



# Albion Marine Solutions

**TRUSTED ENGINEERING PARTNER**

[info@albionmarine.com](mailto:info@albionmarine.com)

Ph: +1 604 529 8488

24/7 Line: +1 778 994 9993

Vancouver, Canada

[www.albionmarine.com](http://www.albionmarine.com)



C I S M a R T



# Our People

- Ship Operational and Management background
- Project management experience: retrofits, new build, FSO/FPSO/FSRU & hybrid vessel conversions
- Large naval architecture and design team
- Project Engineers have sailing experience and trained by OEM
- Design Engineers are part of ship repair and ship building industry
- Our riding team fitters are certified welders and mechanics
- Repair and fabrication facilities have proper QA standards





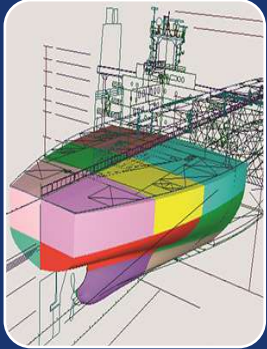
## Locations

- Head Office and PMO: Vancouver, Canada
- Engineering Office : Chennai, India
- Technical: Gdansk, Europe
- Sales: Shanghai, New York
- Repairs: Vancouver, Halifax, Singapore, Shanghai, Gdansk, Tenerife, Split and Houston

# Our Expertise



**North America's leading Marine Engineering and Naval Architecture Solutions Company**



## NAVAL ARCHITECTURE

NEW VESSEL  
DESIGN  
3D MODEL  
RETROFITS  
NEW  
TECHNOLOGIES

## BALLAST WATER MANAGEMENT SYSTEMS

RETROFIT  
AFTER SALES  
SUPPORT  
WATER  
SAMPLING

## AIR EMISSIONS

SCRUBBERS  
SCR  
EGR  
PROJECT  
PLANNING  
SITE SURVEY  
CREW TRAINING  
PROCUREMENT

## LNG

LSMGO  
ALTERNATIVE  
FUELS  
FEASIBILITY  
STUDY  
OPERATION  
SUPPORT

## OFFSHORE CONVERSION

SHUTTLES  
FSO  
FSRU  
FPSO  
OIL & GAS

## ASSET MANAGEMENT

CONSULTANCY  
SITE TEAMS  
REPAIRS

## 3D LASER SCANNING

3D MODELING  
PLOT PLANS  
VESSEL HULL  
DRAFTING  
DESIGN  
DAMAGE  
ASSESSMENT

## PROJECT MANAGEMENT

ENGINEERING  
COMPLIANCE  
SOLUTIONS  
FLEET  
UPGRADE  
NEW  
EQUIPMENT  
RETROFITS

# Our Services – Value Proposition

*A Turnkey Project Management Solutions Expert*





# Values Difference



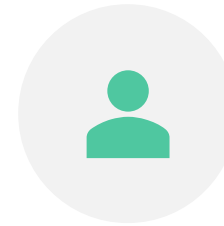
OPERATIONAL  
BACKGROUND AND  
UNDERSTANDING OF SHIP  
OWNER'S REQUIREMENTS



ENGINEERING  
KNOWLEDGE AND OEM



CAPABLE DESIGN TEAM



PROJECT ENGINEERING  
PERSONNEL DEDICATED TO  
THE PROJECT



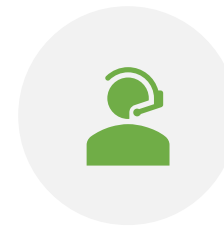
COST EFFICIENT



RISK MANAGEMENT



WORLDWIDE SERVICES



AFTER SALES SUPPORT



# Affiliations



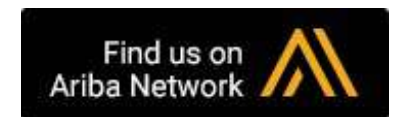
## MARITIME ASSOCIATIONS



## TECHNOLOGY PROVIDERS/ MAKERS



## SERVICE NETWORKS



# Returning Clients





# Profile Facts

- Key personnel have excellent background in construction, vessel conversion, new build and operation of FPSO, FSO, FSU, FSRU, Shuttle tankers, LNG, AHT and other offshore vessels.
- Dedicated team for hybrid vessel construction and conversions, providing complete “one-stop-shop” solution.
- Current project management portfolio exceeds 300M USD
- Current project management and in-house design/ engineering team 50+ personnel. Located in Canada and India. Easy scalable to over 100.
- Multi- disciplinary in-house, experienced design team.
- Excellent relationships with equipment manufacturers and vendors based on previous projects, enabling quicker retrofits / conversions.



# Major Services



- Business case & Feasibility studies development
- Yard Evaluation, Selection and Tendering
- Planning & Project Management
- Procurement Management
- Engineering:
  - *Design, Engineering and Modeling Solutions*
  - *Asset integrity assessments*
  - *Static and dynamic structural strength and fatigue analysis*
  - *Life extensions and analysis*
  - *Transportation and installation engineering*
  - *Offshore engineering*
  - *Class Approval Packages and Approval Management*
- Construction Expertise / Site supervision
- Commissioning:
  - *Commissioning plan*
  - *Core test plan*
  - *Procedures*
  - *Start up procedures*
- Operational procedures development
- After sales management





# Project Management

Our team executes complete EPCM projects or provide project support from inception to completion phase:

- Business case development
- PMO set up
- Tendering
- Project planning
- Interface management
- Engineering package
- Procurement management
- Offshore conversions
- Logistic support
- Construction management
- Completion and commissioning
- New equipment retrofit
- Fleet upgrade programs
- Ship propulsion re-powering
- Legislative compliance refits







# Asset Management

Our team provides services for fleet expansion program and technical management of existing fleet:

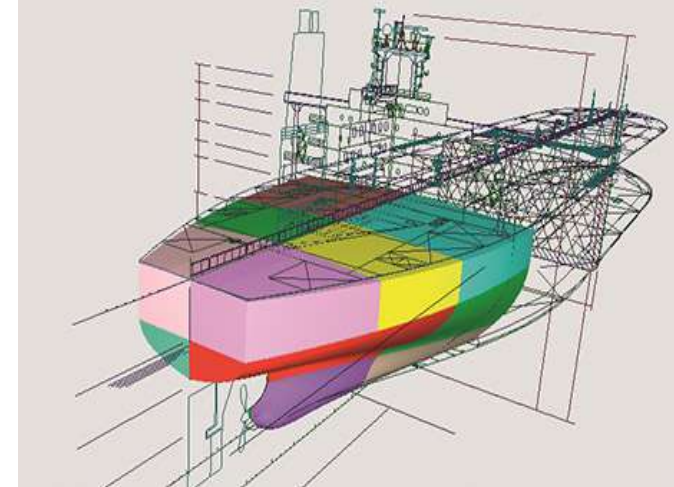
- Dry docking support
- Pre-purchase inspection
- Vessel hand over support
- New build program support
- Specification review
- Factory acceptance test (FAT) attendance
- Complete site supervision teams
- Maintenance optimization
- Retrofit





# Naval Architecture

- Vessel Condition Surveys
- Conceptual, detailed and production Design  
Engineering Expertise
- Structural Integrity Assessment
- New Build and Conversion Yard Site Supervision
- Factory Acceptance Test Attendance
- Structural, Propulsion and Machinery Arrangements  
Development







# 3D Laser Scanning and Modeling



- Specialized in 3D laser scanning for maritime, industrial engineering and design applications.
- Factory trained and experienced professionals
- Usage of latest 3D CAD modeling software to prepare 3D concept models and detailed fabrication drawings for ship conversions and plant upgrades.
- Experience of over a 100 vessels for 3D scanning and model development





# Fabrication and Repairs

- Repairs at anchor
- Riding teams (engine fitters, welders, electrical)
- Machine shop
- Steel work
- Pipe fabrication shop
- Authorized service from OEM





# Legislative Compliance Solutions

Our team provides optimization study, project management, engineering package, retrofit and operation support solutions for:

- Ballast water management
- Hybrid vessel construction and conversion
- Air emissions abatement
- Alternative fuels
- Bilge water handling
- Sludge handling
- Soot water handling
- Sewage treatment
- Garbage handling





# Ballast Water Management

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# Ballast Water Management

## **HANDS- FREE SOLUTION FOR SHIPOWNER / MANAGER**

- End-to-end solutions, managing all aspects of the project:
  - *selection and procurement of the suitable system*
  - *Basic & detailed engineering design*
  - *completion of modifications*
  - *Installation*
  - *training of crew members*
  - *After sales support.*

Our expert portfolio combines:

- *operational experience,*
- *technical expertise, and*
- *legislative knowledge.*



# Ballast Water Management

## **AN EXPERT, RELIABLE TEAM SUPPORT**

- Our team will be composed of operational experts, design engineers and specialist in ballast water treatment systems, system deployment and piping and specialists in engineering work and installation.
- No exclusive partnerships with any maker or supplier for un-biased approach.
- Existing collaboration with several BWTS suppliers.
- Equipment maker trained personnel.
- All team members have marine operations/ sailing background.





# Ballast Water Management

## Project Planning

- Discuss the ship owner's specific requirements.
- Review individual vessel operational profile.
- Establish project objectives: schedule, quality plan, cost envelope and deliverables.
- Create a project plan, including resources, interface management, reporting and milestones.

## BWT System Selection

- Utilize our proprietary database of BWTS available on market and
- Cost-effective recommendation as per vessel specifics: design, trading patterns, ballast tanks capacity and flow rate requirements.
- Develop criteria for technical, operational and installation requirements.
- Consider vendor's standing production capacity and after sales support.





