Issue 1 | April 2018

FOCUS

Transformational engineering

Norway's mothership

Plug-and-play power

Pipeline x-ray vision

BMT

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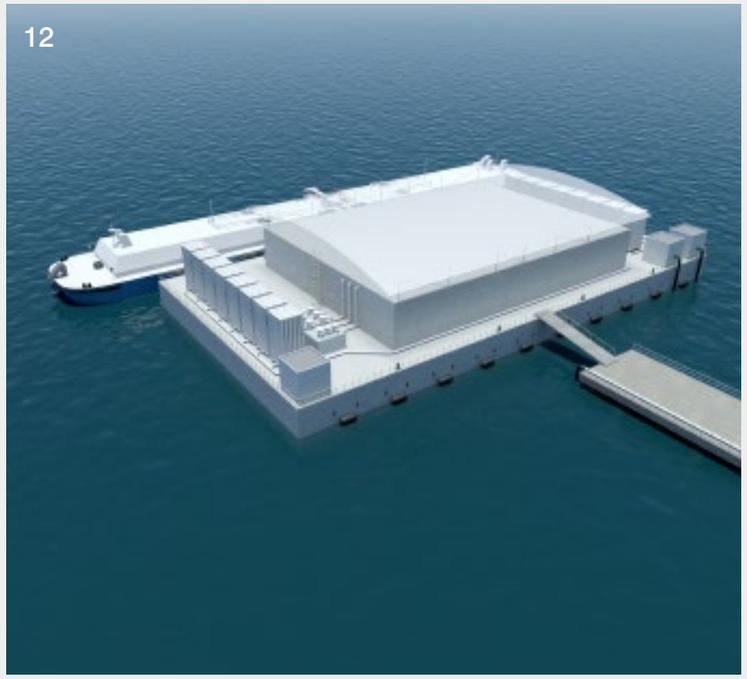

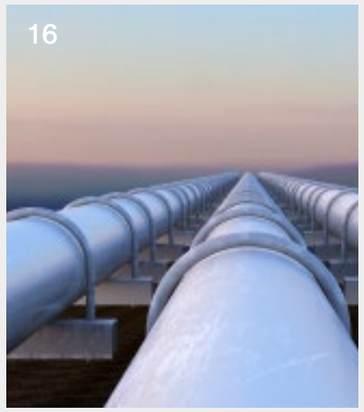

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Editorial

Welcome to the first issue of Focus for 2018. I am delighted to see so many fantastic achievements and new ideas in this edition, with broad coverage from many areas of our business. I am sure the articles will fascinate and inspire you, as much as they have me.

As we embark upon a year of ambitious business transformation, it is really important that we continue to hold close and value those things which make us truly special. This edition of Focus is jam-packed with stories which highlight our collective spirit of innovation, application, and our focus on customer needs, which are exactly the characteristics I want to foster and grow. We will use our transformation programme to deliver a resilient business platform to enable and support these characteristics, whilst providing exciting and meaningful development opportunities for our people.

I hope that in reading this edition, you feel compelled to contribute to the next edition. Focus survives and will thrive on the strength of the articles we all supply.

Until next time!

Sarah Kenny
Chief Executive

In this issue

We take a closer look at the engineering technologies and projects that are already or could in the future, transform people's lives. It's with enormous pleasure that we have Pam Melroy providing her thoughts on the engineering breakthroughs that have made a positive and significant difference to the world we live in today – an insightful and thought provoking read. We also take a closer look at Norway's new mothership, HNoMS Maud, a BMT-designed vessel that will support vessels and subs at sea worldwide.

I hope you enjoy this issue and we would like to thank all our authors who have given their time to provide us with their views and insights. We always welcome your feedback on the magazine. If you have any thoughts on any of the subjects we have covered or would prefer to receive this publication in electronic format, please send your feedback to our editor at jenni.williamson@bmtglobal.com

"Our people are every bit as good as I thought they were."

Q&A with Sarah Kenny

Chief Executive, Sarah Kenny took the BMT helm on 1st August last year, with a brief to sharpen the company's competitive edge, while adding more value for customers. Top of her growth agenda has been unification of the various companies under one simple BMT name; not to dilute the group's identify as niche specialists, but to build and grow from this reputation. Focus caught up with Sarah to find out more about her vision for the organisation.

What has most surprised you about BMT since joining the company?

Having worked alongside BMT for almost my entire career, I have always admired the organisation's technical brilliance, the quality of its work, and the intimacy of its customer relationships; BMT truly takes ownership of customers' issues. Those factors were a big attraction before I joined, and it is brilliant to experience them from the inside. Our people are every bit as good as I thought they were.

