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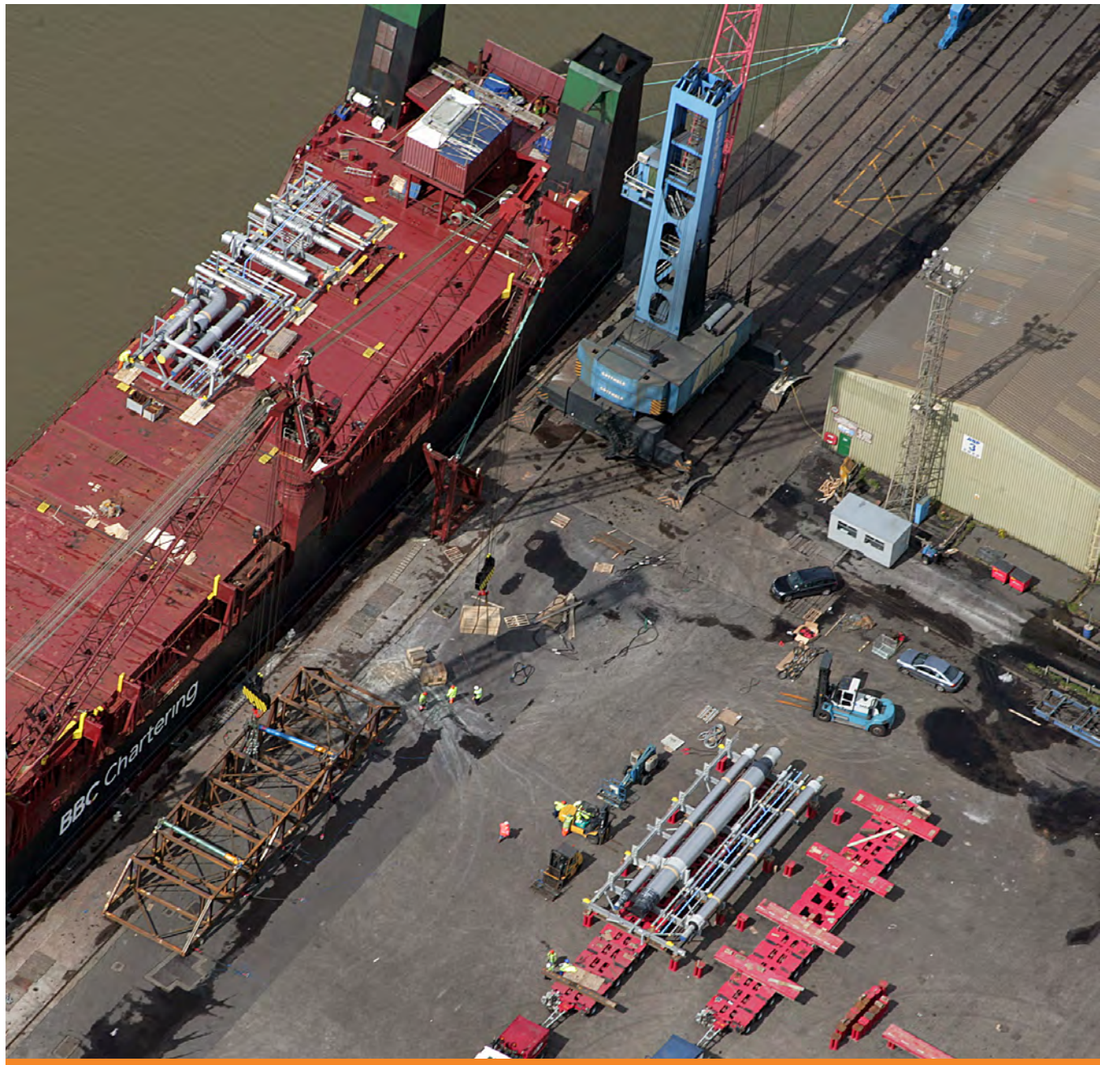
INNOVATING HEAVY LIFT SOLUTIONS

PART OF THE Malin Group



DESIGN 3RD PARTY WARRANTY SUPPORT

PART OF THE Malin Group

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MALIN ABRAM

OUR APPROACH

Malin Abram is your trusted advocate for all things heavy lift. From the beginning as a ship delivery outfit in the 19th century, Malin Abram has evolved to a full marine engineering service, working with a variety of clients worldwide, to deliver complex projects encompassing many disciplines. We do this by focusing on what matters: our client and their needs.

