WindEnergy NETWORK

COMMUNICATION HUB FOR THE WIND ENERGY INDUSTRY

Health & Safety

Emergency Response

BLADE INSPECTION & REPAIR

Inter-Array Cables

ISSUE 31 - MARCH 2016 | £7.50

Meet the Team

We return to our more natural format of features requested by our readers rather that 'spotlighting' specific areas of the industry.

MEET THE TEAM

Please have a quick look at our 'Meet the Team' page – we visit numerous events throughout the year and we love meeting our readership. In this world of advanced communication technology it is just good to meet up in person either at a stand or over a coffee/drink.

Our next event is imminent… Oceanology International at Excel, London from 15th to 17th March 2016. Please make contact so that we can diarise an appointment.

INTER-ARRAY CABLES

Siem Offshore Contractors is our sponsor and therefore head our feature – they have supplied a stunning image for our front cover.

OTHER FEATURES INCLUDE…

In a packed issue, we are pleased to cover the following interesting topics:

- Health & Safety
- Blade Inspection & Repair
- Emergency Response
- Launch & Recovery Systems
- Seabed Surveying
- Failure: Root Cause Analysis
- Radar Mitigation
- Due Diligence
- Protective Coatings

TWENTY6

Jon Herbert, of Twenty6, has been working for a number of companies within the industry to help them tell their stories by means of good editorial over the last few years several of which have appeared in this magazine over the years.

Click to view more info

As our decision-making readership know, we do not accept advertorials as these do not work in a professional and sophisticated industry. Good editorial is therefore very important to us. Therefore, if you would like to use Jon as an independent writer, please do not hesitate to contact him direct.

EDITORIAL CONTRIBUTIONS

Please feel free to contribute to the next edition. Your contributions are vital to our success so please do not hesitate to get in touch.

INTERACTIVE MAGAZINE IN PRINT AND ONLINE

Many of you are now quite aware of our magazine's interactive links. By using QR Codes in the printed version and direct links online we are able to assist our readership in finding out much more information on products and services available to the industry.

Please try these here to see what we mean

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= Click to view video

FORTHCOMING FEATURES – GET INVOLVED

Please feel free to contact us if there is any subject area which you think may be of interest to our readership and we will do the rest – there is never any charge for genuine editorial.

Wind Energy Network Issue 32 (editorial deadline 15th April 2016)

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Sponsored by The Met Office
3 Life Extension of Windfarms
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Sponsored by PJ Marks & Co
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Sponsored by Subsea Innovation

Duncan McGilvray
Editor | **Wind Energy Network**

www.windenergynetwork.co.uk

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Scan/click this link to find out how to get involved in the magazine

High Seas

Selecting a cover image is never an easy exercise – trying to guess what we will receive, what features become the most prominent and of course what you would enjoy seeing.

Siem Offshore Contractors supplied the cover image – it so fits with the theme of working offshore and the conditions experienced.

OTHER FEATURES INCLUDE…

- **Health & Safety** – as well as regular contributions we feature a real world experience as our Junior Reporter takes us behind the scenes while training for offshore work
- **Blade Inspection & Repair** – as the industry progresses important components are scrutinised and solutions found
- **Emergency Response** – when working offshore there is even more emphasis placed on procedural safety systems and preparations

Duncan McGilvray
Editor | Wind Energy Network

COVER IMAGE

Siem Moxie carrying offshore support units as well as transferring people and equipment during an inter-array cable installation project

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GET IN TOUCH

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INDUSTRY LEAD ARTICLE

ROYAL SOCIETY FOR THE PROTECTION OF BIRDS… AND WIND TURBINES

Proof, if proof were needed, that extols the myth that wind turbines are a danger to birds.

The RSPB and Ecotricity were given the go-ahead recently to build a new wind turbine in green energy partnership

RSPB HEADQUARTERS

RSPB and Ecotricity, Britain's leading green energy company, have installed a wind turbine at the nature conservation charity's headquarters in Sandy, Bedfordshire. The 100 metre tall wind turbine will generate around two million units of green energy every year, equivalent to over half of the electricity the RSPB uses across its 127 UK locations.

With this one wind turbine, Europe's largest nature conservation charity, in partnership with Ecotricity, will reduce carbon emissions by up to 800 tonnes every year.

HOLISTIC APPROACH

Martin Harper, RSPB's Director of Conservation, said: *"Climate change is the single biggest threat to our planet. This is about our birds and wildlife as well as our way of life. Around the world, and even in the UK, we can already see how these changes are affecting wildlife, the places where they live as well as damage to our homes and disruptions to the economy.*

"It is down to everyone to play their part. In the UK, we have the potential to generate a significant portion, if not all, of our electricity from sustainable sources. This will take time and it will take investment. So I am proud to say the RSPB continues to back words with actions to show we are serious about tackling the threat of climate change with our biggest single renewable energy project yet."

PARTNERSHIP

The project is a partnership between the RSPB and Ecotricity, Britain's leading green energy company, in which Ecotricity finances and installs the turbine that produces affordable green energy for the RSPB.

Ecotricity pioneered this unique approach fifteen years ago, and its wind turbines currently power operations for Ford, Michelin, Sainsbury's and B&Q.

21ST CENTURY APPROACH

Dale Vince, Ecotricity founder, said: *"This is a 21st century approach to making energy in Britain – it's about working with our customers to make energy where they live and work, and sharing the benefits with them.*

"Green energy puts power in the hands of the people – the technology allows us to democratise and decentralise energy in Britain. "That's exactly what this partnership does; it allows us to work together with our customers to make green energy where they need it and to share the benefits – the complete opposite of the old top down approach.

"Green energy is also a strong economic and an environmental choice – it's about jobs and the new industrial revolution, about building a truly sustainable economy in Britain."

RSPB ENERGY EFFICIENT PROJECTS

The new turbine is the latest development in a growing portfolio of RSPB projects that are making the charity more energy efficient and greener. The RSPB has aligned its carbon emissions reduction ambitions with the 2008 Climate Change Act, which includes a legal duty for 80% reduction of greenhouse gas emission by 2050.

To achieve this, since 2007, the RSPB has set out a target to reduce its carbon emissions by 3% per person per year to 2020 as the first phase towards this ambition. Over the last few years, the RSPB has invested in energy conservation, photovoltaic (PV) roof systems, wind power, solar thermal collectors, ground source heat pumps, biomass generators and more to achieve this target.

SITE ECOLOGICAL AND ENVIRONMENTAL RESEARCH

Ecotricity, in partnership with the RSPB, completed three years of detailed ecological and environmental research to confirm that the location is a suitable site for a wind turbine before presenting final plans to the local Planning Authority.

Martin Harper added: *"Last year world leaders came together, recognising the impact of climate change and the need to act now. We now have a global agreement to hold the Earth's average temperature to well below 2 degrees C. Renewable energy will play an important part in this.*

"Using wind energy is a proven and reliable technology that reduces greenhouse gas emissions. But turbines must be located where they are sympathetic to our natural environment.

METICULOUS PLANNING

"The RSPB has been involved in over 1,500 wind farm applications, offering our expertise and advice to local authorities, land owners and energy companies. This ensures that local nesting activity, migratory patterns and flight paths are all taken into account when planning a new wind turbine.

"I hope that our wind turbine will inspire others to take action and join us in using renewable energy to power our country."

RSPB

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= Click to view video

PROJECT REACHES MAJOR MILESTONE AT PORT OF BLYTH

A project to build one of the world's largest pipe laying systems has reached a major milestone with the arrival of the main tower section at Port of Blyth.

PROJECT DETAIL

The structure, designed by IHC Engineering Business, part of Royal IHC, and weighing almost 1,000 tonnes, has been shipped in from The Netherlands. It was transferred to IHC Engineering Businesses' main UK manufacturing and assembly facility based in Port of Blyth's South Harbour Terminal using specialist transport units.

IHC Engineering Business is a major supplier of engineering solutions to the offshore energy sector and will complete the eventual 2,500 tonne pipe laying system at the facility in early 2017. It will ultimately form part of a large deep-sea offshore construction vessel.

IMPORTANT MILESTONE

IHC EB Managing Director, Paul Hardisty stated; *"The J-Lay project is enormously important to us and we are proud to have reached this critical milestone. This is the first major project we will execute at the Port of Blyth. It will pave the way for other major works that we will complete in 2016.*

"The establishment of our new facility is a major landmark in the development of IHC and is clear evidence of our commitment to manufacturing in the North East. We are grateful for the excellent support received from the Port of Blyth team."

MAJOR OFFSHORE ENERGY HUB

Port Chief Executive, Martin Lawlor also confirmed *"We are delighted to see the arrival of this major structure as part of a significant project for both the Port and IHC EB. This demonstrates the close working relationship between our two companies and is another example of the Port's emergence as a major offshore energy hub."*

IHC Engineering Business

Click to view more info

= Click to view video

REACH MEGA HEIGHTS

Wind turbine towers are set to reach heights of up to 170m with new construction techniques and materials, according to wind power engineering specialists K2 Management. Tower heights have grown steadily over the last decade as operators seek stronger wind speeds higher up in the atmosphere.

NEW TECHNOLOGY DEVELOPMENTS

Based on work with various clients across the globe, K2 Management believes new technology developments like modular concrete structures mean turbine heights are likely to soar to up to 170m in the coming years – higher than London's 'Gherkin', and almost as high as the Eiffel Tower.

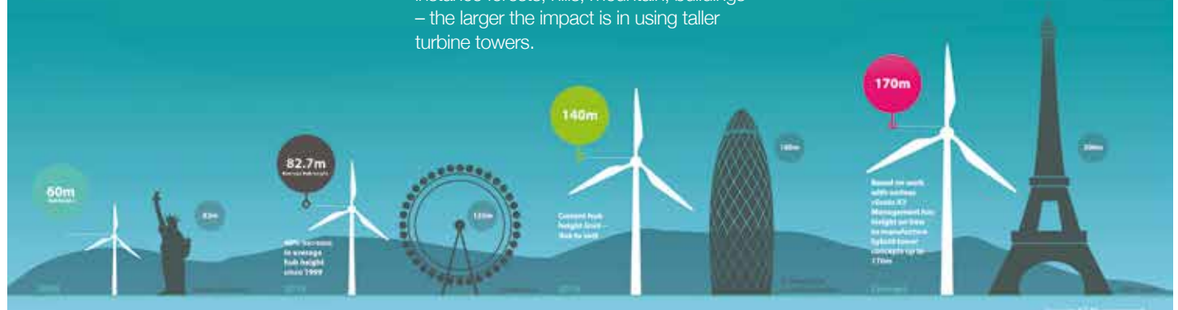
This compares to the tallest towers of 150m at present. There has been a 48% increase in average hub height since 1999, and based on its experience in the industry and its partnerships, K2 Management has insight on how to manufacture hybrid tower concepts up to 170m.

COMPARISONS

According to K2 Management wind resource experts, a 3 MW turbine located in a forest area for example, with an average wind speed of 6 metres per second, will meet 13 percent more wind speed if the turbine height doubled from 70 to 140 metres. Annual energy yield prediction would increase by almost 30 percent because of less surface aerodynamic drag and the viscosity of the air. Therefore, going up to 170 metres from 70 metres will boost energy yield prediction by 35 percent on average. The more complex the terrain – for instance forests, hills, mountain, buildings – the larger the impact is in using taller turbine towers.

COMMON SIGHT

K2 Management CEO Henrik Stamer says: *"170m towers could become a common sight in the near future in markets like the USA and Germany as part of a new renewable skyline. We expect to see more of these mega designs as we help our clients get the most out of their wind projects."*



UNIQUE VANTAGE POINT

Through its network of experts across the globe, K2 Management possesses a unique vantage point overlooking the wind industry, allowing for a view into emerging trends.

The company is able to draw on this wide breadth of experience to identify ways of making wind projects more efficient.

Stamer adds: *"As a company that is at the global cutting edge of technology we are helping push the limits of the wind industry in terms of power generation efficiency, cost-effectiveness and return on investment; and these new mega wind turbine towers are a case in point."*

K2 Management

LEADING THE WAY TO COMMERCIAL ACCEPTANCE OF FLOATING LIDAR

AXYS Technologies Inc. (AXYS) has recently completed another two successful validation campaigns for its FLiDAR 6M wind assessment platform. This latest achievement marks the 9th and 10th independently reviewed offshore validations undertaken by the company to advance the commercial acceptance of its FLiDAR technology for offshore wind resource assessment in support of project financing.

LATEST VALIDATION CAMPAIGNS

The latest validation campaigns took place at FINO 1 in the North Sea and at West of Duddon Sands in the Irish Sea, adding 11 more months of validation data to AXYS' already impressive body of evidence for commercial acceptance. Both validation campaigns achieved over 98% data availability through harsh winter storm conditions while meeting or exceeding the accuracy standards established by the Carbon Trust Offshore Wind Accelerator (OWA) Roadmap.

"DNV GL has carried out numerous independent validations of AXYS' FLiDAR systems over the past 3 years, comparing over 20 months of FLiDAR Wind Assessment data against offshore met mast data from FINO1, NAREC and West of Duddon Sands," said Detlef Stein, Global Head of Practice for Resource Measurements at DNV GL. *"AXYS' FLiDAR systems have consistently provided high data availability and accuracy under a wide range of harsh environmental conditions."*

WIND ASSESSMENT CAMPAIGNS

Since the initial deployment of its flagship system in 2009, the company has successfully completed 17 offshore wind assessment campaigns and now 10 offshore met mast validations covering a range of operational, site and met ocean conditions in Europe, North America and Asia. This represents a total of nearly 12 years at sea.

FIRST FLIDAR SYSTEM

"AXYS produced the first FLiDAR system by equipping our proven 6M met ocean NOMAD hull with a LiDAR," said Terry Tarle, AXYS President & CEO. *"AXYS has supported the operation and maintenance of a fleet of 6M MetOcean NOMAD buoys in extreme weather and sea state conditions off the coast of Canada for over 30 years, so it is no surprise to us that our FLiDAR system has proven to be so reliable for conducting wind measurement campaigns in the harshest of offshore conditions."*

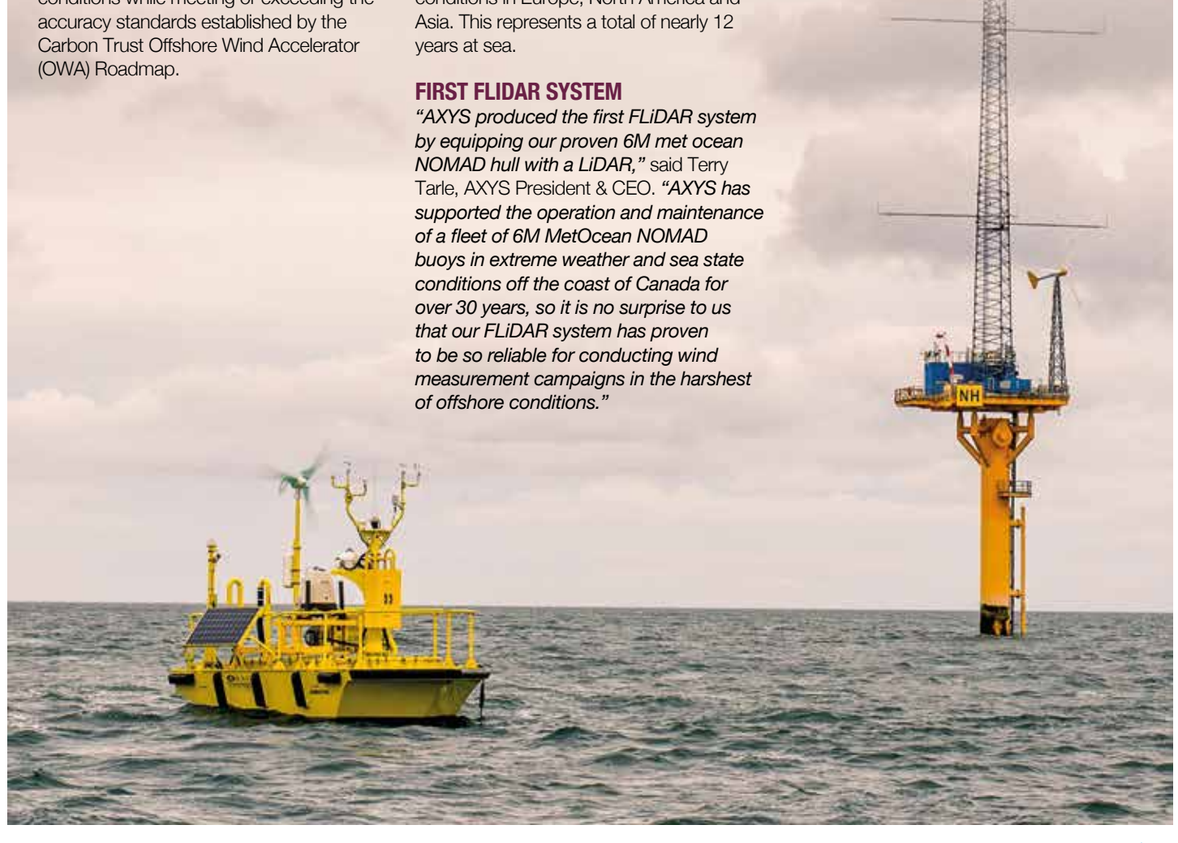
WORLDWIDE OPERATION

AXYS now operates a lease pool of 8 FLiDARs worldwide with 2 backup systems available on short notice. AXYS FLiDAR systems have been designed and hardened over the past 7 years to increase survivability and maintain high levels of accuracy and data availability in extreme weather and sea states. Features such as dual-LiDAR, triple-redundant power supply and communications, and redundant data storage were all designed to continually improve system reliability and to ensure the success of our customers' projects.

AXYS Technologies Inc.

Click to view more info

= Click to view video



HOTA FEATURE SPONSOR HEALTH & SAFETY

Ensuring health and safety on the Humber

We introduce HOTA our sponsors for this feature, which is an extremely important subject area for the industry. On a more personal note Karen Shepherd, HOTA's General Manager gives us a few interesting answers in our regular '20 Questions'.

Established in 1987 by the Industry for the Industry, HOTA is a Quality Training Provider, offering nationally approved training and tailor-made bespoke courses to meet individual and company specific training needs.

A Limited Company with Charity Status, all surplus funds generated are ploughed back into enhancing its training facilities.

FLEXIBLE APPROACH

Attracting over 8000 delegates per year and offering more than 100 training courses across a number of industry sectors including Offshore, Maritime and Renewable, HOTA is renowned for its flexibility, professionalism and its industry experienced highly trained team of trainers delivering courses when, where and how they are required.

Excellent facilities are offered to delegates including free on-site car parking, Wi-Fi, restaurants and amenities.

20 QUESTIONS

WHO ARE YOU?

Karen Shepherd, General Manager, HOTA (Humberside Offshore Training Association Ltd)

LOCATION

Hull, East Yorkshire

TIME AT COMPANY

I completed 25 years in August 2015

FAMILY STATUS

Married no children

CAREER OVERVIEW

I started at HOTA as a Course Administrator at the age of 20 years, at that time there were only 3 other members of permanent staff. HOTA was located in Hull City Centre in small rented offices and all training was provided by third parties including Hull College and Humberside Fire & Rescue Services.

I was promoted to Office Manager and then Business Development Manager and when Linda Ellis retired I was appointed the General Manager by HOTA's Board of Trustees and officially began the role in January 2013.

EDUCATION

I have a Higher National Certificate in Business & Finance and a 2:1 Degree from Hull University in Business Management. I did my education the hard way, I completed both qualifications whilst in full time employment and started them when I was in my early 30's. I was convinced and possibly pushed to go back in to education by Linda Ellis, my strong minded boss who at the time was the General Manager at HOTA!

FIRST JOB

Whilst at school I worked holidays and weekends at Burgess's, which was a famous family owned ice cream company in Beverley. When I left school I took a pay cut to start full time work on a YTS with the House of Fraser Group.

WHO ARE HOTA'S CUSTOMERS?

HOTA's customers range from individuals who are brand new to the specific industry that have never been to Hull before let alone HOTA – for example a magician going to work on a cruise ship in the Caribbean to large multi-national companies that have used HOTA since it established in 1987.

The variety day-to-day is definitely my favourite part of the job which is apparent through the type of training provided and also the customers we deal with. Although I am officially HOTA's longest serving employee I am still learning new things which I love as it keeps me on my toes!

WHAT ANNOYS YOU THE MOST?

Bad manners – especially when you open the door for people and they don't say thank you.

WHAT WAS YOUR BEST HOLIDAY?

I love all my holidays whether it's a city break or cruising around the Caribbean but I will say my honeymoon to Cape Verde was probably my favourite!

WHAT WAS YOUR WORST HOLIDAY?

I haven't really got a worst holiday but probably the funniest one would be a cruise that we booked to Ireland for a few days and due to the weather conditions we never left Mersey Docks in Liverpool we call it the 'doomed cruise'!!

WHAT IS YOUR DREAM HOLIDAY?

Anywhere where it is hot and relaxing with great food, good friends and my husband but I have just put Vietnam on my bucket list!

WHO WOULD YOU NOT LIKE TO BE?

Anyone famous – I like my own life and privacy.

WHAT IS YOUR FAVOURITE SMELL?

Freshly brewed coffee and baked bread

WHAT IS THE MOST BIZARRE QUESTION YOU HAVE EVER BEEN ASKED… APART FROM THIS ONE!?

I have a bizarre question I like to ask people – 'If you were on death row what would your last meal be' it's a great ice breaker and certainly gets people talking.

WHAT IS YOUR FAVOURITE RECORD/CD/ARTIST/MUSIC?