Clearly, I knew that the business was made up of many individual operating companies, but I hadn't realised quite how much that was holding BMT back. The way we are organised means we find it difficult to collaborate meaningfully, to share best-in-class practices, and to ensure we always put our best global resources at customers' disposal in order to solve problems. It also holds us back from giving employees better career development opportunities. We miss business and cross-selling opportunities too; with customers feeding back that they didn't realise we had complimentary services (to those we are already delivering to them) in areas where they need help.

Unifying our brand drives powerful collaboration, better serves our customers, and unlocks business benefits. We will remain specialists in our core markets, but as one company, not as many. Changing the way we go to market and support our customers is how we will grow.

"We will remain specialists in our core markets, but as one company, not as many."

Where do you see the greatest business challenges?
Customers across our core markets are changing the way they do things, as they respond to and anticipate changes in their markets and customer bases. Whether this materialises in changes to technology and information use, or to acquisition and commercial strategies, we must be ready and on the front-foot.

Our skills, competencies, and reputation will get us so far, but we need to address the evolution of these markets in order to capitalise on their growth. That is about partnering better with industrial peers and our supply chain, focused investment on diversifying into other areas of future growth such as autonomy, environmental change management, cyber and digital rail/ports.

We are not necessarily going to retain our historical geographic strength in some of our markets, so we have got to look closely at, and understand the direction in which they are moving. These trends are challenging for our customers too, so we must stay close to them in order to help them navigate the changes. We should develop focused regional strategies towards sustainable growth.

Change might be challenging, but it is also the birthplace of opportunity. We must equip ourselves to grasp these opportunities proactively, not simply react to changes as they happen - and that requires an evolutionary shift within our business.

What are the strategic priorities?
As I look across BMT's entire portfolio, it is clear there are three strategic priorities.

First, we must sustain our core business. That means we have to grow - because any business that is not growing is declining - and we do that by evolving into an organisation that can meet the changing demands of our customers.

Secondly, we must enable powerful collaboration right across our business. Wherever you find a pocket of great internal collaboration, you see even better customer relationships and the beginning of real growth. Improving internal collaboration is critical to our ability to forge ahead, but there is also much more potential for external collaboration with partners ranging from SMEs to large prime contractors and government agencies. The fact that we are independent of the supply chain means we are uniquely placed to collaborate highly effectively. Making more of these opportunities will help take us into emerging markets where currently we may not appear big enough to compete.

Thirdly, we must invest in order to capitalise on customers' thirst for innovation. Our customers have the most demanding of challenges and recognise the value of being technologically ahead of the competition, so if we are on the front foot in terms of technology, practices, and processes, we can take advantage of this appetite for spending on innovation.

What does success look like for you?
Success is having inspired, engaged employees who feel that their career aspirations are recognised and supported, that they are doing meaningful work, and that they are well developed and properly rewarded. As an Employee Benefit Trust, all our employees are shareholders in the company.

In terms of our customers, success means they consider us an essential business partner who consistently exceeds their expectations. And of course, delighted customers sell on our behalf.

For BMT as a business, success is about achieving growth, and also being recognised and valued within the industry as a high-performance player.

FAQs

1. Why don't you hire an external team to run the change programme?
The best people to deliver change are the people who understand the company best: its workforce. Our people are being asked to volunteer for the various workstreams we have implemented as part of the change programme, using their expert knowledge of the business and our customers. This will help drive the direction of the business.

2. What does the unification of BMT companies under one brand mean for customers?
The same people will still be doing the same jobs, but customers will gain valuable access to BMT's global skills and resources to help them succeed and meet their business challenges.

3. Why is BMT an Employee Benefit Trust?
There are three reasons why:

- Hire and keep the best people: We are a different type of business: a place where people employ capital, NOT where capital employs people.
- Relationship focus: When a business is held in trust for its employees, they are essentially the owners and owners act with a sense of responsibility and pride that makes a huge difference to customer service, with a focus on fostering long term relationships with partners and customers.
- Able to take the longer-term approach required to innovate: Without the shorter term demands of shareholders to answer to, we can look at building longer-term value. We can commit the resources necessary for innovation that may have longer payback horizons. That's evident not only in our research and innovation programmes but our investment in training and development. There is a cultural point here too: EBTs also tend to be flatter, less hierarchical places where the sharing of ideas happens more readily.

"Our strategic priorities are to sustain our core business, enable powerful collaboration, and invest to capitalise on the appetite for innovation."