OUR TEAM

AS THE COMPLEXITY OF THE EQUIPMENT WE HAVE DESIGNED HAS EVOLVED, SO TOO HAS THE CAPABILITY OF THE MALIN ABRAM ENGINEERING TEAM, SPECIALISING IN THE DELIVERY OF MECHANICAL LIFTING AND HANDLING AIDS.

The team is comprised of a unique mix of naval architects, structural engineers, mechanical engineers, lifting engineers, and project managers, as well as hydraulics and control systems specialists.

Our diverse range of skills and expertise enables us to deliver bespoke solutions for our clients, whether the task is in their workshop, on site inland, at the water's edge or at sea above and below the waterline.

We are experts in the handling and relocation of abnormal loads and cargoes. For many logistics projects this primarily involves hired in equipment, which ranges from cranes, heavy haulage, tugs and barges, through to specialist hydraulic jacking and skidding equipment.

Servicing client's specialist needs, we have through these heavy lift logistic projects, designed, developed and fabricated an enviable range of specialist steelwork and project specific equipment.

Steelwork can range from simple transport frames and beams, to more complex cradles and modular supports, all critical to assist with the reorientation of the cargo during transport and installation.

The complexity of the lifting and handling aids, utilised on many of our projects, are such that the design becomes critical, not only for movement and handling, but also as an aid during the construction and erection of our client's equipment.

OUR SERVICES

MALIN ABRAM'S DESIGN AND THIRD-PARTY WARRANTY SUPPORT SERVICES ARE AVAILABLE TO SUPPORT CLIENTS WHO ALREADY HAVE ALL PRIMARY TRANSPORT CONTRACTS IN PLACE.

At the core of this service is the provision of independent technical advice, solutions and assurance for our clients. This form of contract can be broadly split into two main categories, namely third-party technical authority services and independent technical support.

Technical authority services:

Technical authority services are typically those required by underwriters, who carry responsibility for insuring a client's cargo. These services can also be required by the client themselves looking for oversight of work they have contracted, as part of internal due diligence and project support. When providing this service, we ensure that all operations are executed in a safe and controlled manner, as well as ensuring compliance with any project specific or industry guidelines required. We offer both technical documentation review and on-site warranty / third-party assurance services for operations.

For marine operations we can carry out full Marine Warranty or third-party assurance scope. Alternatively, where review of the entire operation is not required, we can provide technical 3rd party review of individual aspects of the operation. These 3rd party reviews can encompass any aspect of an operation, from assessment of cargo sea fastening design, vessel longitudinal strength and stability calculations, towage and mooring plans, through to review of operational method statements and risk assessments.

Similarly, for land based moves we can offer warranty, third-party assurance and individual review services. Technical review is available for the full range of land-based operations, including trailer, lifting and skidding operations.

When operating services under these conditions, a clear line must be drawn between delivering and reviewing services, to ensure that clear liability and subcontractor controls are in place. We differentiate ourselves from typical warranty and third-party review authorities, as we utilise our in-house technical experts that are also highly experienced in the day to day delivery of projects. This range of experience ensures a knowledgeable yet a practical approach to design reviews, with constructive guidance and feedback aimed at not only reducing risk, but also cost, where possible.

Independent technical support services:

Malin Abram can offer a wide range of heavy lift design and support services, including ad-hoc support for projects where gaps in the supply chain or project technical expertise becomes apparent. Similar to our technical authority services, all of our engineering design work is carried out to ensure a safe and efficient operation, by a team well versed in working to industry standard guidelines and design codes. We can support transport projects with both detailed engineering documentation and on-site supervision of operations.

In the case of marine operations, we can undertake all forms of operational planning, from production of storyboards, risk assessments and method statements through to towage plans and procedures. Our in-house engineering team can also carry out a wide range of design tasks including:

We also provide technical support for lifting and trailer operations, with provision of the following:

- Sea fastening design
- Ballast calculations
- Structural strength checks
- Grillage design
- Lift plans
- Rigging design
- Lift supervision
- Site surveys
- Mooring studies
- Motion response analysis
- Offshore deployment analysis
- Trailer arrangements
- Trailer strength & stability checks
- Swept path & access studies
- Assistance with trailer selection

DECK STRENGTH CHECKS

DECK STRENGTH CHECKS ARE USED TO CONFIRM THAT A CHOSEN TRANSPORT ASSET, WHETHER THAT IS A SHIP, BARGE OR EVEN AIRCRAFT, HAS ADEQUATE LOCAL STRENGTH FOR THE PLANNED TRANSPORTATION OPERATION.