I don't really have a favourite record or artist I love all types of music but at present it would be Rod Stewart and Adele - but I do have a 5 worst songs list!

IF MONEY WAS NOT A FACTOR WHAT WOULD YOU BUY TOMORROW?

It would have to be booking a holiday for all my family including my nieces and nephews and the only place to go would be Florida and Disneyland – having memories is what counts.

WHAT TALENT WOULD YOU LIKE TO HAVE?

I have to say singing – I think I can sing but my husband doesn't agree with me!

WHAT LAW/LEGISLATION WOULD YOU LIKE TO SEE INTRODUCED?

It has to be drinking and driving – I don't understand how you can be in charge of a car with alcohol in your system – leave your car at home if you want to drink!

WHAT PROMINENT PERSON WOULD YOU LIKE TO MEET?

Prince Harry – think he would have some fantastic stories to tell and I admire all the brilliant work he does for people!

WHAT BOOK ARE YOU READING AT PRESENT?

I don't have a lot of time to read – but I love to read on holiday I've already got a couple lined up including Gone Girl for my holiday in June.

WHAT CAR DO YOU DRIVE?

A Renault Megane Convertible – my husband hates it but my 82 year old mum loves the roof down!

TYPICAL DAY

On a typical day I am in the office from 7.30 and enjoying my first coffee of the day, after that my office can be likened to Piccadilly Circus – I can deal with anything from personnel issues to writing press releases and even completing questionnaires like this!

I wouldn't change my job for anything, every day is different and I love meeting and helping people – I have a great team at HOTA and when you see delegates coming back again and again it proves we are doing our job right!

HOTA

Click to view more info

= Click to view video

THE IMPORTANCE OF SAFETY WEAR
MATCHING CLOTHING AND WORK

Mascot offers hi-viz clothing for anyone who places high demands on their safety wear. It combines high safety, smart design, super freedom of movement and all of the functions that you really need. The range offers both workwear and winter clothing, in six different two-tone combinations. Choose between combinations in all of the fluorescent colours: red, yellow or orange.

WIDE CHOICE OF SIZES

All employees will fit into the new range, whatever their height and build because it comes with three different leg lengths as standard and in up to 17 different waists per leg length.

BEST SAFETY ON THE MARKET

Mascot products live up to the highest safety standards on the market, approved according the newest standard, EN ISO 20471. More reflective areas than specified by the standard have been provided, in order to increase visibility.

Today, in more and more industries there is a need for safety workwear at work. In particular, this applies to industries where a large part of the work takes place near traffic, cranes and other motorised vehicles, as well as work that takes place in the dark. And it is a good investment.

Certified safety workwear keeps employees safe while they concentrate on work. The employees will be visible at night, during the day and from all angles, including from the rear where it is impossible for them to see. With the right safety workwear, neither reflectors nor fluorescent material will be hidden by blind angles.

STANDARDS

EN ISO 20471 is an international standard that requires visible workwear for employees in high-risk areas. Using the right safety workwear is important, this also applies to safety footwear. Reduce the risk of accidents by choosing footwear with non-slip soles.

FOOTWEAR

The company's shoes have soles that have passed all tests for slip resistance and have reached the highest standard in the market, SRC. At the same time, the soles are highly durable and equipped with great ladder grip. In addition to safety factors, in the footwear, high comfort is also important so that you feel comfortable in your shoes throughout the working day.

EXTREMELY WEAR RESISTANT

The company's workwear meets the highest requirements in comfort and durability. The smart combination of materials in the trousers, shorts and bib & brace are primarily placed allowing for the cotton to be next to the skin for the sake of comfort and polyester on the outside to provide durability.

In addition, there are several places where CORDURA reinforcements are used on exposed locations, such as pockets, knees and ankles. The material is seven times stronger than cotton, thereby ensuring extra-long life for the product. The seams are also reinforced and the trousers, shorts and bib & braces have triple stitched seams in several places to strengthen the garment.

Mascot Workwear

Click to view more info

EUROPEAN PARLIAMENT IS ASKED… HOW SAFE ARE YOUR BOLLARDS?

What do the UK, Netherlands, Spain, Greece, Portugal, Italy and Sweden have in common? Answer, they are all in the EU.

What do Nigeria, India, Mexico, Brazil, Australia, New Zealand, UAE, Egypt have in common? Answer, they not in the EU.

However, all the above countries have in common, individuals who have directly expressed concern over the safe working loads of quayside bollards and how to test them.

There are the obvious concerns of bollards being fit for purpose when mooring vessels and making them secure.

BUT…

Imagine working in your office when a missile hits the side of your building, or sitting in your car when the back window shatters with explosive force; these are recent examples of catastrophic failure where bollards parted from their fixings hurling 200 and 80 mtrs respectively. Thankfully financial cost was the only effect.

Why is there an absence of health and safety legislation ensuring bollard safe working loads?

RAISING THE DEBATE – ENSURING SAFETY BY JUDE KIRTON-DARLING MEP

"Ensuring safety in European ports and harbours is a key concern of the EU.

"As ships get larger, weather patterns and wind speeds become less predictable and new strong and light-weight materials are developed to moor vessels, new hazards are emerging in relation to the integrity of bollards.

"An often overlooked area when it comes to the safe mooring of vessels in ports, shipyards and harbours is testing the safe working load (SWL) of bollards. With the size of vessels ever-increasing, the time has come to focus and raise the issues that have been experienced with bollard failure, as well as the challenges faced in testing the SWL of bollards.

INCREASED FAILURES

"Industry experts report that incidents of bollard failures are increasing worldwide, with the increased risk to human life and safety as well as damage to infrastructure and other vessels. As a result some governments are considering mandatory testing rules on mooring bollards in situ.

QUESTIONS TO ANSWER

"Does the Commission intend to make the testing of bollards mandatory?

"Is the Commission aware of incidents in this field in European ports and harbours?"

Tyne & Wear Marine

ED'S NOTE
We will endeavour to keep everyone informed as the issue progresses.

ENSURING SAFETY FOR REMOTE CREW IS SIMPLY GOOD BUSINESS

Companies operating in all sectors realise that retaining the most expert, knowledgeable staff is simply good business. Experienced team members often perform duties more efficiently than junior staff and typically have more know-how to draw upon when faced with challenging situations.

The diversity of activities that workers need to carry out in this industry is wide-ranging. It includes engineers to ecologists, installation crews to construction workers and of course maintenance personnel and operators who work on wind farms on a regular basis. These activities typically take place in far-flung, sparsely populated areas often with limited or non-existent terrestrial or GSM mobile communications.

ESSENTIAL OPERATIONAL REQUIREMENT

Gavan Murphy, Director of Marketing EMEA at satellite technology pioneer Globalstar says: *"Improving working conditions and welfare for remote crews, in particular those working in potentially hazardous environments, has moved up the agenda to become an essential operational requirement."*

To add to the safety imperative, emergency rescues offshore can require specialist support such as an air ambulance. All told, remote crew require a communications system they can trust, rain or shine, 24/7, to guarantee an always-on link with colleagues.

A satellite-based communications solution offers the only viable communications lifeline.

GPS MESSENGER

SPOT Gen3 from Globalstar is a rugged, pocket-sized, affordable personal GPS messenger that helps users stay connected via satellite even where there is poor or no mobile phone signal. If a worker needs help urgently, with the single press of a button, first responders are alerted, the worker's GPS co-ordinates are transmitted and a rescue operation is initiated.

INCREASING INTEREST

The company has seen increasing interest from businesses to better help them fulfill their duty of care obligations to lone workers, including Northumbrian Water Group. The regional water provider has deployed over 300 SPOT Gen3 devices to enhance the safety of 1,500 employees who carry out checks on reservoirs in remote areas.

POSITIVE FEEDBACK

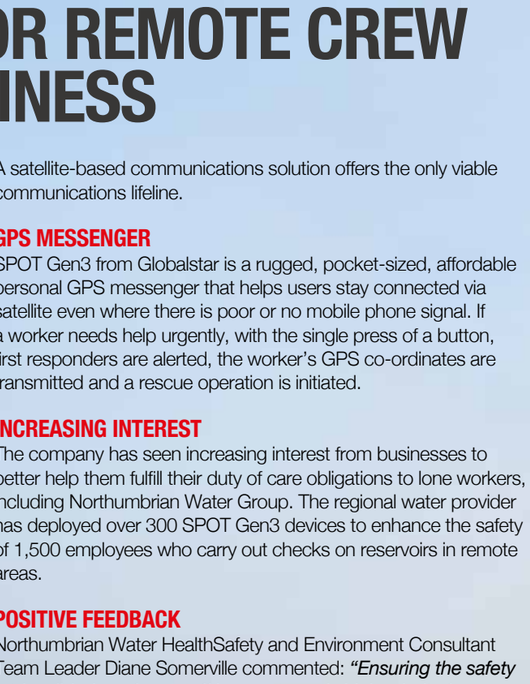
Northumbrian Water HealthSafety and Environment Consultant Team Leader Diane Somerville commented: *"Ensuring the safety and well-being of our staff is an extremely high priority for Northumbrian Water Group and it helps us attract and retain skilled employees. Feedback from staff on the new solution and SPOT has already been overwhelmingly positive.*

"Our employees are telling us that the system is easy to use and we are delighted that we are delivering on our ongoing commitment to constantly ensure that our people are safe while at work while they provide vital services to our customers."

JUST GOOD BUSINESS

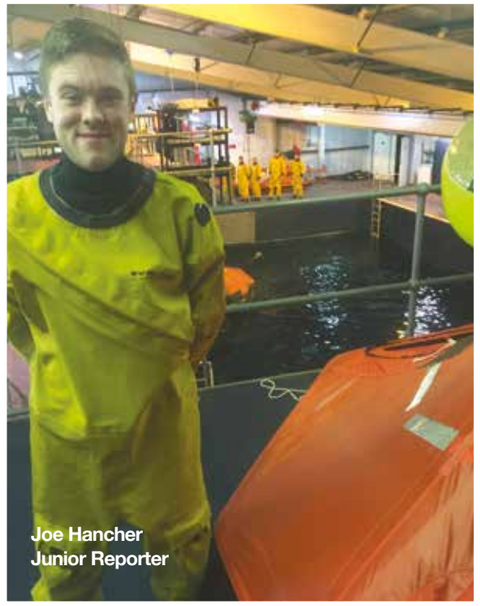
In light of the hazardous tasks which many working professionals in the wind energy sector carry out, often alone, there is a clear need to provide lifeline communications that improve their safety. It's just good business.

Globalstar



REAL LIFE EXPERIENCES

We have been featuring the Humberside Offshore training Association (HOTA) and their important Health & Safety offshore training for many years now. The opportunity presented itself for us to cover a real world scenario when our Junior Reporter, Joe Hancher required such training before he sped off on a worldwide business adventure. We introduce Joe Hancher who takes up the story…


Joe Hancher
Junior Reporter

WELCOME… AND FORM FILLING

On arrival at HOTA at (8.15am prompt) for the on a personal survival techniques one day course, I was greeted by a very professional and welcoming staff. My documentation was very important as they ask a range of questions form your age to your medical history even as far as companies you were working for.

TRAINING BEGINS

At 8.45am we began our training, I was pleasantly surprised to find that the course was a mixture of theoretical and practical exercises and both sides of the course were very interesting. Furthermore I was not prepared for the size and professional quality of their facilities.

FACILITIES

Our day began with the theoretical side when we were taken from the main building where coffee is provided (FOC) in the canteen and taken to the secondary building. This was the main learning area and the building consisted of a large deep pool and several individual classrooms.

We were seated in classroom one where we experienced a very detailed PowerPoint presentation on what to do in different situations; for example if the ship runs aground. Our instructor was very knowledgeable and had obviously worked in the industry for many years.

NOTABLE POINTS OF INTEREST

We covered a lot of information however there were particular categories which stood out for me: the types of life boats and rafts and their contents. Also personal survival equipment. For a young man who has never worked offshore I found this theoretical exercise gave me lots of valuable information I knew very little about.

We took a short fifteen minute break in the middle and then resumed our lecture.

LUNCH

Around about mid-day the books were pushed aside and we broke for lunch, which was fantastic with wide variety of choice from Chicken Kiev to stew in an enormous Yorkshire pudding. Even salads (safe to say no one chose the salad!). I guess to sum it all up the large menu slightly surprised me especially when I got my stew and pudding as the quality was phenomenal.

BACK TO WORK

At 1pm we went back to the classroom and ran over all the practical exercises we would be doing in the session.

The practical exercises were good fun and very enjoyable; almost like an assault course in water, however it does bring the harsh reality of how cruel the elements can be and how these what seem like simple exercises could save your and possibly countless other lives in a situation of danger at sea.

HITTING THE WATER

We changed into our swimming gear in a very small changing room. My group were taken to the poolside where we suited up into our survival suits and did buoyancy tests to make sure you could swim with no life vest.

We then put the life vests on and they remained on for the duration of the practical session. A very physically demanding part is backstroke in a survival suit and trying to flip over a rolled over life raft. However I would like to point out that the well trained staff kept us safe at every moment of every exercise.

DRYING OFF

Shortly after getting changed (around 3pm) we made our way over to the main building to sign our certificates; important note to remember this certificate lasts five years and must be renewed after this period.

COMMENDATION

I must commend HOTA and thank them for sharing their knowledge and time with me I would be very interested in doing another course and highly recommend this professional service with a great attitude towards safety… not just at sea but in their own facility.

Joe Hancher
Reporter
Wind Energy Network

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RISK MANAGEMENT

JAD Financial Solutions provide non-executive solutions to a portfolio of clients across the Humber Region.

In a previous article the company briefly mentioned the benefits of Boards having a Risk Register in the context of presenting to a potential customer's due diligence team that major threats to the continuity of business had been identified and their likelihood of happening assessed and assuaged.

OFFSHORE WINDFARM COMMERCIAL RISKS

On an offshore windfarm commercial risks include unplanned downtime. Managing that risk involves deciding between the benefits of Preventive Condition-Based Maintenance, or adopting a Reactive Approach to mechanical failures.

	LIKELIHOOD				
SEVERITY	1 RARE	2 UNLIKELY	3 POSSIBLE	4 LIKELY	5 ALMOST CERTAIN
1 NEGLIGIBLE	VERY LOW *(Green -1)*	VERY LOW *(Green -2)*	VERY LOW *(Green -3)*	LOW *(Yellow -4)*	LOW *(Yellow -5)*
2 MINOR	VERY LOW *(Green -2)*	LOW *(Yellow -4)*	LOW *(Yellow -6)*	MODERATE *(Amber -8)*	MODERATE *(Amber -10)*
3 MODERATE	VERY LOW *(Green -3)*	LOW *(Yellow -6)*	MODERATE *(Amber -9)*	MODERATE *(Amber -12)*	HIGH *(Red -15)*
4 MAJOR	LOW *(Yellow -4)*	MODERATE *(Amber -8)*	MODERATE *(Amber -12)*	HIGH *(Red -18)*	HIGH *(Red -20)*
5 CATASTROPHIC	LOW *(Yellow -5)*	MODERATE *(Amber -10)*	HIGH *(Red -15)*	HIGH *(Red -20)*	HIGH *(Red -25)*

NOT A THEORETICAL EXERCISE

Managing risk however should not be thought of as a theoretical exercise raised at the behest of the purchasing department. A strong management team needs to be strong enough to admit to itself that it cannot control every adverse event that could happen.

MATRIX APPROACH

A client of the company uses a matrix approach to assessing risks. One way of populating a 'League Table of Risks' is to attach values to each possibility based on its likelihood of occurring and its potential impact on how the business performs.

The table below shows in the top left where the lowest analysed risk would sit [Rare x Negligible] and in the bottom right where the highest most catastrophic risk would sit [Almost Certain x Catastrophic].

Using this table as a simple pictorial prompt any risk in the red boxes requires an immediate action plan.

ASSESSING SPECIFIC RISKS

How one assesses a specific risk will depend upon the circumstances and type of business. During my time as Financial Director in a global duck business, a recurring major risk was the arrival of bird flu into their breeding farms.

Any outbreak immediately curtailed breeding stock exports for a minimum of six months. The threat to future sales is self-evident – why should a Chinese farmer defer his own business requirements because we can't supply him?

ACTION PLAN

The action plan was a relentless focus on quality and hygiene at the breeding farms and to support a number of income streams from other parts of the business that would continue to generate cash should an outbreak happen. But you can never control diseased birds flying to our shores. This would probably be a '16' in this matrix – likely and a major risk.

In this example, the probability of an equipment problem could be either 'Possible -3' or 'Likely -4'. Its severity could be between 'Minor-2' and 'Major -4'. The judgement call would be whether controlled preventive maintenance reduced the severity call to 'Negligible – 1'. That call should be taken after an informed debate.

Isn't it about time you reviewed your Risk Register before you are prompted by your Non-Exec?

Jim Doyle
JAD Financial Solutions

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subsea innovation FEATURE SPONSOR LAUNCH & RECOVERY SYSTEMS

LAUNCH & RECOVERY SYSTEMS

Subsea Innovation are a world leader in the design and supply of Launch & Recovery Systems (LARS) having supplied over 100 systems to major operators worldwide. All LARS are designed, constructed and tested according to DNV GL Standard for Certification of Lifting Appliances No 2.22 and also Portable Offshore Units DNV 2.7-3. Designs and constructions have evolved over 25 years of operational experience in an ever increasing range of environments including deep water and heavy weather.

From this experience the company has built up a number of standard LARS variants covering a variety of requirements. Each system is field proven and examples can be found in active service worldwide.

XW-90

The XW-90 LARS is the standard Subsea Innovation LARS.

Standard and optional features include - Hydraulically controlled swingframe, self-fleeting sheave wheel, radio controls, lighting – strip, flood and emergency, fall arrest systems, hydraulic gates, snubber walkway, skidbase sliding and rotary pallets, cursor systems and overboard platforms, integrated control room and bespoke deck skid systems.

Model	XW-90 LARS
SWL	15,000 Kg
Outreach	4.5m
Skidbase Dimensions	4m (W) x 6m (L)
Gross Weight	27,000 Kg

XWM-90

The XWM-90 LARS is developed from the XW-90, with similar specifications, the XWM-90 has a cranked upper boom offering closer launch to the splash zone and an increased outreach of 5m.

HF-135

The HF-135 LARS was developed by Subsea Innovation to give a greater outreach and to allow the boom to reach a horizontal position, an advantage for vessels with high free boards. This positions the ROV closer to the water and reduces the pendulum effect during launch and recovery.

This system can be fitted with an integral sliding pallet which can be used to position the ROV, TMS or tool skid in different locations for maintenance.

Model	HF-135 LARS
SWL	15,000 Kg
Outreach	5m
Skidbase Dimensions	4m (W) x 6m (L)
Gross Weight	35,000 Kg

HFM-135

The HFM-135 LARS retains all the functionality of the HF-135 but its outreach is further increased to 6.5m. It also has the cranked upper boom offering closer launch to the splash zone.

XX-90

The XX-90 LARS is designed specifically for the trencher market. This system is suitable for large/heavy vehicle deployment as it includes an integral recovery winch swing frame for operations using a non-lifting umbilical.

Model	XX-90 LARS
SWL	15,000 to 50,000 kg
Outreach	5m
Skidbase Dimensions	6.5m (W) x 8.7m (L)

All systems are supplied with a ROV umbilical termination socket and hydraulic power units to operate the units can also be provided if required.

PARTNERSHIP

Subsea Innovation are partnered with NTD Offshore who have a long track record in the supply of both electrical and hydraulic winches and control systems. These winches can be supplied as part of a full package. All models can be supplied for deck layouts.

BESPOKE ENGINEERED SOLUTIONS

The company also produce bespoke engineered systems for specific client requirements. The company can cater from simple transport limitations and weight limits to major design changes improving their designs to assist their customers as the industry faces more challenging market conditions. Some examples of units based upon our proven XW-90.

XS-90

The XS-90 LARS was developed by Subsea Innovation to be easily road transported throughout the world. The unit is a bolted construction containerised into a 40' standard offshore spec container.

XT-90

The XT-90 LARS was developed by the company to be easily road transportable within the USA and other areas with width limitations. System width is reduced to 3.2 metres.

FT-90

The FT-90 LARS was developed by Subsea Innovation to meet the requirements for light weight ROVs. Key changes are a reduced size and fixed boom offering a lighter weight system.

HIGH SEA STATE SOLUTIONS

The company has recently put together an engineering package to allow the launch and recovery of a free flying ROV in Hs 4.5. This would offer a great reduction is costs associated with vessel time spent waiting on weather.

The main challenge was created by not only the high sea state but the large projected area of the vehicle giving a calculated DAF of 6.5. Subsea Innovation designed a passive damping system into the cursor frame which effectively changes the spring rate of the system lowering the DAF to 3 keeping the size and cost of the system to a minimum.

Other features are heave compensation on both the main and cursor winches coupled with a system to keep things dynamically synchronised and finally an all-electric docking box capable of being submerged with the cursor and reducing the possibility of fluid spillage overboard.

REFURBISHMENTS

Subsea Innovation offer surveys and factory refurbishments of LARS, TMS, HPU and winch systems. This service offers life extension of asset equipment which is becoming increasingly popular in the current market conditions. All work carried out and new parts supplied come fully warranted for additional piece of mind.

UNRIVALLED SUPPORT

All systems delivered are supported by a team of experienced engineers with a complete database of both technical and construction information that is retained electronically and has been maintained since the company was established.

Technical support services offered include on-site commissioning, servicing and repairs carried out by qualified service engineers. This is complemented by a comprehensive spares programme and a large stock of both major and minor components.