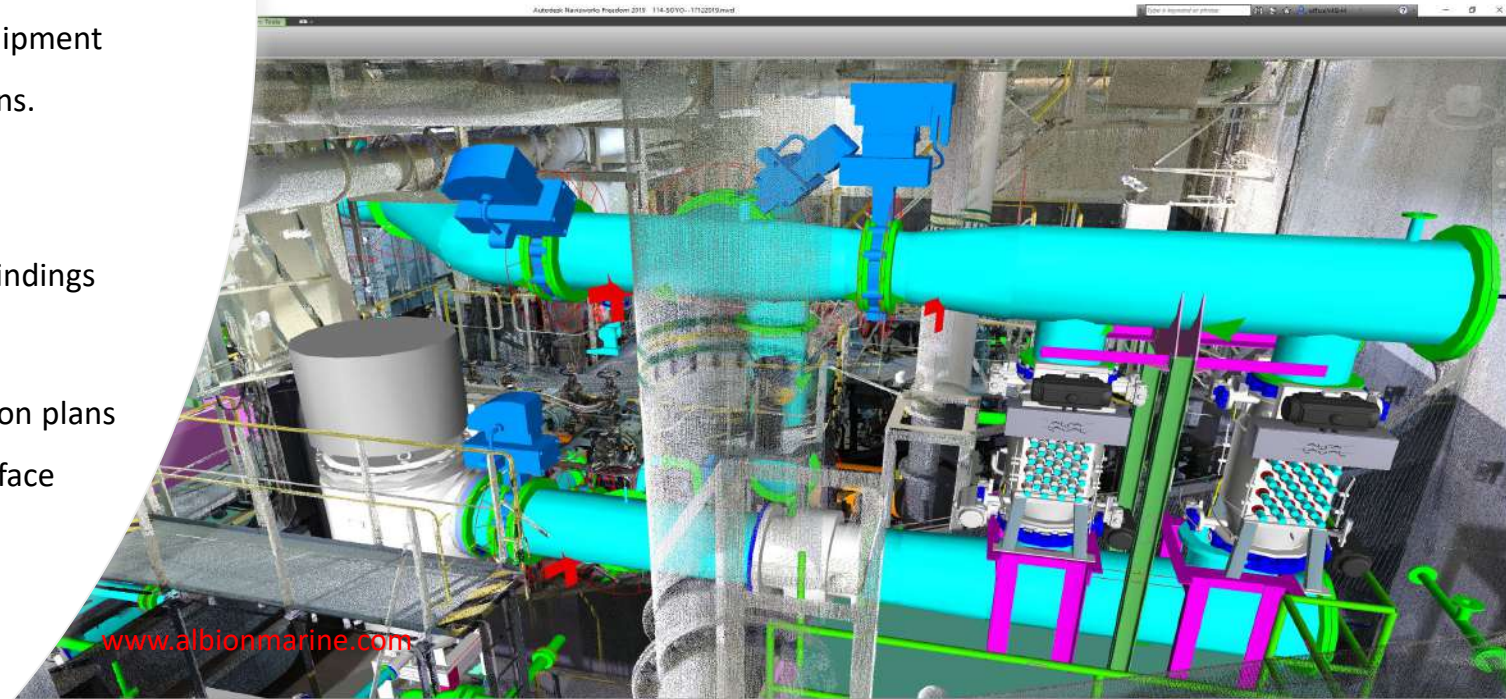
# Ballast Water Management

## Ship Site Survey

- Utilize modern survey and 3D scanning techniques to ensure quality engineering design data.
- Prepare survey reports with recommendations for equipment location and operational risk reviews and considerations.

## Basic Engineering

- Carry out Feasibility Study to ensure Ship Site Survey findings are inline with the BWTS installation requirement.
- Carry out necessary calculations and develop installation plans with the details of the installation layout and the interface with existing systems and machinery.



# Ballast Water Management

***We deliver the maximum number of deliverables per engineering package***

## Detailed Engineering

We deliver engineering design package and dry-docking specification with:

- Detailed spool piece design and pipe layout.
- Foundations fabrication and installation drawings.
- Piping hydraulic pressure drop calculations.
- Complete documentation packages to satisfy the Class and Flags requirements.

## Logistics and Procurement:

- Assist the ship owner with commercial negotiations
- Develop a detailed procurement plan.
- Arrange a follow up on delivery of all items.





# Ballast Water Management

## Installation, Completion, Commissioning:

- Provide skilled personnel for yard supervision to ensure the job is completed in accordance with specification and applicable requirements.
- Arrange riding crew, materials and work packages for retrofits at sea or at anchorage.
- Conduct pre-commissioning checks of newly installed equipment as per system maker's Ship Owner's and Class requirements.
- Support Ship Owner in yard negotiations.

## Crew Training:

- Develop tailored crew training materials in accordance with ISM Code and Operator's SMS.
- Deliver training programs on both system operation & maintenance.







# Ballast Water Management – Operational Support

## *Installation is just the Beginning of Operations*

### Ballast Water Management Plans (BWMP):

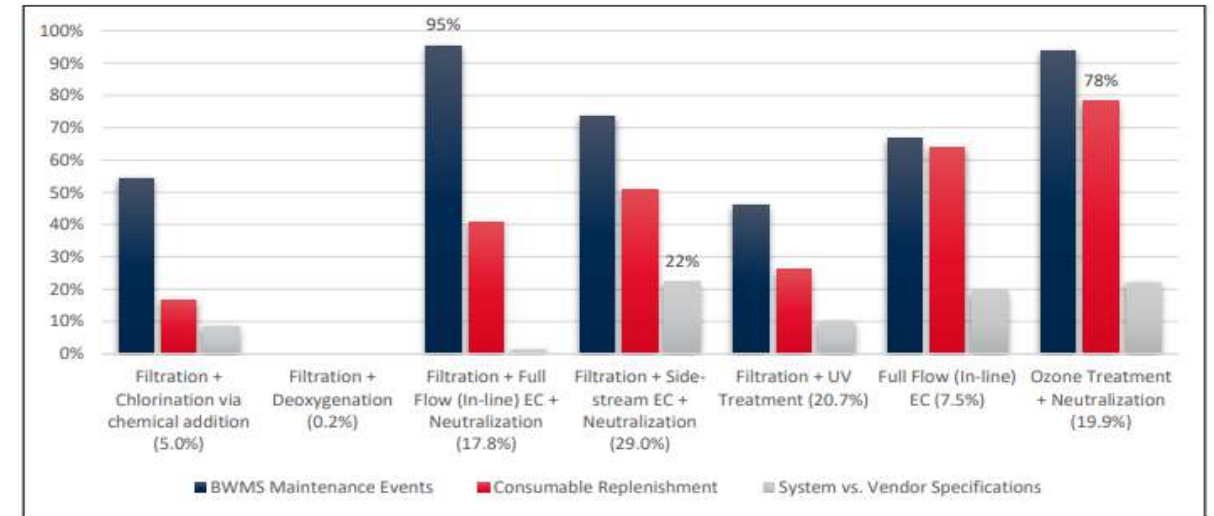
- Changes to existing BWMP, including valve sequences & operation flowcharts
- Class approval management

### Indicative & Detailed Sample Testing

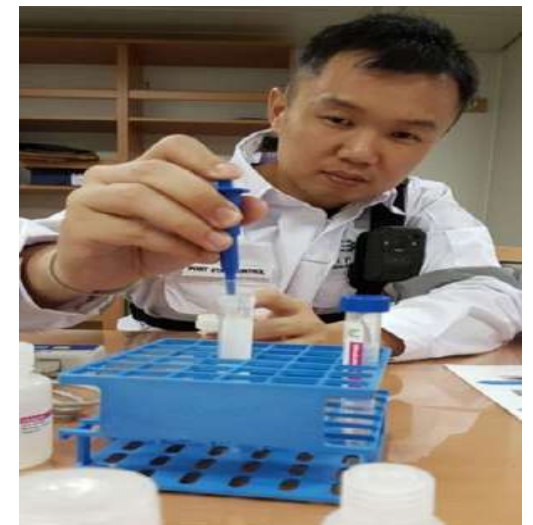
- Mandatory from October 2021 as per IMO guidelines & US VGP EPA 800-B-14-001
- Indicative in-situ sampling for owner to be assured of results
- Samples to be collected, stored and sent to USCG & Class approved laboratories
- Results and report within 24 hours, if required.

### Other Operational Support Services

- BWTS planned maintenance program.
- OPEX budget projections
- Comprehensive retrofit documentation package.



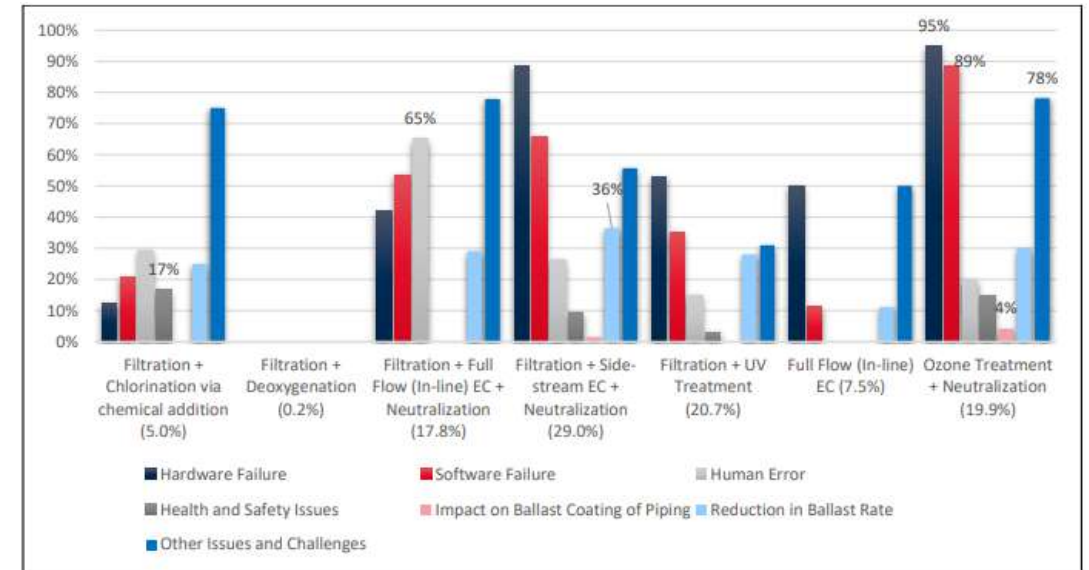
Post Operations concerns reported (Source: ABS Report 2019)





# Ballast Water Management – After Sales Support Package

- Annual Health Check completed within normal port stay – 24hours / 2 days
- Requires minimum crew assistance
- Health Check includes :
  - *Filter Operation, Verification and Inspection.*
  - *UVR, EC unit Inspection*
  - *CIP Checks (in case of UV system)*
  - *Valves, cables Check*
  - *Instrument Calibration as per Calibration Schedule*
  - *Hands On Crew Training*
  - *Overall inspection, including basic structural issues as well as issues noted by the vessel crew, alarm logs etc.*
- Could be added on to **Albion Marine's Sensor Exchange/ Calibration Program** within the same vessel visit.