These checks are carried out by confirming that the local loads in way of a cargo's supports, do not exceed the assets structural limits. These checks can typically be grouped into three categories:

CHECKS TO PUBLISHED VALUES

Checks to published values are typically simplified checks, carried out by comparing the force per unit area exerted by the cargo supports, against known allowable deck load limits (i.e. published vessel tank top strength).

CHECKS TO 1ST PRINCIPLES

In the case of checks to 1st principles, the local load carrying structure is analysed. The checks are carried out using relevant industry guidelines, typically utilising "working stress design" (WSD) or "load factor resistance design" (LFRD). This method allows the local support structure to be assessed against calculated compressive loads, shear, bending and combined stresses.

CHECKS USING FINITE ELEMENT ANALYSIS (FEA)

With FEA, the local or global structure of the deck is modelled using FEA software and assessed against applied load cases. The geometry of the deck structure is modelled as a "mesh" and assigned the material properties of each section of the structure. This mesh can then be checked against the calculated loads for any structural failures, such as buckling or shearing.

The category of check required can be decided by a number of factors including:

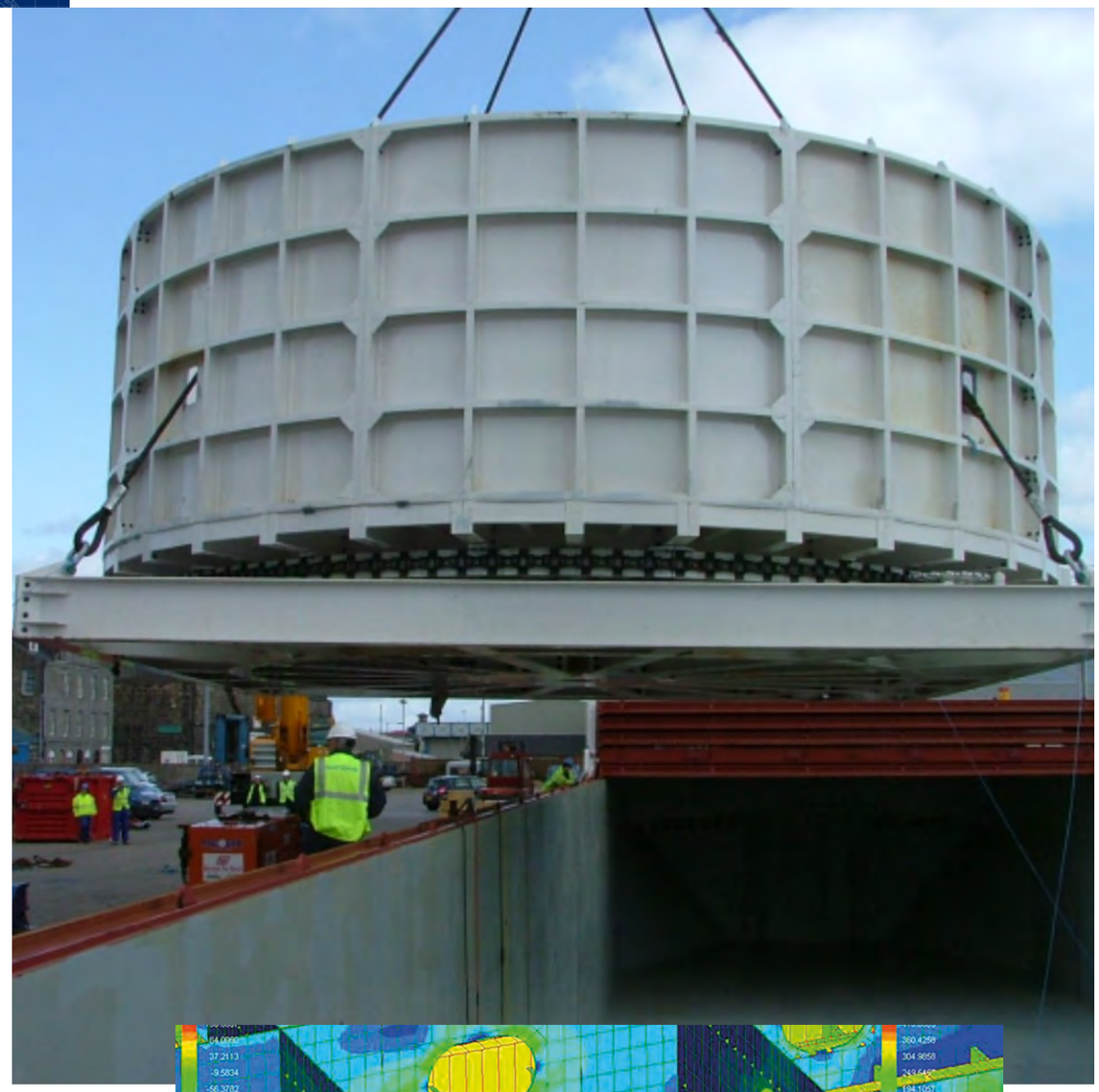
- Weight of cargo
- Complexity of cargo support arrangement
- Stowage position of cargo
- Structural arrangement of deck
- Nature of the operation

