

PW OFFSHORE
帕罗海工



钢丝绳NDT无损检测 Wire rope NDT inspection

一、为安全而生

For the wire safety

帕罗（上海）海洋工程有限公司，拥有一项核心技术“铁磁性构件无损探伤检测技术”，对钢丝绳、钢缆、斜拉索、索具进行精确内外部各种损伤及剩余载荷检测。技术经历十余年研发及应用，为目前世界通用领先技术，满足ISO4309检验标准。

产品广泛应用于索道、石油平台、港口机械、海上风电、起重机、工业制造等领域。并结合磁感应线分析技术，提供全面的钢丝绳安全保障。

帕罗海工拥有一支专业的无损检测团队，可以满足全国24小时不间断服务。

PW (Shanghai) Offshore Co., Ltd has a core technology NDT testing technology for Ferromagnetic; Internal and external damage and residual load detection of wire rope, steel cable, stay cable and rigging, Technology experience more than ten years Development and application, for the world's current general leading technology, to meet ISO4309 test standards.

Products are widely used in wire rope, oil platform, port machinery, offshore wind power, cranes, industrial manufacturing and other fields. and Combined with magnetic induction line analysis technology, provide a comprehensive safety guarantee for wire rope.

PW Offshore has a professional NDT team, can meet the national 24 hours uninterrupted service.

创新

高效

智能

创造

Innovation; Efficiency; Smart; Creation



二、帕罗产品概述

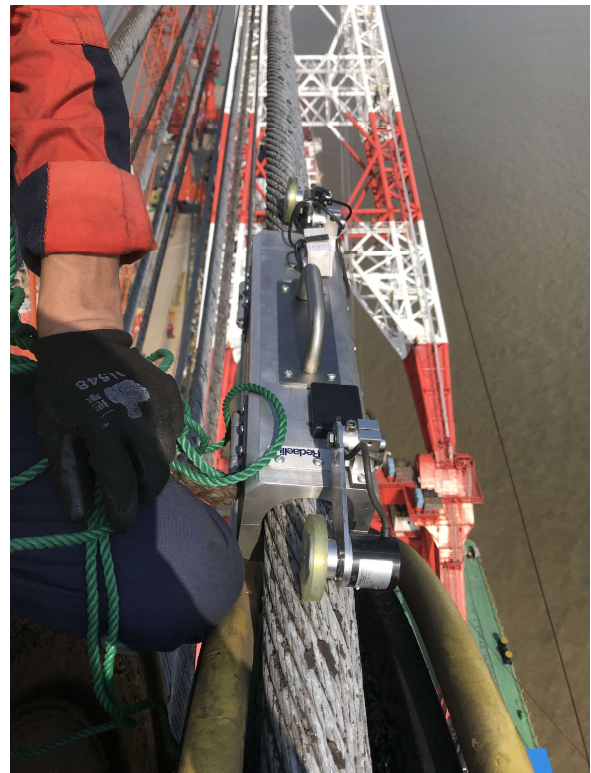
Product overview

帕罗（上海）海洋工程有限公司是一家专业经营国际知名品牌的特种钢丝绳及其配件的生产加工企业，公司成立于2011年，注册于上海金桥自贸区，在国内常年备有常用规格库存，兼具完整的加工能力。同时是国内大型吊机，锚机钢丝绳安装服务商，同时承接钢丝绳NDT无损检测服务。

帕罗（上海）海洋工程有限公司钢丝绳无损检测系统运用传感检测技术嵌入式技术、磁感应线分析、通过前端NDT监控装置和平台无缝对接，将钢丝绳事实数据和报警信息实时发送到电脑，实现数据分析反馈，辅助安全规范操作，有效避免钢丝绳子损伤事故的发生，消除安全隐患。



