



佩森环科
PURE OCEAN
TECHNOLOGY

POT DeSO_x Scrubber

1

POT Company

2

POT DeSOx Scrubber

3

Retrofitting Installations





COMPANY-XINFA



Is located in Shidao Industrial District Rongcheng City, the east end of Jiaodong peninsula in China. Established in 1996, it has developed to a large scale fishery group integrated with marine fishing, seafood processing, marine biological products, port intergrated services, Ship building and repair, marine product R&D and production and sales, Fishing net manufacturing, cold-chain logistics, mariculture and ecotourism, forming a comprehensive management pattern for fishing industry, trade, production and research.

80+ subsidiary companies, with 4000+ staffs

1B USD
Total Assets

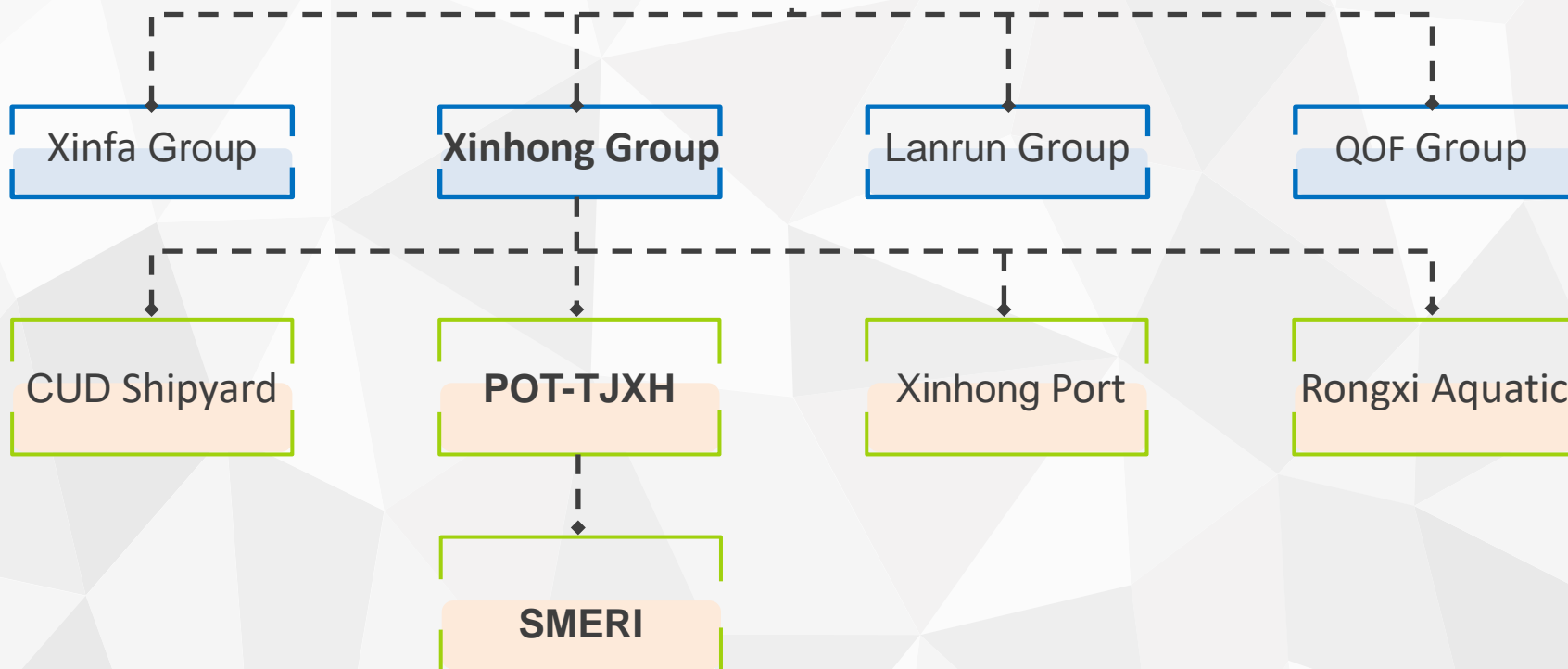
500M USD
Yearly output

70M USD
Foreign exchange



COMPANY-XINFA

Xinfa Holdings





COMPANY- POT



Shandong Pure Ocean Technology Co., Ltd.