Strategic appointments

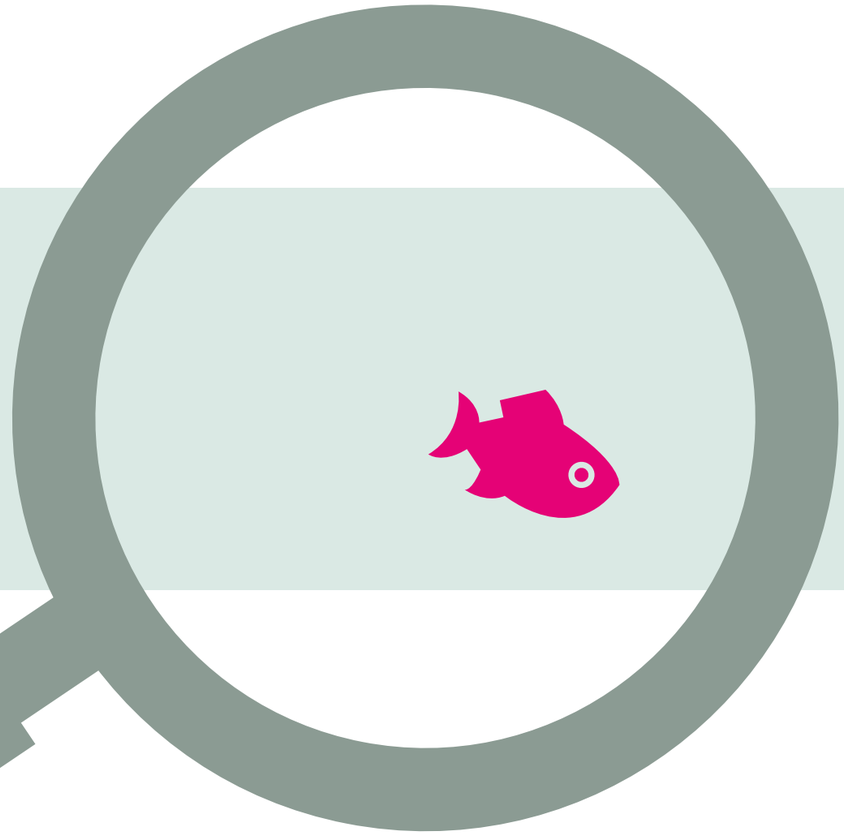
Guy Tomlinson

Group Capability and Strategic Director - Guy joins BMT from QinetiQ where he led a 35-strong business development team as UK Sales Director. He has a wealth of experience across the maritime, defence, cyber and information and training domains, as well as leading on several sales and business development transformation programmes. Guy comments: "A big part of my role is to harness this technical excellence and focus our efforts on helping to make a real difference to some of the global, engineering challenges that our customers face today."

David Bright

The Group Operations Director is a member of BMT's Executive Committee with responsibility for the oversight and delivery of transformational change across BMT to ensure the business continues to deliver high quality project outcomes for its customers.

What you didn't know about Sarah….



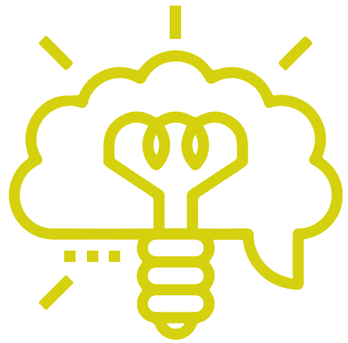
My first Saturday job was an early lesson in running a business. Working in a small high street chemist's, I got to do a bit of everything: cashing-up, ordering, stock-taking, and of course dealing with all sorts of weird and wonderful customers.

A perfect work day doesn't mean one without problems. Problems are part of life. I enjoy seeing people take ownership of a situation and strive to fix it, with my help or support if they need it. It's a good day when customers tell me our teams have just done something incredible and made a real difference.

Most emails don't need an immediate response. I never turn my phone off but that doesn't mean I'm obsessed with it. We run an international business, so I have to check in last thing at night and first thing every morning, but while I read most emails, I don't feel compelled to reply straightaway. On holiday I have a deal with my husband that I can do stuff on my phone for an hour a day.

I find work-life balance a slightly bizarre concept. When you have trained hard for a career you're passionate about, to think of 'work' as somehow different from 'life' seems a bit odd to me.

Friday night bliss is eating fish and chips in my pyjamas watching rubbish telly. And having cake; I'm a big fan of cake!



We all have a responsibility to inspire others to go into our amazing field. Today I see that same negative peer pressure with my own children, especially my daughter, which is why I became a STEM ambassador. It's about stepping up and showing people that when you choose engineering, science and technology, far from spending your time waving spanners around, you're solving real-world issues and helping people to survive and work in incredible and challenging environments.