- ◆ 能在线检测钢丝绳内外部断丝、磨损、锈蚀、变形、松股、跳丝、材质变化等各种缺陷功能。
- ◆ 检测结果报告能满足不同行业的标准同时具有断丝根数和断丝断面积与钢丝总断面积的之比的形式显示。
- ◆ 利用计算机USB接口直接采样处理分析，具有在线声光报警与实时显示结果功能。
- ◆ 传感器圆型结构、周向环绕、轴向磁化，将钢丝绳瞬间磁化到饱和状态。
- ◆ 传感端采用合金铝外壳，具有防水、防尘、防震、防潮功能。
- ◆ 工作稳定，性能可靠，检测精度高，抗干扰性强，数据准确。
- ◆ 根据国家计量法和国家安全生产法的规定，每台仪器均由国家计量机构，按美国ASTM1571美国标准作为第三方进行检验，并出具检测报告，获得法定资质。



三、技术核心和法律资质

Technical qualification

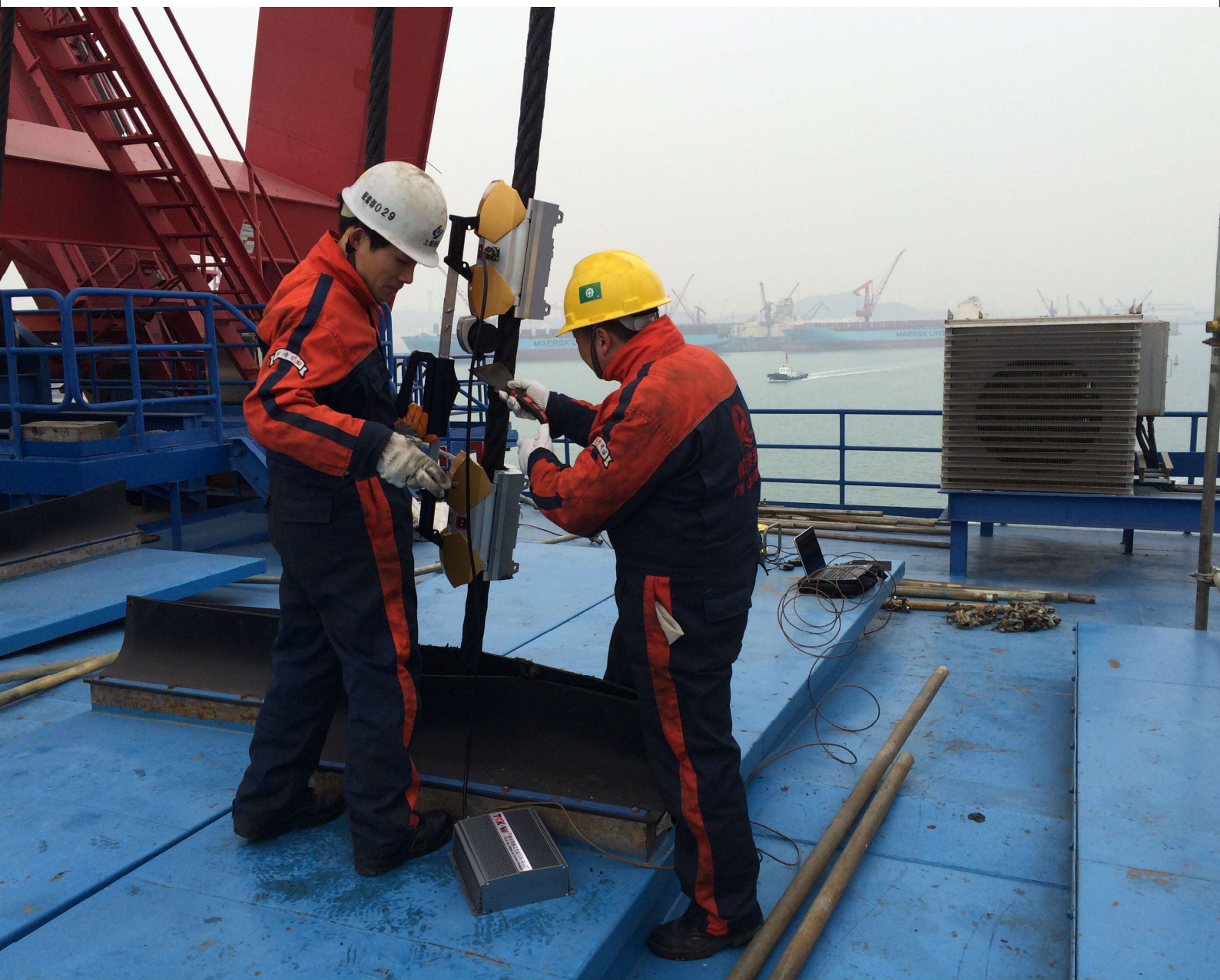
对钢丝绳进行全程无损扫描。



四、技术指标

Technical indicators

- 全系列能检测钢丝绳直径范围： $\Phi 1.5—300\text{ mm}$ （需配置不同系列规格传感器）
- 传感器与钢丝绳相对速度： $0.0—6.0\text{ m/s}$ 最佳： $0.3—1.5\text{ m/s}$
- 传感器导套与钢丝绳间隙最佳： $2—6\text{ mm}$ ，允许间隙： $0—15\text{ mm}$
- 断丝缺陷（LF）检测能力
- 定性：单处集中断丝定性检测准确率 99.99%
- 定量：单处集中断丝根数允许有一根或一当量根误判
- 单处集中断丝根数无误差定量检测100次以上准确率 $\geq 92\%$
- 金属截面积定量变化率（LMA）
- 检测灵敏度重复性允许误差： $\pm 0.055\%$
- 检测精度示值允许误差： $\pm 0.2\%$
- 位置（L）检测能力：检测长度示值百分比误差： $\pm 0.2\%$
- 电源：电脑电池供电 5V
- 传感器重量：常用规格 $< 10\text{ kg}$
- 环境温度： $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$ 大气压力： $86 \sim 106\text{ Kpa}$ 相对湿度： $\leq 85\%$