Specialized in production, sales of high-tech marine products, and provide global service.

POT is established in 2017, located in Renhe industrial district of Rongcheng City, Shandong Province, China. POT has 200+ staffs, with qualified engineers in scrubbers, marine and ship repairing/newshipbuilding industries, experienced workers etc.

SMERI, a subsidiary company, is engaged in consulting, design, installation and commission, supervision and engineering contracting for ship and ocean engineering projects etc.

COMPANY- PLANT



The total area covers more than 266,400m², including workshops, laboratory, stores, office building, training center, dormitory, etc.

POT plant has

1. electrical/machinery workshop of 21,000m² (crane capacity 3*100T);
2. structural workshop of 27,000m² (crane capacity 7*100T);
3. a spray painting workshop;
4. an open fabrication area covering 30,000m² (gantry crane capacity 1*100T/36mH, 2*50T/16mH);
5. The workshops are equipped with all kinds of equipment for machining, CNC cutting and welding, cold working, including transfer equipment.





DeSOx ? Sulphur Cap ?



IMO's 2020 Global Sulphur Cap

IMO regulations to reduce sulphur oxides (SOx) emissions from ships first came into force in 2005, under Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL Convention)

MARPOL Annex VI

- Prevention of air pollution from ships. - Clean air at sea

MEPC 73, October 2018 in London

Adopted an amendment to MARPOL Annex VI;

- to implement and enforce the 0.5% sulphur limit globally, effective on 1 January 2020
- to prohibit as of 1 March 2020, the carriage of fuel oil with a sulphur content exceeding 0.5% on board a ship, unless the ship is fitted with a scrubber or equivalent cleaning technology
- the 0.1% sulphur limit in ECA / SECA region since Y2015 will continue to be enforced

ECA / SECA

Baltic Sea – as defined in Annex I of MARPOL (SOx only);
 North Sea – as defined in Annex V of MARPOL (SOx only);
 North America, including most of the US and Canadian coastline – as defined in Appendix VII of Annex VI of MARPOL (SOx, NOx and PM); and
 United States Caribbean Sea, including Puerto Rico and the US Virgin Islands – as defined in Appendix VII of Annex VI of MARPOL (SOx, NOx and PM).
 Further ECA areas presently being discussed are shown below.





IS SCRUBBER THE CHOICE ?

Available solutions existing in the market:

1. SOx preprocess: MGO tanks are installed or ME/AE/Boiler retrofitted, the retrofitted cost of this method is low, but later running cost is high which depends on the price of MGO.
2. Dual fuels: LNG/LPG are used, the retrofitted cost of this method is extremely high and the shipload will be reduced. The efficiency of the main engines will be reduced more than 30%, and the diesel engines selection is difficult.
3. SOx postprocess: POT-DeSOx system is installed, the retrofitted cost is not so high, and the later running and maintenance cost is low.

Days of ship running per year	Use HFO	MGO	Savings
	(USD/Year)	(USD/Year)	(USD/Year)
180	2,052,000	3,132,000	1,080,000
200	2,280,000	3,480,000	1,200,000
225	2,565,000	3,915,000	1,350,000
250	2,850,000	4,350,000	1,500,000
275	3,135,000	4,785,000	1,650,000
300	3,420,000	5,220,000	1,800,000

Configuration is subject to 57,000DWT Bulk Carrier, oil consumption is 30t/day, MGO/HFO price difference is low 200USD/ton. This calculation does not include bank interest, exchange rate changes, fuel price and other parameters, for reference only.



COMPANY QUALIFICATION

Lloyd's Register

SHANDONG

No. 4, Renshe

Current issue date: 7 Oct
Expiry date: 6 October 20
Certificate identity number

AE

SHANDONG PURE OC
NO.4 WEST ROAD, R

Attn: Mr. Dong C
Re: Apt
Est

Comments:

1. The following are

- 1) Detail exhaust
- 2) Details of all design parameters specific to units
- 3) Descriptions including well as which exhaust
- 4) Material spec residue tanks.

