

## Ports and terminals

Services and solutions

# Clarity from complexity

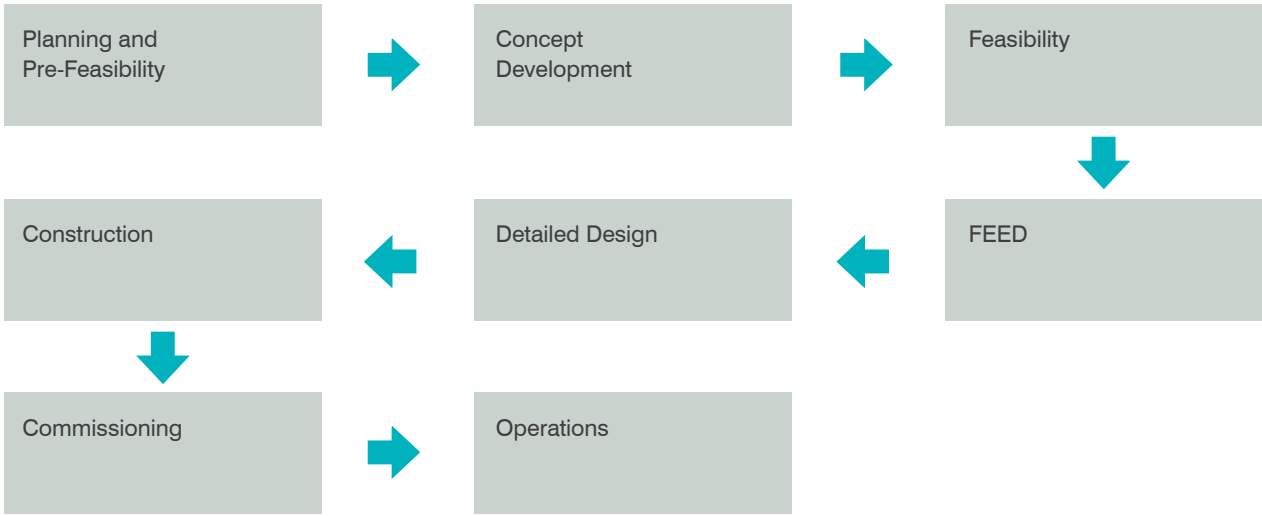
We support customers at each stage of the planning, development and operation of ports, terminals and harbours.

We are a leading international multi-disciplinary engineering, science and technology

consultancy offering a broad range of services, particularly in the energy and environment, defence and transport sectors.

From concept to planning, design and construction, right through to operation and maintenance, our holistic approach combines

valuable engineering experience with sustainable environmental management and economic practicality to deliver high-value solutions for customers.



“What we like most about BMT is their deep understanding of our needs, their flexibility, and the high quality of the results they deliver. I look forward to working with BMT again in the near future.”

Department of Business Development,  
Modern Terminals Ltd, Hong Kong

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# Investment and Planning

Well planned, critical infrastructure is essential to economic growth. By providing investment and planning support throughout the initial stages of infrastructure development, we aim to help customers build future growth on strong foundations.



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- 1: Site Selection Study for LNG Facility at Pipavav, India**

We carried out an in-depth SWOT analysis and cost and feasibility studies at sites in Pipavav, to identify the best location for an LNG import terminal. On completion of the study, we were subsequently selected for environmental impact assessment and engineering design work.
- 2: Masterplanning Study for Weifang Port, China**

When Malaysia-based Sime Darby needed an independent consultant to review the development of Weifang Port in Northern China, they called on our expertise. We developed a strategic masterplan, covering the economic, technical and financial aspects of developing the port.

## Market and Economic Assessments

We provide financial and economic assessments for investors in shipping, transport and related infrastructure. Our customers can access our in-depth technical and commercial expertise through a range of services that includes port cargo flow forecasting, market reviews and competitive analysis, concept plans, masterplanning and feasibility studies. We also undertake financial reviews and asset pricing, and can provide customers with plans for financing their projects.

In addition, we can offer a wide range of other services including strategic economic analysis, tactical management reviews, detailed cost optimisation and quality management studies.