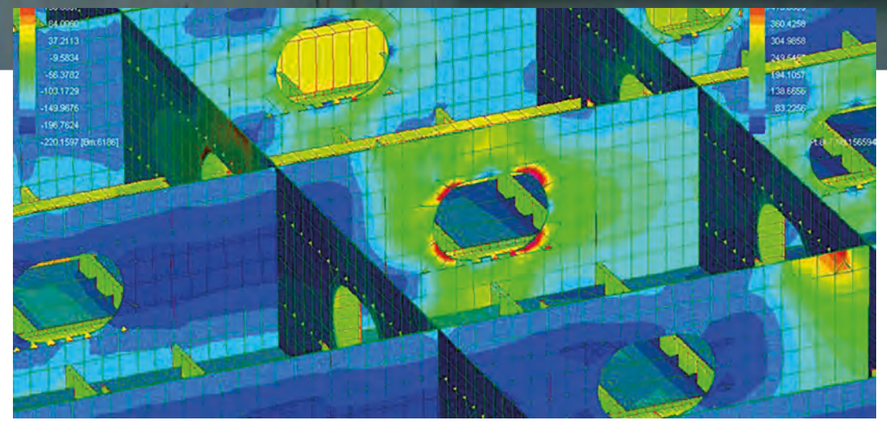
Malin Abram are on hand to provide both technical advice on the deck strength checks required and to carry out these checks.

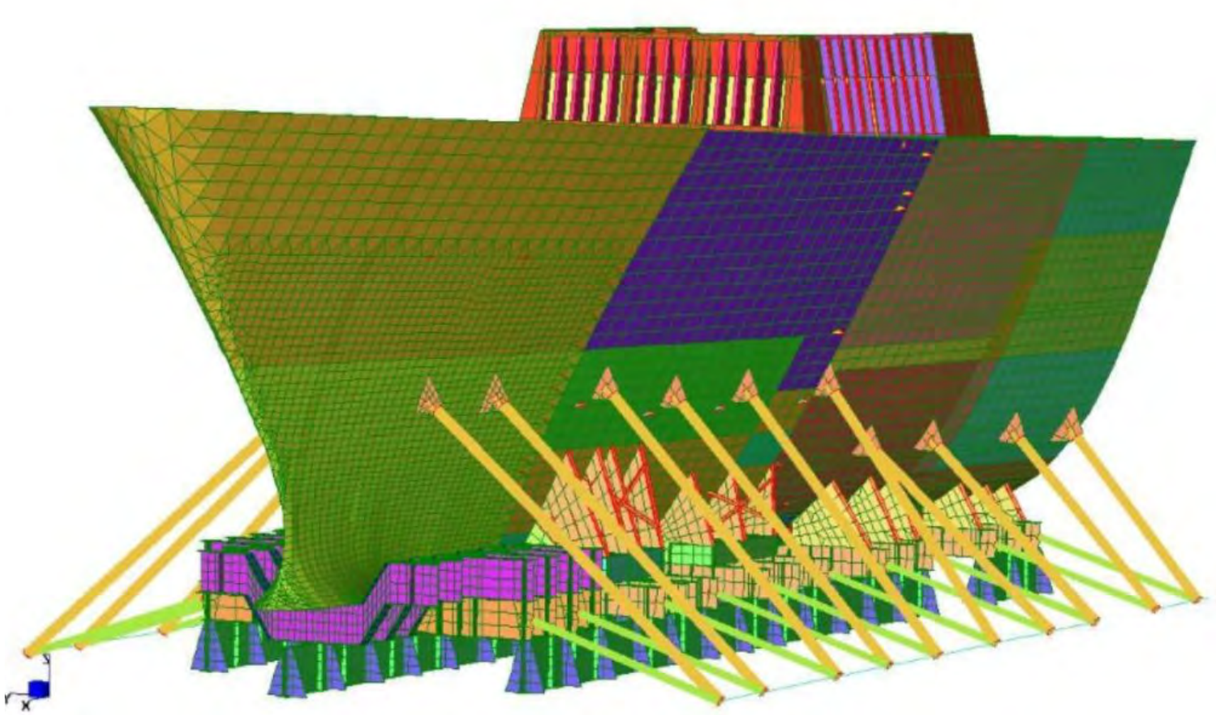
For more common arrangements, we have developed a wide range of internal calculation standards, which utilise first principle approaches, in accordance with industry standard design codes.