Customer Name: SHANDONG LTD

Attending Office: Yanke

First Visit Date: 07-Nov-19

Certification Of:

Survey Location:

Equipment Data:

Manufacturer Number(S): No. 1
Model Number:
Destination Vessel (Name):
Destination Vessel (Class):
Builder/Shipyard:
Builder ID / Hull No.:

Design State:
ABS Reviewing Organization:

Additional Data:
ABS Stamping

This is to certify that the following survey and r

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This is to certify that the following survey and r

Traceability of materials used on Welding plans, procedures & w
The principal data has been ver
Examined during manufa
machining, and non-destruct
All parts of the machinery ver
Subject to satisfactory instal
Asbestos-free declaration ver

One (1) unit of Scrubber Tower drawings with task No. T172 & ABS Guide for Exhaust Tr

Particulars of Scrubber Tower:
- Overall Height of Scrubber
- Height of Reaction Chamber
- Height of Heat Exchange

One (1) unit of Scrubber Tower in accordance with the drawing order for Building No. 172-01-01

1. Particulars of Scrubber Tower

Customer Name: SHANDONG LTD

Attending Office: Yanke

First Visit Date: 07-Nov-19

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1. Particulars of Scrubber Tower

INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE

Republic of Liberia
by American Bureau of Shipping

Name of Ship	Distinctive Number or Letters	Gross Tonnage
BAO GLORY	18060 DSOX3	32147

IMO Number: 9457309
Port of Registry: Monrovia

At present, POT has already acquired great certification, Including the AIP certificate from ABS & LR, ISO 9001 quality management system certificates from CCS & LR, and the 1st domestic IAPP certificate for EGCS; furthermore, POT acquires 5 domestic invention patents, 7 domestic utility model patents, 1 software copyright, 1 appearance design and 2 international invention patents.



WORKMANSHIP

WELDING PROCEDURE SPECIFICATION
焊接工艺规程 (WPS)

Company: Shandong Puro Steel Technology Co., Ltd.
Welding Process: 0334
Supporting PQR No.: WPS-PQ-1008

Identification #: WPS-PQ-1008
Type: Manual
Machine: Automatic

JOINT DESIGN USED
Type: Butt
Position: 1G
Backing: No
Back Beveling: No

ELECTRICAL CHARACTERISTICS
Transfer Mode: Air Carbon Arc Cutting
Current: AC
Voltage: 200V
Pulse: No

WELDER INFORMATION
Name: Zhang Jie
No.: 0001
Date: 2019.10.10

WELDING PROCEDURE

Pass or Weld Layer	Process	Filler Metals	Current	Voltage	Travel Speed	Heat Input	Joint Details
1	GTAW	ER308LSi	DC	140-160	18-19	8.5-11.5	
2	GTAW	ER308LSi	DC	140-160	18-19	8.5-11.5	
3	GTAW	ER308LSi	DC	140-160	18-19	8.5-11.5	

Welding diagrams and inspection stamps are included in the document.

ABS
CCS
DNV-GL
KR
IACS
Lloyd's Register
ClassNK
RINA



WPS proves the workmanship qualification of the manufacturer.
POT has acquired a complete series of approved WPS documents for super austenitic stainless steel & duplex stainless steel form main classes, including DNV-GL, ABS, BV, CCS, LR and BV.