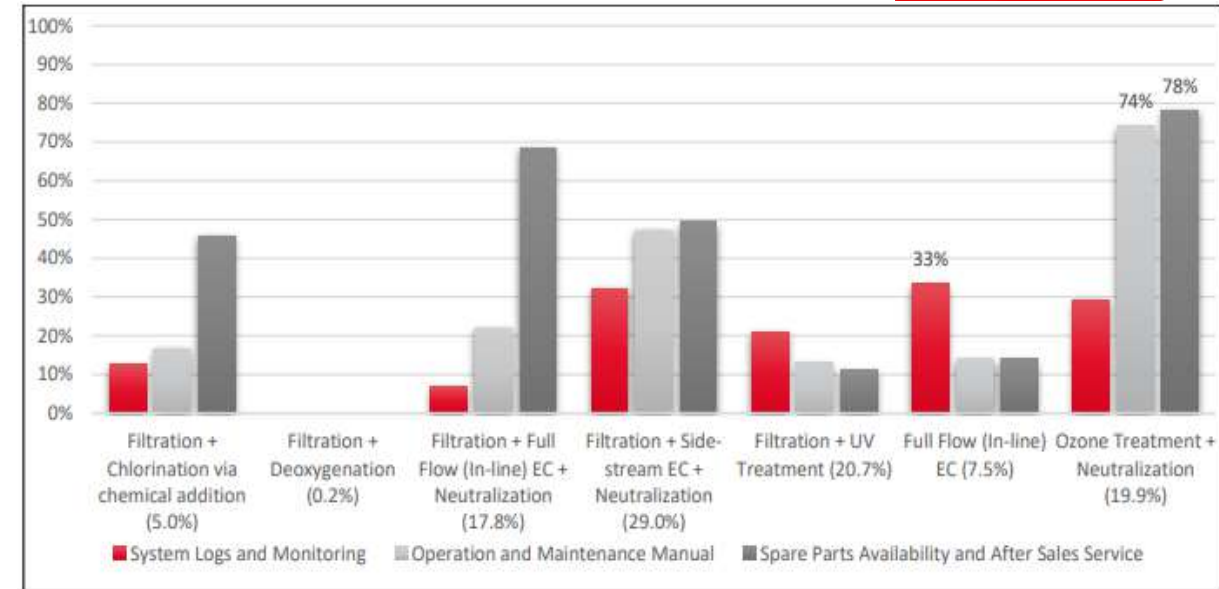
In-Operation concerns reported (Source: ABS Report 2019)





# Ballast Water Management – After Sales Support Package

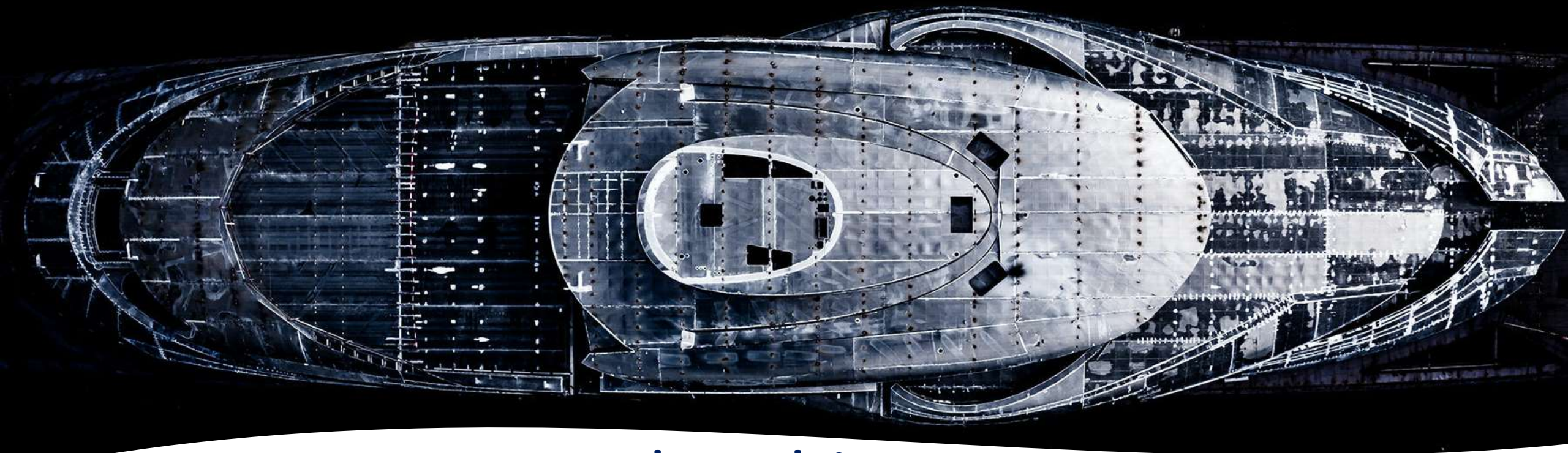
- Attending engineer trained at BWTS maker's facility
- Engineer could be dispatched anywhere globally from Chennai, Vancouver, Shanghai, Singapore, Gdansk, Constanza or Montreal
- Great interest from shipowners due to:
  - *No infringement on makers' proprietary support*
  - *Level up from ordinary maintenance done by crew*
  - *Many malfunctions could be prevented*
  - *Does not include maker's proprietary software check/ issues*
  - *Considerable cost savings as compared to OEMs*
  - *Well received by external parties as a proactive measure w.r.t Environment Compliance*



Maintenance concerns reported (Source: ABS Report 2019)







# Naval Architecture

[info@albionmarine.com](mailto:info@albionmarine.com)

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Vancouver, Canada

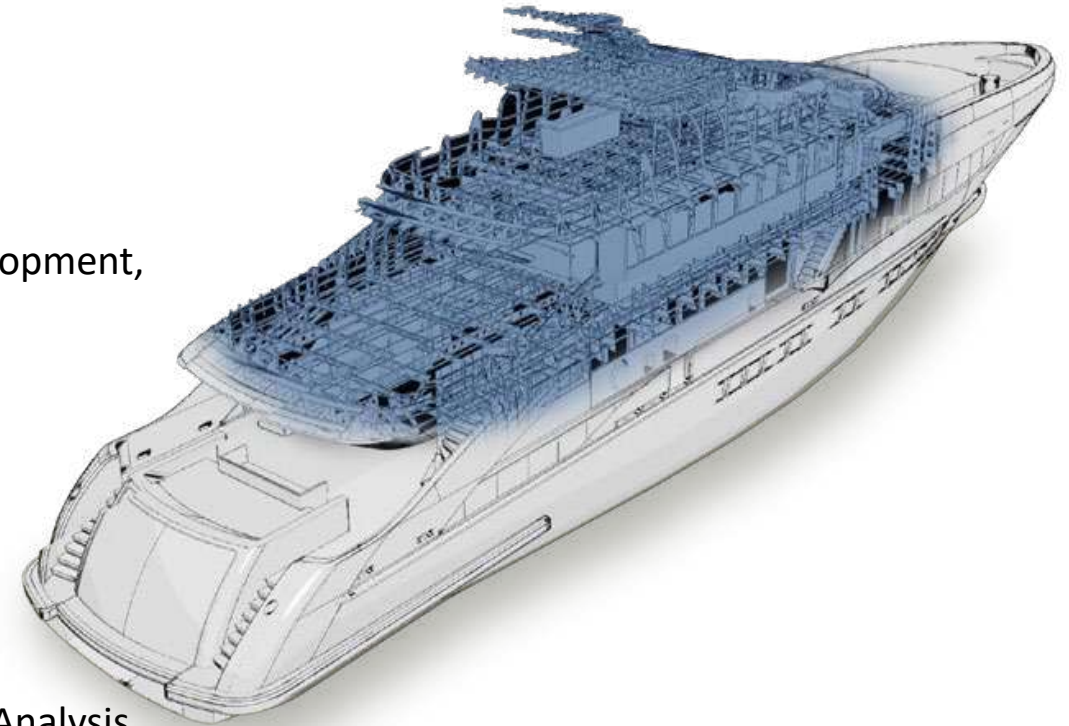
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# Naval Architecture

## Our services include:

- Vessel Conditions Surveys
- Structural Integrity Assessment
- New Build and Conversion Yard Site Supervision
- Yard Selection
- Factory Acceptance Test Attendance
- Marine Accident Investigation
- Concept Design
- Contractual Design
- Production Design
- Design Optimization
- Vessel Specification Development, Review and Validation
- Structural, Propulsion and Machinery Arrangements Development
- Tonnage Calculation
- Stability Assessment and Analysis
- Structural Analysis





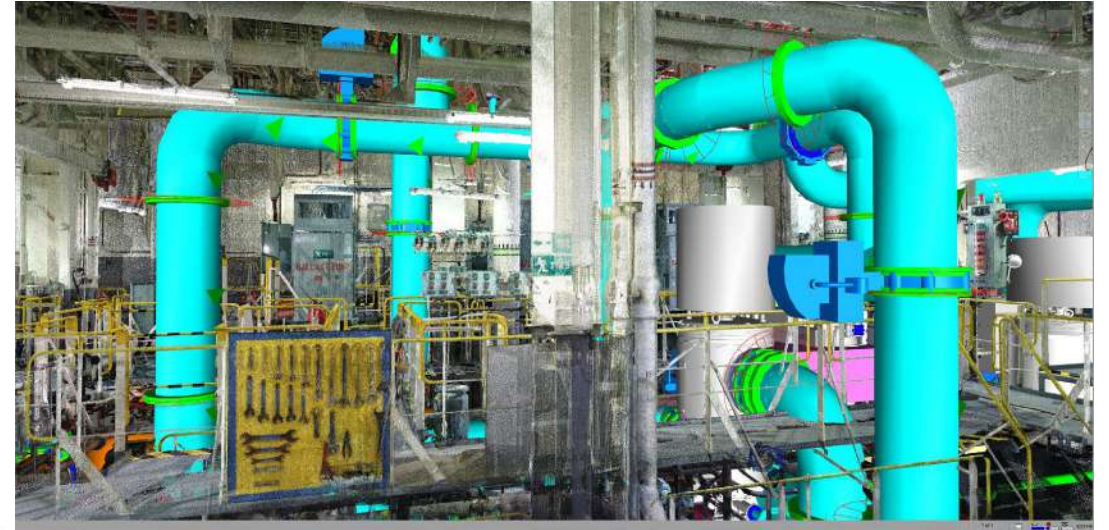


# Naval Architecture

Our team has experience in design, optimization, conversion, repowering and various retrofit of passenger's vessels, ferries, tugs, tankers, FSO, FPSO, FSRU, barges, tankers, bulk carriers, LNG and specialized vessels.