FACILITIES

The design, build and testing of all LARS units is conducted in house at Subsea Innovation's UK headquarters. The 40,000Sq/ft purpose built facility includes project and design offices, a number of meeting and training rooms.

The company's workshop is serviced by two 25Te and two 5Te cranes and boasts a 4m deep 72m3 floodable pit for wet testing of products and the safe testing of their fully dipping LARS.

Subsea Innovation

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PUNCHING ABOVE ITS WEIGHT

LAWSON ENGINEERS IS A MECHANICAL HANDLING SPECIALIST WITH A 50-YEAR TRACK RECORD. THEIR EXPERTISE IN SPECIAL PURPOSE MACHINE DESIGN ATTRACTS CUSTOMERS FROM MANY INDUSTRIES WITH RECENT DECADES SEEING A CONCENTRATION ON ROPE AND CABLE HANDLING – PRINCIPALLY DECK MACHINERY FOR SHIPS, RIGS OR PLATFORMS.

This is by no means all, they also make hoists, lifts, davits and small cranes, hydraulic power packs, pressure vessels, containerised systems, process machines and over the years have introduced several 'firsts': a small British company punching above its weight. From these bespoke projects come 'repeat' products.

They currently serve subsea, oil & gas, oceanography and exploration, defence, green energy and pharmaceutical sectors.

Containerised LARS for ROV or subsea tool allows shipping anywhere as a CSC container. Container transforms into a 5m wide handling system with a 1m section holding the Hydraulic Power unit to drive the LARS.

PREFERRED BUSINESS APPROACH

Their preferred approach is to have significant customer involvement at project definition before tailoring a back-catalogue of evolved and field-proven designs to suit those requirements, inventing anything truly new along the way. This provides greater customer satisfaction than trying to second-guess a particular customer's need or sell the same standard 'black box' to everyone. Hence most sales are technical sales.

LAUNCH AND RECOVERY SYSTEMS (LARS) PIONEERS

From the late 1970's they were a pioneer of LARS for ROVs (Remote Operated Vehicles) and hard-suits, and have made more than 120 Work Class ROV LARS to date. These compact systems are 'fully integrated' where Lawsons solve all integration issues in the design rather than the customer having to solve them when he buys a spread of different suppliers equipment. LARS are split between 'specials' and 'products', range from 1-16Te SWL (load lifted from the deck), to handle 100-8000m of cable usually 6-150mm, and all operate to Sea State 6 or higher. These products are sold world-wide.

ACCESS SYSTEMS

Man-access systems for maintenance support are another area repeatedly visited both onshore and offshore, with electric, hydraulic and pneumatic drives offered. Much of this work requires a compact design to fit an existing space.

GREEN ENERGY SECTOR EXPERIENCE

Other than ROV LARS, previous work for the green energy sector includes HPU and wing lift system on Marine Current Turbines SeaGen in Strangford Loch in 2006.

Alongside the new products they cover the remaining part of the full-life cycle for their products: spares, service and maintenance, with refurbishment and upgrades for older machines.

Should you have an access, umbilical, cable, hose or wire rope winch, davit or crane, hydraulic power unit requirement you could do worse than give this flexible company a call.

Lawson Engineers

subsea innovation FEATURE SPONSOR LAUNCH & RECOVERY SYSTEMS

New cutting edge power cable plough system

Royal IHC has secured an order for a cutting edge power cable plough system, destined for DeepOcean's brand new cable installation vessel – Maersk Connector.

SPECIFICATION

The advanced equipment to be provided by IHC comprises a 3.3m trench depth power cable plough, a sea state 5 LARS and tow winch. The provision of 300kW of jetting and 150t pull force enables complete operation in the widest range of seabeds. The jetting system has been designed in close collaboration with DeepOcean.

INNOVATION

Additional innovative technologies include the capability for simultaneous lay and burial operations with subsea cable loading. It has a 5m MBR product route, facilitating trenching of the vast majority of current and planned export power cables. IHC's patented rotating bellmouth provides a more product friendly cable route, especially when the plough is being deployed through the water column.

UNIQUE VESSEL CAPABILITY

DeepOcean's Maersk Connector, designed and built by Damen, will be the only power cable vessel with grounding capability, DP2, 7 point mooring and a bespoke IHC LARS having both tow winch render and constant tension capabilities.

DeepOcean's Commercial Director, Pierre Boyde commented *"This is a key piece of technology for our State of the Art Cable Vessel Maersk Connector. It enables DeepOcean to offer significantly better power cable installation and protection that has previously not been available in the market. We are delighted to work with IHC in introducing this game changing technology in combination with employing the North East UK supply chain."*

UK INDUSTRIAL DEVELOPMENT

The Plough system will be designed and largely built in the UK, both securing jobs in the North East of England and demonstrating the value of offshore wind in terms of UK industrial development.

WORKING TOGETHER

IHC and DeepOcean have worked closely with Energi Coast colleagues to capitalise on the extensive offshore renewable energy sector expertise from the region and North East England's unique offering to the industry. IHC is proud to be working with DeepOcean on this flagship project, scheduled for sea trial off Maersk Connector in Q4 2016.

Royal IHC

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DeepOcean

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Not just a traditional Marine Consultancy

Marine consultancies offer a range of marine survey and consultant engineering services to a broad spectrum of clients in nearshore and offshore environments. They employ specialists such as marine engineers, master mariners and naval architects who can act as independent agents for their clients as well as finding innovative solutions to technical problems.

ABPmer, a wholly owned subsidiary of the UK's largest ports group (Associated British Ports), is not such a consultancy.

SPECIALISTS IN ONE OF THE MOST CHALLENGING ENVIRONMENTS IN THE WORLD

Since its beginnings over 65 years ago, as the government's advisor on port development, ABPmer's staff have specialised in understanding the marine system itself, one of the most challenging environments in the world.

Today their knowledge and experience of offshore, coastal and estuarial environments is used to inform marine policy development and licensing decisions as well as racing tactics for elite sailors and design criteria for offshore structures.

WORKING IN OFFSHORE WIND SINCE 1999

Although the brand may not be as familiar as some, ABPmer has been working in offshore wind since 1999. Their understanding of the offshore environment regularly assists marine consultants, offshore developers, regulators and contractors.

The company has been commissioned to prepare coastal process assessment chapters for EIAs; undertake habitats regulations assessments for offshore renewable plans; provide thresholds for design criteria and calculate weather windows and downtime for construction planning.

COLLABORATIVE CULTURE

And ABPmer does not fit the typical client/consultant model. It considers itself different to large consulting firms. Due to its small size (50 staff) and its public sector roots, the culture is one of collaboration both internally and externally. They seek to truly understand their clients' needs so that they work as an extension of the client team, tailoring their service accordingly. Working in such a way naturally leads to collective innovation – an example is their new online weather downtime calculation service that they have developed in conjunction with offshore contractors.

DEPTH NOT BREADTH

The company also encourages its staff to be thought leaders in their field. This means you will work with the member of staff who has the depth of knowledge and experience to deliver the answer, and not buy the usual pyramid-shaped consultancy team where the expertise is passed to the client via bright young things.

ABPmer really is a different kind of organisation. It's small, non-hierarchical, innovative and results-oriented. It builds strong and long relationships with its staff and clients. On average staff have worked with the firm for over a decade, its key clients for even longer.

ABPmer

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Recent turbine failures and the root cause

From lapses in manufacturing quality to the introduction of new technologies, wind turbine components are still at risk of costly failures. Determining the root cause of the failure can not only prevent future liabilities for equipment manufacturers and reduce risk for operators but also improve production procedures and industry design standards.

The following recent wind turbine failures illustrate the Root Cause Analysis (RCA) process.

INTERMEDIATE PINION – PROBLEM

Multiple wind turbine gearboxes had catastrophic intermediate pinion failures during a similar timeframe. Gear tooth fractures resulted in liberated pieces of metal and consequential damage to other components. The gearboxes had been refurbished by an aftermarket supplier other than the OEM and had been in service less than 3 years.

Intermediate pinion tooth fracture caused by a material defect

INTERMEDIATE PINION – CAUSE

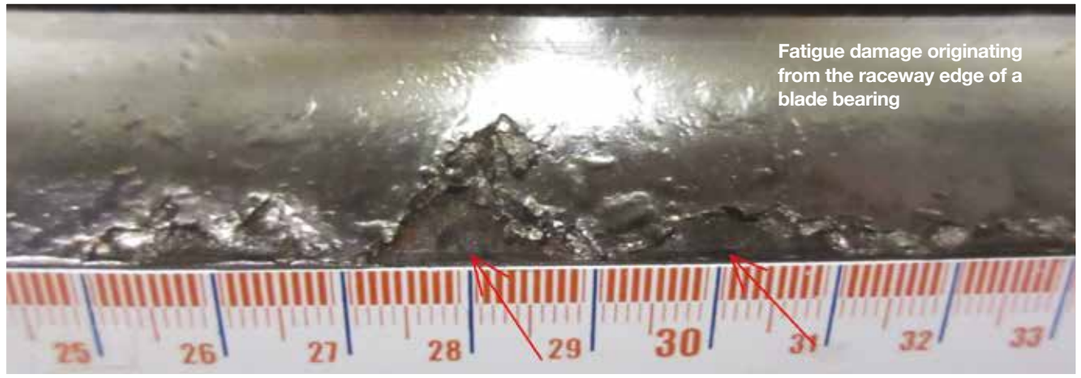
Metallurgical analysis on cross-sections of the fractured teeth determined that the cracks originated at subsurface material defects. Further testing identified them as oxide inclusions containing aluminium and silicon. During normal cyclic loading the inclusions act as localised stress concentrations which cause cracks to form prematurely. It was determined that the batch of steel used by the gear supplier didn't meet the cleanliness grade.

INTERMEDIATE PINION – SOLUTION

A gearbox repair specification was established for the suppliers of the refurbished gearboxes which defines that material cleanliness must meet certain standards and gear manufacturing quality control processes must be added using non-destructive testing.

RCA BENEFITS

Gearboxes in the same batch were identified and proactively repaired, saving them from significant consequential damage. The supplier's processes were improved by adhering to the stricter repair specification, a good outcome for both the owner and the supplier.



Fatigue damage originating from the raceway edge of a blade bearing

BLADE BEARING – PROBLEM

A wind turbine blade bearing was taken out of service due to pitch angle asymmetry. Upon disassembly, the failure was identified as macropitting at the edge of the bearing raceway. Macropitting is a progressive failure mode driven by fatigue of the steel material.

BLADE BEARING – CAUSE

The damage was caused by excessive contact stress at the edge of the raceway where the contact area of the rolling elements had shifted beyond the raceway edge, referred to as 'ellipse truncation'. The increased stress this causes to the components reduces fatigue life, leading to early failure.

BLADE BEARING – SOLUTION

Design improvements were made to improve the raceway contact, thus minimising the edge contact stresses during ellipse truncation. This was achieved by stiffening the rings, adjusting pre-load and optimising the micro-geometry of the raceway profile. The failure costs of the installed base can be alleviated by periodic grease sample analysis. Early detection of failures allows forecasting for bearing replacement, thus minimising downtime and crane fees.

RCA BENEFIT

Without knowledge of the failure cause the turbine owner would have replaced failures with new bearings destined to fail. The RCA has enabled the owner to source aftermarket bearings with the necessary design improvements.

Romax Technology

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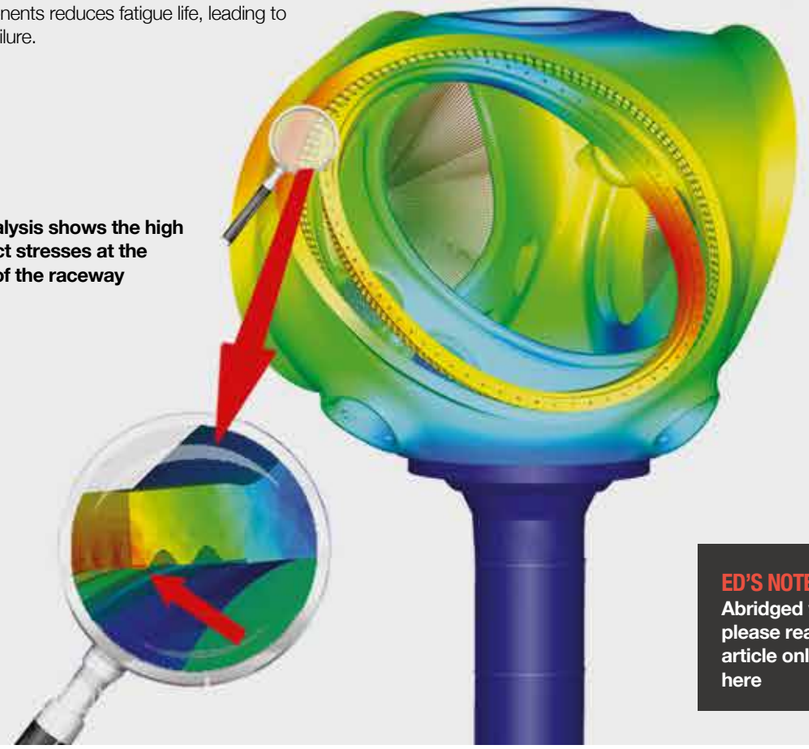


FE analysis shows the high contact stresses at the edge of the raceway

ED'S NOTE

Abridged version please read full article online – link here

Click to view more info

SOLVING PROBLEMS… BEFORE THEY OCCUR

A root cause analysis discipline in the maritime sector can help transform a company`s engineering culture from being reactive to being proactive which has been shown to increase efficiency.

Marine engineering staff with this forward thinking mind set typically will have less unplanned vessel break downs and more reliable operational days for their fleet. The discipline in constantly striving to improve evermore complex vessel`s reliability and efficiency are understanding beforehand, what factors can cause an unplanned vessel breakdown and determine what preventative actions are needed to be taken to avoid one before they occur.

INTELLIGENT VESSEL DATA

The key to this is providing 'intelligent vessel data' for engineers and operation managers to be able to monitor the vessel information in real time combined with historical information at their fingertips with predictive maintenance alerts giving an early indicator when a component part may be near to failing.

The challenge for all roaming technical staff is providing the detailed alerts and historic information available for inspection, where ever they might be and even on their smart phone to enable an investigation to the root cause trends and thus develop their own maintenance policies for planned and routine maintenance for improved reliability and vessel efficiency.

PLANNED MAINTENANCE SYSTEM (PMS)

One new solution that addresses this problem is a vessel PMS with an optional predictive maintenance alerts module combined with near real time remote vessel sensing intelligent remote asset monitoring solution (iRAMS) which offers information to enable the operator to 'solve problems before they occur'.

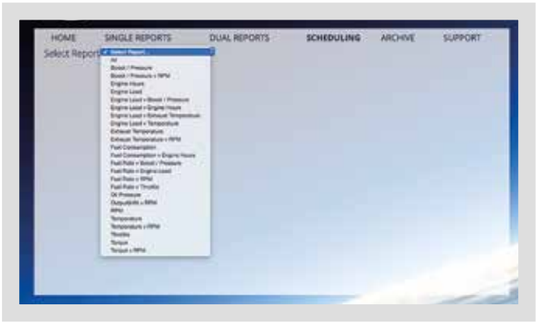
When operating vessels offshore at maximum efficiency with a small crew, getting the right information at the right time to be able to identify a potential failure before it arises has been the traditional challenge for many CTV operators.

Vessel PMS applications has been widely adopted for many years in the larger fleets and is now understood however by integrating a new AST maritime remote sensing and engine diagnostic system, iRAMS with a Planned Management System (PMS) now offers a solution providing the right information at the right time for a vessel operating globally.

The picture below is a snap shot of the vessel engines data taken every 5 minutes and transmitted shore side to the iRAMS portal. The iRAMS reporting portal records and displays in near real time the entire vessel history for later investigation for root cause analysis providing very advanced and detailed reports on a variety of factors and parameters from single reports with a single parameter e.g. fuel consumption, temperature, RPM, oil pressure, boost etc. to more advanced dual parameters.

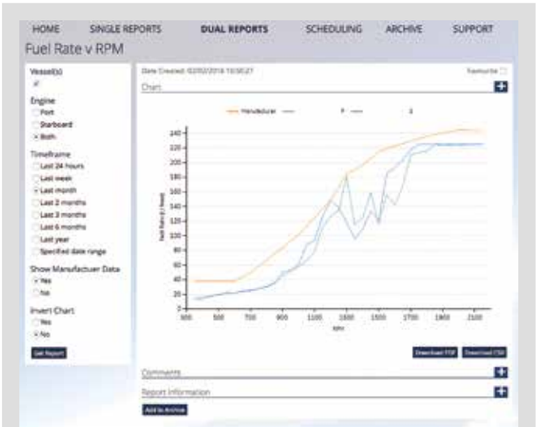
More advanced dual parameters engine data is also available for example comparing fuel consumed against engine hours or engine load verses boost to providing a more detailed insight leading to identifying efficiency issues.

This wealth of vessel management information can be accessed pictorially or downloaded in CSV format with a useful report feature to be able to schedule them to be automatically emailed once a day/week/month etc. perhaps even direct to a client if required, reducing administration expenses.



The iRAMS reporting portal is able to compare the performance of the engines against the engine manufacturers published data. In the example below, this particular vessel is operating above the manufactures published performance statistics.

All engine manufacturers tend to be cautious when publishing their specific engines performance data however having the ability to compare with a few key strokes their claims against actual live data or against other vessels in the fleet is clearly of value.

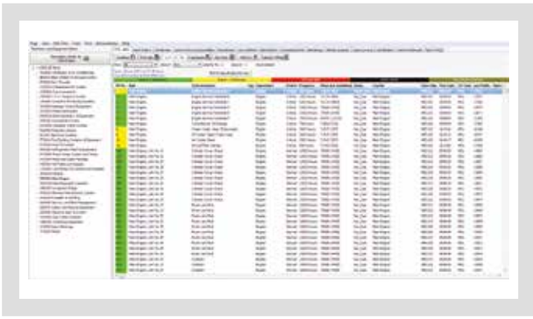


The new AST iRAMS and PMS solution has been developed specifically for the maritime market and can become an integral part of a vessels SEEMP strategy, reducing emissions and meeting compliance regulations.

Remote vessel management offers reduced down time for unplanned engine maintenance, automation of daily reports, reduced fuel consumption (including monitoring and influencing Skipper behaviour) and combines engine diagnostics and automated vessel efficiency reporting.

VIBRATION ANALYSIS AND ALERTING MODULE

A new recent development within the combined PMS and iRAMS solution is a vibration analysis and alerting module. Vibration sensors on the vessel record data which is then transmitted remotely and automatically populate the shore side PMS application. The PMS application constantly monitors the vibration data and automatically alerts the vessel owner when the vibration data parameters are outside the preconfigured normal operating values giving an early indication of routine servicing is required on a specific component – engines, shaft etc.



The alerts are available shore side by way of a traffic light system and a logon message generated each time the PMS application is accessed providing the right information at the right time for root cause analysis.

An additional advanced feature to automate daily administration and reduce human error developed from client feedback is automating the daily vessel report within iRAMS. Data from the vessel is pre-populated onto an iRAMS form which automatically feeds engine hours, fuel used, staff on board, any incidents reported through to the PMS which in turn can provide HSE statistics for KPI reporting.

SUMMARY

In summary this new development in vessel management means forward thinking vessel operators and engineers have now all the tools for route cause analysis to develop their own maintenance strategies and gain even greater vessel efficiencies than ever before.

Sam Woodcock, Head of Technical Services in AST states *"Remote vessel monitoring and predictive maintenance applications are clearly driving down costs in the offshore industry.*

"The pace of development with our new range of sensors and detailed reporting analysis means vessel operators today with small crews, have far more intelligent tools to manage their vessels more efficiently and all remotely."

AST Marine Sciences

Click to view more info

THE VISION

GREEN PORT HULL
THE VISION

The Green Port Hull vision is to establish Hull and the East Riding of Yorkshire as a world-class centre for renewable energy, creating wealth and employment for the region.

With its prime location close to the offshore wind opportunities in the North Sea, established infrastructure, knowledge, expertise and the capability to handle a diverse energy mix, the region is capitalising on its strengths.

These attributes are the reason that Siemens, the world's largest engineering company, chose Hull as the location to build its offshore wind turbine blade manufacturing, assembly and servicing facilities that will form the centrepiece of Green Port Hull.

The Siemens investment is just the catalyst for the Green Port Hull vision. As well as offshore wind, there are major opportunities in bio fuels, waste to energy, solar, wave and tidal power generation.

PLANNED INVESTMENT

- Siemens/ABP – £310m (joint investment) offshore wind turbine facility
- Energy Works – £200m green power plant
- Biomass Handling Facility at Port of Hull – £150m investment enabling transport of sustainable biomass to Drax Power Plant
- Reality Energy Centre – a £130m 49MW biomass fired power plant
- Ron Dearing University Technical College – specialising in digital technology and mechatronics

LOCAL ECONOMY

The renewable energy sector will be the single biggest influence on the local economy for generations, creating thousands of new jobs along with a wealth of opportunity for local people and business.

The investment will provide a huge boost to the UK's offshore wind industry and the Humber region. Up to 1,000 jobs will be created directly, with additional jobs during construction and indirectly in the supply chain.

The start of production at the blade factory is scheduled for September 2016, with full production levels reached from mid-2017 onwards.

The first windfarm that will benefit from blades produced in Hull is Dudgeon, off the Norfolk coast, which will see installation of 67 Siemens 6MW offshore wind turbines. With an overall capacity of 402 MW, Dudgeon will provide clean power to more than 410,000 UK households.