五、 业绩案例

Reffences

钢丝绳NDT无损检测直径10-180mm



联合船级社共同检验

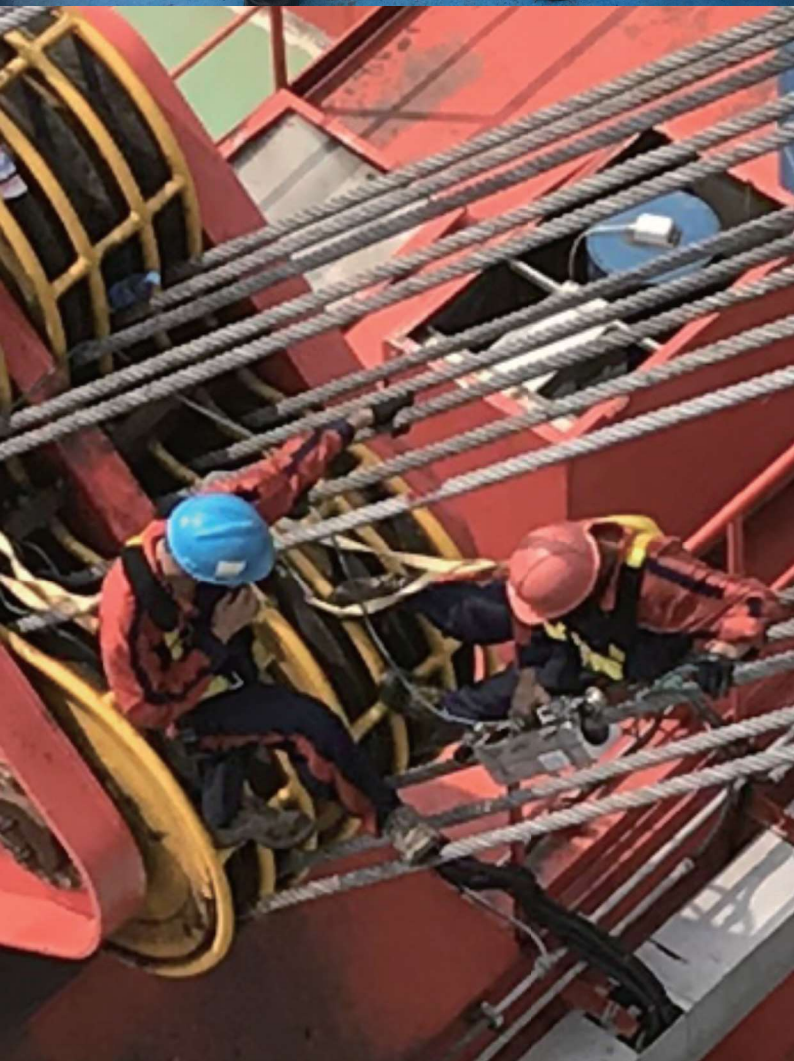