Vessel design services for :

- *Initial concept design & feasibility study*
- *Basic and detailed contractual engineering design*
- *Class approval documentation package*
- *Yard production drawings*

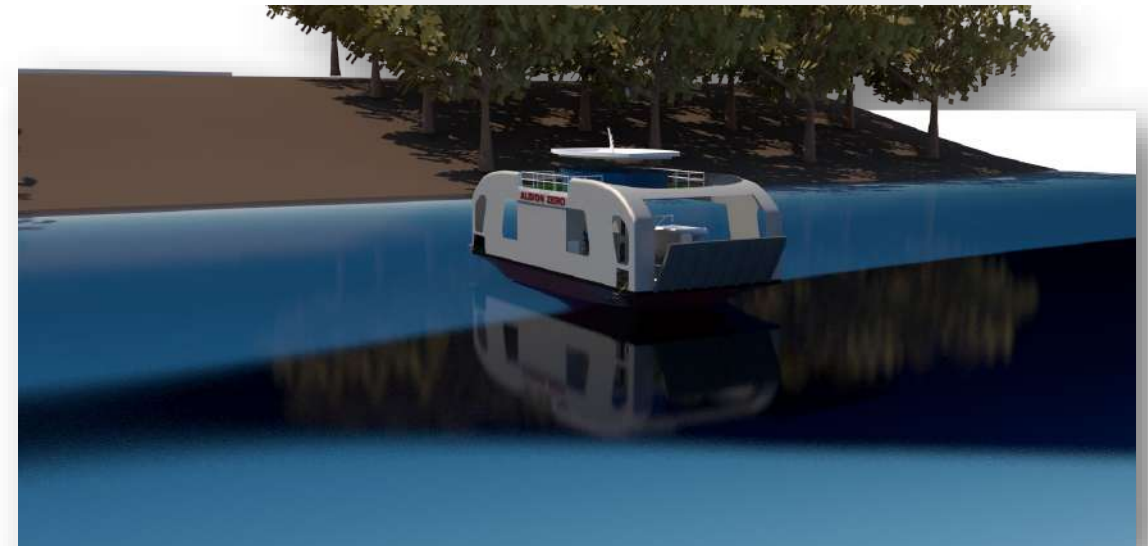






# Naval Architecture

- Unique combination of seagoing and shipbuilding practical experience.
- Over 50 design/ engineering personnel with a team dedicated to each client for seamless project management.
- Innovative design capabilities to produce highly efficient solutions.
- Skills (Software): PDMS, Plant 3D, Ship constructor, Ansys, Sacs, Tribon, AutoCAD





# Services Supply Standing Agreement

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# Design/ Engineering Support

## Standing Agreement

### ADVANTAGES OF HAVING A DEDICATED SERVICE PROVIDER

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- One stop shop solution: *24x7 open hotline for all needs*
- Dedicated team for all your projects – *updated upon regular feedbacks*
- Faster response time to fleet emergencies – *worldwide network with ability to reach vessel anywhere within 48 hours*
- Standard rates for standard services - *allows for better annual budgeting*
- Allows for a faster, cost-effective bespoke team development for unique feasibility studies for new ventures
- Ambient understanding of desired deliverable quality and schedule delivery compliance
- Slicker project operations due to inter-team communication over past projects





# Design/ Engineering Support Standing Agreement

## WHY ALBION MARINE SOLUTIONS ??

- 24 x 7 support : *reliable engineering partner with dedicated Vancouver-based account manager*
- Existing project execution experience
- Local presence : *same time zone communication, face to face weekly meetings, faster response time*
- Client- dedicated PM and team - *usage of same project team with feedback- based improvements for seamless project execution*
- Add on support services: *yard supervision, design compliance support, class approvals, lifecycle maintenance, legislative compliance solutions*
- Ability to ramp up in emergency scenarios: *Proven emergency support capability during fabrication drawing package and maker- design package completion*
- Expert in comprehensive feasibility studies : *Allows for informed decision- making for new ventures, retrofits, fleet construction orders, equipment selection, technology comparison, fleet optimization solutions*





# 3D Scanning and Modelling

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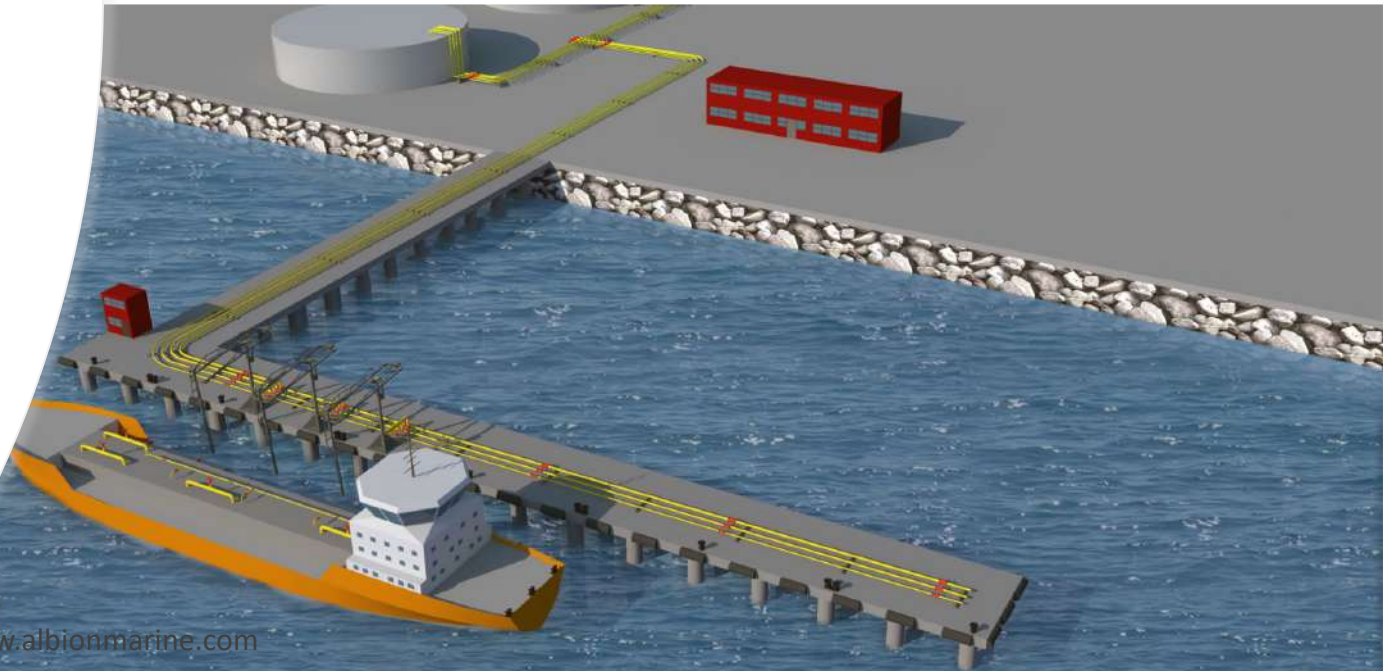
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# 3D Scan & Modeling

- Expertise in 3D laser scanning, modeling, design and drafting services for maritime and industrial engineering applications.
- Factory trained and experienced professionals capable of complimenting the scanning with vessel survey .
- Top of the line scanners with submillimeter accuracy.
- Civil Engineering capability with Drone scanning, photogrammetry and Building Information Modeling (BIM) experience



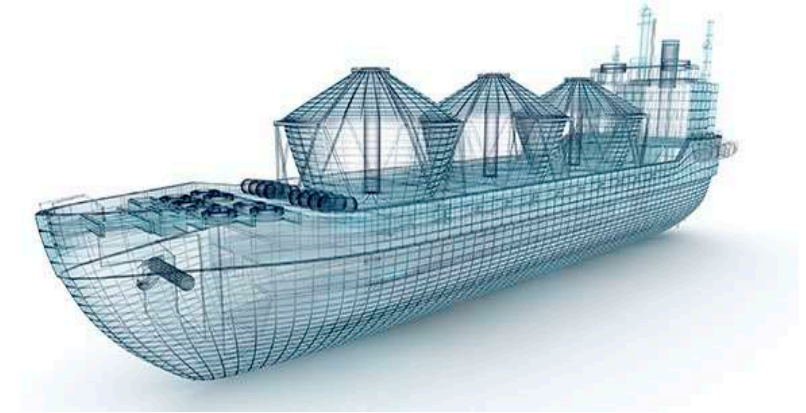




# 3D Scan & Modeling

## STREAMLINED EXECUTION PROCESS

- The laser scans are extracted from the Point cloud to create isometric drawings.
- Usage of latest 3D CAD modelling software.
- Our designers use the latest 3D CAD modelling software to prepare :
  - *3D Concept Models,*
  - *Basic engineering package*
  - *Detailed Fabrication drawings for ship conversions, and plan upgrades*
  - *custom part and assembly modelling,*
  - *prototype design,*
  - *complex construction design,*
  - *structural layouts*
  - *Damaged hull survey of hull and machinery*





# Air Emission Reduction Solutions

[info@albionmarine.com](mailto:info@albionmarine.com)

Ph: +1 604 529 8488

24/7 Line: +1 778 994 9993

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# Air Emission Reduction Solutions

Experts in planning, execution and after-sales support for the retrofit of scrubbers, Selective Catalytic Reduction (SCR) and Exhaust Gas Recirculation (EGR) systems.