I'm an accidental engineer. My background is Marine Environmental Science but since that's all about trying to fix real-world problems, it led inevitably to engineering. I had so much passion for going out to sea and doing scientific things with mud and fish and water, my girlfriends thought I was insane. In fact, the peer pressure not to do the things I loved was quite considerable, but my father is an engineer and my mother ran a production line for avionics equipment so it all seemed normal to me.

Diversity in the workplace is essential. Everyone gets hung up on diversity being about women. It's not. It's about difference: difference in attitude, thinking, social background, academic background, ethnicity, gender, and more. As a senior woman in this industry, you have to be very careful not to come across either as wanting to pull up the ladder behind you and deny other women the same opportunities, or as wanting to put women in charge of everything at the expense of men. I don't want women to take over the world, but I do want to achieve true diversity.

There are really simple ways to overcome unconscious bias. Put women on interview boards for example.

IT pioneer Dame Stephanie Shirley is one of my heroes. She broke the glass ceiling in the 1960s and set up an all-female software company which programmed the black box flight recorder for Concorde. In that male-dominated era, she changed the name on her letterhead from Stephanie Shirley to Steve Shirley so that people she approached seeking business meetings would agree to see her.

TED talks are a powerful source of inspiration and ideas. If I have a spare few minutes at lunchtime, I'll usually find one to watch. You can learn a lot.

I wouldn't ban any buzzwords or business jargon – but I would mandate the playing of buzzword bingo at every meeting.

Building relationships isn't about having business meetings. It's about getting to know what makes people tick. What are their priorities? What is on their mind that they may not have connected to something you can do? The best industry events are good for having these slightly different conversations. Plus, it would take months to get together with all the people you can talk to at, say, Defence and Security Equipment International (DSEI).

Self-belief is critical for success. The best piece of advice I ever heard was at a women's Royal Navy vs Royal Air Force rugby match. It was a mud bath, the RAF side was winning, and you could feel the mood dropping in the predominantly naval crowd. Then a young Navy player got the ball under her arm and started running so fast and so hard that nobody could keep up. But part way down the pitch she seemed to lose her nerve a bit and started looking left and right to see who was coming up behind her. Suddenly, a spectator stood up, cupped his hands round his mouth, and yelled: "Believe!" The effect on the girl was incredible. She put her head down, belted for the line, and got the try. It's a simple piece of advice but very powerful: believe, and you will get there.

In an exclusive interview for Focus, Pam, a former NASA astronaut and a recognised leader within aerospace, defence and technology provides her unique insights into transformational engineering….

Transformational Engineering

What would be your top three examples of how transformational engineering has changed lives in remote or inhospitable locations?

My top three examples of transformational engineering that have changed lives in remote/inhospitable locations includes telemedicine, the Internet, and microelectronics. Telemedicine was pioneered by NASA in the '60s and '70s as a way to preserve the health of astronauts in space without doctors available. Now, rural hospitals and healthcare providers have the ability to be guided by experts thousands of kilometres away. The Internet of course provided the ability for information to flow for educational and professional purposes to remote locations, allowing people to create wealth through new business models. Finally, microelectronics have allowed tremendous capability in hand-held devices such as GPS, smart phones, and satellite phones to enable both connectivity but also increased safety in remote locations, especially in mobile situations.

What would you say has been the single most important engineering breakthrough during your career? And why? What difference has it made?

Without a doubt the Internet has had the most radical impact on our lives and our work within my professional career. It is hard to even remember how difficult it was to transfer information and maintain contact without it. It has impacted the speed of technology breakthrough by collaboration and cloud computing, education, and civil engagement and empowerment.

Can you cite a specific challenge that is currently exercising today's engineers - one that has the power to make an enormous difference when resolved?

I think the most intractable problem that I see in engineering today is trust in autonomy. We have many new autonomous systems that show great promise but understanding how to test them and validate them is a very difficult problem, especially in complex environments. We currently can only enable simple capabilities that we can test and understand. Autonomous air vehicles have fewer problems to solve than the maritime domain, and complex ground terrain is the most difficult problem of all. If we can understand complex non-deterministic systems and learn to trust them, we can unlock the potential of autonomous systems in lower-cost transportation, health care, agriculture, and border security – all pressing needs.

What do you think will be the most exciting engineering development in the next decade?

To me, one of the most exciting things that is happening right now is the work around understanding the brain better. Our ability to understand and treat mental and neurological disorders and manage brain performance is primitive by comparison to other disorders. Being able to treat mental illness, depression, and Alzheimer's disease in a way that is positive and simple would have a huge positive impact on the world.