**Hong Kong 2030 Market Assessment**

We are carrying out a two-year study to examine the future potential of Hong Kong's port, and develop a strategy for its development up to 2030. The study includes reviews of global markets and competitors, and extensive stakeholder consultation. We will undertake long-range throughput forecasts and outline port planning.

**Ukraine Port Development Feasibility Study**

We played a key role in delivering the Ukraine Port Development Feasibility Study. Tasks included reviewing market and traffic flows, conducting technical and economic feasibility studies, preliminary engineering designs and preparation of tender documents for private sector investment.

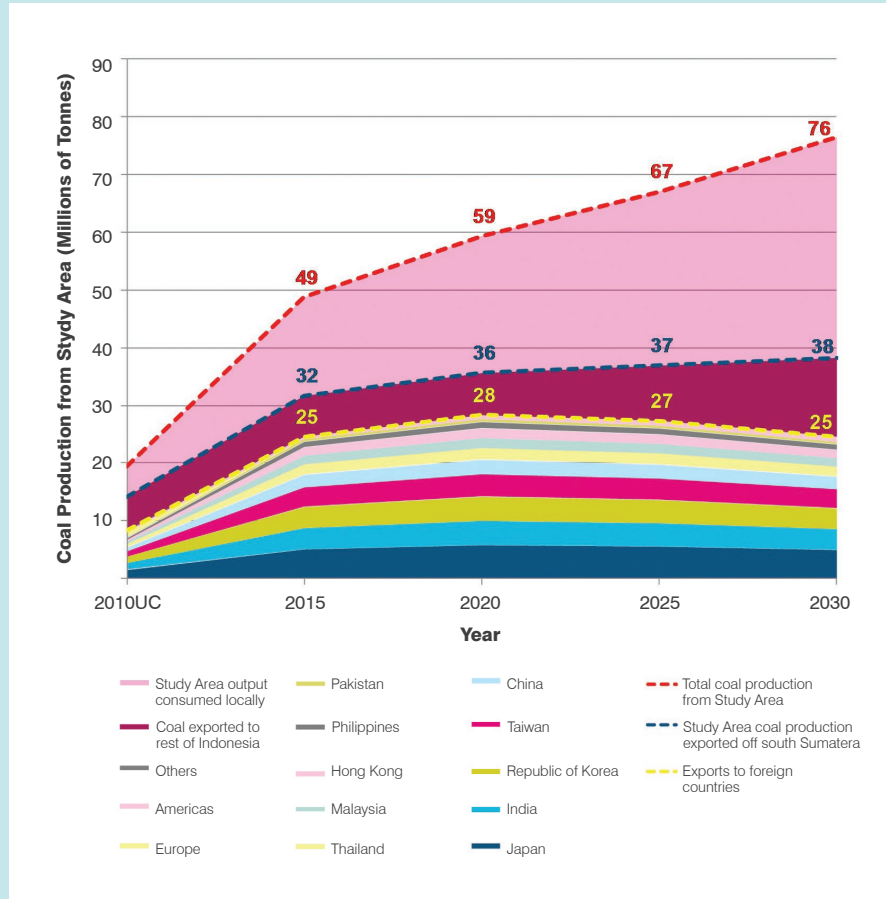
## Marine and Transport Planning

We offer an extensive portfolio of planning, design and assessment services for transport projects and supporting infrastructure. Services range from site selection, feasibility studies and concept designs to traffic impact assessments (TIA) and temporary traffic management (TTM) schemes, as well as detailed traffic simulation and network modelling studies. By working closely with economic and environmental specialists, our transport experts provide customers with robust economic assessments for transport and logistics proposals, including green transport solutions.