- selection of most suitable equipment
- engineering,
- fabrication, retrofit and supervision
- project management services.
- IMO 2020 Implementation Plans and execution by carrying commercial and technical Feasibility Studies.
- Fuel oil tank cleaning services
- Development of operations and procedures to change over to compliance fuel or low Sulphur fuel.





# Air Emission Reduction Solutions

Albion Marine Solutions is an associate member of the Exhaust Gas Cleaning Systems Association (EGCSA).

## Air Emissions Abatement Solution Selection

- SO<sub>x</sub>, NO<sub>x</sub>, CO, GHG, PM and other pollutants have different natures and require different treatment solutions.
- Due to the diversity of exhaust emissions and treatment solutions, technologies vary in operating principles, design, size, power requirements and ancillary demands
- Recommendation with consideration to vessel specifics: design, trading patterns and configuration of power and propulsion plant.
- Develop criteria for technical, operational and installation requirements.
- Consider vendor's standing, production capacity, and after sales support.





# Air Emission Reduction Solutions

## Major Projects (2019-20)

- 5 x 14000TEU vessels & 5 x 10,000TEU container vessels.
- Turnkey package with 3D Scan, concept design, basic and detailed engineering as well as on-site design support.
- Executed retrofit of *industry's third largest scrubber installation* in only 34 days
- Completion of *the industry's second largest scrubber installation* in only 36 days including commissioning, compliance testing and flawless sea trials



(Above left) Retrofitted 10,000 TEU vessel with added scrubber with perforated plate at port.

(Above right) Former funnel at starboard of 10,000 TEU vessel.





# Air Emission Reduction Solutions

## Major Projects (2019-20)

- Unique perforated plate scrubber housing design for easy maintenance and reach to all dampers and valves.
- Lightweight, airy, cosmetically apt & protects scrubbers from weather conditions

### Project Challenges

- Entire project execution during CoVid19 period in China
- On-site supervision and drafting team throughout all retrofits.
- Took over basic design from maker mid-way in the project
- Successfully delivered yard fabrication drawings asked to be prepared as an emergency a month before vessel arrival.



(Above left) Former funnel at port of 14,000 TEU vessel.

(Above right) Retrofitted 14,000 TEU vessel with added scrubber with perforated plate at starboard.

# Air Emission Reduction Solutions After Sales Service Package

## Complete Health Check ( Semi-annual)

- Detailed Checklist- based inspection by maker trained personnel.
- Completely in-line with the periodic maintenance scope provided by the maker.
- No infringement with any maker. Does not involve proprietary software checks.
- Covers structural, mechanical and electrical maintenance scope
- IAS and system integration checks, including electrical cabling issues.
- Comprehensive health check report provided at the end with issues, recommendations and photos.
- Usually combined with **sensor calibration/ exchange program**.





# Air Emission Reduction Solutions

## After Sales Service Package

### Sensor Exchange Calibration Program

- Calibration of all sensors as per maker's manual.
- Executed by maker-trained personnel.
- Maker- certified calibrated sensor is installed while old sensor is sent to the sensor maker's calibration facility and stored with AMS
- Involves all commonly used sensors such as *pH sensor, pAH probe and turbidimeter.*
- Quick turnaround time of only 2 weeks for calibration.
- Usually combined and completed within the scrubber health check scope within the same vessel visit.
- Sensor exchange/ replacement/ calibration – completely managed by a dedicated Albion Marine Project Manager



SC1000 Multi-Parameter Universal Controller Display







# Tank Cleaning & Ship Sanitation Services

[info@albionmarine.com](mailto:info@albionmarine.com)

Ph: +1 604 529 8488

24/7 Line: +1 778 994 9993

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## Tank Cleaning Services – Fuel oil Tanks

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- Our team utilizes a holistic and methodical approach to development of cost-effective and reliable solutions for each type of vessels.
- No need to dock the vessel. Experienced riding squad.
- Job is executed based on vessel cargo schedule, route, negligible anchorage/ port stay.
- Complete schedule and project management by dedicated project manager.
- Disposal at authorized facilities only.





# Cruise Ship Cleaning & Sanitation Services

Comprehensive support and sanitation services for cruise ships, including:

- **HVAC & Duct Cleaning**
- **Galley Exhaust Hood Cleaning**– Reduces fire risk
- **Asbestos Abatement** – Full trained and certified Asbestos removal practices
- **Mold Remediation**– Environmentally friendly mold remediation techniques
- **Interior (Living Area) Sanitation/Surface Decontamination**– Prevents disease and infection.





# Fleet Operation Support

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# Fleet Operation Support

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- **THE NEED**

The crew training in operation and maintenance of the shipboard equipment and systems are the essential requirements under STCW 2010, other international conventions and national standards.

- **HOW CAN WE HELP YOU?**

Our team can develop the vessel and equipment-specific crew training manuals and computer-based training programs. The training program would be tailored to customer-specific needs.





# Fleet Operation Support

- **EQUIPMENT MAINTENANCE PROGRAM**

- *Maintenance schedule,*
- *OPEX cost projections,*
- *a detailed list of spare parts and of installed components, as well as*
- *a list of critical spares*

- **PLANNED MAINTENANCE SYSTEM (PMS) & DRY DOCK MANAGEMENT SYSTEMS (DMS)**

Extensive experience with various models of Planned Maintenance Systems (PMS), including :

- *DNV GL, NS5, AMOS, RAST, Neptune, InfoShip, TM Master, GL Shipmanager, Maximo, Bassnet, Star IPS and TeoMaki.*
- *Upto 1400 ship crew trained till date*







# Fleet Operation Support

## SUPPORTING CLIENTS IN PMS SERVICES

- Creation of PMS databases for most of presently used PMS applications
- Optimization of vessels maintenance plan according to classification & company standards
- Conversion of PMS databases between various applications and databases
- Training programs for PMS applications

## DEVELOPING IN-HOUSE SOFTWARE SOLUTIONS FOR SHIPPING & OFFSHORE INDUSTRY

- ODMS Personnel: ship-office crew management (payroll, document control, rotation plan)
- ODMS Plan: PMS software
- ODMS Documentation: ISM Manuals, Company's Manuals, Company Forms
- ODMS Replicator – full database replication between office and ships
- Any kind of data conversion and reporting tool



# Fleet Operation Support

## PMS DATA OPTIMIZATION PROJECTS

- Standardization of vessels' component list
- Standardization and optimization of vessels' maintenance plan with latest rules, company policy and Makers' requirements (Risk Assessment, CBM, Class Requirements)
- Optimization and globalization of ship's spare parts databases

## DIGITALIZATION OF VESSEL'S DOCUMENTATION

- Conversion of paper documentation into easy to manage digital data
- Conversion of paper/digital drawings into AutoCad format





# LNG – FUEL and CARGO Expertise

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# LNG – Fuel & Cargo Expertise

- Broad expertise in all areas of marine and offshore Liquefied Natural Gas fields, including LNG as a Fuel and LNG as a Cargo.
- Our personnel have been involved with project management, engineering, consultancy and site supervision for several LNG projects.
- Consulting as well as end-to-end engineering and project management services for conversion of power, propulsion and steam plants to LNG.
- Our technical and cryogenic experts work closely with customers to select the most viable and cost-effective layout option.



# LNG – Fuel & Cargo Expertise

## End to End Solution

- Discuss Ship Owner's specific requirements.
- Prepare a Business case.
- Follow up and post-project support including operation procedures, planned maintenance system, crew training and acting as an Owner's engineer.

## LNG Solution Selection

- Our team will compare available technologies and their cost drivers to recommend the most suitable solution to address our client's requirements.
- We then recommend the most suitable system with consideration to operation requirements and vessel specifics.
- Develop criteria for technical, operational and installation requirements.





# LNG – Fuel & Cargo Expertise

## Feasibility Study

- Ensures that the solution satisfies all the technical and commercial requirements.
- Complimented with a Ship Site Survey.

## Design and Engineering

- Our team will utilize modern survey and 3D scanning techniques to ensure quality.
- Prepare detailed machinery, steel work and pipe piece design and layout.
- Develop EIA Design Package
- Complete documentation packages to satisfy the Class and Flag requirements.
- Develop specific operation manuals.