COOPERATION PARTNER



中船澄西



舟山龙山船厂



黄埔文冲

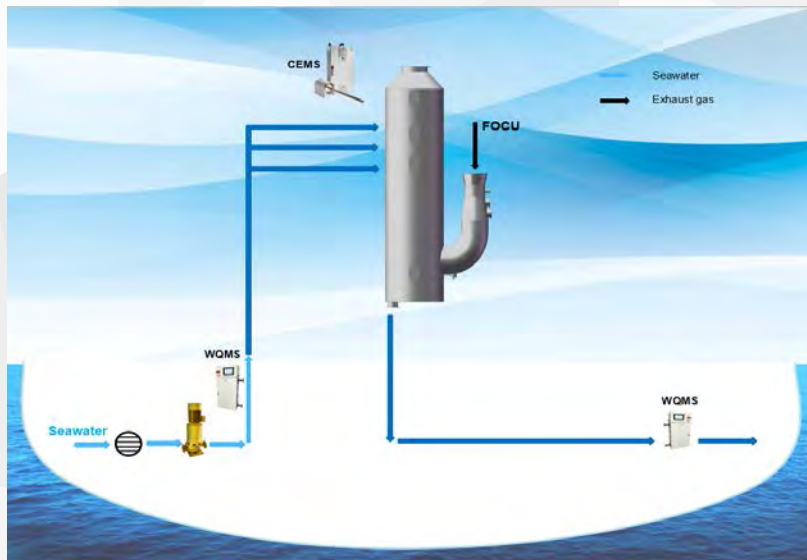


大连船舶重工集团有限公司
DALIAN SHIPBUILDING INDUSTRY CO.,LTD

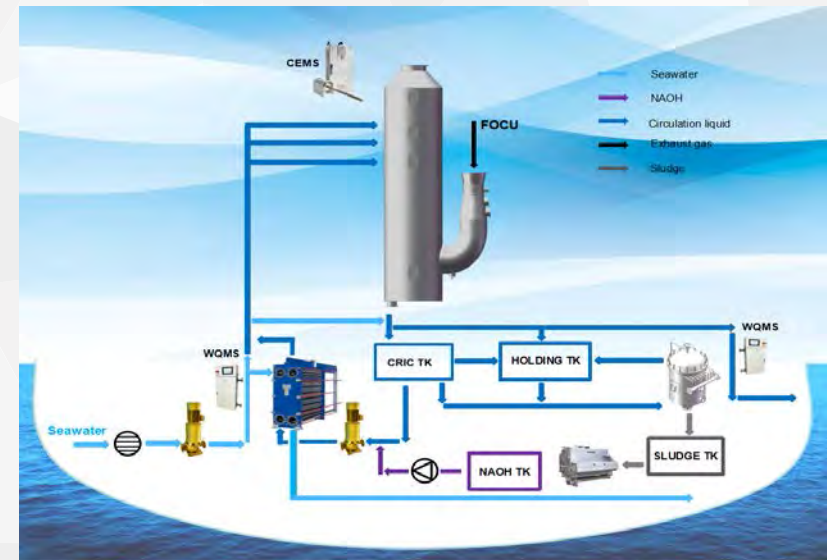
POT DeSO_x SCRUBBER

POT is a dedicated in-house R&D, technology and engineering design Company for Exhaust Gas Cleaning Systems (EGCS) DeSO_x Scrubbers, complete with manufacturing facility, and integrated with 3D scanning, retrofitting installation, commissioning and after-sales services.

POT DeSO_x Scrubber has gained the international leading level in many aspects including its technology, price, footprint, weight, OPEX and safety etc.