We can also add expertise for more novel or detailed checks, utilising a range of software tools for advanced numerical analysis such as beam modelling and finite element analysis.

Additionally, our first-class Quality Approval system is accredited to DNV-ISO 9001:2015. All of our engineering is presented in a clear and easy to follow format, with the justification required to allow for fast and efficient approval by third-party warranty.







GLOBAL INTEGRITY CHECKS ON CARGO

STRUCTURAL CHECKS ON CARGO IS OFTEN AN OVERLOOKED FACET OF HEAVY LIFT TRANSPORT, WITH THE ASSUMPTION THAT THE CARGO WILL BE ABLE TO TAKE THE LOADINGS ASSOCIATED WITH SEA TRANSPORT AND THE RISK IS PASSED BACK TO THE CLIENT.

However, structural checks on the cargo may be taken from the FEED stage with immature data and assumptions, or worse, not carried out at all. The structural integrity of an item of cargo is just as important as the stowage and securing arrangements. If the cargo is not designed for sea-going loads or wrong assumptions have been made when checking the structural integrity for sea transport, then there is the possibility the cargo is damaged, or worse is lost at sea.

There are a wide range of reasons why the structural integrity of a cargo may need to be checked or re-assessed, including:

- Original assumptions about sea-going loads have been superseded and are found to be optimistic
- Original design team are no longer available to re-assess the structure
- The support condition or securing positions have changed through necessity of stow and securing methodology
- A warranty surveyor or 3rd party has requested further detail or analysis
- The cargo and carrying vessel's interactions are complex

Large cargo pieces are often generically assumed to be structurally strong. However, whilst the cargo will have areas of high and low structural load capacity, so will the carrying vessel or barge. This raises several technical considerations from positioning of supports and securing to avoid structural failures, to assessing changes in cargo loadings due to differences in deck structure stiffness.

Our team has a strong understanding of structures and vessels, with vast experience of assessing the interaction between the two, ensuring safe transportation and avoidance of any potential structural failures. We can tailor our offering to suit a range of budgets and risk profiles, offering everything from first principle checks to dynamic non-linear finite element analysis (FEA).

MARINE WARRANTY SURVEYING

MARINE WARRANTY SURVEYING (MWS) PROVIDE INDEPENDENT THIRD-PARTY TECHNICAL REVIEW AND APPROVAL OF MARINE OPERATIONS.

The MWS will typically review and approve all related technical documentation, as well as attending the physical operation itself, to check it is executed in line with the approved plans.

The appointment of an MWS (from a suitably qualified organisation), can be a requirement of the insurance policy for a marine operation. The MWS helps to mitigate the risk on a marine operation, as they provide an independent check to ensure accepted standards and guidelines are being followed.

Malin Abram marine warranty surveyors are specialist project cargo transportation engineers and naval architects with a broad skill set covering all aspects of cargo transportation. Our team provide expert guidance and technical review for projects to ensure that cargo is transported safely from point of loading to point of delivery.