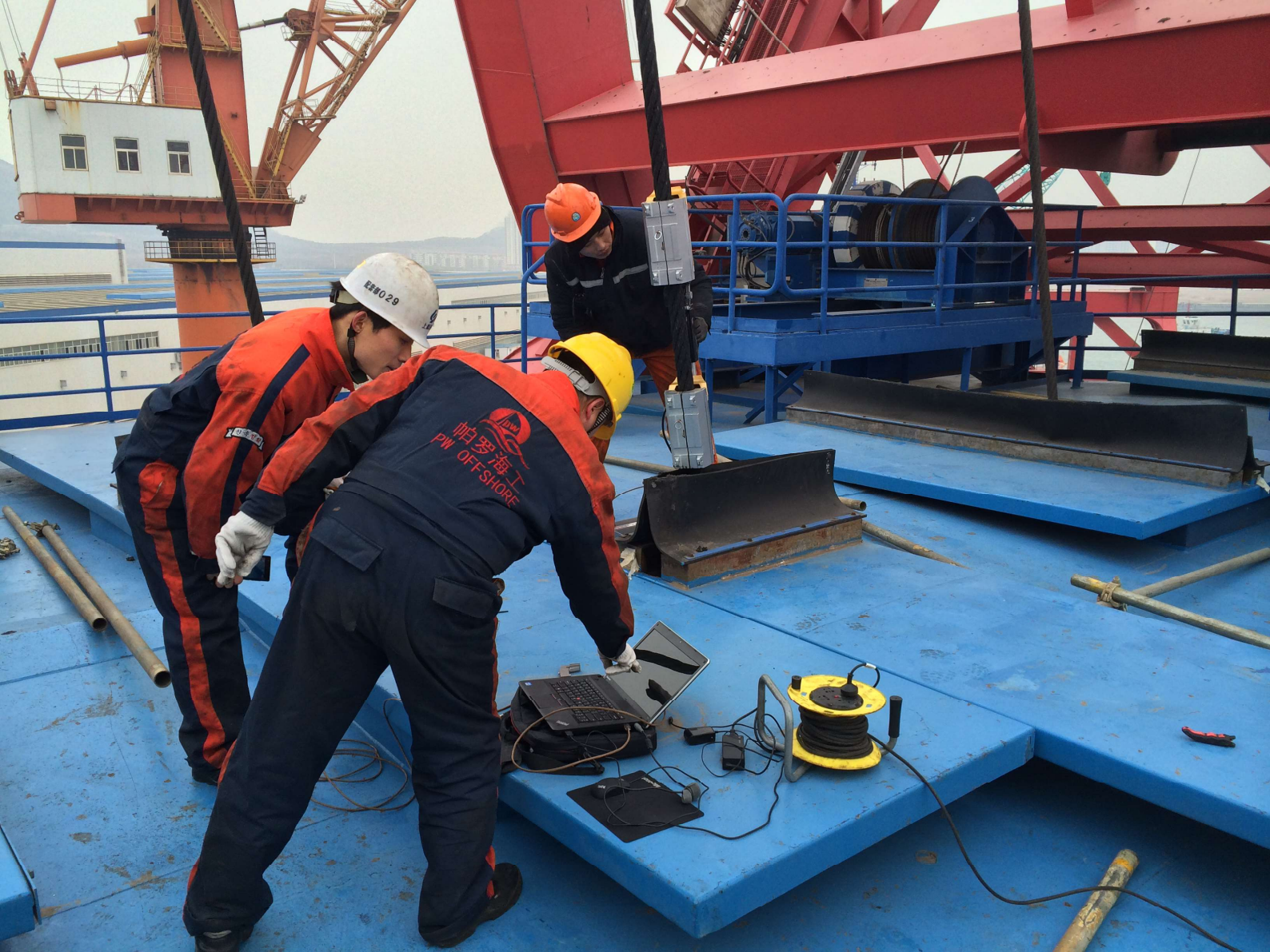
Cooperation with class