Pam Melroy

Pam is a retired Air Force test pilot and former NASA astronaut and Space Shuttle commander and has gone on to serve in industry and senior government positions.

Colonel Melroy received a Bachelor of Arts degree in Physics and Astronomy from Wellesley College and a Master of Science degree in Earth and Planetary Sciences from Massachusetts Institute of Technology. She then attended the United States Air Force Undergraduate Pilot Training and flew the KC-10 for six years as a co-pilot, aircraft commander and instructor pilot. She is a veteran of Operations Just Cause, Desert Shield, and Desert Storm, with more than 200 combat and combat support hours. She has logged more than 6,000 hours flight time in more than 50 different aircraft and holds multiple world records in aviation.

Selected as an astronaut candidate by NASA, Colonel Melroy reported to the Johnson Space Center, Texas, in March 1995. She flew three missions in space, all complex missions to construct the International Space Station. She was Space Shuttle pilot during STS-92 in 2000 and STS-112 in 2002, and Space Shuttle Commander during STS-120 in 2007. She is one of only two women to command the Space Shuttle. Colonel Melroy has logged more than 38 days in space.

Colonel Melroy is now a Senior Advisor for Space Strategy at Nova Systems Pty, Ltd in Adelaide, Australia.

Plug-and-play power

Floating modular infrastructure will bring affordable power to remote communities

The correlation between electricity, education, and GDP is indisputable, so it is essential that remote communities have access to power they can afford.

Historically, electricity has been delivered to isolated communities via diesel generator sets, but growing concern about emissions and the availability of huge gas reserves worldwide makes gas an increasingly attractive fuel choice.

While liquefied natural gas (LNG) is a feasible alternative, it is much more difficult to transport than oil, requiring specialised containers and precisely engineered pipelines that can withstand its extreme -160°C temperature. Traditional infrastructure for moving LNG around the world has been typically designed on the back of 25-year contracts between suppliers and major customers, such as power stations or urban utilities, and the costs and complexity are acceptable in this context.

When you try to shrink the size of the conventional delivery operation to bring relatively small amounts of LNG into inaccessible places, unit costs climb fast. Shipment requires distribution from a central hub to local satellite receiving terminals, and if each of these includes conventional jetties and onshore regasification facilities at every landing point, then land acquisition, permitting, construction, and logistics problems can be challenging. Additionally, in the key markets of Asia, building earthquake-proof infrastructure requires the highest quality of construction and finishing, which is a difficult task at many remote sites.

So, the challenge has been to devise an LNG reception system that does not incur major diseconomies of scale. Cue the AgileNLG Floating Storage Regasification Unit (FSRU) which, as the name suggests, stores the fuel in its liquid form and turns it back into gas for pumping ashore.

But, if you are after power, why stop at doing the regasification process offshore? Why not avoid the need for an onshore terminal altogether by attaching a power station to the FSRU to create a complete piece of floating infrastructure?

AgileLNG provides communities with the opportunity for power and gas together, and takes the basic FSRU approach further than ever before in order to wring out costs.

- The hulls are built of concrete, instead of steel, making them much more durable in the hostile marine environment and permitting longer lifespans and significantly less inspection and maintenance.
- The different elements are modular so they can be pre-fabricated and joined together as required, avoiding potentially expensive technical issues with a single massive barge.
- Using standard off-the-shelf components makes the build more straightforward.
- Shipyard manufacture enables repeatability and quality control.
- The use of atmospheric vaporisers for regasification has the potential to create substantial volumes of fresh water - a valuable community benefit that is being reviewed in the further development of the design.

AgileLNG offers a reliable, entirely flexible, three-module, power delivery system that can be configured to suit individual sites. The storage and regas unit can be employed on its own or with support and power units attached.

While economy of scale means it is never going to be possible to distribute small amounts of LNG as cheaply as large volumes, AgileLNG has done much to minimise the increase in unit rates over an operation ten times the size.

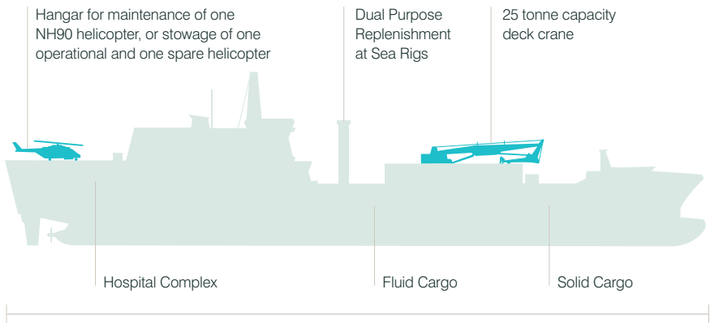
The platform can bring reliable power to remote coastal communities world-wide, and permits the roll-out of cleaner fuels across all scales of urban development.