In addition to the construction of a manufacturing facility, a new quay is being built for the loading of part-assembled turbines for shipping to offshore wind farms, and part of the dock is being filled to create extra storage space.

POSITIVE PROGRESS

Construction work on the Alexandra Dock site is progressing well and is on schedule for a late 2016 completion. The 54-hectare site, which ABP and their main contractor GRAHAM Lagan Construction Group Joint Venture (JV) are making ready for Siemens' offshore wind turbine blade manufacturing facility, is being transformed in Hull's biggest engineering project since the port was built. The enabling works undertaken by ABP and their contractors are worth £150 million.

The dock infill has now been completed, with one million cubic metres of sand pumped into the dock to fill one third of the water area. Excess sand was stored to be used for the 7.5 hectare reclaim, which will become the new quayside, and this is now being pumped into position just behind the redundant timber sheds and jetties, which will be demolished in the coming weeks.

Piling of the blade factory is complete and the steelwork is now being erected. Marine piling for the new quay wall is well underway and piling for the new roll-on roll-off ramp is almost finished.

CONTINUED...

THE VISION

UK contractor VolkerFitzpatrick is building the 40,000sq m blade factory and a large adjacent car park. VolkerFitzpatrick is supported by Hull-based Neville Tucker Ltd, which has been awarded a £12m subcontract for electrical and mechanical services. Humber-based business Clugstons has been appointed by Siemens to construct a 12,300sq m service and logistics facility and has begun preparatory works.

Finbarr Dowling, Hull Project Director, said Siemens was committed to driving regeneration and to playing its full part in realising the economic potential of Hull and the Humber.

He added: *"Our facilities at Alexandra Dock will be a flagship for green energy manufacturing, reinforce the Humber as the UK's renewables region and open up a wealth of opportunity for local people and businesses.*

"Siemens is not the answer to all Hull's challenges, but we can play an important part in addressing them. Our bold move to invest in the UK offshore wind industry by creating these facilities in Hull can be a major catalyst for regeneration. It can stimulate other investments and positive developments."

A BOOST TO THE UK SUPPLY CHAIN

As the UK's largest investment in offshore wind, Green Port Hull is not just valuable to the people and businesses of Hull and the East Riding. It is an asset to the UK renewables supply chain as a whole.

"Green Port Hull is receiving a lot of interest, as it's the largest investment in offshore wind in the UK," said Mark Jones, Director of Regeneration at Hull City Council, who is a key partner in the Green Port Hull project.

"One crucial factor in this is demonstrating the value of UK business. Renewables is a new industry for us and it's not about subsidies – it's about creating real economic activity, here in Hull and across the country. So far, Green Port Hull has generated 800 jobs, and these roles are in a region of the UK that needs more employment opportunities. Supply chain opportunities are so valuable and we are working closely with local companies and contractors to enable as much work as possible to remain within Hull and the East Riding.

"Global interest is gathering momentum too, with supply chain companies keen to set up here and collaborate with UK suppliers. We need to push the UK Government policy position to provide a stable environment for investment, in the knowledge that the industry is focused on cost reduction that can be embedded through co-location here in Hull.

"Our objective is to secure as much investment into the city as possible and help our businesses capitalise on this opportunity."

GROWTH OPPORTUNITIES ON A LOCAL LEVEL

While internationalisation is great for the UK wind supply chain in terms of inward investment, the team at Green Port Hull is committed to keeping as many supply chain opportunities within the region.

To ensure this once-in-a-lifetime opportunity becomes a reality, Hull City Council and East Riding of Yorkshire Council, along with partner organisations, devised the Green Port Growth Programme. With an investment of £25.7m, the programme, which is supported by the Government's Regional Growth Fund, is designed to capitalise on the renewable energy opportunities. It aims to develop indigenous business growth within the sector and secure long-term economic growth and employment for the region.

THE PROGRAMME DELIVERS ACTIVITY THROUGH SIX BUSINESS STRANDS…

- Employment and Skills Development
- Site Assembly
- Inward Investment
- Business Support and Advice
- Business Investment Grants
- Research, Development and Innovation (RDI)

Key strands for local businesses are Business Support and Advice, and Employment and Skills Development.

Dawn Hall, project manager for the Business Support strand, is already seeing local companies make the most of supply chain opportunities. She said: *"We've already supported over 150 local businesses through advice and funding. One company in our region that has benefitted is Boston Energy, which provides recruitment services to the energy sector. Since securing funding to invest in equipment and specialist training for staff, the firm has strengthened its relationship with Siemens and is hoping to expand into Europe by looking at a number of joint ventures and collaborations."*

Bob Ferraby is project manager for the Employment and Skills Development strand.

He said: *"We have a firm picture of what businesses need in terms of skills and around 600 people from more than 200 local companies have improved their skills, putting some real strength in the workforce and making this area more attractive to businesses in the renewables sector.*

"However, we are also aware of potential 'churn' – the skills gaps that will be left as people migrate to jobs in renewables. For example, we have a thriving caravan industry in Hull, so we envisage workers from this sector will be interested in opportunities at Green Port Hull. We are looking at the local economy as a whole and making sure our established industries are well supported."

Mark Jones added: *"Green Port is a broad strategy to capture the opportunity from the renewable sector. The Siemens investment and the partnership with ABP is an example of close working for mutual benefit, both to industry and the community. We have worked extremely closely with Siemens who themselves have committed considerable resources to ensure that everything goes well for the area and to ensure, where possible, local employment and supply chain benefits are reached.*

"We are dedicated to helping them. The Hull area has a wealth of well-established firms already working within the maritime sector. A lot of their skills are transferable into the wind energy industry. We are offering them assistance with this and are finally seeing a transition for businesses locally. We hope to see this positive progress continue."

Green Port Hull

Click to view more info

RELEASING BLOCKED WINDFARM DEVELOPMENTS IN EUROPE

QinetiQ has been helping windfarms and radar systems co-exist for many years using its extensive radio frequency modelling capabilities to show developers and radar operators whether or not issues are likely to exist with planned developments.

If conflicts are predicted then QinetiQ's Radar Impact Assessment team is particularly skilled in identifying those issues and suggesting potential mitigation options. Early assessment is crucial to save developers and stakeholders potentially many thousands of pounds in wasted development costs.

PROBLEMS ENCOUNTERED

Large structures such as wind turbines can cause problems for radar and telecommunications systems. Typical problems include echoes from wind turbines appearing on radar displays, data interference and signal blockage.

Objections from radar or telecommunication owners can block the progress of windfarm developments and result in developers and stakeholders losing time and money on costly planning inquiries.

As an example, approximately 6 gigawatts of planned windfarms are currently blocked in France due to concerns raised by the meteorological service Météo-France and the Military. In an attempt to break the deadlock, the French Government passed a law in November 2014 allowing private contractors to conduct independent impact assessments on its behalf.

If the contractor can prove the accuracy of its predictions, it receives validation from the Government and its recommendations can be legally recognised in the consideration of planning applications.

RESEARCH AND DEVELOPMENT ORGANISATION

As a research and development organisation QinetiQ has a long history developing techniques for use in military radar systems for the MoD. The organisation is now applying this expertise to commercial application areas. The world's first stealthy windfarm is being built in France by EDF EN and Vestas using their technology under licence.

The stealth wind turbine technology is optimised to reduce interference of wind turbines with meteorological radars.

DEVELOPING TECHNIQUES

Over the past two decades, the company has developed advanced processing techniques to model the influence of the environment on radar and telecommunication systems and assess their performance.

These techniques range from propagation algorithms to analysis of the complex way in which a wind turbine reflects radar and radio signals. The company has developed a unique method, CLOUDSiS, for modelling the impact of wind turbines on meteorological or weather radars.

As a company with diverse research facilities and specialist knowledge, QinetiQ is therefore uniquely positioned to work with windfarm developers to maximise the number of consented windfarms, whilst ensuring the accuracy and quality of radar service is unaffected.

RADAR IMPACT ASSESSMENT METHOD

The company's radar impact assessment method is the first to achieve Météo-France validation, having successfully modelled interference caused by an existing windfarm. The team used its CLOUDSiS software to produce predicted data which was then compared side-by-side with confirmed measurements taken at two windfarms in Normandy by Météo-France.

The test confirmed that the software is able to predict radar interference with the high degree of accuracy required by the French Government.

Dr. Thierry Le Gall, Technology Exploitation Manager at QinetiQ, said: *"France has faced a dilemma when seeking to build new windfarms. New turbines cannot be approved until their potential impact on weather radar is fully understood, but until now there has been no satisfactory way of predicting their impact before they are built."*

"QinetiQ has demonstrated that, using expertise and technology originally developed for military applications, it is possible to accurately model the effect that a proposed site will have on meteorological readings. This is a big step in enabling France to increase its adoption of renewable energy, while offering Météo-France assurance that this progress will not harm its ability to make accurate weather forecasts."

SUCCESSFUL MODEL

Since the successful validation of CLOUDSiS in November 2015 QinetiQ has worked with developers planning windfarms around ten Météo-France radars assessing the viability of approximately 280MW of planned onshore wind projects. A key part of the success of the model is the flexibility to optimise the yield of projects, whilst ensuring the radar impacts are acceptable.

As well as work on weather radar the Radar Impact Assessment team is experienced in assessing the impacts on most civil and military surveillance systems in line with relevant industry guidelines (e.g. Eurocontrol, OPERA, CAA CAP764, CAA CAP670).

Typical systems studied include…

- Primary Surveillance Radar (PSR) such as Air Traffic Control (ATC), en-route and Air Defence (AD) systems
- Secondary Surveillance Radars (SSRs)
- Aviation navigation aids (e.g. ILS, DME, VOR and AGA VHF communications)
- Shipping radars
- Telecommunications

QinetiQ's operational experts, including former air traffic controllers and weather radar experts, provide expert opinion on operational impacts and mitigation options to assist windfarm developers and aviation/weather radar stakeholders in the windfarm planning process.

TAILORED STUDIES

Results and scenario illustrations are shared in Google Earth format allowing stakeholders to understand the impacts and solutions. Every study QinetiQ undertakes is tailored to the project specific impacts and to meet the concerns of the customer.

QinetiQ

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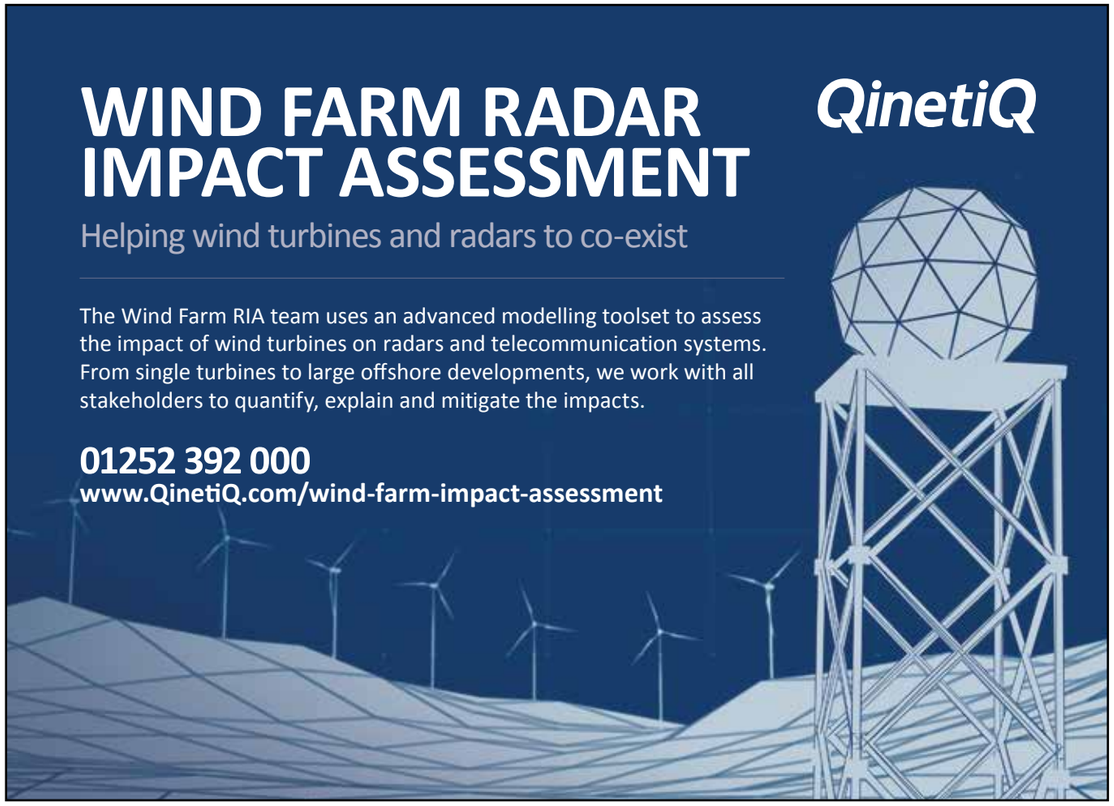

WIND TURBINE RADAR MITIGATION

For many years, radar objections have delayed the construction of wind developments throughout the UK. During this time, promising mitigation solutions have come to the forefront but have they actually delivered? Moreover, what solution is most likely to remove radar based objections heading into 2016? This article provides a brief update on the current state of radar mitigation solutions.

MICRO-SITING & LAYOUT OPTIMISATION

This remains the most reliable radar mitigation solution that, if economically viable, is the best bet for removing a radar objection. Sometimes a small drop in overall tip height can remove an objection, whilst optimising the layout can reduce the radar's visibility due to intervening terrain.

RADAR BLANKING

Still a viable option for many small wind developments however, the availability of radar blanks is limited due to existing turbines, existing blanks and airspace usage. Furthermore, it is still the case that only certain radar operators will accept radar blanking.

RADAR DISPLAY UPGRADES

This solution dims the returns from wind turbines on the radar display so that the appearance of clutter is reduced. Tests are underway at airports around the UK however, it is not believed that this solution has led to construction of new schemes to date.

IN-FILL RADAR

The process of 'patching in' the coverage of an existing unaffected radar to the display of an affected radar. This is a successful mitigation solution but it is only viable in certain locations in the UK where existing radar coverage permits.

STANDALONE IN-FILL RADAR SOLUTIONS

This solution involves a standalone radar sensor at the wind development to provide an in-fill feed to the affected radar's display. It is believed that this technology has mitigated existing wind developments but it has not has led to construction of new schemes.

PRIMARY RADAR UPGRADES & REPLACEMENTS

This is the most expensive mitigation solution, often requiring a co-op of developers in association with the radar operator. This solution has been implemented primarily to mitigate existing wind developments but it is believed that testing is ongoing at UK radar locations to determine their full potential (for example Project RM implemented by NATS).

CONCLUSIONS

The simplest solutions are still the best in the world of wind turbine radar mitigation. However, these options are not always feasible which is where technical mitigation is required. Most technical solutions are still in their infancy but further testing is ongoing.

Pager Power

RADAR REVOLUTION

The received wisdom in the aviation and renewables industries that radars and windfarms do not mix is outdated. Cambridge based technology company Aveillant have a proven and fielded solution for radar operation over wind turbines, which is expected to free up capacity both on and offshore.

UNTAPPED CAPACITY

In the UK there are windfarms with a combined capacity of over 12GW currently in operation. This is enough to power three million homes and provides the equivalent output of two nuclear power stations. However, there is at least another 6GW of capacity held up in planning departments due to objections from the civil and military aviation sector.

Wind turbines look a lot like aircraft to primary airport radar because they create a similar profile and signal. And because conventional radar systems can only detect the distance direction of a signal, not its altitude, they can only output a 2-dimensional aircraft track. In the area around the turbines planes can appear to move in the wrong direction, known as 'track seduction', or may not be detected at all.

A new and reliable approach to radar operation is needed if the industry is to unlock significant additional capacity

HOLOGRAPHIC RADAR – A NEW APPROACH

In 2015, Aveillant announced the installation of the world's first 3D Holographic Radar system to cover Severn Trent's Derby wind turbines close to East Midland's Airport. The system has now completed safety approval with the Civil Aviation Authority and is ready for operation.

Holographic Radar operates in a fundamentally different way to conventional radar, giving full 3-dimensional tracks even directly over wind turbines. Tim Quilter, Aveillant's Product Manager, said *"This project represents a significant first for the industry but is really only the beginning of how systems like this can free up capacity currently bogged down in planning departments."*

OFFSHORE WINDFARMS

Extensive modelling work recently conducted by the company for operation over large offshore windfarms has shown the huge potential of the technology in this environment. Evaluation of over 500 scenarios including some of the most challenging configurations, gave a detection probability over the windfarms of over 99% and close to 0% false tracks.

The perception that windfarms pose a problem to aviation radars must now change. New technology has provided a solution. It is time for the turbines to start turning.

Aveillant

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Life Is On Schneider Electric FEATURE SPONSOR BLADE INSPECTION & REPAIR

THE BOTTOM LINE

With every turn of a blade, you're trying to maximise the power generation and profits of your windfarm – the condition of your assets, the efficiency of your operations and the safety of your crews all impact your bottom line. Weather is another significant factor that can affect every area of your organisation. Mitigating harmful and increasingly volatile weather conditions can help reduce unexpected, short-term costs and long-term risks to your operations.

Blade damage as a result of severe weather is a familiar occurrence. In fact, lightning strikes are typically a leading culprit in most geographies. Lightning can be especially harmful because it often goes undetected initially, causing the damage to propagate over time and resulting in more extensive repairs or even a full blade replacement. Suddenly, you're faced with failed equipment, unplanned maintenance and unscheduled equipment expenses, such as crane procurement. Costs can quickly reach six figures, not even taking into the account the lost power generation.

DETECTION – THERE'S A BETTER WAY

Traditionally, the most common and high-tech way to visually determine if a wind turbine has been struck by lightning is to use your eyes – hardly a fast or efficient method!

You can't stop lightning from damaging your turbines or blades but you can enhance the efficiency and speed with which you identify the problem, initiate repairs and get a turbine back on line. Schneider Electric offers an efficient automated and 21st century answer in the most comprehensive support package on the market for lightning solutions. From blade inspection reports, to highly accurate weather forecasts, to patented lightning alerts, you receive powerful intelligence that helps you react faster, keep crews safer and get those blades turning again.

BLADE INSPECTION REPORTS

A key component of the company's industry-leading intelligence is lightning tracking technology. Operators receive a daily data report that includes…

- All lightning strikes that were close enough to impact a specific turbine
- The likelihood that turbines within a given area were struck
- The affected turbine's name/ID
- Date and time of strikes
- Latitude and longitude
- Amplitude and polarity

Moreover, all strikes are assigned a confidence level, allowing you to choose the degree of confidence that a strike occurred within a certain number of metres, as well as prioritise your response.

By removing the guesswork and physical trips to view individual turbines, crews now know which ones may need attention ahead of time and can schedule inspection and maintenance accordingly. Warranty and insurance paperwork is accurate and supported with hard data. In addition, earlier detection and faster repairs mean that blades can be fixed before the damage gets any worse – cutting overall blade repair costs and turbine downtime.

With a flash detection rate of 99 percent across Europe, detailed reports allow you to proactively assess and repair potential issues faster. And if you have questions or need more information, a professional meteorologist is available at any time for a personal consultation.

WEATHER FORECASTING

Lightning can endanger crews and damage turbines, so it's critical to understand your risk before the lightning starts to flash. Schneider Electric has a long-standing reputation as one of the most accurate and reliable weather forecasters in the world.

Knowing when to expect severe weather ensures better safety in the field, as well as more efficient repairs that minimise generation loss. For example, forecasting helps you determine optimal times for performing routine maintenance on a calm day with little or no wind. You can also have greater confidence that a storm has passed and more quickly dispatch crews to repair blades after a storm.

WEATHER ALERTS

Even with highly accurate weather forecasts, there will be times when severe weather suddenly starts to develop and endanger your crews. The company's patented mobile alerts provide early warnings and an estimated evacuation time when severe weather threatens an area, as well as notifications that let crews know when it is safe to resume work.

For example, operators can view real-time lightning strike data as well as receive alerts when lightning is detected within a pre-defined radius of a windfarm. The alerts are location-specific, so crews that are out making repairs on large windfarms will be alerted on their mobile device, no matter their location. When the severe weather has passed and conditions are deemed safe, crews and operators receive an all-clear alert notifying them that they can return to the field.

THE BOTTOM LINE

Lightning damage is not always visible or predictable and can lead to larger problems if left undetected. Through lightning tracking technology and blade inspection reports, weather forecasts and alerts, you now have powerful intelligence to help take your windfarm to a new level of automation and efficiency – and to make real impacts on its profitability.

Schneider Electric

Click to view more info

HIGHER INTERNAL RATE OF RETURN = LONGER LIFECYCLE

Blades are the turbine component most impacted by age. Coating, lamination, aerodynamics, lightning protection systems all show increasing failures over time – trailing edge, blade shell, spar, root and lightning protection systems are the parts that are most hit by age.

TURBINE DOWNTIME

Turbine downtime doubles over the years: 2.8 days/year in the first 5 years in operations, 5.3 in the last 5 years – blades can contribute to up to 25% of the downtime, particularly in the second half of the normal turbine life-cycle. Aging hits blades harder than natural events and the consequences of failures are becoming more and more critical.

ASSOCIATED COSTS

Inspections on aging turbines report cracks in the trailing edge panels, transverse and longitudinal, split of the trailing edge bond lines, failures of the web bond lines. The rotation of the blades causes undesired deformations, independently from wind – deformations are the root cause for these cracks.

The total associated cost of repair per year on such failures is around 4 thousand € and represents over 60% of the total blade maintenance budget.