3600吨浮吊钢丝绳检测

3600T floating crane wire NDT inspection





证书 CERTIFICATION



Certificate of test and Examination of Wire Rope, sling & Accessories
NDT E-MAG INSPECTION SERVICES

REPORT OF ELECTRO MAGNETIC WIRE ROPE

Test Certificate No. 14120815

Receiver: SWIBER OFFSHORE CONSTRUCTION PTE LTD
Add: 12 International Business Park SWIBER@IBP
Singapore 609920

Project Title: TEPI SMK3 project
PO No: 4500115092
PR Date: 10098330

Name and address of the maker or supplier of the rope:	BRIDON ROPES LTD Wire rope brand: Bridon(UK)
Inspection place	Qingdao Wuchuan Shipbuilding Industry CO., LTD (CSIC)
PO Date:	02th 12 2014
M/V	KAIZEN 4000
The name of crane	3800T Floating Crane
Place of inspection	Whipline Hoist
Equipment & Serial No.	PWT40/PWT60 ; KZ30810JC51735
Product's Series No.	X0412452/5
Class Reference No.	NC1077441
Mill Product date (D/M/Y)	28-Oct-12
Month of Used (D/M/Y)	3-Jul-13
Nominal diameter	54mm
Maximum external diameter allowable reduction is 7%	50.22
Actual Diameter	50.77MM / 52.45MM / 53.95MM
Inspection Length	150M
Construction	6*36 IWRC
Surface treatment	Ungalvanised
Lay(right, left)	RHRL
Tensile Strength	1960N/mm ²
Minimum breaking load of rope	220T
The manufacturer	BRIDON
Broken Wire	0
Corrosion	7.32%
Test date of Inspection (D/M/Y)	3th-Dec-2014
Flew upper limit	10%
NDT Loss of metallic cross sectional area (LMA)	6.47%
The Test results	Safe for use

Reference Standards and codes

Operation and Maintenance of Offshore Cranes, API RP 2D Sixth Edition, May 2007; Portal and Pedestal Crane AMSE B30.4-2010;
Standard Practice for Electromagnetic Examination of Ferromagnetic Steel Wire ASTM E1571-11;
Cranes-Wire Ropes-Care, Maintenance, Installation, Examination, and Discard BS ISO 4309;
The safety crane of installation GB6067.1-2010; Steel wire rope product stands EN12385-4;

Remark: Lubrication is dry coverage. Wire rope should be more frequently lubricated.
The detail information of inspection see attachment file.

We certify that the above particulars are correct, and that a competent person carried out the examination and test.

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www.pwoffshore.com



Original



Certificate of test and Examination of Wire Rope, sling & Accessories
NDT E-MAG INSPECTION SERVICES

REPORT OF ELECTRO MAGNETIC WIRE ROPE

Receiver: SWIBER OFFSHORE CONSTRUCTION PTE LTD
Add: 12 International Business Park
SWIBER@IBP
Singapore 609920