This Ikea-style approach to small-scale LNG distribution pieces together off-the shelf and prefabricated elements to deliver a smart and flexible solution at an acceptable price: maximising cost savings through intelligent design. BMT's Richard Colwill explains how these modular barges have the potential to transform lives across the archipelagos of Asia and around the world.

Norway’s new mothership

Ultra-flexible HNoMS Maud will support surface vessels and subs at sea worldwide

HNoMS Maud



Length: 180.7 m

Vital statistics

Built by Daewoo Shipbuilding and Marine Engineering (DSME), Maud will support Norway’s frigates, corvettes, mine countermeasures vessels, submarines, and small craft:

- **Beam:** 25.9 m
- **Speed:** 18 knots
- **Primary fluid cargo capacities:** F76 Diesel Fuel: 7000 te / F44 Aviation Fuel: 300 te
- **Primary solid cargo capacities:** 40x TEU (Twenty-foot Equivalent Units) containers/ 200 te ammunition or a mix of vehicles and boats

Named after Queen Maud of Norway, this 26,000-tonne logistics and support vessel is the first of its kind in the Royal Norwegian Navy. The fully winterised, bespoke design is based on BMT’s scalable AEGIR platform and provides global task force support from one multi-role ship, featuring helicopter flight deck and hangar, and a 48-bed hospital capability. On entering service, she will be the largest ship in the Norwegian Navy.

Logistics support is critical for endurance at sea and therefore for the operational strength of any naval task force. HNoMS Maud’s ability to deliver fuel, spare parts, ammunition, medical supplies and hospital facilities to all four corners of the earth, transforms the power of the Norwegian naval fleet.

The cost-effective AEGIR concept ticked all the boxes for the Norwegians, offering all the capacities, functionality and flexibility required by the navy.

“The most important features are the vessel’s ability to carry large amounts of solids and fuel and deliver them in open waters, to handle helicopter operations, and to deliver lifesaving treatment and surgery to close to 50 patients,” said Project Manager, Bjørn-Ove Stikholmen. “Her flexibility is seen in many elements of the design, from the large container deck and ammunition-classified holds which enable her to carry different types of cargo, to the large mess decks that can be converted into hospital wards supporting the overall medical capability when required.”

Maud’s global role means all her systems must remain fully operational in the most inhospitable conditions, including at temperatures as low as -30°C which gave the BMT engineers a complex design challenge. Not only did they want to protect equipment from the elements wherever possible to minimise the risk of icing, but they also had to factor in the significant power draw required by the ship’s heating and anti-icing systems.

“All the modifications required for winterisation have knock-on effects and we needed to understand the full impact of these from the start in order to properly balance our design,” explained Ian Savage, BMT’s Deputy Design Manager. “This involved many complex fundamental calculations and significantly advanced our learning about winterising designs.

For example, the power required by the anti-icing systems was more than we had originally anticipated as the wind had a larger cooling effect than expected; it wasn’t just the air temperature we had to deal with. This required a detailed analysis of the operating modes to ensure that sufficient power was available for other tasks on the ship.”

Winterisation requires a host of design considerations, including locating equipment and systems internally, protecting exposed equipment, a strengthened hull, incorporating additional crew shelters and drying facilities and designing freeze-resistant tanks.

“A lot of the innovation with this vessel was around putting it all together into a balanced design; dealing with the different operational requirements for each of the varied roles that this vessel will perform, the mix of commercial and naval design standards, and constraints as one,” added Simon Jones, BMT’s Design Manager. “That challenging holistic approach working closely with the end customer, the shipyard and other stakeholders was crucial for achieving this innovative design.”

The globe is criss-crossed by millions of kilometres of oil and gas pipelines, traversing continents beneath remote, inhospitable, and often mountainous terrain. Interaction with a variety of geotechnical hazards makes some ground movement inevitable. But what did that landslide actually do to your pipeline? Is that subsidence sufficient to compromise safety? BMT has come up with a way to give pipeline operators accurate intelligence about what's going on underground. Aaron Dinovitzer and Abdelfettah Fredj explain.

