analysis will be done according with the absolute /5D/10D lateral static method as defined in DNV RP F109.

Open Case		Save Case		STABLELINES		Version		Programmed by DNV Deep Water Technology	
Calculate		Create new Parametric runs		On Bottom Stability of Submarine Pipelines		V14.41		DNV	
Output file name	C:\Users\... \Case1	Project	Submarine Pipelines	Calculations by	Surfaces Support/STI/line	Checked by			
Input path	C:\Users\... \Case1	Return Period Values for Wave and Current		Number of directional combinations considered		12			
Pipeline data		Soil interaction		Environmental Parameters		Wave dir		Current dir	
Sp (m)	0.0000	Sp (m)	0.0000	Wdir (deg)	0	Wdir (deg)	0	Wdir (deg)	0
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世界首创500kV交联聚乙烯绝缘(光电复合)海底电缆(含软接头)

The World's First 500kV XLPE Insulated Composite Subsea Cable(with Factory Joint)

2017年3月,公司中标国家电网公司浙江舟山500kV联网输电工程海底电缆项目,产品包括500kV光电复合海缆、瓷套式终端、锚固、修理接头等。该项目采用的500kV交联聚乙烯绝缘(光电复合)海底电缆系统为世界首创,产品突破了六大核心技术:

超长度保障——产品软接头已经过百次试验,通过型式试验,并取得报告;

铠装新思路——首次实现圆、扁铜丝铠装;

可靠性验证——产品经受三次型式试验;

运维安全性——抢修接头取得国际权威机构挪威船级社(DNV)认证;

无接头保障——已实现超净XLPE绝缘100吨连续挤制,确保500kV连续制造长度至少18km;

接地新技术——实现大长度绝缘护套海缆的铅套和铠装短接技术,且通过相关标准的防水试验。

2018年,国际首根500kV(含软接头)光电复合海底电缆正式交付并顺利通过竣工验收,东方电缆成为业内唯一具有500kV海底电缆本体和500kV软接头工程应用的企业,真正攻克了大长度交流海缆的技术核心难题。同年,公司再次中标该项目第二回路工程。两根500kV(含软接头)光电复合海底电缆分别于2019年1月和6月正式投运,至今稳定运行。

近年来,随着全球能源互联、岛屿开发、新能源海上风电等现代海洋经济理念的蓬勃发展,超大容量的海洋输电和信息需求也随之成为热点,全球范围都在为此努力,并不断突破此领域的一个个制高点。



Orient Cable won the bid of State Grid Zhejiang Zhoushan 500kV transmission project in March 2017. The scope of supply including 500kV composite subsea cable, termination, hang off, repair joint. This 500kV XLPE insulated composite subsea cable system is the world's first and has broken through the 6 core technologies:

Over length -factory joint be tested many times and obtained type test report;

Armoring -- Implemented round and flat copper wire armoring firstly;

Reliability verification products pass through 3 type tests;

Safety of operation and maintenance - the repair joint has been certified by DNV ;

No joint support - Achieved net XLPE insulation 100 tons continuous extrusion, to ensure that 500kV continuous manufacturing length at least 18km;

New grounding technology- Achieved large length lead sheathing and armoring short circuit technology and through the waterproof test.

The world's first 500kV subsea composite cable (including factory joint) was officially delivered and successfully passed the acceptance test in 2018. Orient Cable became the only enterprise in the industry with 500kV subsea cable and same voltage factory joint engineering application, which overcomes core technical problem of large length AC subsea cable. Orient Cable had awarded the 2nd circuit bid project the same year. Two 500kV subsea composite cable (including factory joint) were officially put into operation in January and June 2019 respectively, and have been in stable operation so far.

The ultra-large capacity of offshore power transmission and information demand has become a hot spot with the rapid development of global energy interconnection, island development, new energy wind power and other modern marine economy recent years. The whole global make effort for this and continue to breakthrough in the field.

海上风电输出主干线三芯220kV光电复合海底电缆

220kV 3-Core Composite Subsea Cable--Offshore Wind Power Output Main Line

2017年至今,公司凭借多年在高端海洋缆领域的技术沉淀,持续斩获多个海上风电项目的重大订单,分别有三峡新能源广东阳江西沙扒海上风电项目、粤电阳江沙扒海上风电项目、福建中闽莆田平海湾海上风电二期项目、三峡新能源江苏大丰300MW海上风电项目、国华东台四期(H2)300MW海上风电项目、华能江苏大丰300MW海上风电项目等,合计三芯220kV光电复合海底电缆近1300km。