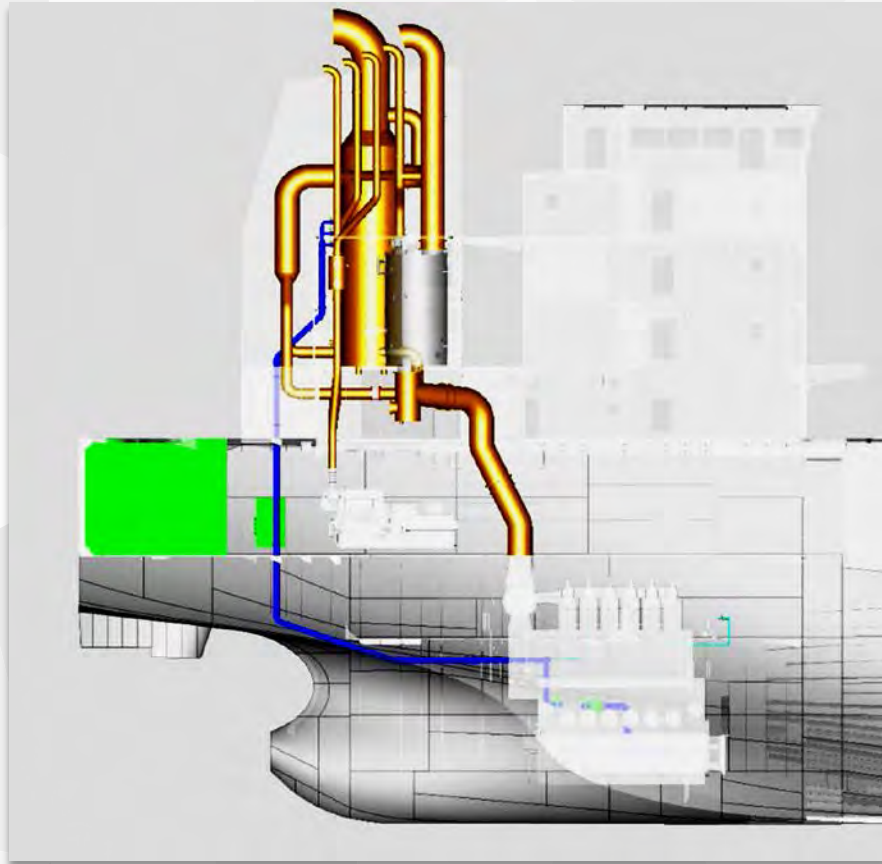


Open Loop mode



Closed Loop mode / Hybrid mode

POT DeSO_x SCRUBBER



- 1 Scrubber
- 2 Spray system
- 3 NaOH system
- 4 Washwater treatment system
- 5 Control system
- 6 Continuous monitoring systems

POT DeSO_x Scrubber system is in-house designed, and tailored to customers request according to ship types

POT DeSO_x SCRUBBER - Tower



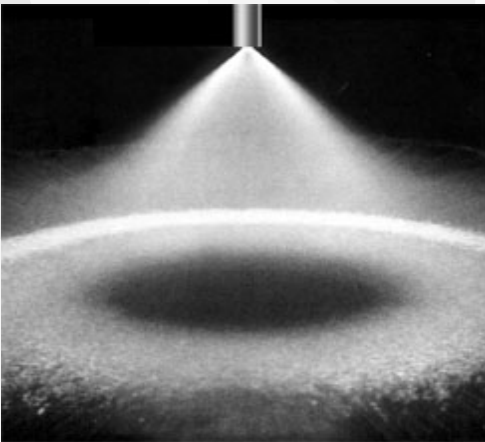
I-Type



U-Type

1. Super Duplex stainless steel is chosen with material of high resistance to crevice corrosion and pittings, and to withstand the HT exhaust gas and sea water mix.
2. The capacity is designed based on the treated exhaust gas volume.
3. The exhaust gas residence time, scrubbing and soot recycle performance are to be taken into full consideration.

POT DeSO_x SCRUBBER – Spray System



1. The spray system is composed of connection pipelines and special sprinkler nozzles, etc.
2. The material selection for connecting pipe and sprinklers is resistant to corrosion and high temperatures.
3. Design considerations - atomization effect and anti-clogging.
4. Atomization effect of spray system reaches upto 0.3mm, that can fully realize the neutralization of the flue gas and the washing water.

POT DeSOx SCRUBBER – Control System



Control system are designed for automatic control to avoid misoperation by crew. All the alarm points are transferred to engine room alarm system besides the capability of remote failure diagnosis.

Main components brand : Siemens / ABB / Schneider

Control box/Touch panel : Beijer / Advantech / ABB

PLC : Siemens

DeSOx SCRUBBER – Monitoring Systems



Continuous Emission Monitoring System (CEMS) monitors the concentration of exhaust gas to calculate SO₂ (ppm) / CO₂ (%v/v).

Wastewater Quality Monitoring System (WQMS) monitors pH, PAH, turbidity and temperature to ensure the discharged wastewater is in compliance to the corresponding requirements under different MO and/or USCG rules.