OTHER AREAS OF FAILURE

Another typical area of failure is the leading edge: when the blade is distorted in transverse shear, stresses increase in the leading edge area. Solutions to reduce the cross-sectional shear distortion are being made available and are aimed at preventing fatigue cracks thus reducing failures.

However, the main part of the blade subject to failures which could be difficult to recover, leading to the need to replace the blade instead than just repairing it, is the fatigue in the root region, mainly due to the higher gravity induced edgewise loads.

REPAIR TIME

One of the most critical issues regards the time needed to do the repair – for non-structural failures, eTa Blades has developed a UV based resin and patch in tailored kits, enabling a 30mins durable repair.

The company is taking the lead on improving wind turbine efficiency, lower the O&M cost and extend the life-cycle of the turbines. They are developing and testing specific repair and improvement solutions for all the issues stated alongside their main business of re-blading.

eTa Blades

INCREASED OUTPUT THROUGH IMPROVED MEASUREMENT TECHNOLOGY

CASE STUDY – FIBRE OPTIC BLADE ICE DETECTION SYSTEM PROVEN IN PRACTICE

During winter, multiple international manufacturers tested the fos4Blade ice detection system in their wind turbines. The recently completed evaluation has shown that the fibre optic system with rotor-integrated vibration sensors is not only more accurate than ice measurement systems installed on the wind turbine's nacelle but also more cost-effective.

A field test determined a yield increase of more than 100 MWh at a 3 MW wind turbine.

ICE FORMATION

Ice formation on wind turbine rotor blades not only adversely affects aerodynamics but is dangerous as well. To avoid chunks of ice breaking off and becoming uncontrolled projectiles, wind turbines must be shut down in the event of ice build-up.

Up until now common practice has been to install sensors on the nacelles of the wind turbines, the ice build-up on which is considered indicative of ice build-up on the rotor blades. The problem is that the measuring processes formerly used to detect ice build-up are not very accurate and thus generally err on the side of caution. As a result wind turbines often remain inoperative for much longer than is actually required to prevent ice throw.

CERTIFICATION

In September 2014, the world's largest classification company for wind turbine equipment, Germanischer Lloyd (DNV GL SE), certified the blade ice detection system from fibre optic specialists fos4X GmbH. It is also the first system of its kind which fulfils the IEC-61400-13 standard for vibration measurement on wind turbines. In preparation for the pending series integration in wind turbines, a comprehensive set of validation tests was conducted in the winter of 2014/2015 at various turbine manufacturers.

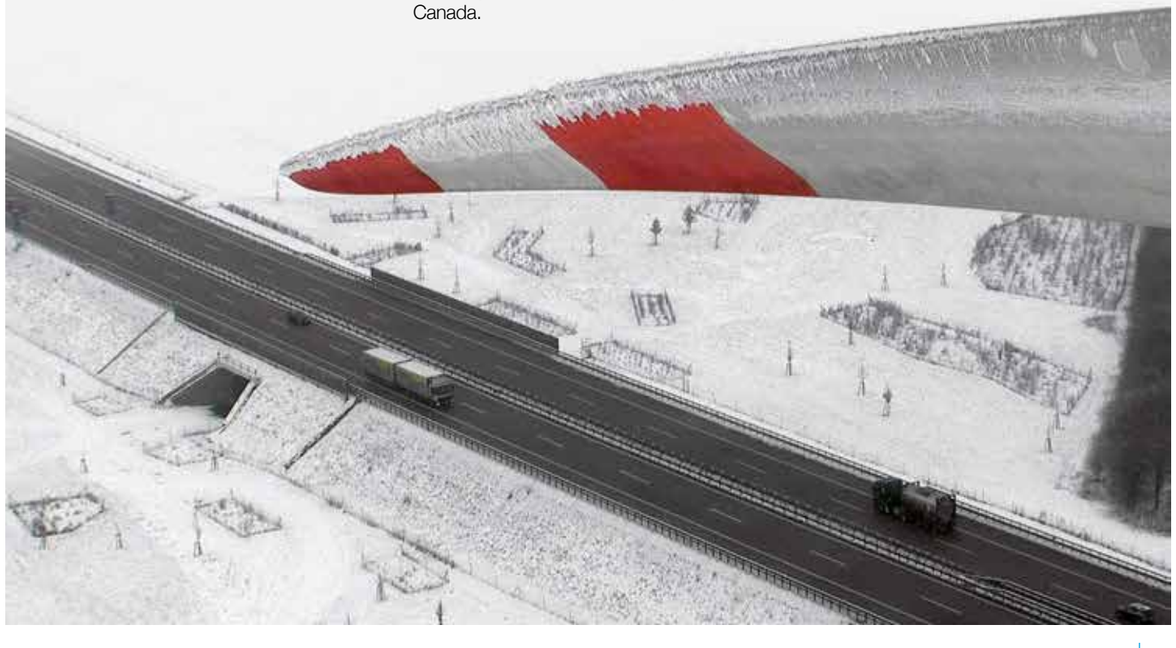
The tests examined case of ice build-up in a range of different operating modes on 14 different types of turbines located in Germany, Austria, the Czech Republic and Canada.

KEY ADVANTAGE

Consequently, the key advantage of measuring vibrations directly at the rotor is the ability to automatically restart once the ice has melted, with no manual intervention.

An additional 119 MWh to 249 MWh were produced when the fibre optic blade ice detection system controlled shutdown of the wine turbines. Based on average yields, this constitutes a 2.2 to 5 per cent annual increase.

fos4X GmbH



MINIMISING OPEX WITH BLADE REPAIR STRATEGIES

DIVERSE REPAIR NEEDS

The repair of wind blades present a special set of issues due to the varied types of repairs that may be needed, the wide range of materials available and the physical limitations that complicate repairs. For some repair scenarios the drill & fill technique offers the best balance of composite repair and minimal impact to composite integrity.

Used in filling pre-existing voids or inter-layer de-bonds that have occurred in relatively small areas, drill & fill involves drilling small holes (as small as 3mm) through the composite skin and injecting a specialised two-component adhesive that fills the void and binds the composite layers together.

LIMITATIONS

There are limitations to the usefulness of drill & fill: it is not used as a major structural repair, nor will it address engineering design issues. Drill & fill does however allow for a versatile up-tower repair to a common class of composite problems before they could potentially cause greater issues.

Not just any adhesive will work for a drill & fill operation. An ideal drill & fill adhesive needs to have a reliable cure mechanism independent of the presence of moisture and under anaerobic conditions that exist. Ideally the adhesive will be thixotropic to allow injection through the small holes used and flow freely through the repair area. In addition, as drill & fill does not allow for cleaning of the surfaces to be bonded the adhesive needs to be fully functional without surface preparation.

A good drill & fill adhesive should be both hydrophobic and immiscible to allow it to displace any liquid water (not ice!) that may have collected in the void.

UNDERSTANDING TEMPERATURE EFFECTS

Since repairs are made up-tower, it is also important to understand the effect of ambient temperature on both the cure profile of the repair adhesive and the substrates being bonded. In general lower temperatures will slow the curing process, affect the time to complete repair and affect the flow rate of the adhesive during application making it harder to inject into the repair. Higher temperatures during use will speed the curing process and allow the adhesive to be injected with less pressure.

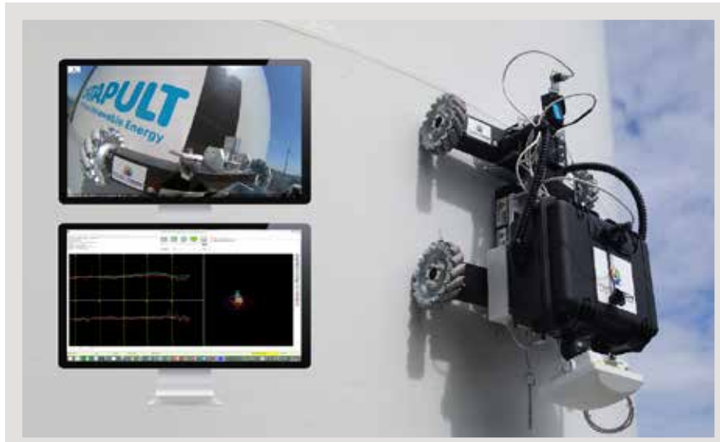
PROPER USE

In summary the proper use of drill & fill repairs on composite blades can be a useful maintenance tool in keeping the turbine operational with minimal downtime. As with all composite repairs, work closely with your adhesive supplier to understand the features and limitations of their materials.

ITW Wind

BLADE AND STRUCTURE INSPECTIONS

Invisotech, an inspection services technology company based in Newcastle is bringing its innovative inspection solutions to the wind industry to tackle early identification of blade leading edge erosion and to test general structural integrity in one asset sweep.



GROWING CONCERN

Blade condition and performance is a growing concern in the industry, as has been highlighted by the Offshore Renewable Energy Catapult's (OREC) Blade Leading Edge Erosion Programme (BLEEP), which has been working to co-ordinate initiatives to reduce the adverse impact of blade erosion on wind turbine performance.

Assets are being damaged by bird strikes, lightning strikes, rain, hail, ice and insects to name a few. Blade erosion and deteriorating gel coats can significantly decrease the aerodynamic efficiency of a turbine blade and cause significant performance losses, leading to a decreased lifespan and an increase in the overall running costs.

Innovative ideas, solutions and processes may hold the key to asset longevity and future O & M planning.

O & M STRATEGY

Any good O & M strategy starts with solid inspections at its core and as such a high-definition inch-by-inch review of your assets is a great place to start. Knowing the condition of turbine blades is essential to build a long-term strategy for maximising the blade in-service lifespan.

Structural integrity is another growing area of concern, heightened by recent asset failures like the breaking of a turbine at the Samsø (Paludans Flak) offshore windfarm, which was caused by a welding fracture.

NON-DESTRUCTIVE TESTING (NDT)

Certain NDT technologies can be utilised to check the health of every inch of every weld and in conjunction with the HD video footage can deliver valuable, usable data in relation to structural integrity and condition monitoring. Invisotech as one such provider of inspection services, in partnership with an industry leader in NDT technology have a completely wireless ROV inspection solution with on-board HD cameras and NDT probe, which can be easily and quickly deployed onsite.

Using such technology initially removes the inherent dangers of using rope access personnel and extended periods of asset downtime until they are needed to conduct repairs.

Visual inspections in a controlled and stable manner can help build a fuller asset picture and draw attention to problem areas; monitoring degradation over time. Time spent now understanding your assets can save significant time and cost later rectifying a problem, or worse, dealing with a complete asset failure.

Furthermore a visual inspection with a Remotely Operated Vehicle (ROV) crawler can be achieved with very little asset downtime, thus maximising your yield.

STRUCTURAL INTEGRITY HEALTH-CHECK

In addition to the blade inspection a structural integrity health-check would be highly recommended too. This can be done at the same time again minimising asset downtime and disruption.

LESSONS LEARNED

As an industry we are clearly still in the early days of truly understanding our wind assets but we can look at the lessons learned from the oil & gas sector and an increase in incidents to reasonably predict that questions over asset structural integrity will dominate board room conversations in the future. An inspections programme is a vital tool to de-risk your portfolio.

Invisotech

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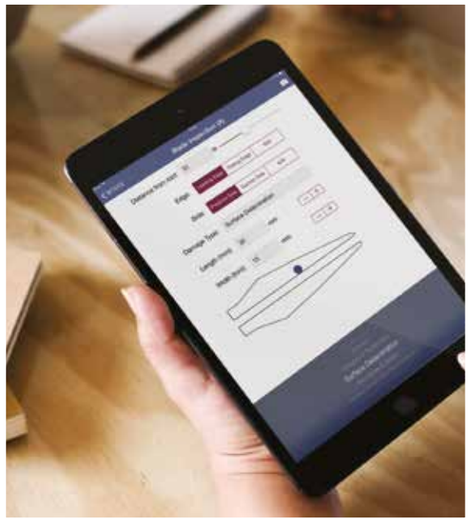
= Click to view video

CUTTING COSTS IN PRODUCTION AND MAINTENANCE IS KEY

With more than 1,300 offshore wind turbines off the UK coast and sufficient energy to power three million homes generated in the last five years, the offshore industry is fast establishing itself as a viable energy source. By 2030 there are plans that 35% of the UK electricity demand will be met by offshore wind but cutting costs in production and maintenance is key.

"The industry needs to innovate as advances in technology will help reduce the costs of offshore wind," says Steve Ross, Managing Director – GEV Wind Power. *"Time efficient and cost effective repair and maintenance programmes will ensure the longevity of turbines and maximum return on investment."*



LEADING EDGE EROSION

Leading edge erosion is incredibly costly to a developer as it reduces the turbine's efficiency and reliability. Blades with no protective coating can show the first signs of wear within two years and even the smallest scratch is a weak link in productivity so should be considered as necessary maintenance.

"In 2015, we became the first contractor to be trained by BASF with its BASF RELEST leading edge protection system," adds Steve. *"This two-part paint technology offers four times higher resistance than conventional solutions and is designed to bear extreme conditions to provide significantly improved erosion and corrosion protection, thereby offering immeasurable savings in maintenance."*

MAINTENANCE PRACTICES

Scheduled maintenance costs are relatively low, however studies have shown that unscheduled maintenance for baseline windfarms of 4-10MW turbines, constitutes around 65% of O&M costs.

Steve continues: *"Our new fixed-price maintenance plans provides developers with the security of a scheduled maintenance programme, at pre-agreed costs."*

Utilising panoblade camera systems, offers further cost savings as it enables the rapid capture of high resolution images from an entire turbine blade surface and shares these via a web-based platform. GEV technicians are then able to identify the blade that requires priority maintenance and as only one operator is required to inspect the turbines, the system offers both exceptional savings in time and money.

"We used this cost saving technology extensively in the field during 2015 and typically achieved the inspection of over 70 offshore wind turbines in three weeks," adds Steve. *"It can inspect up to five onshore or three offshore turbines per day."*

GUARANTEED REPAIR TIMES

The company is also able to provide guaranteed repair times by deploying its patented wind habitat structure which mitigates many of the environmental restrictions causing the delays in repairing blade damage. The wind habitat is easily retrofitted to most blade access platform solutions.

"Technology solutions that optimise and provide cost savings are essential to the long-term future of the offshore renewables sector," concludes Steve. *"As the UK becomes a hub for the industry the potential for UK innovators is huge.*

"Announcements confirming Galloper, East Anglia ONE and the submission by Scottish Power Renewables for East Anglia THREE reinforces the commitment of the industry's major players. It is now up to technology and O&M companies, large and small, to realise and seize the opportunity they have been presented."

GEV Wind Power

CENTRE OF EXCELLENCE

Providing a high standard of simulator training for offshore wind

Globally, there are over 35,000 job vacancies in the maritime sector, and many of those opportunities are here in the Humber – home to the UK's largest, multi-purpose ports complex.

Trade in coal, cars, food, freight, passengers and petroleum is growing and the region is poised to expand again, as it takes on a new role as the international hub for the emerging renewables energy sector.

SUBSTANTIAL OPPORTUNITY

The opportunity for maritime businesses is substantial, particularly for those servicing the offshore wind energy sector. That's why Modal Training was created – to provide a centre of excellence for the ports, energy and logistics sectors offering a comprehensive range of tailored training.

Patrick Henry

£7MILLION FACILITY

The £7million facility will be the first in the UK to offer integrated, multimodal logistics training for sea, road, rail and air, as well as a full range of support services. Until now businesses and their employees have had to travel to access this specialised skills training. Now it's available in the Humber, the UK's 'energy estuary', both for existing companies and future investors.

Equipped with state-of-the-art simulators, Modal Training will deliver realistic training, replicating the working environment, in a wide range of settings. Facilities will include extensive warehousing, engineering and rail safety teaching facilities, and the UK's only Freight Forwarding Academy.

The first simulators have just been procured and include a full suite of advanced ship, offshore vessel, engine room and radar kit from Kongsberg Maritime, the global leader in marine training technology.

TRAINING EQUIPMENT

The equipment, which includes a detailed 360° model of the Humber, will be used to support the delivery of advanced training courses for maritime professionals and businesses. The simulators effectively replicate the working environment for a wide range of maritime roles, including bridge crews, navigators, maritime engineers and Vessel Traffic Service (VTS) operators. Each part of the simulator system can be operated independently, or be interconnected to provide full vessel operation exercises for an entire crew.

Patrick Henry, CEO of Modal Training, said:
"Modal is here to provide training of the absolute highest quality to maritime businesses across the Humber region and beyond, which is why we've invested in a full suite of advanced marine simulators from Kongsberg Maritime.

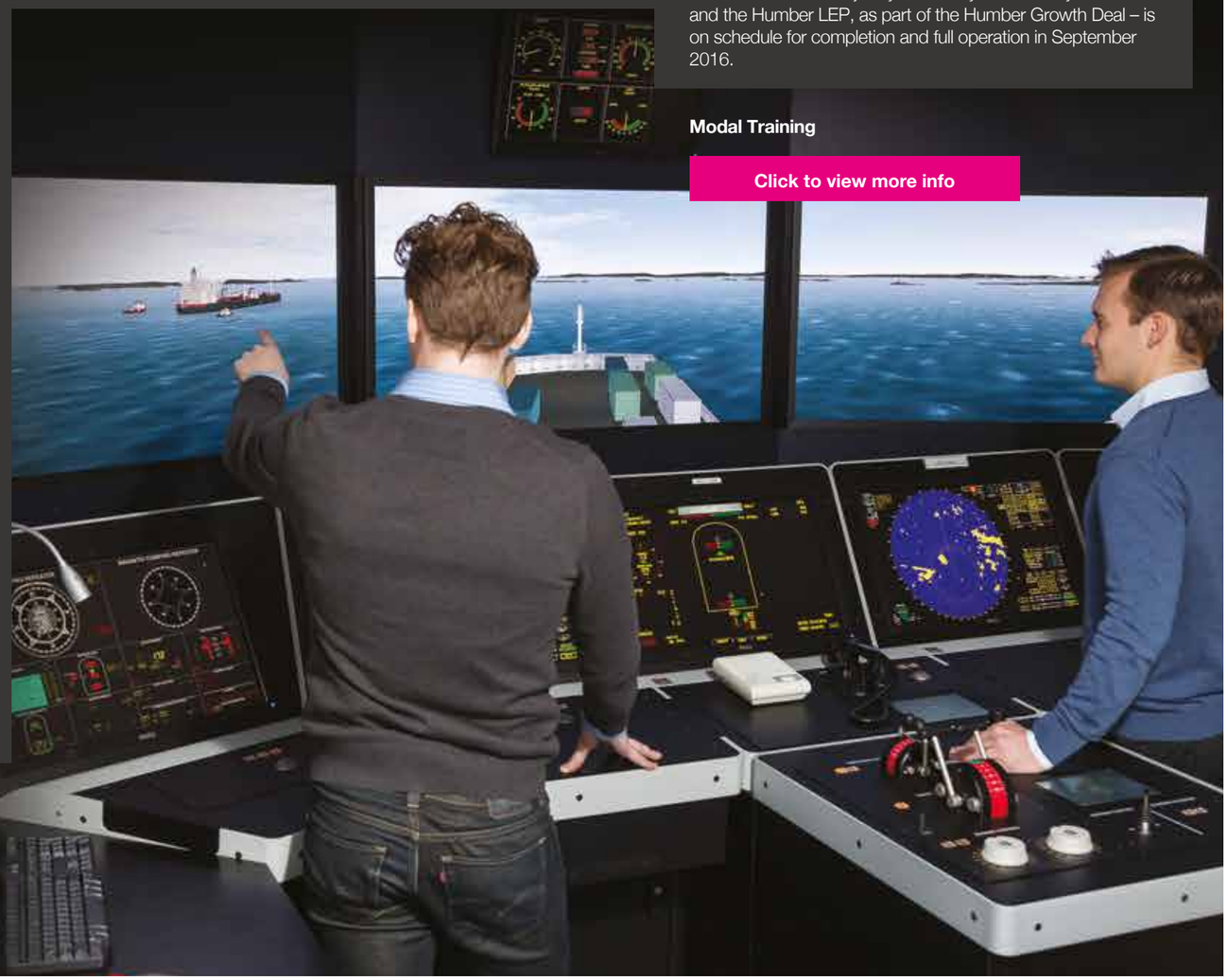
"We've listened to leading companies from across the maritime, offshore and renewables industries, and we are in the process of developing an extensive suite of equipment designed to meet their real-world training requirements exactly.

"The Humber is home to the UK's largest multi-purpose ports complex and Modal will provide the high quality, tailored training that businesses need to take advantage of growing opportunities in the region and across the wider sector."

TRAINING CENTRE

Work has just started on Modal Training's 5,696 m2 facility in Immingham, with the design phase of the project now in progress.

The centre – which is jointly funded by the Grimsby Institute and the Humber LEP, as part of the Humber Growth Deal – is on schedule for completion and full operation in September 2016.



Modal Training

Click to view more info

SUPERIOR SUBSEA SURVEY

FROM CONCEPT TO COMPLETION AND BEYOND

Subsea surveys provide developers and offshore contractors with vital information to help build and maintain cost efficient offshore windfarms and subsea power networks.

Surveys are performed throughout a project life cycle and help develop field layout, subsea cable routes, identify UXO and other seabed obstacles, support cable lay activities and enable subsea inspection of infrastructure to ensure integrity and operational longevity.

PROJECT SOLUTION PROVIDER

DeepOcean is an innovative project solution provider and supports subsea renewable and interconnector projects from concept, engineering, survey, installation and protection through to subsea inspection and maintenance.