上述海上风电项目的共有特点是路由长度长、敷设难度大,这就要求公司结合自身的技术特点,针对性的提出三芯220kV海缆的制造方案,最大程度的解决工程实际问题,确保工程有效实施。部分路由的海缆长度达76km这对于国内乃至国际都是首次实施。结合工程实际和国内的相关配套条件,首次开创性的使用三芯整体式220kV海缆硬接头,接头外径长约10米,直径约1米。



Since 2017, Orient Cable had been awarded several significant offshore wind power projects including Three Gorges New Energy Guangdong Yangjiang Yangxi Shapa Offshore Wind Power Project, Yudean Yangjiang Shapa Offshore Wind Power Project, Putian Ping Bay offshore wind farm Phase II project, Three Gorges new energy Jiangsu Dafeng 300MW offshore wind power project, Guohua Dongtai Phase IV (H2) 300MW offshore wind farm project and Huaneng Jiangsu Dafeng 300MW offshore wind power project with total over 1300km 3-core 220kV composite subsea cable.

Due to the long distance routing, the installation work is more difficult to perform at site. During the cable production engineering, the cable length up to 76km and rigid joint for 3-core cable (size L*W: 10m*1m,) had been special designed to resolve the difficult of cable laying.

大长度海洋脐带缆项目打破国际垄断

Large Length Umbilical Project Had Broken International Monopoly

2017年2月，作为唯一与多家国际知名脐带缆厂家同台竞技的中国企业，东方电缆斩获“海工文昌9-2/9-3/10-3气田群开发项目脐带缆(BID SECTIONI)”项目。

项目产品包括脐带缆(23.7km)、牵引头(含锚固、悬挂法兰)、J-tubeseal、限弯器、抢修接头、连接盒(脐带缆和CHA间)、压力监控系统等。

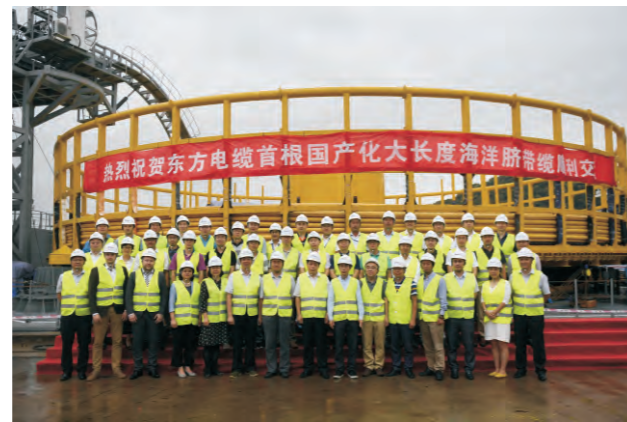
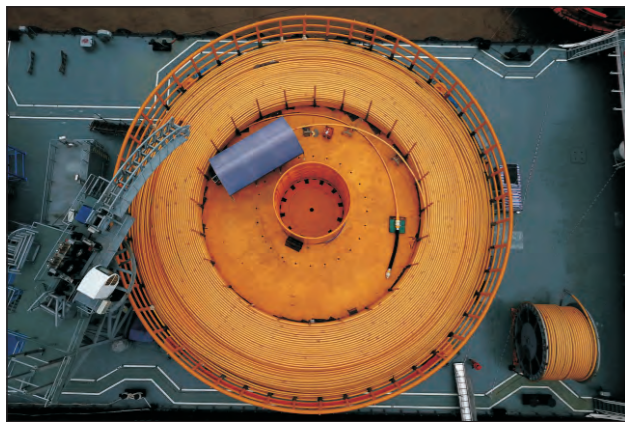
2018年6月，项目顺利交付。现已在南海文昌9-2/9-3/10-3气田群项目中成功投运。

该项目的实施标志着我国在深海油气开发的核心装备上取得了重大突破，将逐步摆脱水下装备主要依赖进口的现状，为我国实现能源安全和维护南海争议海域的国家主权提供了有利支持。公司是国内唯一实现海洋脐带缆产业化的企业。

Orient Cable had gained Wenchang 9-2/9-3/10-3 Umbilical Project in February 2017 as the only Chinese company competed with many internationally famous umbilical manufacturers.

The scope of supply including umbilical 23.7km, pulling head, J-tube, seal, bending restrictor, repair joint, connection box and pressure monitoring system. The project had been delivered in June 2018 and successfully installed in the China South Sea Wenchang 9-2/9-3/10-3 Gas Field Project currently.

The implementation of the project marks a major breakthrough in the deep-sea oil and gas development equipment. And provide support to achieve energy security and safeguarding national sovereignty of the South China Sea in china. Orient Cable is the only company with the ability to produce umbilical cable in China.