Project Title: TEPI SMK3 project
PO No: 4500115092
PR Date: 10098330

PHOTOGRAPHIC AIDE TO INSPECTION

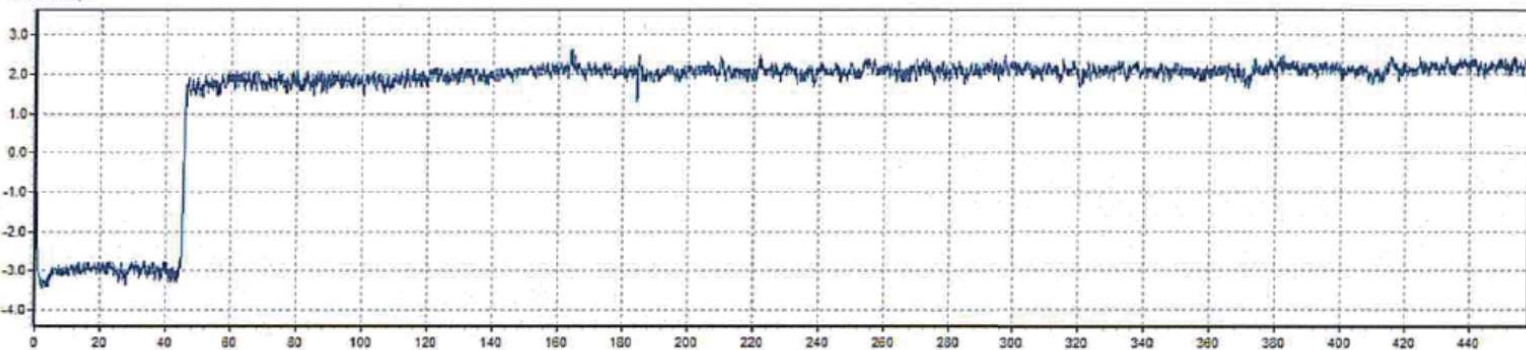
Date of report	8th-Dec-2014	Report Number	14120815
photographic details			
Fig 1: Whip line wire rope view	Fig 2: Datum position view	Fig 3: The Inspection start at layer	
Fig 4: Lay length view	Fig 5: Outer strand view	Fig 6: Lubrication is dry coverage	
Fig 7: Rope diameter measurement	Fig 8: Lay length measurement	Fig 9: Finish at outermore layer	
The person making the report Yang LianSheng (Eric Yang) NDT Wire Rope Inspection ASNT Level II LEEA Dipl., LEG(Reg No 016047)		The person authenticating this report Polo Zheng Technical & Operations Manager As per SWIBER procedures	

Original

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LMA trace, %



LF trace, mV

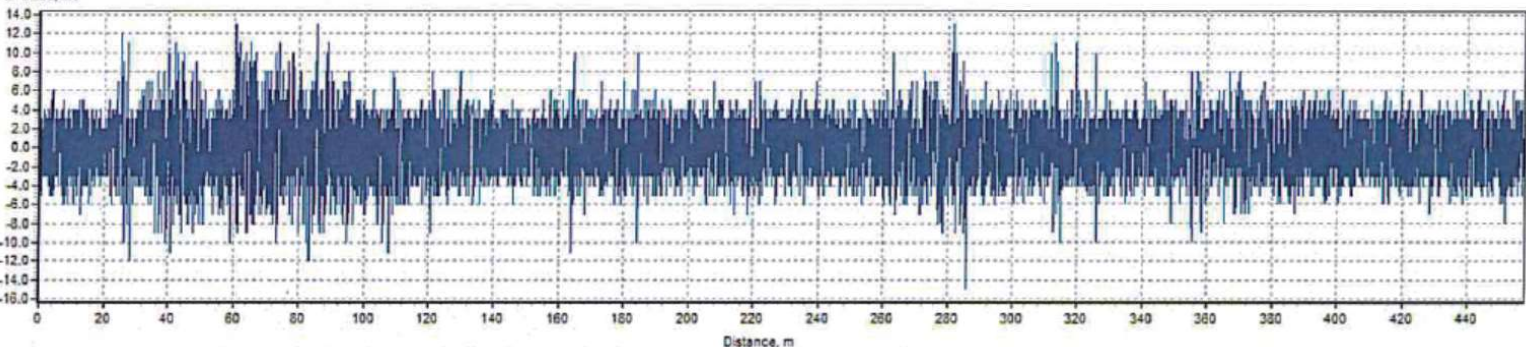


Fig 1. Auxiliary hoist wire rope NDT result

证书 CERTIFICATION



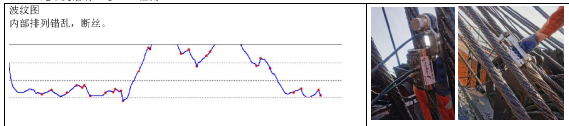
帕罗（上海）海洋工程有限公司钢丝绳检验证书 PW OFFSHORE GROUP INSPECTION CERTIFICATE