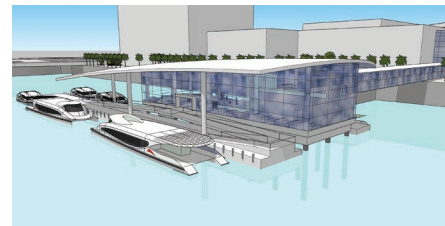
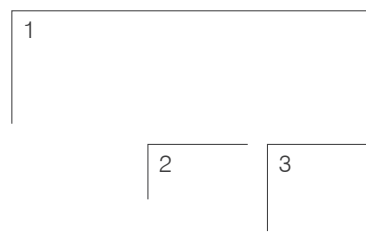
Site selection studies are carried out by our staff whose expertise include; geotechnics, marine accessibility, and marine environmental conditions.

**Coal Transport Study, South Sumatra, Indonesia**

Indonesian port operator Pelindo II commissioned us to develop a transport link from South Sumatra's coal mines to the coast. Our solution, backed by extensive environmental, financial and technical analyses, involved transporting the coal downriver by barge to a floating transshipment facility. We also developed a phased implementation plan to match infrastructure costs with growth in demand.







# Marine Facilities Masterplanning

We prepare long, medium and short-term masterplans for ports and marine terminals. We have extensive experience of conducting feasibility studies for high-profile container, bulk and cruise ports and helping customers to select the most suitable locations for their projects. We provide layouts and plans for both new developments and reconfiguring existing ports.

We also specialise in planning, designing and project managing all capital and maintenance dredging works. This includes obtaining the required approvals and dredging licences. Our experts assist with berthing and downtime assessments, reclamation and ground improvement work, project management of multi-disciplinary maritime development projects and detailed designs for rock armoured breakwaters, groynes and seawalls.

## LNG Marine Terminal Feasibility Study

We carried out a feasibility study for a LNG marine terminal. Using state-of-the-art simulation software, we established the Metocean conditions at the site, evaluated manoeuvring and mooring aspects for various jetty configurations (location and orientation) and predicted operational downtime, cargo transfer and storage requirements over a 20-year period.

## 1: Kijing Deepware Port, Indonesia

Through our long-term engagement with the customer, we delivered pre-feasibility and detailed feasibility studies and an outline design of the Kijing greenfield port. We provided analyses on the market situation, economic viability, port connectivity and issues related to oceanography, marine engineering expertise for design development as well as recommending partnership arrangements for future operations.

## 2: Marine Facilities Masterplanning, Dubai

We have developed a Marine Transportation Masterplan that will meet Dubai's public transport needs up to 2030 and provide passengers with seamless travel. The project includes an Integrated Transport Strategy that covers all modes of transport and is consistent with Dubai's future plans. We also forecasted marine transport usage and requirements for berthing and other support facilities.

## 3: Oakajee Port Development Feasibility, Australia

We have conducted detailed investigations and assessments to ensure an optimum port layout at the Oakajee Port Development in Australia, where geotechnical conditions and exposure to the prevailing swell have created challenges to dredging and breakwater construction. We also conducted dredging studies and designed the breakwater, with input from international experts.



“ Using our risk, management and operations expertise, we provide due diligence studies that are robust, structured, and defensible. ”

## Port and Coastal Environmental Assessment

Multi-disciplinary consultancy services and our developed software tools are at the heart of our environmental management offering. Our services include impact assessment and mitigation, training, and IT support. From engineering design, economic development and resource optimisation to protection of ecosystems, training, legislation and policy development, we take a balanced approach that adds real value to our customers’ projects.

Our engineers and scientists study baseline water quality conditions, marine ecology, coastal processes and shoreline erosion to offer port planning impact assessments and specialist dredging management. Our modelling and monitoring activities are underpinned by high quality technology and a deep understanding of physical, chemical and biological processes.

### Cairns Shipping Development, Cairns, Australia

The project proposed widening and deepening of the Cairns entrance channel in order to accommodate large cruise ships that frequent the region and allow such ships to moor along Trinity Wharves, bringing significant regional economic benefits. We were engaged to assist Port North with the preparation of a Revised Environmental Impact Statement (EIS) following the ban on offshore placement of capital dredging in the Great Barrier Reef Marine Park.

As technical lead for marine studies, we provided technical inputs in the form of extensive coastal and water quality data collection; 3D hydrodynamic modelling of dredge plumes; marine ecological surveys and impact assessment; coastal processes and water quality impact assessment; sediment quality assessment; and options analysis for dredge material placement on land and at sea. During the construction phase, we were engaged by Ports North to provide site superintendency and environmental monitoring works.