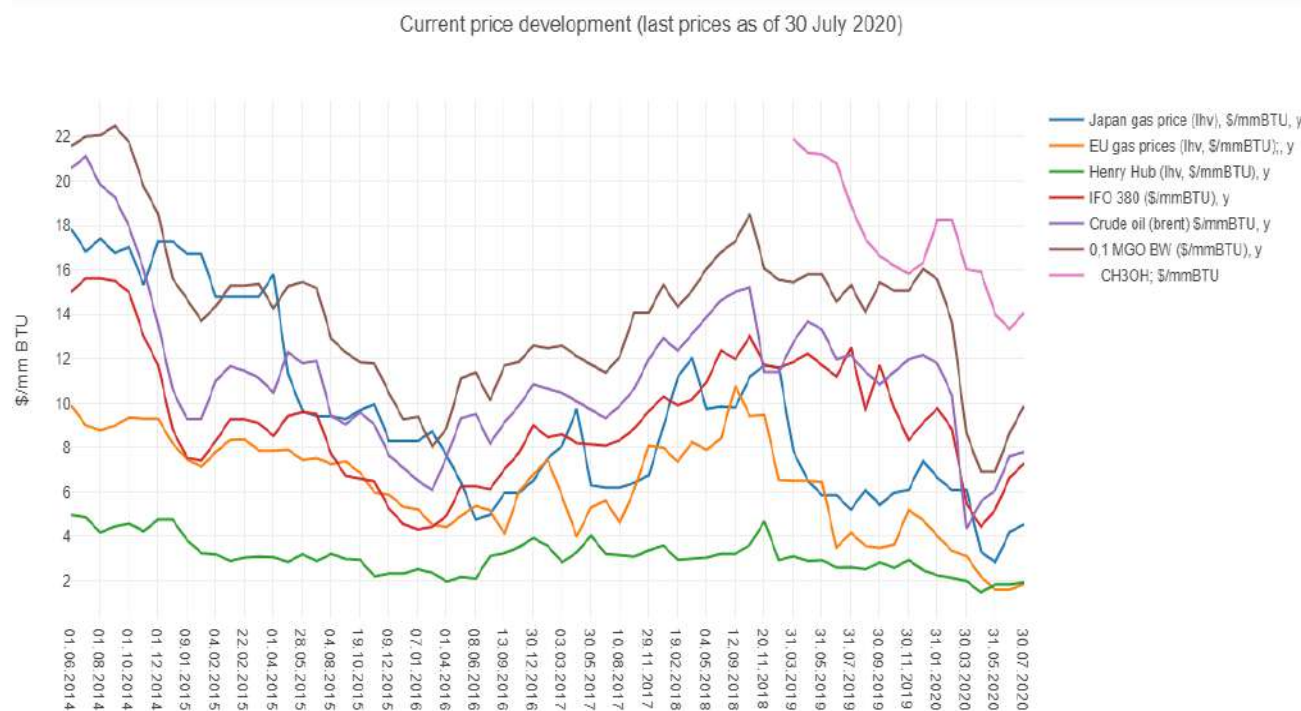




# LNG – Fuel Gas Supply System (FGSS)

## WHY USE LNG AS FUEL ?

- Conversion to LNG interest is driven by stringent air emission reduction legislations and Shipowners' focus on reduction of the bunker Opex.
- Compared to other marine fuels, LNG can lower ship exhaust emissions of:
  - sulphur oxides (SOx) to almost zero
  - nitrogen oxides (NOx) by up to 95 per cent for diesel cycle engines and up to 85 per cent for Otto cycle engines
  - particulate matter (PM) by up to 99 per cent
  - greenhouse gases (GHG) by up to 21 per cent over the entire life cycle, depending on the engine technology.



### As end of July 2020

- IFO 380/180: 7,3/7,8 \$/mmBTU = 280/300 \$/ton

- MGO 0,1% S: 9,9 \$/mmBTU = 400 \$/ton

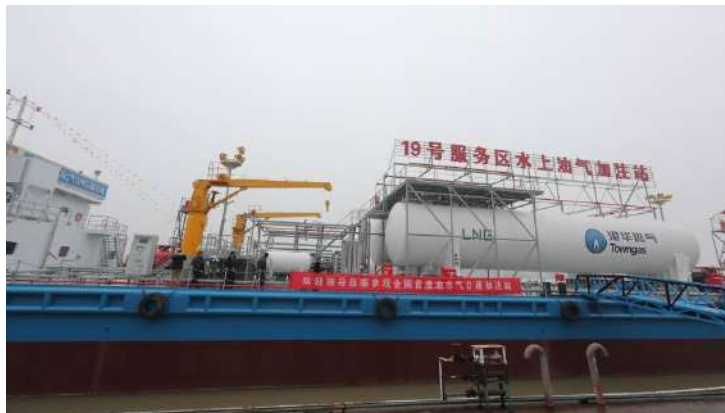
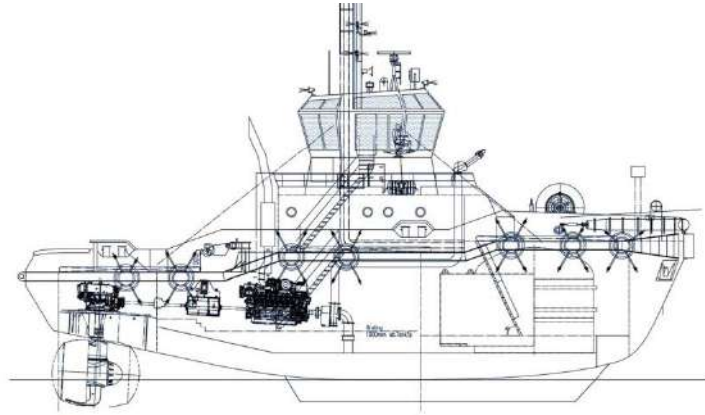
- **Gas TTF: 1,6 \$/mmBTU (lhv)= 74 \$/ton**

- CH3OH: 14,1 \$/mmBTU = 266 \$/ton

- Crude oil Brent: 7,8 \$/mmBTU = 299,3 \$/t = 41,0 \$/barrel

(Source: DNV GL)

# LNG – Fuel Gas Supply System (FGSS)



[www.albionmarine.com](http://www.albionmarine.com)

## Our FGSS Package includes:

- Complete design/ engineering, including Class Approval
- Procurement management & equipment delivery
- Type C deck mounted LNG fuel tanks,
- LNG bunkering modules,
- a cargo handling system and
- an integrated LNG fuel supply system.
- provisions for crew training
- support during commissioning
- Life cycle maintenance package





# Oil & Gas – Offshore Expertise

[info@albionmarine.com](mailto:info@albionmarine.com)

Ph: +1 604 529 8488

24/7 Line: +1 778 994 9993

Vancouver, Canada

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# Oil & Gas Outlook – Canada 2020

- Expected to rise by \$2Billion in 2020 (source: *Canadian association of Petroleum Producers*).
- 6% more investment in Canadian upstream energy sector in 2020, taking the total to \$37 billion, boosted by slashing of corporate tax rates by Alberta.
- Saskatchewan Oil output to be boosted by 25% by 2030

## Gas Sector Projects- Canada (2020)

- West Coast Projects
  - \$40 Billion Kitimat LNG project to have all 4 trains (underway or sanctioned) by Dec 2020. All in operation by 2023.
  - Woodfibre LNG, Squamish BC: \$1.8Billion
  - Jordon Cove Project : \$10Billion : Supplied by Western Canada
  - Dawson Creek to Kitimat LNG pipeline : \$6.2Billion
- East Coast Projects (running or in pipeline):
  - Goldboro LNG, Nova Scotia: \$10.8Billion
  - BearHead LNG, Nova Scotia





# Offshore Experience

We support our customers through the entire FSO/ FPSO/FSU conversion project life cycle:

- *Business case development*
  - *Tendering*
  - *Planning*
  - *Procurement*
  - *Engineering*
  - *Construction*
  - *Commissioning*
  - *Installation*
- Our team has a proven track record of the successful completion of off- shore projects. This is achieved through the robust **EPCM life-cycle framework**.







## Major Services

- Asset integrity assessment
- Static and dynamic structural strength and fatigue analysis
- Life extensions and analysis
- Heavy lift analysis
- Transportation and installation engineering
- Concept jacket and topside engineering







# Offshore Experience

- Design and Conversion Project Manager / Engineering: Teekay- FSO Suksan Salamander, FSO Pattani Spirit, FSU Bahrain, FPSO Libra, Shuttle tankers and LNG new builds. Tilbury LNG terminal.
- Technical VP: 11 FPSO and 6 FSO
- Construction Manager/ Superintendent: Bumi Armada and MODEC- FPSO Armada Olombendo, FPSO Armada Sterling II, FPSO BP Angola PSVM, FPSO Cidade de Mangaratiba, FPSO Cidade de Rio de Janeiro, Cidade de Niteroi.
- Director: Teekay- Shuttle tanker new builds, FSU Bahrain, FSO Rangrid, FSO Falcon Spirit
- Director: FSRU Swan, FSU Bahrain
- Director/Naval Architect: Teekay – FPSO Sevan Humminbird, FPSO Petrojarl Banf, Petrojarl Varg, HiLoad DP.
- Technical Manager: Teekay- Pearl, FSO Karatha Spirit, Pattani Spirit, Dampier Spirit, FSRU Galeomma , FSO UOTE





# Offshore Experience

- Lead designer: Wison - CNOOC Jacket and topside , FLNG Excelerate Amni , USA VGS FRSU Hough FLNG , EXMAR FRSU ; Worley-Parsons - Chevron FPSO, FPSO Saga Petroleum
- Structural Lead designers: Oman DD- Offshore Windmill, Offshore platform HVDC, BORWIN 3, FPSO CYRUS, NDC Dyvinya, FUGRO drill ship.
- Piping Lead engineers : Ocean Tech Solutions - Semi-Submersible drilling rig (West Eclipse), Offshore HVDC Converter Platform; Platform Supply Vessels; RABIGH II Saudi Arabia, SOHAR–Oman-FOR KIPIC-5, FPSO OYO, FPSO HLJOC







# Passenger Vessels

[info@albionmarine.com](mailto:info@albionmarine.com)

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24/7 Line: +1 778 994 9993

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## Passenger Vessels

- Project managers with previous experience as Chief Engineers/ Captains onboard passenger vessels.
- Certified *Transport Canada* Class 1 Marine Engineers
- Not just an experienced design house but possess vessel operational expertise
- Varied experience with passenger vessel construction, conversion, operation and disposal

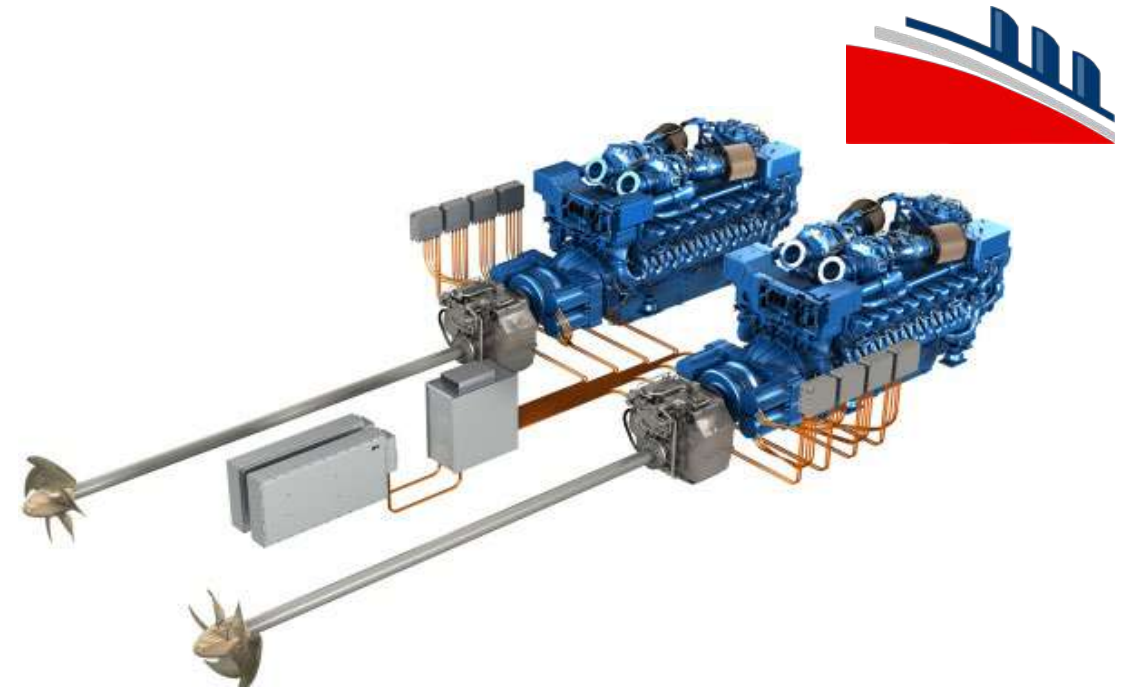


# Passenger Vessels

Albion Marine Solutions has shown its prowess in passenger vessels design/ engineering as well.