证书编号 Certificate No: PW-CIMC-210703IN

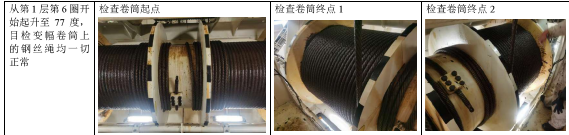
委托方/Customer 华电重工股份有限公司
检验地点/Place of Inspection 广东揭阳海上风电
项目号: HUISMAN-OMC-1800T AFT BOOM WIRE
合同号: (2021)HD-PW-001
检验时间/Date of Inspection 2021.07.03
检验产品明细及结论/Product Particulars and result

吊机名称及编号 Serial No.	钢丝绳名称 Equipment	规格 Dimension	NDT 检测长度 Length of NDT inspection	结果 The Result
华电中集 01 HUISMAN 1800T	变频钢丝绳 1 (尾吊) 位置: 第 4 片滑轮上口处大约 2.5 米左右	Boom wire (尾吊) D50mm OMB, Type: 8*K26; L:1540M	2.5M	报废
	变频钢丝绳 2 (首吊) 位置: 臂架从休息架提升到 70 度左右 长度大约 1000 米	Boom wire (首吊) D50mm OMB, Type: 8*K26; L:1540M	1000M 左右 (变频臂架 6 层)	安全

被检曲线结果 (报废):
尾吊变频钢丝绳 NDT 检测



首吊钢丝绳目检正常 (安全)



检验标准 Inspection Test Standards:
× GB/T 21837-2008 《钢丝绳无损检测方法》
× GB5972-2016 起重机用钢丝绳检验和报废实用规范
× API RP2D 海上平台起重机使用与维护推荐做法
× API Spec2C-2012 海上基座式起重机
× ISO 4309 检测长度标准
检验项目 Scope of Inspection:
原始证书审核: Audit to original certificate
× 外观检查和尺寸测量: Visual inspection and dimension measurement.
× NDT 无损探伤检测 NDT inspection (波形图)
经钢丝绳检测设备采样数据分析, 出具该钢丝绳报告。

签发日期: 2021-07-03 检验师: 郑永刚 (工号: P1021) 审核:
Date of Issue: 2021-07-03 Surveyor: Kevin zheng (PIN: P1021) Auditor:

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Certificate of test and Examination of Wire Rope, sling & Accessories
NDT E-MAG INSPECTION SERVICES

REPORT OF ELECTRO MAGNETIC WIRE ROPE Test Certificate No. PW-CIMC-210703IN

Receiver: 华电重工股份有限公司
M/V HUADIAN ZHONGJI 01
IMO: 9787285

Reference No: PRJ11100257209/1
PO No: (2021) HD-PW-001
PR Date: 20210703

Name and address of the maker or supplier of the rope:	BRUNTON SHAW (UK) Add: Sandy lane workshop, nottinghamshire S80 3ES Telephone: 01909537600 Fax: 01909 500199 Email: info@brunton-shaw.com.uk Web: http://www.brunton-shaw.co.uk
Inspection place:	JIEYANG wind Anchor place
检测地址:	广东揭阳海上风电
The name of crane	1800T HUISMAN OMC Crane
吊机名称	霍氏威马1800T OMC
Position of inspection	BOOM WIRE
钢丝绳检测位置	变频钢丝绳
DNE Equipment & Serial No.	17PW08AG
无损检测设备编号	17PW08AG
Mill Product date (DIM/Y)	7-Apr-20
钢丝绳出厂日期	07-04-2020
Month of Used (M)	10 month
使用月数 (单位: 月份)	10个月
Nominal diameter	50mm
公称直径	50mm
Maximum external diameter allowable reduction is 7%	46.5mm
最大允许直径损耗	46.5mm
Actual Diameter	48.5mm, 44.3mm, 42mm, 46mm
实际测量直径	48.5MM, 44.3mm, 42mm, 46mm
NDE Inspection Length	2.5M
无损检测长度	2.5米
Construction	8*K26 L2HLL 1960 Galvanized
结构	8*K26 六股 1960 镀锌
Actual breaking load of rope	2379KN
实际钢丝绳破断拉力	2379千牛
after broken breaking load of rope (Broken)	951KN (About)
目前大约破断拉力(损伤后)	951千牛 (大约)
Broken Wire	6
断丝数量	6
Corrosion	0.11%
腐蚀性	0.11%
Flew over limit (LMA)	10%
最大允许断丝量上限	10%
NDE Loss of metallic cross sectional area (LMA)	40.70%
断丝量	40.70%
The Test results	No Safe
检测结果	报废
Reference Standards and codes 参考标准 Standard Practice for Electromagnetic Examination of Ferromagnetic Steel Wire ASTM E1571-11; Cranes-Wire Ropes-Care, Maintenance, Installation, Examination, and Discard BS ISO 4309; The safety crane of installation GB6067.1-2010; Steel wire rope product standards EN12385-4; We certify that the above particulars are correct, and that a competent person carried out the examination and test.	