With expertise servicing a wide range of clients in the Oil and Gas industry, from insurance underwriters to cargo owners, Malin Abram can offer expert technical and operational review with regards to cargo delivery. From document review and parallel comparative engineering, to procedural assessment and operational supervision, we offer a wide range of MWS related services to de-risk cargo transport operations.

MARINE & SITE OPERATIONS SUPERVISION

IN ADDITION TO DETAILED ENGINEERING AND PLANNING, SITE OPERATIONS REQUIRE CAREFUL MANAGEMENT AND SUPERVISION TO HELP ENSURE WORK RUNS BOTH EFFICIENTLY AND SAFELY.

Site operational management requires a strong understanding of the operations to be carried out, as well as the associated risks and mitigations.

Malin Abram naval architects and project engineers are trained in managing various site operations, from lift-on/lift-off to roll-on/float-off operations, taking care to manage all subcontractors interfaces and Sim-Ops.

Whether managing a short cargo loading operation or a large turnkey project, our site operations team have vast project management and leadership experience, enabling them to act as a single point of contact on site. Our team can offer extensive operational planning, with practical, safe systems of work that can be integrated with any client requirements.

SUITABILITY SURVEYS

SURVEYS PROVIDE AN INDEPENDENT ASSESSMENT OF AN OPERATIONAL AREA OR ASSET, ALLOWING COMPARISON TO REQUIRED CAPABILITY.

Understanding the capabilities and limitations of an area or asset is a key part of the operational decision-making process. A clear understanding of these factors helps to ensure areas/assets are only booked for contracts they are capable of fulfilling.

Malin Abram can carry out a number of different surveys, each tailored specifically to a client's requirements, including:

- General surveys - including draught surveys, structural surveys, 3D scanning, etc.
- On/off hire surveys - carried out at the start and end of a charter period to minimise disputes over condition or repair costs
- Suitability surveys - required to ensure that all contractual and functional requirements can be met by the asset

Our operational experience combined with our chartering and engineering expertise provides us with the ideal background to carry out a range of survey activities on vessels and of marine assets.

Whatever the purpose of the survey, our team will deliver clear and detailed reports, confirm that the asset under consideration is as required and, if we think otherwise, will provide constructive advice and feedback to ensure that your project is a success.

TRAILER STABILITY & STRENGTH CHECKS

TRAILER STABILITY AND STRENGTH ARE VITALLY IMPORTANT CONSIDERATIONS FOR ANY TRAILER TRANSPORT OPERATION.

Having adequate mechanical stability ensures the cargo and the trailer will not tip over during transport, whilst adequate structural stability prevents overloading and failure of the trailer components.

When assessing the strength and stability of a trailer for a given cargo and transport operation, a range of factors need to be considered, these include:

- Cargo weight & CoG

- Cargo support configuration atop trailer bed

- No. of trailer axles & configuration

- Hydraulic configuration of trailer axles

- Transportation route to be covered (camber, gradient etc)

We can offer an independent assessment of a trailer arrangement and advise if the proposed arrangement is stable, as well as any restricting limits that need to apply to the operation. We are also on hand to assess the structural integrity of the trailer chassis and advise if it is within the manufacturer's limits. If not, we can suggest alternatives to ensure your operation is completed safely and successfully.

YOUR PARTNER

WE PLACE YOUR NEEDS AT THE HEART OF ALL THAT WE DO.

We focus on the project requirements and are committed to finding the most suitable solution. This means we are not tied to using certain equipment or suppliers and can truly obtain the best working, and most cost-effective solution.

We are proud of this commitment and our mission to find the most innovavtive methods to solve even the most difficult problems, often with a relatively simple solution. We are here to act as your partner, to guide you through all of your options at each stage, outlining the opportunities along the way and working to minimise any potential risks.

We provide our clients with one point of contact who has an overall view of the project and who will select a dedicated team, tailored to your requirements.

We also provide, if required, project management services to enable us to manage the project for you, from start to finish.

Additionally, our first class Quality Approval system is accredited to DNV-ISO 9001:2015. All of our engineering is presented in a clear and easy to follow format, with the justification required to allow for fast and efficient approval by 3rd party warranty.