A few of the major recent projects are as follows :

- 2019: MLU specification preparation: Prepare the complete mechanical and electrical specifications for mid-life upgrade (MLU) of a BC Ferries vessel with major retrofit upgrades.
- 2019: Passenger vessel disposal: Served supervision and advisory role on behalf of *Transport Canada* for safe disposal as per IHM standards of an abandoned passenger vessel.
- 2020: Ferry construction: Albion Marine is in the final stages for its proven ferry design to be approved for construction for a south-east Asian client.





# Hybrid Vessels

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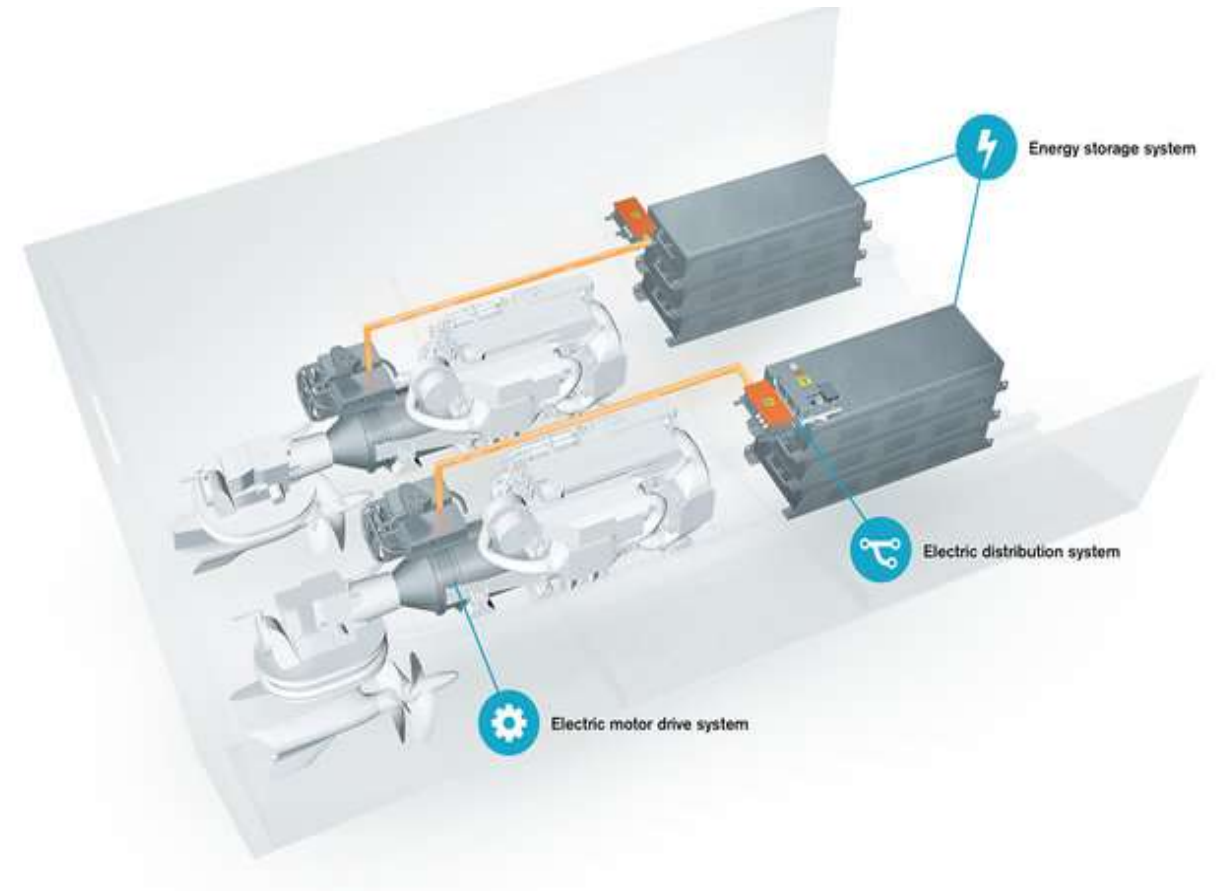
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# Hybrid Vessels

- Dedicated team for hybrid vessel construction and conversion projects.
- Certified *Transport Canada* Class 1 Marine Engineers with exact knowledge of Transport Canada and Class regulations.
- Existing relationship with latest technology makers in order to find the most cost-effective solution.
- Our prestigious clients include provincial Canadian governments , commercial shipping lines as well as hybrid equipment manufacturers.





# Hybrid Vessels Experience

- 2018: Cable ferry conversion : Chosen by one of the Canadian provincial governments for design/ engineering and integration of conversion of their ferry from diesel-hydraulic to electric. It also involved concept design for a solar powerplant setup.
- 2020: Downtown ferry electrification study: Expected to provide a comprehensive feasibility study for preferred propulsion method for new-build fleet of ferries.
- 2020: Proprietary design: Albion Marine is scheduled to present its proprietary zero-emissions electric ferry design at the CFA 2020 event this September ( event now postponed to next year).







# Riding Squad Services

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# Riding Squad Services

- Albion Marine Solutions has the capability and the expertise to take up voyage repairs onboard all types of vessels.
- The voyage repairs are carried out onboard the vessel without hampering the routine operation of the vessel and thus no commercial loss for the client.
- Riding Squads are composed based on the nature of the job scope.
- Trained and certified - Fitters, Welders, GRE Fitters, Electricians, Skilled and trained Fitters for Main and Auxiliary engine major overhauls.
- Dedicated and trained team to carry out routine health checks and repairs of Scrubbers and Ballast Water Treatment System.

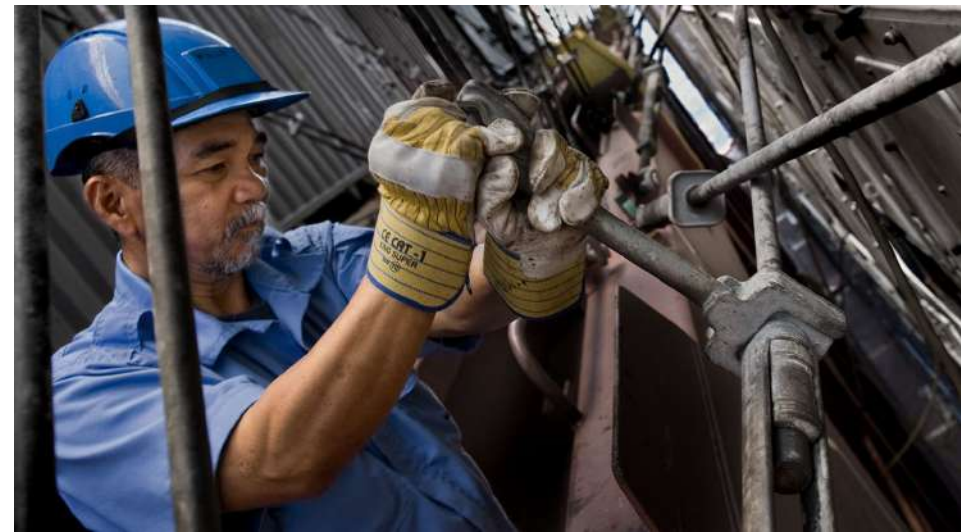


# Riding Squad Services

Albion Marine Solutions can take up voyage repairs or work in the shipyard for new build and during routine dry-dock repairs with the Riding Squads.

Albion Riding Squad can perform:

- Repairs and/or renewal of steel and/or GRE pipes.
- Fabrication jobs involving installation of ladder, stairs, access platforms, installation of lifting I-beam.
- Retrofitting of any equipment/s on deck, engine room and accommodation .
- Major overhaul of main engine and auxiliary engines.
- Repairs of auxiliary machinery – viz. winches, windlass, deck cranes, various types of pumps, air compressors etc.





# Safety Culture

*At Albion Marine, Safety is not just a value, its a way of life.*

- Zero Lost Time to injury (LTIs) since inception of operation.
- Mandatory safety seminars and revision courses for all operational personnel.
- All PPEs checked for wear & tear and expiry before every project.
- All Rope Access Equipment Inspected & tested annually.
- Constant feedback for riding squad safe working operation taken from clients after each project for continual improvement.





# Superintendency Services

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# Superintendancy Services

## Major services :

- Procurement and logistics
- Site supervision
- Maintenance/ repair and retrofit
- Port Assistance
- Audits & Vessel Surveys
- Operations Support, including PMS assistance
- Vessel lifecycle management : *Pre-purchase surveys, Newbuild, Handover/ Takeover audits & management, change of flag, lifecycle maintenance, drydock specifications and execution, vessel disposal*



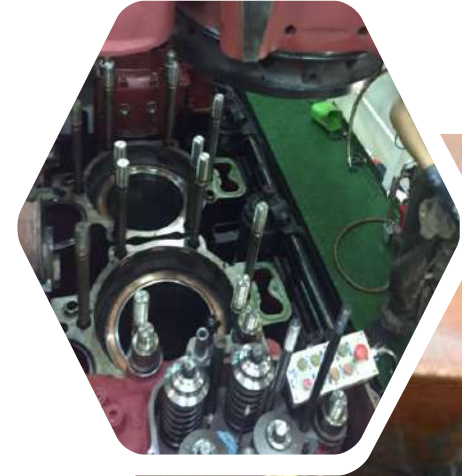
# Superintendancy Services

Albion Marine provides Superintendancy services globally, managed by a dedicated Ship Superintendancy team in Delta, BC, Canada.