### Numerical Modelling at Port of Gladstone, Australia

Since the 1970s we have been associated with development and management in Port Curtis and the associated Port of Gladstone, which is one of the world’s largest export ports. Tasks have included feasibility studies and environmental impact assessments for terminals, navigation channels and infrastructure on behalf of the regulating authorities and private enterprises.

Through use of advanced numerical modelling tools for hydrodynamics and water quality, we are aiding in the improvement of environmental practices and management and continues to monitor performance and collect data to support modelling predictions.

## Technical Due Diligence

We help customers identify potential investment risks through technical due diligence and critical assessment of management processes, the supply chain and operational capability. This enables our customers to resolve any issues in advance of financial close, and gain reassurance about the viability of

their project. Using our risk, management and operations expertise, we provide due diligence studies that are robust, structured, and defensible.

### Lender’s Technical Adviser, India

We provided Lender’s Engineer services to Infrastructure Development Finance Company Limited (IDFC), regarding

a loan to AP Moller / Maersk, for the container terminal development at Pipavav. The work included a detailed cost estimate, on-site inspection of container cranes and an assessment of the layout and efficiency of the port. We, having been involved in the project for more than seven years, also advised on the business plan.



### Esperance Port Authority Shiploader Design, Australia

Esperance Port Authority (EPA) Western Australia, selected us to conduct a complete independent structural design review of a new iron ore shiploader.

The review covered all primary and secondary structures plus all critical mechanical connections affecting the strength and stability of the plant. EPA has since retained us to carry out annual structural inspections and to act as a key technical adviser.



# Design and Engineering

From conception to construction, we have a wealth of experience in port and terminal architecture. We provide a detailed design service that complies with international codes, project management, design review, and value engineering. Our customers also call on our expertise in preparing contract documents.

## Engineering Design Services for Marine Facilities

We have assisted customers in designing successful proposals for developing marine facilities. Our holistic approach to engineering solutions involves specialists around the world, supported by sophisticated design and optimisation tools.

Engineering services include marine structural engineering, pavements, geo-technical engineering, environmental engineering, Metocean studies to support design, material handling systems, buildings, utilities and associated mechanical and electrical systems.

### Engineering Design Services, India

As part of ambitious plans for expansion, Mundra Port appointed us to assist with construction of a multi-purpose berth between an existing terminal and T-2 Jetty. We carried out detailed engineering and design of all marine structural elements comprising approach trestle, unloading berth, shore protection and services on the berth. The unloading berth was designed for vessels ranging from 10,000 dwt to 60,000 dwt as a free standing structure supported on a vertical steel pile foundation.

### Engineering Consultancy for Four Jetties on Pulau Busing, Singapore

Our design and project management capabilities were called upon for the development of the oil storage terminal on Pulau Busing. Work involved design and construction management of four jetties accommodating vessels from 6,000dwt to 120,000dwt. We also developed the tender package to select the marine contractor and sought government approvals.

“ Our holistic approach to engineering solutions involves specialists around the world, supported by sophisticated design and optimisation tools. ”

## Bulk Materials Handling and Consultancy

For many years we have been helping customers to optimise the performance of bulk material handling equipment. This includes bucket-wheel excavators, stackers, reclaimers, shiploaders, ship unloaders, conveyors and conveying systems, mills, crushers, screens, draglines and mining shovels. Our experts offer a complete service from initial investigations and design of machinery to project management, specialist electrical services, procurement and technical support.

We use specialist design tools to undertake finite element analysis, computational fluid dynamics, discrete particle modelling, fatigue and conveyor analysis. Our experts provide an efficient and reliable assessment of problems, supported by software specially developed in-house to carry out complex, state-of-the-art analysis for conveyor dynamics. We are involved with both the industrial and commercial aspects of port equipment from shiploaders and unloaders to grab cranes and passenger gangways. From design to advice, we offer quality engineering services that benefit day-to-day, short-term and long-term operations.