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Signature

Original



Certificate of test and Examination of Wire Rope, sling & Accessories
NDT E-MAG INSPECTION SERVICES

REPORT OF ELECTRO MAGNETIC WIRE ROPE Test certificate No. PW-CIMC-210703IN

Receiver: 华电重工股份有限公司
Add:

Cert No: PW-CIMC-210703IN
Project Title: 华电中集01
PO No: (2021) HD-PW-001
PR Date: 20210703

PHOTOGRAPHIC AIDE TO INSPECTION			
Date of report	03th JULY-2021	Report Number	PW-CIMC-210703IN
photographic details 8*k26 L2HLL 50mm L:1540M (BOOM WIRE AFT)			
Fig 1. NDE Equipment ID	Fig 2. lay length check	Fig 3. Inspection start in crane	
Fig 4. vessel view	Fig 5. NDT inspection	Fig 6. the Wire Diameter	
Fig 7. Huisman 1800T crane view	Fig 8. broken wire in the block	Fig 9. Inspection by NDT	
The person making the report	The person authenticating this report	Result /结论	
KEVIN ZHENG NDT Wire Rope Inspection Technical & Operations Engineers	OUYANG SHUO Technical & Operations Manager	Broken/报废	

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Original



“华电中集 01” 钢丝绳检测结论报告

PW-CIMC-210703IN

检测日期	产品名称	品牌参数/产品规格型号 Type
2021.07.04	Huisman 1800T 吊机变频钢丝绳 (尾吊)	品牌: Brunton shaw 结构: 8*K26 L:1540M*1 根
客户名称 Customer		华电重工股份有限公司
损伤照片:		
状态分析: 1: 钢丝绳内部存在应力, 在该损伤位置打破内外平衡, 使的钢芯和外股出现位移, 引起的连锁反应 (钢芯偏移, 1#外股下陷, 2#外股突出, 3#外股下陷, 4#5#外股突出, 6#下陷, 7#突出); 2: 对比分析: 检查首吊的变频钢丝绳, 目测良好, 未发现不良状态, 因该 2 台吊机 2 根变频钢丝绳是同批次 (原始证书所示), 基本可以判定非钢丝绳质量问题。 3: 卷筒和筒皮检查: 目测正常, 切损伤处在绳中间部分, 排除卷筒问题。 4: 损伤处在第 4 片滑轮处, 位置靠近 600 米左右位置 (总长 1540 米), 说明该钢丝绳安装时候内部存在应力, 后续使用中逐渐应力集中到该点引起该钢丝绳损坏。 损伤原因分析判定: 可能性分析 1: 属于安装过程中导向滑轮入绳角偏大导致, 带入应力所致。 可能性分析 2: 上一次更换钢丝绳时候, 新旧绳连接方式错误, 没有增加消除应力过度绳, 把旧绳的应力带入新绳导致。 结论: 该钢丝绳已报废, 立即停止使用。		
帕罗工程技术部: 郑永刚 工号: P1021		
日期: 2021/07/03		



帕罗（上海）海洋工程有限公司

PW(SHANGHAI) OFFSHORE CO., LTD



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