QUALITY ASSURED

QUALITY ASSURANCE IS PARAMOUNT TO ALL THAT WE DO - OUR QUALITY PROCEDURES FOR DESIGN AND IMPLEMENTATION OF TECHNICAL ANALYSIS IS RIGOROUS AND WE PAY PARTICULAR ATTENTION TO MODEL QUALITY CHECKS AND STANDARDISED USE OF SOFTWARE THROUGHOUT OUR GROUP.

Our safety procedures onsite and while working on vessels have been formed and developed to cover the specific risks associated with our work and the expectations of our clients.

We are committed to safety and risk management at all stages of a project from concept through to detailed design and implementation to deliver a system fit for purpose. This is achieved through our phased approach to design and development together with a safety assessment process (HAZOP) to ensure that potential hazards are captured early in the design development phase and that risk reduction measures are implemented to ensure that the remaining risks are considered to be as low as is reasonably practicable (ALARP).

We hold ISO 9001, ISO 14001 and ISO 45001 accreditation with DNV GL and our fabrication facility is accredited with ISO 1090-1 Execution Class 4 and ISO 3834-2. Our IT systems are protected and accredited to Cyber Essentials Plus.

DID YOU KNOW...

MANAGEMENT SYSTEM CERTIFICATION
DNV·GL
ISO 9001 = ISO 14001
ISO 45001

CYBER ESSENTIALS PLUS

MEET THE TEAM

JAMES IAN BOWIE

ENGINEERING DIRECTOR

James began his career as a summer intern with Malin Abram, before gaining a degree in Naval Architecture and joining full time as a graduate. Having worked through the graduate programme he served a number of years as a Team Leader, before securing the position of Engineering Director. James has experience in a variety of projects from marine heavy lift transportation, to design and manufacture of bespoke jigs and has been involved in major site operations worldwide.

GARY PATERSON

DIRECTOR

Gary isDirector of Malin Abram, having joinedthe group after completing an MEng in Aeronautical Engineering at The University of Glasgow. Gary has a broad experience on the logistics side of Oil & Gas projects, most notably working as an in-house Heavy Lift Specialist on the TCO project. In addition to being AP (Appointed Person) qualified, he also specialises in seafastening design and global and local structural checks on vessels and barges.

CHRIS CAIRNS

COMMERCIAL DIRECTOR

Chris is the Commercial Director for Malin Abram. Having graduated in 2011 with a degree in Quantity Surveying, Chris spent the first 5 years of his career in the oil and gas industry with a worldwide oil and gas subsea contractor in Aberdeen, where he managed numerous high profile tenders for major oil and gas projects. Chris joined Malin Abram in 2016, where he has enjoyed being involved with tendering various heavylift and marine scopes and seeing them through to project execution. Chris is responsible for the teams' tendering activities, ensuring compliance and tender deadlines are achieved.

JOHN A MACSWEEN

GROUP MANAGING DIRECTOR

John is the Managing Director of the Malin Group. Having graduated with a degree in Naval Architecture and Ocean Engineering from Glasgow University, John joined Henry Abram and Sons as a Graduate Marine Superintendent. From here he has spear-headed development and diversification efforts, resulting in the Malin Group, home to several successful sub-brands, which focus on marine manufacturing, support, and technology sectors all over the world.

RYAN HOMER

PROJECTS DIRECTOR

Ryan is Projects Director at Malin Abram, with extensive experience across a wide variety of projects. He graduated with a degree in Engineering & Enterprise Management from the University of Strathclyde, following this up with a degree in Marine Studies from the University of Plymouth and gaining his OOW Unlimited CoC. Ryan joined as a Trainee Marine Superintendent. He has been involved in a diverse range of projects within the company, from short shipping to major turnkey projects.

STEVEN THORNLEY

SALES DIRECTOR

Steven joined Henry Abram & Sons in 1994 from Babcock Power , as a Marine Superintendent. Steven has been involved in various contracts with BAE, such as the Auxiliary Oilers, LPD Vessels, T45, CVF and Astute projects. Part of a management buyout of Henry Abram and Sons and Malin Marine Consultants in 2012, Steven was promoted to Sales Director, with responsibility for developing the customer base and creating strong customer relationships. In 2015 Steven, along with his fellow directors, founded Malin Fabrication in order to diversify the service offering and improve the joint offering to clients.