INDUSTRY EXPERIENCE

One of the company's many strengths is its impressive track record in subsea survey, having surveyed and inspected more than 70,000km of subsea product. In addition, its subsidiary ADUS DeepOcean has recently undertaking the post-construction bathymetric survey of all infield assets for the Greater Gabbard windfarm, including assessment of cable condition and scour assessment.

DeepOcean has installed over 1000km of subsea power cable and performed associated lay and burial verification surveys. The company has recently secured contract awards to survey, install and protect subsea array, export and interconnector cables on Bligh Bank, Race Bank, Walney Extension and NEMO Link.

TECHNOLOGY INVESTMENT

To ensure clients receive the optimum survey the company continually review operational performance, improve methodology and invest in the latest technology, such as high density video, subsea laser technology and 3D visualisation software, to improve the gathering of data processing and visualisation.

The formula to a cost effective survey is speed and quality. The company's extensive experience in performing acoustic and visual surveys with ROV's, ROTV's and AUV's highlighted that AUV's offer speed but sacrifice options to stop and re-run sections and areas to check findings immediately, whilst traditional ROV's provide high quality data acquisition, but up until now are somewhat slower.

SOLUTION

To tackle this shortcoming, DeepOcean undertook several years of conceptual engineering and development to optimise an ROV platform with the aim of doubling the common survey speed, whilst retaining capacity to carry a suite of multibeam echo sounders, side scan sonars, sub bottom profilers, UHD camera's, laser profilers, a conductivity probe stabber arm as well as a manipulator for light intervention.

The result is DeepOcean's Superior ROV, which was delivered in co-operation with manufacturer Kystdesign in June 2015. The Superior ROV offers the company and its client's superior acoustic and visual line inspection and seabed mapping capability, including increased speed and stability as a result of its hydrodynamic shape, speeds up to 6 knots and twice as fast as conventional survey ROVs. This in water depths to 1000m, with improved positioning with auto track capability and 20% increased data quality through significant improvements or signal/noise ratio.

Figure 1
Superior ROV final design showing configuration with skid and new pipetracker frame (left) and ROV in high speed configuration without skid (right).

The modular approach allows a significant flexibility in operation modes for the vehicle. Three main modes of operation are envisaged:

MODE 1 – SEABED MAPPING

When equipped with a dual head multibeam echo sounder, side scan sonar and sub-bottom profiler, the Superior ROV can map the seabed at speeds between 4-6 knots, twice as fast as traditional ROV seabed mapping.

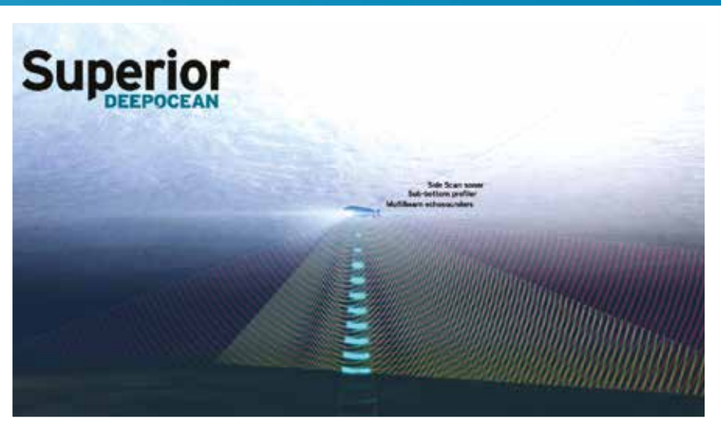


Figure 2
Superior ROV in Seabed Mapping mode

Detailed inspection analyses are carried out at significantly higher speeds than the traditional acoustic surveys.

CONTINUED...

MODE 2 – ACOUSTIC LINE INSPECTION

Acoustic line inspections are performed using side scan sonars only. Superior equipped with still cameras and laser profilers fly right above the pipe/product at 5-7m altitude and provide high resolution pictures from above as well as ultra high density 3D point clouds over the line.

MODE 3 – VISUAL LINE INSPECTION (GVI)

Below is an example showing the level of detail that can be obtained from laser system. This provides significant cost benefit in terms of the increased speed in this mode.

Figure 3
Data example – Comparison 3D point clouds from MBE (left) and laser profile data (right)

Figure 4
Superior ROV – Mode 3 – Visual Pipeline Inspection (GVI)

Carrying a pipetracker, cable tracker, camera booms and Conductivity Probe (CP) stabber arm, the Superior ROV is also able to perform close visual inspection with video cameras looking under the pipe or product is required. The Superior ROV will be able to perform this type of survey at a higher speed than previous ROVs.

Figure 5
Superior ROV – Launched from Volstad Surveyor

Put simply, the Superior ROV is faster, more stable and more capable than other Survey ROVs in the market.

DeepOcean

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= Click to view video

TAKING A CLOSER LOOK

Windfarm operators are rapidly discovering the advantages of using small ROVs (Remotely Operated Vehicles) instead of divers for inspections and simple physical tasks.

Whenever divers work the associated risks are reflected in their cost to the customer and for simple inspection jobs these may be hard to justify. If an inspection is needed to reveal the condition of a Tekmar seal, for example, or the extent of scouring around a bell mouth, a diver's report may also not be as useful as a service that enables the customer to see the situation for himself on an ROV's video or imaging sonar. Small ROVs can make this possible and when the service provider specialises in windfarm support it will have the expertise needed to meet the customer's needs with the minimum of cost and disruption.

LATEST ROV CAPABILITY

Despite their small size, the latest observation class ROVs can have a power and versatility that enables them to tackle a wide range of tasks in sea conditions that would be inaccessible to divers. Enhanced video technology can overcome poor visibility while special cameras can see fluorescent dyes that reveal leaking seals or grout. Even the murkiest water can be penetrated by sonar imagery so engineers can see a situation for themselves before deciding on a course of action.

IN DETAIL

Charlie Foll is Managing Director of Atlantas Marine which has been specialising in windfarm support for several years. *"Our smallest ROV (VideoRay Pro4) is barely larger than a shoe box yet during turbine construction it can carry a messenger wire from a cable-ship and through the monopile. It can also carry a probe to test the cathodic protection system, or use a small manipulator arm to recover marine growth samples for analysis. If the marine growth needs to be removed, a larger Ocean Modules V8 ROV equipped with a pressure cleaner can do the job.*

This ROV's unique 360 degree manoeuvrability makes cleaning more efficient while its ability to settle on an inclined J-tube can give precise measurements of its angle."

OVERCOMING MAJOR CHALLENGE

With costs and efficiency always taking top priority, Atlantas Marine is now demonstrating effective techniques that overcome major challenges during the operation and maintenance of offshore wind farms.

Atlantas Marine

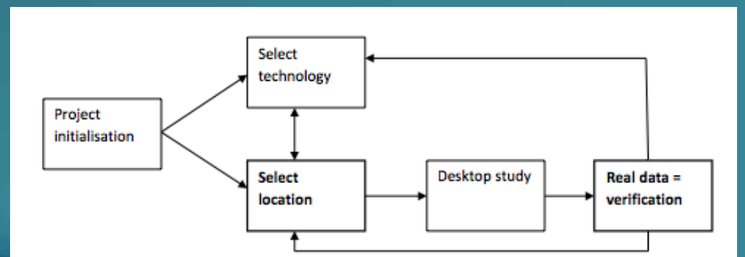
THE IMPORTANCE OF SEABED SURVEYING

Seabed surveying for offshore wind and wave & tidal energy is a broad subject but in encompasses a wide range of very specialised skills and experience depending on the location, local conditions and client requirements. The scope of work for a project can be extensive, but generally includes geophysical (bathymetry, shallow seismic), geotechnical borehole investigations, UXO and clearance surveys as well as metocean data such as currents and wave climate information. In tidal areas, collection of this data can add an extra level of complexity.

The importance of seabed surveying early on in the project lifecycle cannot be underestimated. If the project is to succeed and maximise on its investment, then the site characteristics must be determined well in advance of construction to ensure the location is suitable to the technology type and that marine operations can be well planned to reduce the amount of sea time and avoid any potential issues.

Typically, sites are selected through two main scenarios:

- the technology developer selects a site based on their technology, with a view to finding the right site to match its capabilities
- the site is pre-selected at a demonstration area e.g. EMEC or WaveHub, where the developers need to plan how their technology can make bet use of that location.



In either case, seabed surveying provides the initial information required in order to plan the project and maximise on the conditions and technology available.

HOW SEABED SURVEY ASSISTS IN PROJECT PLANNING AND SITE SELECTION

With the right experience and equipment, hydrographic surveyors will also provide construction support to ensure accurate surface and subsea positioning during installation, of the turbines themselves and of the associated assets such as cables and connectors.

Once a project enters the Operation and Maintenance (O&M) phase, the role of seabed surveys can provide further essential data for monitoring temporal changes in features such as seabed morphology e.g. for scour monitoring to assess impacts on power cable integrity.

If done regularly, and planned in advance, this can be an essential tool in the O&M strategy of the operators.

At the Gwynt y Môr offshore wind farm, Insight Marine Projects Ltd recently provided essential information to their client RWE Innogy/Manor Renewable Energy Ltd which included baseline bathymetric datasets within the wind park as well as additional cable route and UXO surveys. So from pre-construction and O&M through to project decommissioning we have been instrumental in providing the data required by our clients to enable them to best plan the next steps in their project.

Insight Marine Projects Ltd

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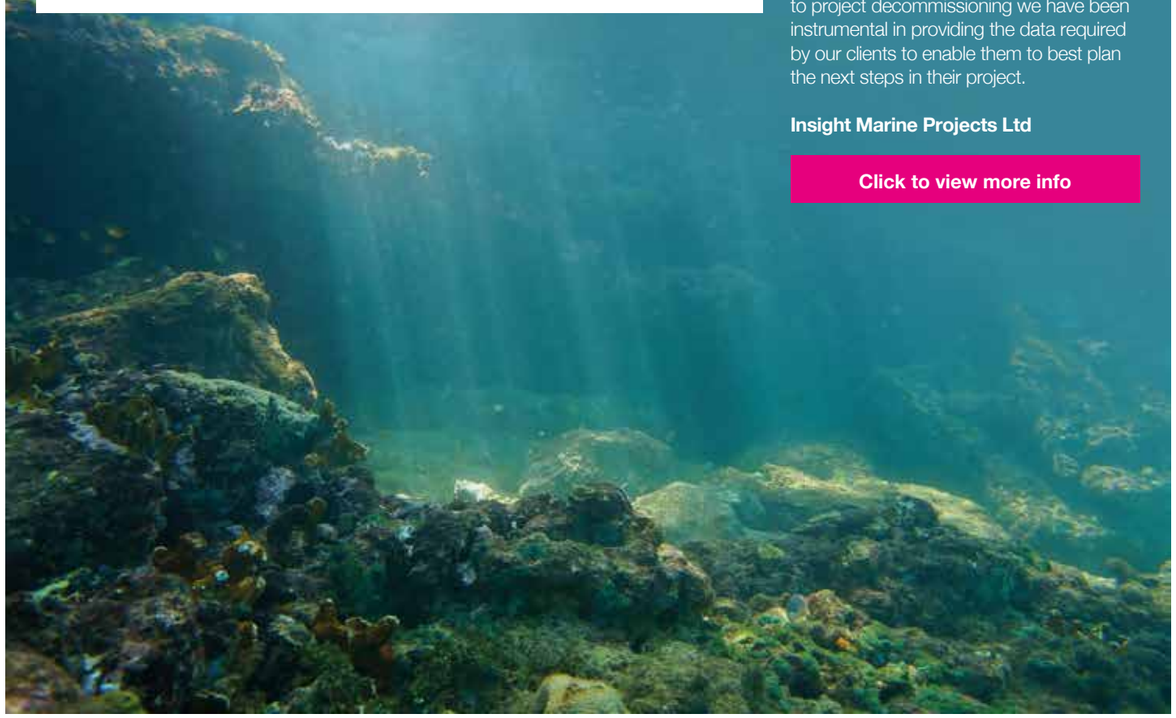


PRINCIPAL CONTRACTOR

Celebrating 3 Years at Teesside Offshore Windfarm

SeaRoc Group, experts in offshore renewable energy since 2002, recently moved into its fourth operational year on EDF Energy Renewables' (EDF ER) Teesside offshore windfarm.

The company was appointed to the role Principal Contractor in December 2012, replacing the residing Principal Contractor, and adopting full responsibility for the site at 00:01 on 1st January 2013.

WORK SCOPE

The scope of work consisted of…

- Construction management for the installation of 27 × 2.3MW Siemens wind turbines and towers
- Completion of foundation works
- Cable termination
- Transition piece energization
- Vessel management
- Installation of scour protection
- Array commissioning and interface management with the onshore works

PROJECT TEAM

At its peak, SeaRoc employed a team of 40 people on the project, which was handed over to the EDF ER Operations and Maintenance (O&M) team on 4th October 2013.

Since then SeaRoc has continued to provide support to EDF ER through the provision of the Marine Coordination system for the O&M phase (which operates using SeaRoc's SeaPlanner software) and also Marine Coordinators, Rigging services, HSE advice and GIS services. SeaRoc and EDF ER have recently signed a contract to extend these services into 2016.

GREAT ACHIEVEMENT

Nick Murphy, Head of Operations at SeaRoc Group commented: *"Our work on Teesside offshore windfarm has been a great achievement for SeaRoc. We are not aware of any other company our size which has successfully delivered the Principal Contractor role for an offshore windfarm and we are delighted to be taking our work on the project into its fourth continuous year.*

From signing the initial contract back on Christmas Eve 2012 and taking over control at midnight on the 31st, we were able to set up a functioning marine coordination system overnight using SeaPlanner. We are proud to have been operating that system continuously now for over 3 years."

SeaRoc Group

Click to view more info

PIONEERS IN THE DEVELOPMENT OF INTER-ARRAY CABLES FOR OFFSHORE WIND

We introduce JDR Cables as sponsors of our Inter-Array Cables feature.

As Editor I had the pleasure of interviewing three of their technical team…

- **Peter Worrall** - Technical Services Director
- **Stephen Ingham** - Lead Analysis Team Leader
- **Caroline Lourie** - Senior Analysis Engineer

KNOWLEDGE AND COMMITMENT

The first thing that strikes you is the level of knowledge and commitment – we do come across this many times in engineering generally but in this case it was palpable.

This introduction to the company and what it stands for will be relatively brief from myself preferring to concentrate on the work they do – you will therefore find a 'storyboard' on the subject area of 'The importance of technical cable analysis' following this introduction.

FOLLOW-UP ARTICLES

This is not the end of the story however as we will be drilling down more deeply in follow-up editions regarding all of the important work JDR Cables carries out in the wind energy industry including…

- The concept of minimising risk prior to a project commencing
- Experience in the Oil & Gas industry and lessons learned
- The company's strong technical function and consideration given to developing a separate department
- Bringing in projects on time and on budget
- Relevant extracts from the technical information received

The importance of technical cable analysis

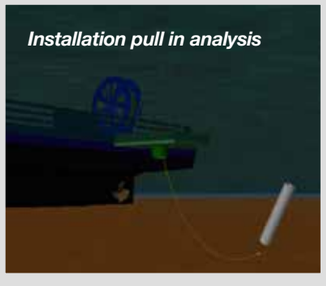
WHY PERFORM ANALYSIS?

Analysis performed at the FEED stage can allow cable product design optimisation, considering:

- Installation loading and requirements for bend stiffeners and restrictors to protect the cable;
- Project specific factors such as total product length and weight for optimal storage and transportation;
- Requirements for stability on the seabed and the most cost effective means of achieving this;
- Fatigue lifetime endurance and resilience to operational lifetime extreme storm conditions.
- Optimising power core size wrt CAPEX material costs vs OPEX cable heating losses
- Any issues identified at FEED stage can be accommodated at detailed design stage in a much more timely and cost effective way than can be done at the project execution stage.

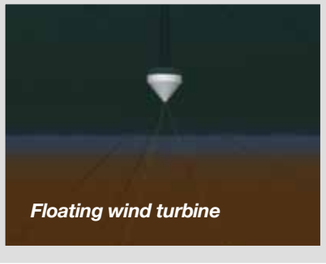
GLOBAL FEA – SYSTEM LEVEL ANALYSIS OF CABLE / UMBILICALS FOR:

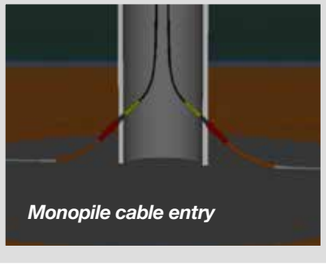
- System design configuration optimisation, considering buoyancy and tethering
- Extreme event analysis to ensure product will not be mechanically compromised
- Fatigue analysis to ensure product will last intended lifetime
- Clashing / interference analysis to assess potential impact of other lines / structures in proximity.

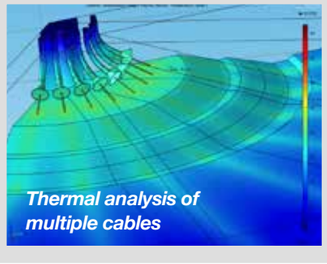

Installation pull in analysis

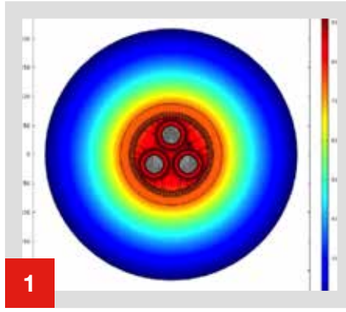
LOCAL FEA – COMPONENT LEVEL ANALYSIS OF CABLE / UMBILICAL CROSS SECTION:

- Thermal analysis for heat losses produced by power cores, for cable rating limitations
- Electromagnetic analysis for environmental impact, identifying levels for detection of buried cables and electrical interference / cross talk between cables in close proximity
- Component level stress analysis to determine


Floating wind turbine


Monopile cable entry


Thermal analysis of multiple cables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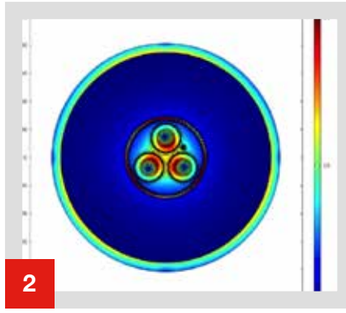
1 Thermal analysis to determine limiting cable rating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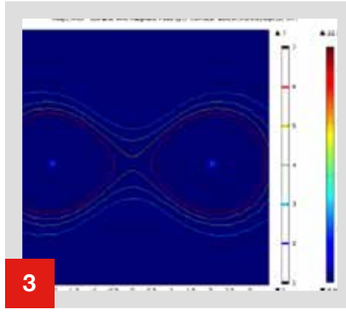
2 Electromagnetic analysis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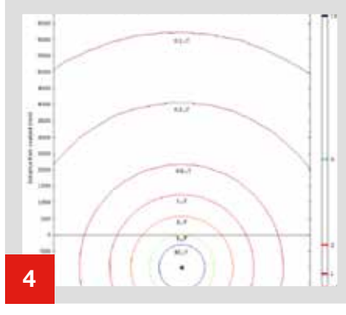
3 Electromagnetic interference analysis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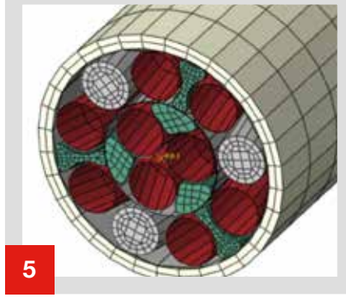
4 Electromagnetic analysis to determine flux density of buried cable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5 Component level stress analysis

JDR ANALYSIS EXPERIENCE

JDR has a wealth of experience in subsea umbilical and power cable design, directly applicable to the supply of power cables to the renewable wind industry. Dynamic global finite element analysis (FEA) for complex umbilical systems and local thermal FEA of umbilical cross sections for complex temperature distribution in the oil & gas industry which can be transferred directly to renewable cable systems.

The insight gained on tidal generation projects is also applicable to the offshore renewable wind industry, in particular wrt stability in extreme tidal environments, routing optimisation for export and array cables and thermal constraints due to cable operating losses. For one such project, JDR utilised dynamic power generation data and cyclic environmental loading within the thermal analysis to optimise cable ratings for cables laid in close proximity.

The technical services team has a strong background in dynamic analysis, cable design and development for the offshore subsea industries.

ARRAY CABLES – PAST, PRESENT, FUTURE

JDR has supplied array cables with both copper and aluminium power cores to many wind farm projects around the UK and Europe. Key areas of experience for renewables include:

- Design and analysis for BSH 2K environmental criteria for cables installed in offshore Germany territories
- Optimisation of cable cross sections for intended ratings, including consideration of cyclic loading and losses
- Cable proximity studies at sub stations to maintain cable ratings

In the future, it is envisaged that the core cross section design specification will be key in reducing the LCOE, by considering CAPEX material content and OPEX heating losses and optimising in particular wrt dynamic cyclic loading due to the stochastic nature of the wind conditions upon the generating capability.

JDR PRODUCTS AND SERVICES RANGE

- FEED design and analysis
- Design and manufacture of power cables and umbilcals
- Global Services installation aftermarket support

JDR Cables

Click to view more info

= Click to view video

FEATURE SPONSOR INTER-ARRAY CABLES

BAD WEATHER TRIES TO STOP WORK

It was a blustery, cold day in January 2015, at the port of Cuxhaven. A plethora of offshore construction and service ships were all seeking shelter due to inclement weather conditions turning aggressive. At E.ON Climate & Renewables' nearby Amrumbank West offshore wind farm construction activity had all but ceased due to the weather.