Model Parameters

POT DeSOx ScrubberType	Unit	POT DeSOx-30-O/C/H	POT DeSOx-60-O/C/H	POT DeSOx-75-O/C/H	POT DeSOx-90-O/C/H	POT DeSOx-100-O/C/H	POT DeSOx-120-O/C/H	POT DeSOx-160-O/C/H	POT DeSOx-180-O/C/H	POT DeSOx-210-O/C/H	POT DeSOx-300-O/C/H
Total Engine Power	MW/h	4	8	10	12	13	15	20	23	27	38
Exhaust Gas flow	Kg/h	31,576	62,846	76,427	94,859	102,764	118,574	158,099	181,813	213,433	300,387
Outer Diameter	m	2	2.8	3.1	3.4	3.6	3.8	4.4	4.7	5.1	6.1
Height	m	11.5	12.5	13	13	13	13.5	13.5	13.5	13.5	14
Weight	T	6.5	9.7	12.6	13.9	15.1	16.2	19.3	20.7	22.2	29
Max Power Load (For Open Loop Mode)	kW	87	139	164	189	202	228	293	331	383	524
Scrubber Efficiency		>98% (Compliance with MARPOL/MEPC requirements)									
Max Temp Inlet	°C	450									
Back Pressure	Pa	<1000									
Run Dry (Yes / No)		Yes									



GLOBAL AFTER-SALES SERVICE



POT has 30+ service stations covering Asia, Europe, US, Africa etc area; and will start production soon in Tuzla shipyard in Turkey.



TURNKEY RETROFITTING INSTALLATION

Advantage : Turnkey Solutions within our group CUD (Weihai) Shipyard

Data collection



Vessel Information (main parameters)

3D scanning



Proposal submission



Approval by Owner, contract

Detailed design and
Class approval



Procurement



Production



Inspection



Shipment

Installation



Commissioning



Training



Sea Trial

Scrubber Delivery Time:

about 5 to 7 months from contract signing;

POT offers Turnkey Package with installation

in our group CUD (Weihai) Shipyard :

Retrofitting Installation Time: about 25 to 30 days



1st TURNKEY RETROFITTING PROJECT



INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE

Issued under the provisions of the Protocol of 1977, as amended by resolution MSC.176(58) in 2006, to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978, as modified by the Protocol of 1982, as modified by the Protocol of 1997, under the authority of the Government of:

Republic of Liberia
(Name of state)
by American Bureau of Shipping

Name of Ship	Distinctive Number or Letters	
BAO GLORY	11881 (30)K3	
IMO Number ¹	Port of Registry	Gross Tonnage
9457308	Malaysia	32742

THIS IS TO CERTIFY:

1 That the ship has been surveyed in accordance with regulation 5 of Annex VI of the Convention, and

2 That the survey shows that the equipment, systems, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

This Certificate is valid only when Supplement (SPPC-VI) 2008 issued as: Valid P.R.China
on: 18 February 2016 is attached.

This certificate is valid until: 13 October 2016 ² subject to surveys in accordance with regulation 5 of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: 03 November 2014
Issued at: Yantai, P.R.China (Place of issue of Certificate)
(Date of issue)

ABS American Bureau of Shipping
Shanghai Branch, P.R.China

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- mv **BAO GLORY**
- 53,000dwt BC
- LOA: 190mtr
- BREADTH: 32.26mtr
- DEPTH: 17.50mtr