### Lyttelton Port of Christchurch Coal Handling Review, New Zealand

We reviewed the coal handling system and associated plant for Lyttelton Port Company and Solid Energy. The review identified operational inefficiencies in the equipment and the layout of the facility. We then recommended improvements to rectify them.



### LNG Re-gasification FEED Study, Melaka, Malaysia

We provided Front End Engineering Design (FEED) for an LNG Re-gasification Unit and Island Berth in Sungai Udang, Malaysia. We were subsequently appointed engineering consultant for detailed engineering design and technical support during the engineering, procurement, construction, commissioning (EPCC) stages of the Island Berth and facilities.

### Container Crane Life Extension Facility Review, Indonesia

We were engaged to provide refurbishment design solutions to extend the life of three 12-year-old Noell container cranes for Jakarta International Container Terminal (JICT) in Indonesia. The scope of the works involved redesigning, reviewing and improving the operation of all the key components.







**Bulk Material Handling and Terminal Design Management**

We played a central role in the design, construction and commissioning of a new multi-purpose bulk material handling and transit terminal for TOLL Geelong Port. Tasks included preparing the specifications and contract documents, evaluating tenders, verifying the design, supervising construction and commissioning. We also addressed environmental regulations, and ensured integration with existing equipment.

**Project and Construction Management and Commissioning**

**Project Management Services for Marine Facilities**

We regularly provide project management for marine facilities, including some of the world's largest port projects. Our services cover contractor choice, construction methodology, site supervision, programming and planning, contract management, quality control and safety. In addition, we can extend our project management service to cover the full lifecycle of the project from concept to commissioning.

“ We can extend our project management service to cover the full lifecycle of the project from concept to commissioning. ”

**Broome Channel Optimisation – Superintendency and environmental monitoring**

The Port of Broome in Australia is the largest deep-water access port servicing the Kimberley region and is the key infrastructure that supports the cruise tourism industry in the region. In recognition of the access constraints and the growing tourism industry in Broome, the Department of Primary Industries and Regional Development, Tourism Western Australia and Kimberley Port Authority (KPA) have contributed funds to optimise the channel to allow passage of larger vessels. Following the completion of site investigation and detailed design works, we were engaged by the KPA to provide site superintendency services for dredging operations.



**Development of Vitol Tank Terminals Marine Jetties, Malaysia**

We provided project management services covering Front End Engineering & Design (FEED), invitation to bid for reclamation, dredging, ground improvement, and detailed engineering for marine jetties in Malaysia.





# Operations

In order to manage and mitigate risks during the operation and maintenance of ports, terminals and harbours, we provide a wide range of services that draw on our global expertise.

## Risk Assessment

We not only study the external and internal risk factors of marine facilities but also their consequences. We look at what impact a project's vulnerability and risk may have on businesses or countries and advise on the most appropriate ways of mitigating that risk. Our experts review navigational issues, search and rescue and the port marine safety code, as well as assessing and auditing safety management systems.

### LNG Navigational Risk Assessment

We led a navigational risk assessment of the anticipated increase in LNG tanker traffic in the Bonny Channel, Nigeria. This involved bringing together key stakeholders and applying HAZID risk assessment to vessel traffic scenarios. It identified strategic methods for reducing risk and improving the safety of shipping, as well as \$40M worth of savings, as part of a capital dredge programme.

### Risk Assessment title

We are developing a strategy for the UK's first alongside ship-to-ship transfer of LNG. The facility will be only the second of its kind in the world. Our scope includes a feasibility study and assessment to identify the risks and ensure they are effectively managed. The project requires close operation with regulators, operators and stakeholders.

## Navigation Simulation and Consultancy

From full-scale trials, free running and captive model tests, to mathematical prediction and simulation, we have many years' experience in all aspects of ship manoeuvring.

Our real time ship-handling and manoeuvring simulator, BMT REMBRANDT, is used by pilots, ship operators, naval architects and port authorities to enable effective training, and to evaluate harbour layouts at the planning stage.