Aboard a support service ship returning from a nearby operational offshore windfarm, the skipper passes Siem Offshore Contractors latest fleet addition, the Siem Moxie heading towards another wind turbine foundation on Amrumbank West. The skipper calls out over the radio a warning about the weather and says that he will see Siem Moxie's crew later for a hot drink and a catch up. The Siem Moxie responds they are aware of the weather and thanks him for the contact.

It takes just over 6 hours to get back to Cuxhaven. Finally arriving in his designated docking spot, the skipper checks his AIS tracker to see how far out the Siem Moxie was from coming back – to his surprise he finds that the Moxie is showing as still in field! He hastily looks up the number of his contact at Siem Offshore Contractors.

MEANWHILE BACK AT HQ

Siem Offshore Contractor's General Manager, Lars Muck is sitting in his office at the company's headquarters in Leer, Germany. It's dark outside, and he can hear the wind blowing. His mobile phone rings, it's an old contact of his, who happens to work on another offshore windfarm in the German North Sea.

"Hi Lars" his friend says over the phone, *"I've just heard that the Siem Moxie's AIS must be broken!"*

Lars pauses, then asks why his friend thinks this is the case. *"There are high winds and waves far over two metres significant wave height, Siem Moxie is the only vessel in field according to AIS."*

Lars smiles to himself, and explains that the Siem Moxie is indeed still working in field, *"She can work in up to three metres significant wave height"* he says. His friend is incredulous, *"How is this possible?"* he asks.

Lars explains that it is a combination of the Siem Moxie's Ulstein X-Bow design hull form as well as a powerful dynamic positioning (short DP) system and stabilisers, all coupled with an active motion compensated gangway used to transfer people to and from foundations in high winds and waves. She has accommodation for sixty people on board, and can stay offshore for long periods.

It's his friend's turn to pause, before asking, *"When can we charter her?!"*

A 'STEP CHANGE' IN OFFSHORE WINDFARM ARRAY CABLE INSTALLATION APPROACH

The Siem Moxie represents a significant technological innovation in the construction of offshore windfarms, with a specific focus on foundation works related to submarine cable installation. A result of a carefully process oriented design considerations, based on client feedback and drawing upon nearly twenty years' experience in submarine cable installation, the Siem Moxie has been built to satisfy a long standing demand for an alternative approach to undertake various support works on offshore windfarm foundations.

On traditional installation projects, personnel were typically delivered to the foundations via sea-level boat-landing/ ladder structures on the outside of the foundation. A so called Crew Transfer Vessel (CTV for short) would push up against the fenders on either side of the ladder on the foundation and technicians would step across from the bow fender to the ladder and then commence to climb up to the working platform of the foundation. This activity was typically very weather sensitive specifically in relation to wave height, and - if delayed - could delay the entire installation campaign.

Equipment needed to perform cable pull-in and termination works would either be pre-installed, delivered by a larger ship via on-board cranes, or hoisted to the working platform by davits or small cranes from a CTV on the foundations thereby eating into a significant portion of the available time required for the safe installation of the submarine cables.

THE SIEM MOXIE IS DIFFERENT

Central to the Siem Moxie is a walk-to-work (short W2W) gangway, designed and manufactured by the Norwegian firm Uptime International. This gangway is active motion compensated, compensating not just for heave, but also pitch and roll using a pedestal mounted compensation system. This is combined with the fully redundant DP-2 system as well as stabilisation tanks and Voith Schneider propulsion to deliver an incredibly stable solution for transferring personnel from the vessel directly to the working platform (or Transition Piece) of the foundations, ready to commence cable installation works.

The Siem Moxie furthermore has a '3D motion compensated crane' developed by Norway-based MacGregor, which is used to transfer all required equipment from the back deck of the Siem Moxie onto the foundations. This leaves the cable lay vessel to focus on laying and trenching of submarine cables, whilst the operational critical path is balanced between the vessel involved in the cable installation activities and the support activities of the Siem Moxie.

TRIED AND TESTED

The Amrumbank West offshore windfarm inner array cable installation project was Siem Offshore Contractors' opportunity to demonstrate that the next generation of far from shore offshore windfarm projects can be supported safely and cost-effectively based on a new approach whereby submarine cables were installed in unprecedented weather conditions, and at record speeds.

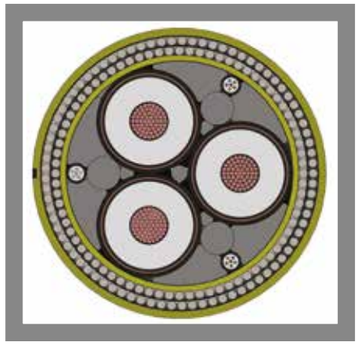
Now the Siem Moxie is moving onto its next challenge, the Nordsee One offshore windfarm where, no doubt, the Siem Moxie will carry on turning heads.

Siem Offshore Contractors

Click to view more info

GOOD PRACTICE

The global offshore renewable energy sector continues to experience rapid development. There is clearly an increased drive within this sector to reduce costs by refining whole project design and developing new, lower cost alternatives. The importance given to the 'Whole Project' approach as opposed to the 'Package' approach should not be underestimated.



GOOD PRACTICE

Of course the success of any venture is directly related to the skill set that is employed. This is particularly so when considering offshore cables.

There continue to be significant cost reduction initiatives that focus on the cabling requirements. Key players are notably interested in promoting and supporting those initiatives that look promising.

CABLE DEVELOPMENT

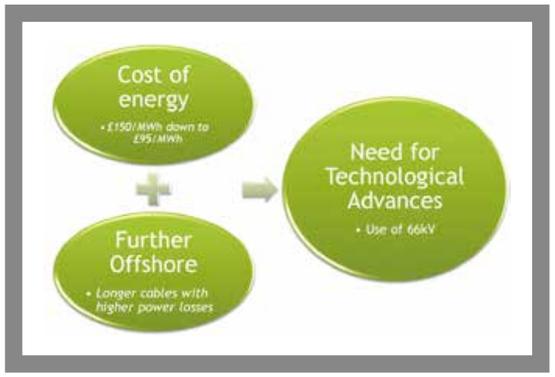
Areas that are currently undergoing significant development include…

- Cable protection
- 66kV cable development
- Termination methods
- Dynamic cables
- Fundamentally new cable designs
- Installation equipment, vessels, techniques and dynamics
- Maintenance/repair
- Standards and guidelines

All of the above points will very likely have an impact upon the technical and commercial viability and ultimate optimisation of your project. Whilst we would like to target each one individually and expand upon them, it is well beyond the space available in this editorial.

ENSURING SUCCESS

It cannot be emphasised too highly that the underlying key to ensuring that your project is a technical as well as a financial success, rests squarely with the skills that you employ. This necessarily starts at the highest level so as to be able to assemble a properly skilled and experienced project team.



It is always essential to ensure that you have a core of skilled resources. Contracting companies and personnel will undoubtedly offer many services to your project but care should be exercised to ensure that the skills being offered to you are indeed real. A mistake at this stage can cost the project a seriously disproportionate amount.

FUTURE PROJECT CONSIDERATIONS

It would be worth considering on your future projects the following key points…

- Due diligence on different design concepts (e.g. wet type) for higher voltage levels, particularly 66kV
- Addressing the current lack of design standardisation
- Robust methodologies for handling longer lengths
- Increased need for thorough route engineering
- Emphasis on ensuring and maintaining jointing skills
- ARM: Availability, Reliability and Maintainability

SOLID FOUNDATION

A good solid foundation is what your project needs to ensure that it is ultimately constructed in the most optimum way possible. There will most likely be many challenges encountered along the route but your team of experts should be able to negotiate them all in the most technically adept and cost effective way possible.

Tony Zymelka
Director, Cable Operations
BPP-Cables

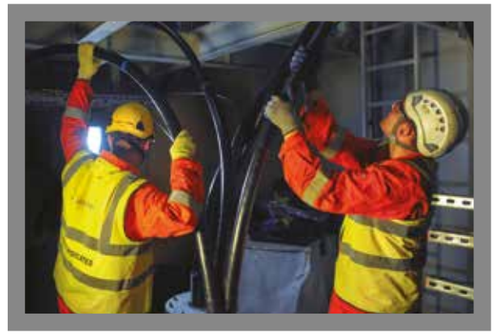
Quality & Efficiency

Optimising installation programmes and improving efficiency, of the construction phase of offshore wind projects is one of the great challenges faced by the industry. Cost reduction initiatives during planning, development and construction are key in ensuring viability of projects for investors and stakeholders. However, it is imperative that reducing costs does not compromise the quality of operation phase of the installations.

CRITICAL PATH

Where construction activities lie on the critical path to project completion there can be added pressure to accelerate works to maintain target deadlines. Inter-array cable installation, termination and testing form part of the activities of which, switch on for operations is dependent upon.

H&Askham have worked on a number of projects providing inter-array cable services and have actively strived to develop not only the practical installation techniques but the overall strategy with which projects are delivered to result in both improved efficiency and quality. Key areas of focus have included; Early Engineering, Personnel Training, detailed Project Reporting & Quality Assurance. This well rounded approach ensures that progressively risk is managed and controlled at each step of the journey.



PROJECT REPORTING

Brian Hanratty, (H&Askham Project Manager, Renewables) describes the benefit of the project reporting methods developed by the company, *"Accurate and detailed daily reporting, communicated on a near real time basis has proven instrumental in the success of recent projects.*

"When acting as the contractor we are now able to feedback information to the client regarding accurate progress of the works to assist with the forward programming but further to this in the role of Client Representative the reporting provided focuses on Quality Assurance."

Brian stresses, *"Fundamentally a quality installation will provide longevity in service."*

CLOSE COLLABORATION

With the influence of array cable terminations being prevalent both on construction and operational performance of a windfarm, it will continue to be an area of interest for both developers and contractors to explore advances in at all stages of the project lifecycle.

Close collaboration of all parties involved in design and construction and engaging with specialist contractors who will provide practical knowledge and expertise based on previous experience will form a sound basis for project success.

H&Askham

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= Click to view video

FURTHER WORK FOR THE SUBSEA HYDRAULIC CABLE GRAB

Pharos Offshore successfully completed a diver-less export cable repair for London Array using the Subsea Hydraulic Cable Grab.

PROJECT DETAIL

Basslink a subsea cable connecting George Town in Tasmania and Loy Yang in Victoria, has a possible fault with the cable which is approximately 100km off the Tasmanian coastline in Bass Strait.

Using the Subsea Hydraulic Cable Grab and a team of personnel from Pharos the cable will be recovered for repair. Pharos delivered a work package with the rapid mobilisation of expertise, equipment to locate and recover the subsea cable.

Reacting quickly to customer requirements the system was prepared and shipped within 2 days.

DELIVERING ENGINEERING SOLUTIONS

Pharos Offshore delivers engineering solutions for subsea cable installation, maintenance and repair.

The company works with clients across the offshore oil & gas, submarine telecoms and renewable power industries. Their in-house expertise includes highly skilled and experienced offshore technical professionals and onshore engineering management and operational support teams.

The company also develops subsea cable handling and burial solutions, including vehicle and handling systems, with a proven track record in taking projects from concept design, delivery, testing and on-going support.

INNOVATIVE SOLUTIONS

Pharos delivers innovative engineering solutions by combining state-of-the-art technology with knowledge gained from real operational experience.

EXPERIENCE

Pharos offshore personnel are experienced in all major manufacturers of remote operated vehicles, plough systems and launch and recovery systems. The company's multi-disciplined team have an extensive track record in subsea trenching, survey and ROV support.

Pharos Offshore

CONTINUED DEMAND FOR INDUSTRY PRODUCTS

Based in Norfolk in the East of England, Albion Manufacturing continues to see the demand for their hand made cable socks/Chinese fingers (Albi-Grips) increase in the UK, Europe and worldwide. The demand for their products comes primarily from the renewable energy/windfarm industry and given their location, Albion are ideally placed for windfarm activity along the east coast and the UK generally.

QUALITY MANAGEMENT SYSTEMS AND ACCREDITATION

The company has undergone a thorough external assessment of their quality management systems in accordance with ISO 9001 and have been granted certification by ISOQAR, a UKAS accredited certification body. Albion originally added cable socks into their manufacture for use in the telecoms and mining industries over 60 years ago but as the offshore industries have grown the company's products have become more commonly used. They had already established a track record for quality and reliability with their clients however the demands of the industry led the directors to decide that improved certification was a necessity.

REPUTATION AND KNOWLEDGE

Albion's reputation and technical knowledge in their field has enabled them to attract many major names in offshore cable manufacture and installation to their ever increasing clientbase. This growing list includes JDR Cables, Prysmian, ABB, Jan De Nul, NKT, Global Marine Systems to name a few.

The company has already supplied their products to a number of UK and European windfarms including; London Array, Humber Gateway, Greater Gabbard, Sheringham Shoal, Scroby Sands, Northwind, Butendiek, Nordsee One, Global Tech, Gode Wind and continue to get enquiries for upcoming windfarms around Europe.

BRIGHT FUTURE

Managing Director, Martin Nix, said: *"Albion's future looks good with enquiries already received for many of the planned windfarms but we aware that we cannot afford to rest on our laurels. We are committed to keeping quality at the forefront of our business operation. Investing in our company and our staff is an essential part of growing our business and attracting and retaining a dedicated and skilled workforce. Having our ISO 9001 certification from a UKAS accredited certification body shows our commitment to both our clients and our staff.*

The added attraction with us is our proven experience and our ability to adapt and tailor make our products to meet our client's specific requirements. We are aware that opportunities within the expanding windfarm sector should continue for some time therefore keeping quality and reliability as our main focus is paramount".

Albion Manufacturing

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REDUCING CABLING COSTS
SOFTWARE PACKAGE

Kinewell Energy has developed the software package Kinewell Layout Optimisation of Cable (KLOC), which reduces offshore windfarm inter-array cabling costs by £3m - £30m per GW of installed capacity.

The KLOC software designs the geographic electrical connections that link offshore wind turbines with a substation, collecting the power before sending it to shore.

EVOLUTIONARY ALGORITHM
The software is based on an evolutionary algorithm. A single iteration of the algorithm considers a small subset of the network and re-designs it. With many iterations the best areas of the network are kept while re-designing the sub-optimal areas.

The software is extremely fast at doing this, allowing good designs to be found within seconds. This allows for an extensive range of design philosophies to be interrogated leading to significant savings.

CASE STUDY
Kinewell Energy has undertaken a case study of the 576 MW Gwynt-y-mor windfarm currently the second largest operating windfarm in the world. The developer installed design is shown in Figure 3 and the design found by the KLOC software shown in Figure 4. In total the re-design yielded savings of £2.2m, or 3% of the installed cable cost.

CASE STUDY COST DETAIL
During the re-design the overall cable length reduced by 1.66 km. Despite this the cable cost increased by £0.18m due to a higher proportion of the total length using cable with a larger cross sectional area. At the same time the installation cost reduced by £0.34m because a greater proportion of the cable is designed to be laid in shallower waters.

The real benefit in this case study however comes through the reduction of electrical losses; some 1.2 GWh per year which is enough energy to boil the water of 5 Olympic sized swimming pools from room temperature.

Figure 3

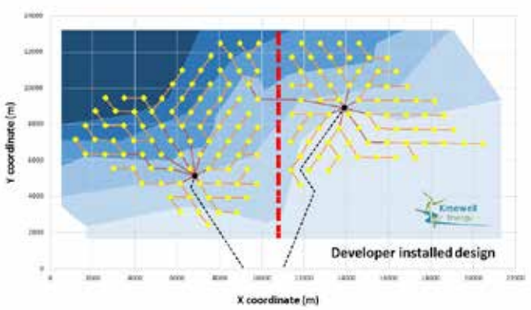
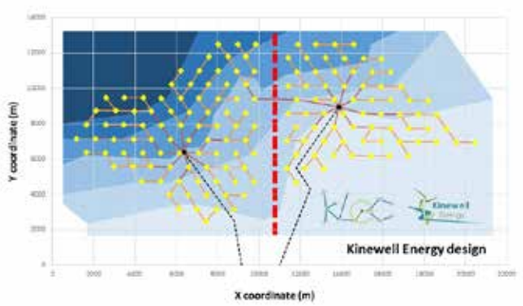
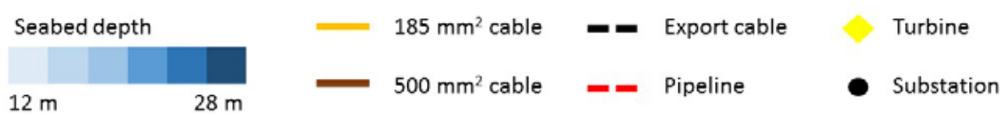


Figure 4





MULTI-INDUSTRY TRANSFERABLE SOFTWARE
Although KLOC is based around offshore wind it is transferrable to many other types of projects. Kinewell Energy can optimise the inter-connection design of any number of nodes with multiple collection locations.

This enables wind turbines, tidal generators, oil & gas pumps to be connected to electrical substations or central processing facilities with electrical power cables, communication cables or pipelines.

Kinewell Energy

Due diligence can be defined as a comprehensive appraisal of a business undertaken by a prospective buyer, especially to establish its assets and liabilities and evaluate its commercial potential.

WIND ENERGY INDUSTRY

From the perspective of an investor in a windfarm, this can take a number of forms which include…

- **Legal due diligence** – checking the status of the various permits, consents and planning conditions and reviewing the commercial contracts and land leases
- **Technical due diligence** – an assessment of the equipment (turbines, balance of plant and grid connection) to understand performance and reliability. May also cover assessing the wind energy forecasts and related assumptions
- **Financial and tax due diligence** – a review of the historical (if applicable) and forecast financial performance of the windfarm, including an in-depth review of the accounts and the valuation model
- **Commercial/regulatory due diligence** – considering the key commercial assumptions that underpin forecast revenue, including forming a view on likely future power price trends the current and future subsidy regime and other market aspects

KNOWLEDGE AND EXPERIENCE

The nature of the wind industry is such that using a diligence provider with extensive sector experience is desirable. For example, technical advisers will often have knowledge of specific turbine models and the associated performance track record and the larger law and accountancy firms for example, have dedicated teams focused on renewables.

WHY COMMISSION DUE DILIGENCE?

This will depend on the scale of investment – a small and relatively simple asset may present a lower risk profile than a large, complex windfarm or portfolio of assets. A larger investment is also more likely to justify the level of fees incurred in conducting comprehensive due diligence.

INVESTMENT FUNDING

Another factor is the source of funds behind the investment. Banks and other debt providers will typically require a higher level of comfort over the future cash flows of the asset than small scale equity investors.

The requirements of debt funding often mean that the future cash flows will need to be assessed to a high level of detail and sensitivities applied to understand the risk of future performance falling short of expectations (with the possible consequence of inability to service debt interest and principal repayments).

Any investment made on behalf of others (for example, investing on behalf of a fund, or as a trustee) will require the decision maker to be seen to have taken all the necessary steps to make an informed and responsible decision – in other words, to have done their due diligence.

The nature and extent of any due diligence needs consideration at an early stage of the investment process to allow sufficient time and scope to carry out the analysis to the desired degree.

ABOUT THE AUTHOR

Gian Paolo is a senior member of PwC's dedicated renewables Transaction Services team. Based in Edinburgh he carries out financial due diligence across the renewables sector for a variety of clients including major utilities, private equity houses, Government bodies and corporates.

He has worked on onshore and offshore wind, solar and marine energy projects in addition to work in the wider power & utilities industry.

Gian Paolo
PwC

Introducing Due Diligence advice from Andrew Jackson Solicitors…

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Andrew Jackson Solicitors, a leader in the field of renewable energy business advice, have been regularly contributing articles to our magazines right from the beginning.

Two of their experts have written articles specifically on Due Diligence and we feature them here – unfortunately we are restricted on the amount of space we have. However, you can read Martin Collingwood's contribution below and access Andrew Oliver's through the QR Code/Online link here.

CONSIDERATION FOR DUE DILIGENCE

The need for type and extent of due diligence will depend heavily upon the nature of the transaction being undertaken.

Essentially it is an information gathering exercise concerning a particular project, company or transaction and needs to be managed effectively to ensure that all the appropriate risks are identified and properly evaluated.

THE PROCESS

In essence the process is an audit of the legal, financial and business risks associated with a project, transaction or company which, if carried out effectively will allow the risks to be properly evaluated and provided for.

It is not a substitute for contractual protection but assists in the exercise of determining what the risks are and what protection you need to put in place and how best to achieve it.

TIME CONSIDERATIONS

The focus of any due diligence investigation will depend on the nature of the transaction and its purpose together with the practical realities of the situation e.g. how much time is there to conduct the investigation?

The exercise will inform the extent of any retention needed, the warranty cover, the contractual terms and the need for and extent of security for performance required. It is important that the team carrying out the due diligence is made up of the right members with the appropriate skills to carry out the exercise.

ASSESSMENT OF RISK

As part of the enquiry, consideration will need to be given to the industry norms in terms of risk as well as the risks specific to the project or transaction in hand and the interests to be protected.

Martin Collingwood
Andrew Jackson Solicitors

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INDUSTRY TRAINING SERVICES DEMAND GROWS

Leading industrial trainer, AIS is experiencing huge demand for wind services as its reputation for response and bespoke training within the renewable energy sector grows.

With UK wide coverage AIS's multi-million pound Renewable Energy Training Centres of Excellence in North Shields and Grimsby are now seeing unprecedented levels of delegates. Most are coming through the companies GWO and RUK wind industry training packages as large projects in the UK and Europe grab headlines.