全球首个浅海抗台风型漂浮式风机动态缆系统

The World's First Shallow Sea Anti-typhoon Floating Fan Dynamic Cable System

2013年至今公司凭借多年在高端海洋动态缆领域的技术沉淀，作为唯一与多家国际知名脐带缆/动态缆厂家同台竞技的中国企业，持续斩获多个海洋动态缆项目订单，分别为CACT惠州21-1动态缆、流花11-1油田动态缆项目、马来西亚AJK油田动态缆项目、三峡首个国内浮式风电动缆项目、渤中25-1动态缆项目。

2013年“CACT惠州21-1动态缆”项目的实施标志着我国在深海油气开发的核心装备上取得了巨大的突破，将逐步摆脱水下装备主要依赖进口的现状，为我国实现能源安全和维护南海争议海域的国家主权提供了有利的支持。

“三峡首个国内浮式风电动缆”项目的实施标志着开启了我国在风电领域的新篇章，为我国实现能源安全和“碳中和，碳达峰”提供有利支持。

Since 2013, relying on years of technical accumulation in the field of high-end submarine dynamic cables, Orient Cable, as the only Chinese company competing with many internationally famous umbilical / dynamic cable manufacturers, has continuously won a number of orders for submarine dynamic cable projects, including CACT HZ 21-1 dynamic cable project, LH 11-1 oilfield dynamic cable project, AJK oilfield dynamic cable project in Malaysia, the first CTGR domestic floating wind power cable project and BZ 25-1 dynamic cable project.

The implementation of "CACT HZ 21-1 dynamic cable" project in 2013 marks a great breakthrough in China's core equipment in deep-sea oil and gas development, which means China will gradually get rid of relying on imported underwater equipment and Orient Cable can provide favorable support for China's realization of energy security and deep-sea oil and gas development.

The implementation of the first CTGR domestic floating wind power cable project marks the beginning of a new chapter in China's wind power field, which means Orient Cable can provide favorable support for China's energy security and "carbon neutralization and carbon peak".



张北±535kV柔直输电工程

Zhangbei ±535 kV HVDC Land Cable flexible transmission project

张北柔直工程采用我国原创、领先世界的柔性直流电网新技术，创造了12项世界第一，是破解新能源大规模开发利用世界级难题的“中国方案”。

东方电缆基于国重项目“±500kV直流电缆关键技术”研发成果，为本工程专供±535kV直流高压电缆，服务冬奥。

该工程不仅具备重大创新引领和示范意义，对于推动能源转型与绿色发展、服务绿色办奥、引领科技创新、推动电工装备制造业转型升级等具有显著的综合效益和战略意义。

Zhangbei flexible transmission project, uses the flexible HVDC transmission network leading technology, creating 12 “the first” in the world, provides a solution to the world class problem of large-scale exploitation and utilization of new energy.

Based on the research and development results of the “±500kV DC cable key technology” of the National Heavy Industry Project, Orient Cable has been selected as the preferred supplier of ±535kV DC high-voltage cables to serve the Winter Olympics.

This project not only has meaning of innovation and demonstration, but also has great benefit and strategic meaning in promoting energy transformation and green development, serving green Olympics, leading technology innovation, promoting the transformation and upgrading of the industry of electrical equipment manufacture.



福建永泰抽水蓄能电站500kV电缆及附属设备采购及安装总包项目

Turnkey Project of Procurement and Installation of 500 kV Cable and Associated Device for the Pumped Storage Power Station in Yongtai, Fujian Province

2020年10月，作为电缆行业龙头企业，东方电缆斩获“福建永泰抽水蓄能电站500kV电缆及附属设备采购及安装”总包项目。

项目内容包括大长度500kV电缆线路布置设计，500kV电缆及其附属设备供应，敷设安装及线路竣工试验等。

作为公司的总包项目，该项目的顺利实施意味着我公司具备承接总包项目的能力，同时，500kV作为目前电缆的最高等级，也意味着东方电缆的技术处于领先地位，对推进公司海陆缆高端电缆技术深度融合具有重要意义。

In October 2020, Orient cable, as the leading enterprise in the cable industry, obtained the “turnkey project of procurement and installation of 500 kV cable and associated device for the pumped storage power station in Yongtai, Fujian province” .

The scope of work includes the design engineering of the layout of large length 500 kV cable circuit, provision of 500 kV cable and corresponding accessory, laying & installation and commissioning test, etc.

Smooth implementation of the project again proven that our company has the capability to undertake the turnkey project, which is of significant importance to promote the deep integration of the company's high-end cable technology of subsea and land cable.