The system has a wide range of high fidelity ship models which can interact with varied environmental conditions and tugs to produce realistic vessel behaviour.

### Navigation Simulation, Brazil

We carried out a feasibility study to determine if the Port of Vitoria could accommodate larger vessels by dredging part of the channel. The study involved using detailed hydrodynamic modelling to produce an accurate set of simulations in line with the terminal's capabilities. They tested the entry, departure and manoeuvrability of container ships in the range of 4,000 TEUs and above.

### LNG Metocean Forecasting

We provide operational forecasting of offshore winds, offshore and near shore waves, currents and water levels in support of operations at the Balhaf LNG export facility in Yemen.

Port operability is optimised by minimizing the number of days where operations are halted due to unexpected, unfavourable conditions.

“ Our objective is to identify and support the delivery of sustainable and efficient solutions that will work throughout a port or terminal’s lifetime. ”

### Navigation Simulation Training, India

We ran a training workshop for pilots at Hazira Port using BMT REMBRANDT navigation simulation software. The workshop, which took place on-site, enabled the pilots to validate their manoeuvres in relation to the operational jetty and gave them an accurate feel of the conditions at the proposed/new jetty.

## Mooring Analysis

Designing and analysing mooring systems is an essential part of port planning. We have extensive experience in this area and in evaluating the feasibility of ship-to-ship and ship-to-structure operations. Our comprehensive consultancy services range from providing expert advice, to a detailed dynamic mooring analysis using specialist software.

### Mooring Analysis, Singapore

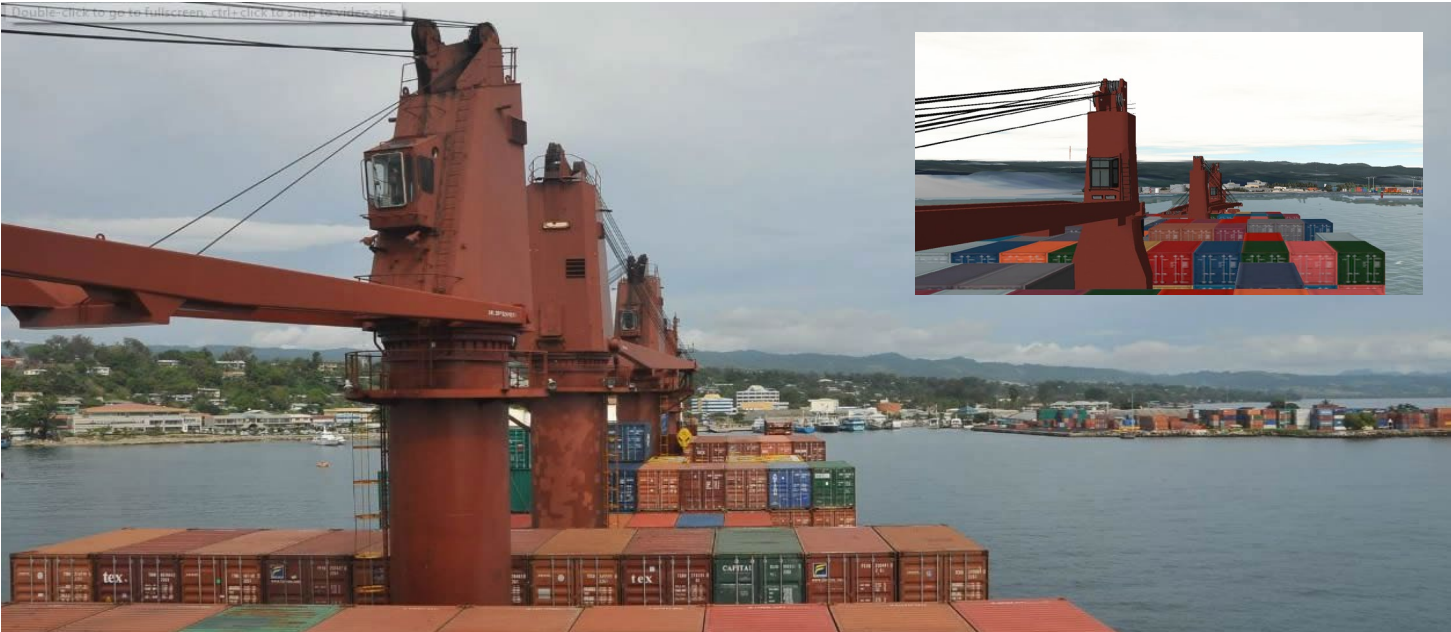
We carried out a mooring analysis at the Sembawang shipyard of two berths being used during the conversion of a tanker into a floating storage and offloading unit (FSO) for a major oil company. The analysis was based on appropriate environmental conditions and the shipyard's proposed mooring arrangement. Using OPTIMOOR software, we identified changes needed to ensure the safe mooring of the vessel.