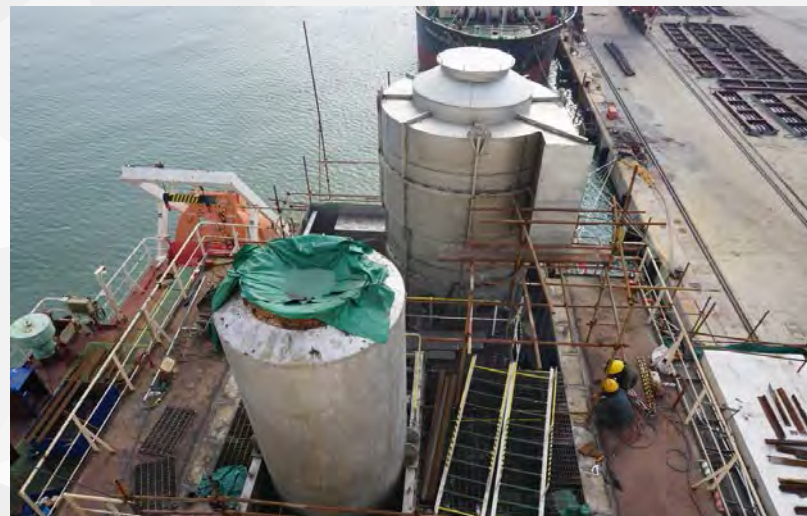
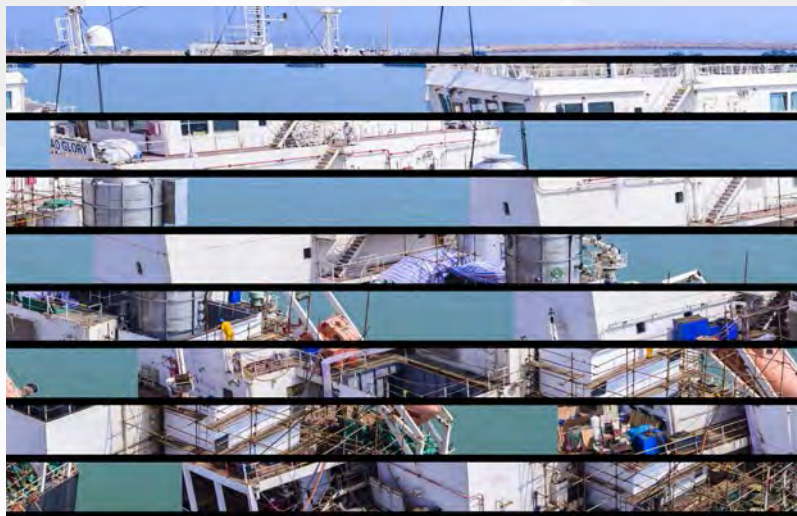
- CLASS: ABS
- ENGINE: MAN B&W 6S50MC-C
- SMCR: 9480KW
- GENSET: DAIHATSU 6DK-20*3sets
- **POT-DeSOx U-75-H**

TURNKEY RETROFIT – Bao Glory





TURNKEY RETROFIT – Bao Glory



2nd TURNKEY RETROFITTING PROJECT



Certificate No. 1423706 2644853-002

INTERNATIONAL AIR POLLUTION PREVENTION CERTIFICATE

Issued under the provisions of
the Protocol of 1987 as amended by resolution MEPC.118(58) in 2008,
to amend the International Convention for the Prevention of Pollution from
Ships, 1973, as modified by the Protocol of 1978 related thereto
(hereinafter referred to as "the Convention")
under the authority of the Government of
The Hong Kong Special Administrative Region of the Peoples Republic of China
by American Bureau of Shipping

Particulars of Ship

Name of Ship	Distinctive Number or Letters	
KALIMANTAN EXPRESS	HK-600 YHMBB	
IMO Number ¹	Port of Registry	Gross Tonnage
800432	HONG KONG	84728

THIS IS TO CERTIFY:

- That the ship has been surveyed in accordance with regulation 8 of Annex VI of the Convention; and
- That the survey shows that the equipment, systems, fittings, arrangements and materials fully comply with the applicable requirements of Annex VI of the Convention.

This Certificate is valid only when Supplement M/PC (if 2008) issued at _____ Yantai, P.R.China
on 03 April 2018 is attached.

This certificate is valid until 15 January 2024 ² subject to surveys in accordance with regulation 8 of Annex VI of the Convention.

Completion date of the survey on which this certificate is based: 01 February 2018

Issued at _____ Yantai, P.R.China _____ 03 April 2018
(Place of issue of Certificate) (City of Issue)

ABS  Internationally Signed By _____
(Signature of Surveyor)

1. A certificate of 2018 class identification number, issued by the Register on October 4, 2018.
2. The maximum gross tonnage of the ship is 84,728 tons, as shown in the Certificate of Tonnage and the Certificate of Load Lines. The maximum length of the ship is 216 meters.
3. The ship is registered in the Hong Kong Special Administrative Region of the Peoples Republic of China.