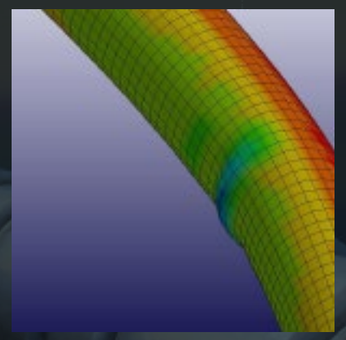
Pipeline vs ground movement

taking the guesswork out of geotechnical hazard assessment

Applying the science

The modelling tool can be used to inform pipe design pre-construction to ensure maximum resistance to likely hazards, but is mostly called in where unforeseen ground movement has raised concerns about damage. It explains behaviours that its predecessors cannot.

- A major slope in southern Manitoba, containing five large diameter crude oil lines, was found to have moved by up to three metres since the pipeline installation. The pipe-soil interaction tool was used to show that one of the pipelines was close to the limit of its strain tolerance.
- Could a light railway be built over a particular pipeline? The loading was simulated with the modelling tool to demonstrate the performance and acceptability of the design to ensure success.
- Would taking material out of the ground below a pipeline cause subsidence, leading to bending and eventual failure? Predictive modelling showed the long-term impact of the mining operation.



Forest fires, floods, and drought are just some of the hazards that put buried pipelines at risk of deformation when unexpected ground movement exerts stresses and strains on the infrastructure. But when they can't see the pipeline, how can operators be sure what's happened?

Geotechnical assessment will tell them how the soil is moving, and data from inspection tools inside the pipeline will provide clues about the pipe's integrity, but until now there has been no way to connect the dots for a clear 3D assessment of the likely effects of the event.

The advanced modelling tool we have developed gives operators the missing piece of the jigsaw. It simulates the ground movement process and predicts the pipe deformation and accumulated strains in the pipeline, today and in the future if the movement continues. This novel technique for looking at displacement patterns and understanding the soil-pipe interaction is much more precise than soil spring-based modelling.

When operators can see clearly what's going on, they can properly evaluate the pipeline's potential for failure – imminently or at a later date - and make better decisions about what needs to be done and when. Does the pipeline need repair or repositioning? Does the slope require stabilisation?

Decisions are driven by scientific calculation, which enrich expert opinion, and means operators need not rush in to carry out work "just in case", but can be confident there is no immediate threat to supply, safety, or the environment.

BMT has a long history of dealing with pipeline integrity, especially in the USA and Canada where more than half the world's oil and gas pipelines are located, and major pipeline operators have expressed interest in – and employed - the new tool.

We have validated our models against field observations and full-scale field tests to prove the tool simulates reality, and we are now applying these advanced models in a range of projects with great success.

We have also worked with the Pipeline Research Council International (PRCI) and the US Department of Transport to develop a simplified version of the tool for relatively quick assessment of some standard scenarios with the aim of reducing pipeline failures due to natural forces.

News

Dubai's Environment Agency Turns to BMT for Aquaculture Project

BMT has been appointed by the Environment Agency - Abu Dhabi (EAD) to determine the environmental carrying capacity of three new aquaculture sites off the coast of Dalma Island in the Arabian Gulf.

Mohamed Hasan Ali Al Marzooqi at EAD comments: "BMT offered clear advantages over its competitors based on the quality of their products and service. Their excellent track record in Australia – arguably one of the toughest regulatory environments in the world – was also very attractive to the EAD team."

BMT will deliver a state-of-the-art EIA approach to assess the potential impacts of sea cage operations in each of the three proposed sites. It will use the same advanced modelling techniques that it used to enable a major Australian aquaculture facility to secure approval by the Western Australia Environment Protection Authority.

BMT Wins Malaysian Contract

BMT has been awarded a contract by a consortium led by HSL Constructor to provide detailed engineering design and risk management consultancy services for a new coal unloading jetty and associated bulk handling system at the Tanjung Bin Energy (TBE) Power Plant in Johor, Malaysia.

The TBE Power Plant, also known as T4, is a super-critical coal-fired power plant developed by Tanjung Bin Energy, a part of Malakoff Corporation, providing the most efficient coal combustion technology currently on the market.

The project win follows on from BMT's work supporting several projects in Malaysia, including the construction of the LNG Regasification Terminal Sungai Udang and the 2 x 1000MW Jimah East Coal-Fired Power Plant.

Sarawak Government turns to BMT for assistance

BMT has been appointed by EMS Progress, on behalf of Sarawak's Chief Minister, to assist with redevelopment of Reservoir Park, Kuching in East Malaysia. BMT will be assisting with environmental assessment studies for the remediation of Reservoir Lake using detailed water quality modelling and stormwater management principles. BMT has also been asked to prepare a Conservation Management Plan for the whole Park, which is located in an urban environment, but still supports important migratory bird species such as the hornbill.

The project was secured through the demonstrated skills and experience of the BMT team in projects of this nature.