## Port Security

Security is an increasingly important issue and we aim to provide the latest thinking and most cost-effective solutions, supported by our worldwide expertise and independent status. Our objective is to identify and support the delivery of sustainable and efficient solutions that will work throughout a port or terminal’s lifetime.

### SUPPORT programme

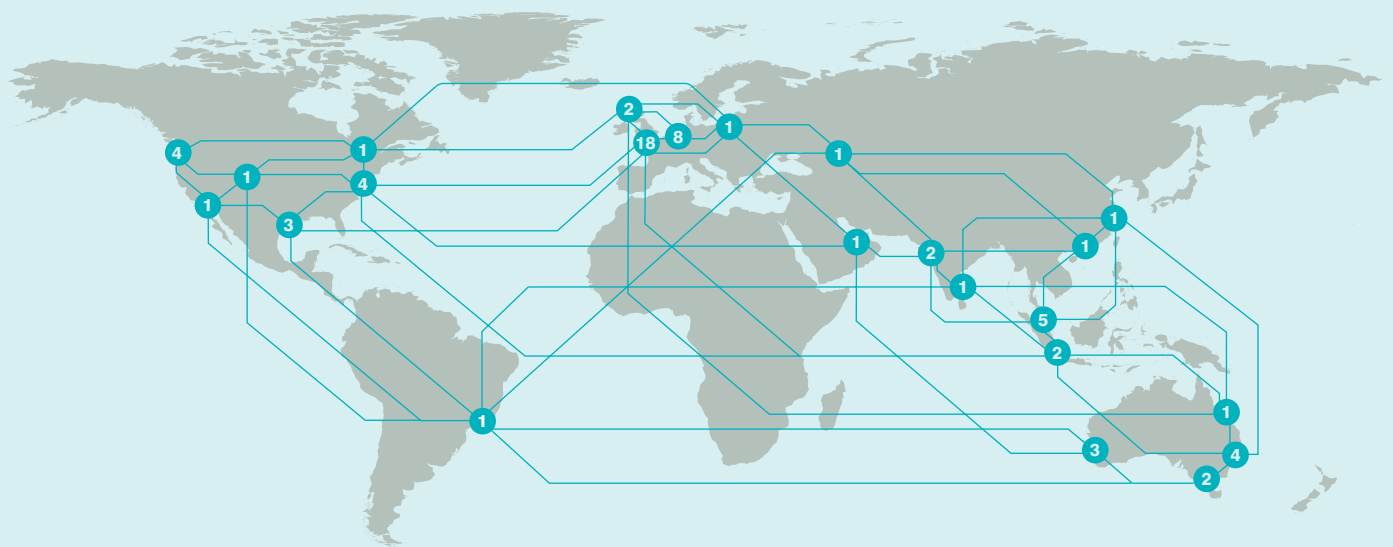
We are part of a Europe-wide project to improve port security and trade flow. The SUPPORT (Security UPgrade for PORTs) programme is studying Europe's next generation of security legislation and developing more rigorous security processes and procedures to reduce threats from crime and terrorism.





**BMT is an international design, engineering and risk management consultancy, working principally in the energy and environment, transport and defence sectors.**

**With locations in all of the major markets we serve, ours is an active network that sees us sharing skills and knowledge, combining disciplines and building international teams to create integrated answers to the questions of our national and international customers.**



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