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- **mv KALIMANTAN EXPRESS**
- **ENGINE TYPE: DOOSAN 6RT-flex50-D**
- **54,686 DWT WOOD CHIP CARRIER**
- **SMCR: 10470KW**
- **Size : 216m LOA x 37m B**
- **GENSET: DAIHATSU 5DK-20e*3**
- **CLASS: ABS**
- **POT DeSOx I-75-O**

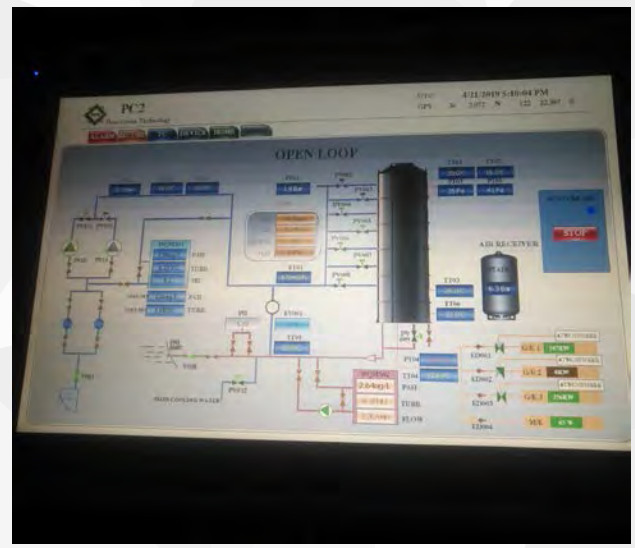
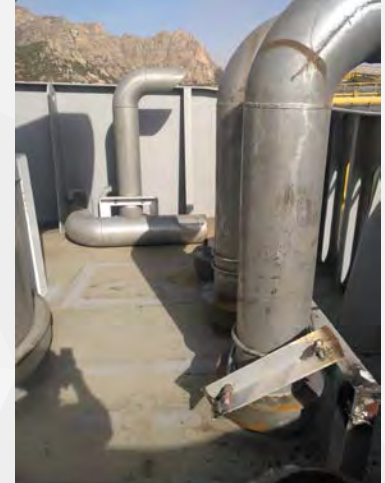


TURNKEY RETROFIT – Kalimantan Express





4th TURNKEY RETROFITTING PROJECT





5th TURNKEY RETROFITTING PROJECT



- **mv SHANGHAI EXPRESS**
- **54,686 DWT WOOD CHIP CARRIER**
- **Size : 216m**
- **LOA x 37m B**
- **CLASS: ABS**
- **ENGINE TYPE: DOOSAN 6RT-flex50-D**
- **SMCR: 10470KW**
- **GENSET: DAIHATSU 5DK-20e*3**
- **POT DeSOx I-75-O**

5th TURNKEY RETROFITTING PROJECT



6th TURNKEY RETROFITTING PROJECT



- **CV AGAMEMNON**
- 7900TEU CONTAIN CARRIER
- Size : 318m LOA x 44m B
- CLASS: BV
- ENGINE TYPE: DOOSAN SULZER 12 RT FLEX 96C
- SMCR: 69,618.5 KW
- GENSET: STX-MAN B&W 7L32/40*4
- MCR: 3,206 KW

6th TURNKEY RETROFITTING PROJECT



脱硫系统整体流程

技术协议/供货范围确定



合同签订



图纸提供/3D 扫描



脱硫系统送审 (船级社)



提供设计参数, 配合设计公司出具方案提交船东



船东批准方案



船东驳回方案



改装 (新造) 系统送审



改装生产设计方案提交船东



改装生产设计方案提供船厂消化准备材料



改装工程开展



———— **THANK YOU** ————

Shandong Pure Ocean Technology Co., Ltd.
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Weihai, Shandong province, China.
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FEEDBACK: +86-22-25601307
Email: business@tjxh-international.com
WEB: www.pureoceanec.com