We also provided **workshop assistance** for critical work from several ports globally such as :

- **USA** : Houston ( coverage areas Brownsville - New Orleans - Miami )
- **Singapore**
- **Europe** : Gdansk, Romania
- **Canada** : Vancouver, Halifax, St. John
- **UAE**: Dubai / Fujairah
- **China**: Shanghai
- **Suez**

All our workshops are fully equipped for machining and fabrication facilities, Class approved welders, technicians and fitters.



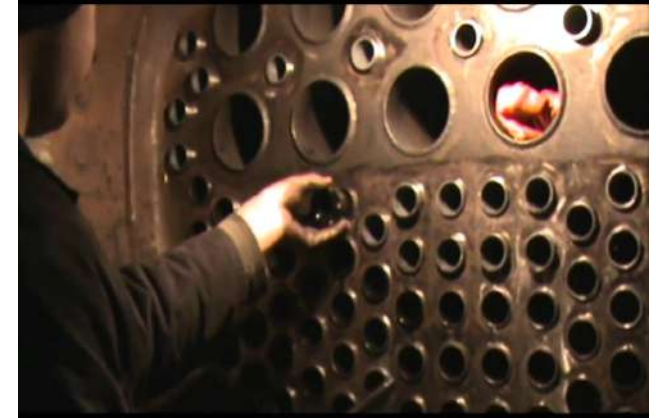




# Superintendency Services

## Our repair/ renewal services include:

- Air condition and Refrigeration system repairs.
- Alternator Pedestal Bearing Renewal.
- Anchor – Chain Supply & Install.
- Auxiliary Engines complete overhaul, replacement of Crankshafts, Camshafts etc.
- Boiler – Re-tubing, Refractory Repair, Valves and Fittings, Safety Valves.
- Calibration of Temperature and Pressure Calibrator, Dynamometer.
- Cooler, Condenser Re-tubing.
- Couplings – Dresser, Hinged YN couplings, Straub.
- Crane Jib Repair, Sheaves replacement, Hydraulic Repairs, Load test.
- Electrical and Electronic Troubleshoot.
- Gangway repair – New Gangway – Rental Gangway.
- Governor Overhaul, Calibrate and Test.
- Hatch Cover Hydraulic Ram Repairs.
- Hose handling Crane hydraulic cylinder pin & bush renewal.
- Hydraulic flexible hoses with certificates.
- Install Bollard, Chock, and Deck Machinery in accordance with Class.
- Main Engine – Unit overhaul, Fuel pump overhaul, Bearings dismantling.
- Motor – New – Rewind – New on Exchange basis.
- Recondition of Cylinder Heads, Piston Rods and Pistons.
- Rudder System repairs assistance.
- Scrubber nozzle repair
- Stainless Steel Reducers – Concentric and Eccentric.
- Stainless Steel Strainers.
- Stainless Steel Tank Repairs
- Steel repairs – Tank steel, Pipes, Hatch covers, Holds, Ship sides.
- Stencils for Name Change.
- Tanker – Tank Local and Remote Gauge Calibration.
- UTI Tape – New, Repair and Calibrate Old.
- Valves – Gate, Globe, Butterfly.
- Windlass Repairs





# Superintendency Services

## Condition Assessment Survey:

- *Corrosion Monitoring*
  - *Coating Assessment (as per IMO Guidelines)*
  - *Pipeline Inspection*
  - *Outfitting Condition*
  - *Tank Sedimentation*
- 
- Underwater hull inspection (at port/ anchorage)
  - Underwater propeller polishing
  - Dry-dock Steel / Hull / Pipeline Repair Estimation and Budgeting
  - Damage / Grounding Survey and Assessments
  - Rafting / Rope Access Surveys – Monitoring / Resource Optimization
  - Owners' Representative / Monitoring of Class Renewal / UTM Surveys / LSA FFA surveys





# Superintendancy Services

## Inventory of Hazardous Materials (IHM)

- Preparation of IHM (Inventory of Hazardous Materials) as per Hong Kong International Convention
- Inspection, Detection, Quantification of Hazardous Materials like Asbestos, Heavy Metals, Ozone Depletion Substances, Poly Chlorinated Bi-Phenyls etc.
- All services performed by Certified HAZMAT Experts
- Turnkey Service Including Lab Testing of Samples Obtained.
- Total lead time for Report Generation after On Board Survey – 3 Weeks

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# UAV/ Drone Services

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Ph: +1 604 529 8488

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# Drone Survey Service

*Surveys without scaffolds !!*

## Advantages of using drones

- **Reduced risk.** Inspector can stay far from dangerous locations/ situations
- **Savings—liability insurance.** Due to reduced human risk
- **Savings—temporary structures.** No need to time & cost consuming scaffoldings
- **Savings—downtime.** No need for industries to system shutdown before inspection
- **Increased safety through increased inspections.** Given the relatively low cost of drone inspections, many companies are using them to perform inspections more regularly, which means that potential problems can be surfaced and addressed more quickly.
- **Better records.** Archivable Drone data represents a meticulous record of the condition of an asset over time.





# Drone Survey Service

***Surveys without scaffolds !!***

## **Condition Assessment Surveys: Tank Internals Survey**

- Most intuitive, reliable and precise indoor inspection drone.
- Real-time HD feed to surveyor/ owner in office (AMV platform).
- Spherical carbon-fibre cage protects propellers from impacts & makes it confined space inspection capable
- Tested to pass through any manhole on vessels
- Photogrammetry software makes it **3D imaging** capable.
- Can be added on with **LIDAR** VF1 & HF1 technology, with on-board processing for real time LIDAR analysis.
- *Simultaneous Localization & Mapping (SLAM)* allows accurate 3D mapping in GPS-denied environments such as indoors, underground or close to large structures.

### FEATURES

#### DESIGNED FOR INDOOR

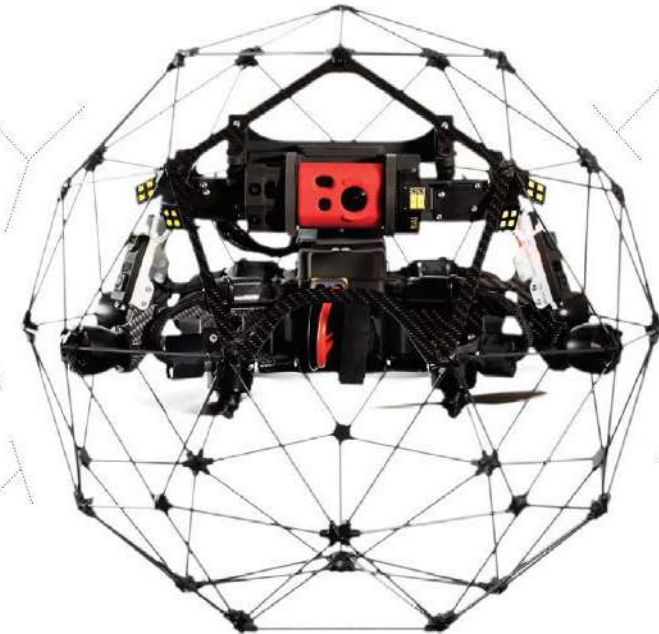
Collision-resilient  
Shockproof payload  
Confined space accessibility  
Robust wireless transmission

#### INTUITIVE TO FLY

GPS-free stabilization  
Distance lock  
Full HD live streaming

#### BUILT FOR YOUR SUCCESS

Easy maintenance  
Training included  
Dedicated support team



#### DATA QUALITY

Close up inspection  
4k Camera  
Thermal camera  
180° tiltable camera pod  
10K lumen  
Adjustable lighting  
Dustproof lighting  
Oblique lighting  
Obstruction-free

#### DATA PROCESSING

Streamlined data management  
3D modeling  
2D measurement

***Drone used: Elios 2***





# Drone Survey Service

***Surveys without scaffolds !!***

## Why use 3D Imaging & Photogrammetry ?

- Provides 3D model of inspected space
- Easier to spot faults in space instead of going through a 1000 photos with a map of internal structures.
- Locating, quantifying, measuring faults precisely.
- Saves time and thus saves project cost.
- Easier volume and dimensional calculations
- *For piping surveys/ inspections:* It allows for shape, elevation of pipe from inside, condition, distance of a defect.

### FEATURES

#### DESIGNED FOR INDOOR

Collision-resilient  
Shockproof payload  
Confined space accessibility  
Robust wireless transmission

#### INTUITIVE TO FLY

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#### DATA PROCESSING

Streamlined data management  
3D modeling  
2D measurement

***Drone used: Elios 2***



# Drone Survey Service

***Surveys without scaffolds !!***

## **Ultrasonic Thickness Measurement (UTM Gauging) –**

***Releasing end of 2020!!***

- Spot thickness reading capable
- A-scan readings at a target position with 5cm precision in diameter
- Real-time waveform input to inspector on ground
- No GPS signal requirement
- UT readings will have resolution of 0.01mm. Measurable thickness range of 1mm to 635mm (25")
- Bespoke design to measure along curved surfaces.

**Usage:** Ships, Storage tanks, cranes, offshore platforms, wind turbines and bridges







# Drone Survey Service

## Condition Assessment Survey – Externals Structure Inspection:

- High resolution 24MP x & camera. Excellent for surveying /GIS/ mapping
- Long range and flying duration
- Weather resistant aircraft and can perform in windy and rainy conditions
- 2 anti-collision beacons installed on top
- Complies with FAA's Night Waiver Standards.



*Drone used : DJI Matrice M200 Version 2*



# ANNUAL ENVIRONMENTAL ACHIEVEMENT AWARDS DINNER



**ALBION MARINE  
SOLUTIONS**  
*Trusted Engineering Partner*

---

**THANK YOU**

**HOW CAN WE HELP YOU?**

[info@albionmarine.com](mailto:info@albionmarine.com)

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