BMT Design Sees Vigor win U.S. Army Contract

MSV(L), BMT's fast landing craft design, has been licensed to US shipyard Vigor in its successful bid for the US Army's next generation of landing craft. With a total value of $979,390,000 over a ten-year period, the contract will provide sustained full-time employment for roughly 200 skilled artisans.

The MSV(L) design with which Vigor won the contract dramatically improves the capabilities of the current LCM-8 and provides the optimal combination of performance, operational flexibility and life-cycle cost while maintaining the reliability and versatility of the Army's current craft.

Samsung Heavy Industries Awards 2 New Contracts to BMT

BMT has secured new contracts with Samsung Heavy Industries (SHI). BMT will supply vessel performance monitoring systems for four VLCC's for a Greek owner which comes on the back of current orders already received from SHI for seven vessels (Suezmax and Aframax tankers) for Norwegian and Singapore owners.

Mr Chang Su Lee, Sales Director at Marbiss, BMT's local agent in Korea comments: "BMT has secured several projects with SHI based on a strong reputation of delivering high quality products. Working in partnership with BMT, we're looking forward to working with SHI to ensure the solutions are fit for purpose and fulfil the needs of their customers."

BMT Wins U.S. Ferry Design Contract

BMT has won a contract for four 26.3m catamaran passenger ferries, destined for operation with Potomac Riverboat Company. Working in close collaboration with the customer, BMT has developed the concept for the new vessel and continues to support the project with production engineering to the selected builder.

The vessels have been developed based on a BMT proven hull form and will be powered by two x Scania DI13 082M 368kW @ 2100rpm continuous duty-rated EPA Tier III engines plus two x FP propellers, providing a service speed of 22 knots. The ultra-low wake design provides maximum comfort and low-impact on this type of craft at relatively high speeds. Metal Shark has now delivered the first two vessels which are now in service.

New Funding for Autonomous Navigation

BMT has taken the lead in a new £1.2million research project funded by Innovate UK, the UK's innovation agency. Collaborating with ASV Global and Deimos Space UK, BMT is seeking to address the challenge of how traditional manned vessels can co-exist with autonomous systems in shared water space. Deimos Space UK, the British subsidiary of Elecnor Deimos, is investigating how the exploitation of existing and future satellite capabilities can contribute to this objective.

The SWANS (Shared Waterspace Autonomous Navigation by Satellite) project will, for the first time, enable beyond line of sight, over the horizon, autonomous behaviour by unmanned surface vessels in areas of congested maritime traffic.

BMT Introduces Venari®-85

BMT has launched VENARI®-85, a new mine countermeasure (MCM) concept design capable of clearing mines faster over a greater area and with less risk to the crew, whilst simultaneously providing broader utility to navies around the world. VENARI-85 offers a flexible, future-proofed platform, capable of a spectrum of roles and able to evolve as technology advances in the unmanned and offboard systems markets take shape.

Combining BMT's ship design pedigree with QinetiQ's integration expertise, and drawing upon the experience of mine warfare operators from several different navies and system suppliers, VENARI-85 has been specifically designed and configured to exploit the next generation of offboard vehicles, mission systems and operational concepts.

BMT and MSI Win FSRU Terminal project

BMT and Metocean Services International (MSI) have been jointly awarded a contract by Gastrade to deploy an Environmental Monitoring System (EMS) and develop metocean criteria to be utilised for the design of the offshore moored FSRU and the subsea pipeline to shore.

The Alexandroupolis FSRU will be located offshore Greece in the northern Aegean Sea in approximately 40m water depth and will connect to shore via a 24km subsea pipeline.

BMT will deliver the metocean criteria study to support the engineering design phase and will use its in-house, long-term wave hindcast and hydrodynamic modelling software TUFLOW-FV, to simulate local sea states and hydrodynamic conditions. TUFLOW-FV is a 2D/3D finite volume numerical model that simulates hydrodynamic, sediment transport and water quality processes.

UAV Performs Perched Landing

The very first UAV to perform a perched landing using machine learning algorithms has been developed in partnership with the University of Bristol and BMT. The revolutionary development of a fixed wing aircraft that can land in a small or confined space has the potential to significantly impact intelligence-gathering and the delivery of aid in a humanitarian disaster.

The 18-month research project was delivered as part of the Defence Science and Technology Laboratory's (Dstl) Autonomous Systems Underpinning Research (ASUR) programme. BMT and Bristol University have demonstrated how the combination of a morphing wing UAV and machine learning can be used to generate a trajectory to perform a perched landing on the ground. The UAV has been tested at altitude to validate the approach and the team are working towards a system that can perform a repeatable ground landing.