INVESTMENT

Queen's Award-winner, AIS has invested heavily in these state-of-the-art facilities, which are purpose-built for the wind industry's requirements. As well as climbing and rescue platforms, vertical fall-arrest safety systems and evacuation hatches the company has also developed a mock nacelle to enable delegates to train in more advanced rescues. In addition the company has new technical engineering facilities ready for the release of the new GWO Basic Technical Training Standards, due to be released later this quarter.

WORKING WITH INDUSTRY

AIS is working with many windfarm owners and operators to plan and deliver competency training and have a number of preferred supplier framework agreements in place.

Renewable Energy Specialist, Alison Isbister, believes that the company's success is down to its unrivalled industry relationships and ability to deliver above and beyond the expected. She said: *"We have forged strong links with some of the industry's biggest players to deliver tailored training programmes for their employees. Our ability to understand the nature of their business and respond quickly to their needs ensures that we are often the first point of call for any training requirements.*

"Often for larger companies with a large number of employees, it can be a logistical nightmare to organise multiple training courses. To help we offer multi-site delivery, weekend training, onsite training and help with planning.

"We can also deliver training at short notice on weather days, enabling employees who can't transfer onto projects to practice key skills, emergency evacuations and identify any potential risks in procedure."

EMERGENCY RESPONSE SKILLS & EXPERTISE

Specifically the company is working closely with industry to deliver the skilled and competent workers required to meet industry objectives and the needs of tomorrow's workforce.

Unlike the oil & gas industry the wind sector is still growing in maturity. Skills and competencies are constantly changing and developing. Using their vast experience in oil & gas, AIS is helping the industry shape standards by developing courses and involving key industry players in proposed changes and pilot projects.

Emergency Response, Advanced Rescue and First Aid training is particularly important as offshore and onshore windfarms become more remote and logistically challenging.

MULTI-DISCIPLINARY TRAINING APPROACH

Many Round 3 farms will involve helicopter transfer, meaning long emergency response times as are already experienced in oil & gas. It is imperative that project team members can deal with emergencies if and when they occur. A multi-disciplinary training approach including drills and scenario based exercises ensures that employees can think on their feet and cope with any eventuality.

The facilities feature a ten metre tall PUMA helicopter simulator to provide realistic simulated heli-deck fire-fighting scenarios, as well as purpose-built structures that mirror some of the internal structures present on an offshore installation. Within these facilities, students experience the heat and smoke conditions of a real offshore fire.

AIS also offers a life-saving four day Advanced First Aid and Incident Management Course. Highly experienced rescue instructors and paramedics deliver scenario based training which gives learners advanced skills and the confidence and ability to manage an emergency situation.

MULTI-LOCATIONS AND FACILITIES AROUND THE UK

The leading training company now has four world-leading training facilities across the UK in…

- Newcastle
- Aberdeen
- Grimsby
- Huddersfield

State-of-the-art facilities offered in one location include…

- World-class 12 acre industrial training village
- Offshore survival pool
- Renewable Energy Centre of Excellence
- 30m wind turbine training tower
- Emergency Response Facility
- Rigging and Lifting Centre
- Rope Access Centre
- CompEx Electrical Unit
- Welding and NDT Centre
- Onsite hotel with rooms starting from just £25 per night

FULL BESPOKE TRAINING SERVICE

AIS's fully bespoke service eliminates the need for training managers and accounts departments to juggle bookings and bills for multiple courses, hotels and travel for their workforce.

REALISM IN TRAINING

Minimum industry standards require individuals working in the wind sector to undertake a 6.5m or a 15m climb. The company has secured an exclusive agreement with ORE Catapult in Northumberland to utilise their 30m training tower, providing more realistic training that goes above and beyond RUK/GWO standards.

Delegates undertake a 30m climb and perform an evacuation towards the sea giving them a full appreciation of the conditions they will face on the job.

Similarly, AIS trains delegates to operate five different types of harness so they are able to fulfill most wind operators' standards. This approach of going above and beyond means that delegates are well-prepared and able to operate at the highest standards when out in the field.

AIS Training

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= Click to view video

AIS TRAINING FEATURE SPONSOR EMERGENCY RESPONSE

UNEXPLODED ORDNANCE

The ever increasing growth in exploration and construction within the marine environment, especially with the continued expansion of wind energy projects, has undoubtedly demonstrated an increase in exposure to items of Unexploded Ordnance (UXO).

CONSIDERABLE PROBLEM

Some reports suggest that 1 in 10 of the bombs dropped on the UK and its surrounding waters during WWII failed to detonate. As such, bomb disposal has become a common addition to the planning phase at offshore sites in the UK and around the world. Should the threat of UXO arise during a project, a crucial question for operators is how they can reduce the commercial downtime caused. Moreover, how they can identify a competent solution thereby maintaining site safety and project continuity.

BEST PRACTICE GUIDANCE

Recently, industry lead bodies such as the Institute of Explosives Engineers (IExpE) and Construction Industry Research and Information Association (CIRIA) have released best practice guidance and other relevant advice to provide support to organisations in the marine environment with regards to the management of UXO risks. Historically, companies who choose to recognise savings early on by neglecting risk management invariably encounter prolonged response times.

This is primarily due to required permit applications and risk management sign off in the event that an item of UXO is encountered on site. This leads to significantly elevated costs during the project causing potential downtime of vessels working in the area and consequently delaying project completion. Whereas, companies who initially invest wisely, and entirely, in a UXO solution will secure prioritised response times and, in turn, reap the financial rewards during the project.

UNEXPECTED COSTS AND POTENTIAL RISKS

Although historically a military deliverable, commercial bomb disposal contractors have understood the importance of timely and appropriate responses to the threat of UXO on a project. A delay in response time could generate significantly elevated and unexpected costs for businesses or potentially result in damage to valuable assets.

Due to the potential risks associated with UXO and other Explosive Remnants of War (ERoW), it is crucial that effective decisions and threat assessments are made during the initial hours of the incident. This subsequently assists with ensuring safety allowing a reduction in potential impacts to the site.

Ramora UK

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MAKING SURE YOU'RE PREPARED WHEN THINGS GO WRONG

We all hope it never happens. The dreaded call comes in from the project where an accident or incident has occurred. At this point we all wish we were better prepared for the event. We wish we had attended that training course or organised a project training event to test ourselves. We wish we had read the Emergency Response manual more recently, checked if it was up to date, that all the contacts were correct and that everyone understood their role.

These are just a few things that might rush through your mind in the event of an emergency occurring. It is especially true when you are the first point of contact, or the person witnessing events unfold.

DOCUMENTED PROCEDURES

To avoid panic and misunderstanding it is essential that every project has a fully documented emergency response procedure or system in place. Equally important is that this procedure is revisited regularly.

Specialist Marine Consultants Ltd (SMC) have worked on a very large number of renewable offshore and oil & gas exploration projects and are often asked to set up and run drills on behalf of clients.

RESPONSIBILITY

Unfortunately, not all projects have a resilient system for testing their emergency response. UK legislation requires companies who are responsible for the safety of their offshore workers to make arrangements for emergencies. The documentation is in place, the emergency response team have been listed, the contact numbers and support team are in place... but is this enough?

The answer is simple. No! Effective response if best achieved through regular testing of the plan. Every ship should hold at least one emergency drill along with safety training every month. Many will hold one drill per week. The reason for this? To be prepared for the worst. No amount of documentation is as valuable as the simulation of an emergency situation.

IMMEDIATE RESPONSE REQUIREMENTS

The benefits of running unscripted real-time scenario drills are vast. The team does not know what is going to occur until the call comes in. They must organise the team and manage the situation, including the media. This we find has become one of the most challenging new aspects of any drill.

Information via social media can be posted within minutes of an incident occurring. PR teams must be prepared to respond, as must all key personnel for dealing with rumour and speculation.

DEDICATED ERT TEAMS

As distance from safe haven to offshore assets increase, we find that projects that have engaged with dedicated ERT response teams, with regular drills are the best prepared for assisting with an actual incident offshore.

Ian Coates
Managing Director
SMC Emergency Response

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EMERGENCY PROCEDURES

If you require employees to enter a confined space, you must prepare suitable and sufficient arrangements for their rescue. Very importantly this is required even if the emergency is not brought about by a specified risk.

PERSONAL EXPERIENCES

I have witnessed a situation during a mock rescue exercise to prove that arrangements were suitable and sufficient, where a casualty with a simulated broken leg, had to be removed from the stretcher because it was impossible to manoeuvre the stretcher (scoop) round a tight bend in the confined space. Imagine trying that with an unconscious casualty, fitted to a resuscitation device, creating a time constraint.

I have also seen, again fortunately during a training exercise, where a casualty being lifted vertically had almost made it out of the confined space (a reservoir wall) when, due to a twist in the access tower (20m vertical) he had to be lowered to the foot of the tower and his boots removed as this was the only way to clear the twist and complete the rescue.

Similarly, I have been informed of a rescue being carried out using a heavy duty tripod placed over a shaft, very successfully rescuing the casualty to the top of the shaft and then realising they had no way of "landing" the stretcher and casualty onto the side of the shaft. Imagine being the casualty and being able to see safety, but not get there!

LESSON LEARNED

The important lesson is practice to ensure suitability and sufficiency of your rescue procedures.

Your rescue arrangements need to ensure you are protecting the rescuers and where necessary, include resuscitation equipment.

PROVISION

The number of times I have gone onto sites where employees are provided with and must wear, respiratory protective devices, either compressed air or chemical oxygen, to find that there is no provision for resuscitation equipment.

Generally, I am informed that if they need resuscitation equipment, they will call the emergency services (999). If someone is recovered, or being recovered, from an oxygen deficient atmosphere, you have three minutes maximum to get an oxygen supply to them. The chance of that happening by calling for help is zero.

RESPONSIBILITY

It's your confined space, your employees, your problem.

CONSIDERATION

When selecting people to provide emergency rescue, reference should be made to the risk assessment and required control measures. Consideration should be given to…

- Causes of an emergency
- Use of equipment - breathing apparatus, lifelines, tripods and winches, cutting equipment, lifting equipment
- Training in donning and using breathing apparatus
- Testing and maintenance of rescue equipment
- Identifying defects - and dealing with them
- Site rules and emergency communication
- Isolation systems
- Resuscitation procedure, including equipment
- First aid
- Fire fighting
- Liaison with the emergency services
- Rescue techniques and refresher training/mock exercises

By far the most effective way of ensuring that work in a confined space is carried out safely and efficiently is to ensure everyone involved, from the Manager to the Supervisor to the Operatives, is competent.

Errol Parrish, Operations Manager
Mines Rescue Marine

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WHATS ON...

Next Issue

(editorial deadline 15th April 2016)

1 **Hydraulic Pumps**
Still available to sponsor

2 **Onshore Operations & Maintenance**
Sponsored by The Met Office

3 **Life Extension of Windfarms**
Still available to sponsor

4 **Supporting High Net Worth Individuals**
Sponsored by PJ Marks & Co

5 **Substations**
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6 **Offshore Oil Changes**
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7 **Fire Awareness**
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8 **Marine Co-Ordination**
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9 **Fall Prevention & Arrest**
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10 **Marine Ordnance**
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11 **Floating Wind Turbines**
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13 **Gangway & Access Systems**
Still available to sponsor

14 **Workboats**
Sponsored by Tidal Transit

15 **Subsea Umbilicals & Seals**
Sponsored by Subsea Innovation

Events and What's New...

OCEANOLOGY INTERNATIONAL (OI) 2016
WHEN 15 – 17 March
WHERE Excel, London
CONTACT **www.oceanologyinternational.com**

IWEA ANNUAL CONFERENCE 2016
WHEN 23 – 24 March
WHERE Dublin, Ireland
CONTACT **www.iwea.com/index**

EWEA WORKSHOP – ANALYSIS OF OPERATING WIND FARMS 2016 (3RD EDITION)
WHEN 14 – 15 April
WHERE Bilbao, Spain
CONTACT **www.ewea.org/events/workshops/analysis-of-operating-wind-farms-2016**

ALL ENERGY 2016
WHEN 4 – 5 May
WHERE Glasgow, UK
CONTACT **www.all-energy.co.uk**

THMA OWC 2016 (OFFSHORE WIND CONNECTIONS) ANNUAL CONFERENCE & EXHIBITION
WHEN 11 – 12 May
WHERE Bridlington, UK
CONTACT **www.offshorewindconnections.com**

AWEA WINDPOWER CONFERENCE & EXHIBITION 2016
WHEN 23 – 26 May
WHERE New Orleans, USA
CONTACT **www.windpowerexpo.org**

RENEWABLE ENERGY ASIA 2016
WHEN 1 – 4 June
WHERE BITEC, Bangkok
CONTACT **www.renewableenergy-asia.com**

FOR MORE INFO ON FORTHCOMING FEATURES

NEXT EDITION - ISSUE 32

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LOOKING FOR A SPECIALIST SERVICE PROVIDER IN THE WIND ENERGY INDUSTRY?

Visit our extensive online Supply Chain Register where circa 1300 companies specific to the wind energy industry are listed

T 01765 644224
E duncan@greenenergypublishing.co.uk
W www.windenergynetwork.co.uk

Offshore coatings Why fail when you can succeed?

High-quality offshore coatings can cost thousands but save millions.

Gunnar Ackx and Howard Jess are ideally-placed to know. They have delivered successful QA- or QC- coating-inspection-services for more than 1,100 wind energy-related offshore structures since 2000.

Together, they provide expert management for thousands of square metres of well-prepared bare metal. Less diligent operators have discovered that even a few neglected square centimetres can lead very quickly to €-multi-million repair costs, lost production time, logistical nightmares and extended legal wrangles.

Howie and Gunnar head up the highly-experienced Howard Jess Solutions/ SCICON Worldwide bvba partnership. Their mission is to prevent such catastrophes on major projects. Both step in regularly to minimise losses when things go wrong!

NEW PAPER ANALYSES HOW TO SAVE 'MILLIONS'

The three very typical real-life case-studies below show how due diligence during sophisticated coating processes can avoid problems, while also keeping repairs costs and disruption low when mistakes are made.

GETTING IT RIGHT FIRST TIME

In the worst case scenario of repairs and replacements at sea, the team works to meet tight access, safety regs, paperwork, timeframes and adverse weather window requirements on operating assets.

Far better, say Glasgow-based Howard Jess Solutions Ltd and Bruges-based SCICON Worldwide bvba, to grab 'the one chance of doing it right in the first place'.

Things go wrong for many reasons, explains Gunnar. Poor surface preparation and application, bad specification changes along the supply chain and poorly-selected coating materials are common causes.

"People tend to manage risks based on the actual coating work costs," he says. *"When operational risks are severe, budgeting must cover the massive potential cost of things going wrong, often for very trivial reasons."* he adds. *"Every € spent on onshore corrosion protection can multiply up quickly by a factor of 50, 100, or more if the problem moves offshore."*

Gunnar is a second generation coatings-inspector & consultant with 23 years of corrosion-protection experience. As MD of SCICON worldwide bvba, he holds an SSPC PCI Level III-, SSPC PCS (Protective Coatings Specialist) & NACE CIP Level III Certification.

Howie, a FROSIO Level III Coating Inspector, multiple-patent holder and former Technical Director of a UK paint manufacturing company, notes cost factors.

"Actual paint costs are relatively small compared to onshore construction phase application costs," he explains. *"If contractors get it wrong and have to correct things offshore, the paint costs to application costs ratio is astronomical – reaching 0.1 to 99.9 (1:999) in one case study. Using the wrong paint is that expensive!*

"We stop small problems becoming large expensive problems by putting the right quality assurance and quality control in place early."

WHICH RISK SCENARIO APPLIES TO YOU?

The paper's case studies cover common offshore and marine problem/solution/ benefit corrosion-protection scenarios.

Project A
Involved no initial QA inspections but included failure-analysis and repair consultation following premature offshore coating failures.

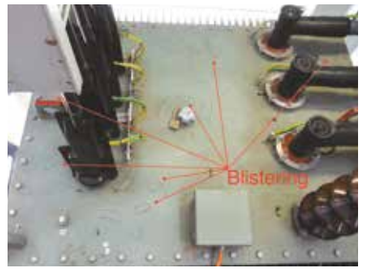
Project B
Full-time QA coating inspectors working for the main contractor avoided €-multi-million repair work.

Project C
A joint-venture between two sub-contractor steel construction companies. Sub-Contractor 1 covered 58% of the new-build structures; Sub-Contractor 2 42%.

Sub-Contractor 1, SCICON worldwide bvba and Howard Jess Solutions provided a full team of certified and experienced QC-inspectors with full stop/go-authority. No claims were made in the first two years.

Sub-Contractor 2, which hired two separate freelance inspectors under its own QC-department (with no training/ certification), was less fortunate.

PROJECT A
'BAND OF BLISTERS' OFFSHORE WINDFARM



Blistering problems on circa 6m² of two substation transformer covers after two years at sea highlighted the difficulty of allowing small components subbed out and then subbed out again, to slip through the QA net. Original client specifications are easily lost or diluted down the supply chain.

Remedial work cost circa €100.000. Investing a couple €-thousand in fully-trained, qualified and certified coating-inspectors before and during the original coating application would have avoided the whole problem. Specifically, the covers of two auxiliary transformers passed so far down the supply chain that although the coated area was minimal, specifications, procedures and quality-control were lost.

In the first year offshore, white zinc-salt formation under a coating applied onto Thermal Sprayed Zinc (TSZ) caused blistering. Failure analysis revealed the ultimate coating-system not complying with ISO 12944, or the client's original specification.

In reality, a two-coat powder-coating-system of suspect quality was used on top of a poorly-applied TSZ. The originally specification required a five-coat liquid-applied coasting-system - including a zinc-rich primer, two water-based intermediate coats, plus two water-based top coats.

Repair work while the 150,000 volt transformers were live in poor weather conditions, during complex transfer operations and with stringent offshore safety certification requirements, meant a final bill of up to ± €16.666/m²!
All this could have been avoided… rather easily.

CONTINUED...

INSPECTION COMPANY SELECTION CHECKLIST

Successful coating depends on inspection-company and the coating-inspectors competence and experience. Owners need to ask themselves…

- Does the inspection company provide inspectors with proven Level III NACE, SSPC and/or Frosio qualifications?
- Do they understand offshore challenges?
- Are the appropriate industry standards referenced correctly in client specifications?
- Does the inspection company have these standards; are they familiar with them?
- Does it carry professional liability insurance?
- Does it have professional accident insurance?
- How many inspectors are available & how flexible are they?

PROJECT B
'HIGH TENSION' OFFSHORE WINDFARM

Thousands of craters found in the first coat during fabrication of three (of 43) transition piece foundations resulted in €100,000+ worth of fabrication-shop re-blasting and re-painting work per transition piece. The alternative would have been an estimated €2.25 million bill if the problem was left to develop further offshore!
Initial coating-manufacturer and coating-contractor reassurances that a limited problem could be remedied by an extra intermediate layer to compensate for local under-thicknesses proved wrong.

The problem persisted, resulting in an intensive search for possible contamination-sources. As QA for the main contractor, we insisted on further in-depth laboratory-analysis of production samples. Several high-tension, high-level meetings followed. Fortunately, a willingness on all sides to reconfigure the production & delivery-schedule meant that suspect coating-batches & transition-pieces were quarantined pending lab test-results.

Careful analysis revealed the basic problem stemmed from an 8% silicon contaminant added in error to the coating. A full 'Norsok qualification lab-test cycle' then proved that one batch failed the Cathodic Disbonding test miserably. The coating-manufacturer ultimately concluded that the offshore coating-failure risks were too high. Reblasting/recoating was the only sensible solution.

A small side-issue - proper registration of coating-batch-numbers - also showed that non-qualified QC-staff use is "an accident waiting to happen". Unnecessary repair-costs could have been even higher. Full diligence from the outset could have prevented the whole problem. We helped save the contractor in excess of €2 million.

PROJECT C
'MINOR DETAIL – MAJOR PROBLEM' OFFSHORE WINDFARM

Poor coating & QC practice on 5,400 overlooked stainless steel grating-studs on carbon steel structures for 30 out of 71 widely-dispersed offshore wind turbines turned a minor detail into a significant problem.

Most studs were not treated properly to Norsok M-501 standards; an average corroded area of 17cm² per stud, times 180 studs per foundation, times 30 foundations was the result. Offshore remediation costs mushroomed quickly to €1.5 million.

The project was overseen by two joint-venture contractors with no in-house QA/QC skills or certifications.

Contractor A hired 3 to 4 certified coating-inspectors from Howard Jess Solutions/SCICON Worldwide to act as an independent QC with stop/go authority over the coating of 41 foundations.

Meanwhile, Contractor B used two separate freelance inspectors to survey the production of 30 foundations under their own QC-department.

Two years after offshore-installations, ALL 30 Contractor B foundations showed corrosion-breakthrough around some 5,400 main platforms & resting-platforms grating-studs. Opening the coating showed substantial areas of surrounding carbon steel corroding due to 'galvanic corrosion'. Clearly, these studs and especially the 'mixed weld', had not been treated to Norsok M-501 standards. Coating-thickness on the studs was less than required. Masking-tape was found under paint. Some surface-profiles were poor.

No similar coating-breakdown was found on the 41 foundations produced by Contractor A under the watchful eye of our QC-inspectors.

Although Contractor A made a higher investment in proper Quality Control, clearly Contractor B paid out circa five times Contractor A's initial budget – a 500% advantage, even on a single project.

Full QA/QC control could have prevented a minor infringement becoming a major calamity from the start.

CONCLUSIONS

There are no corrosion-protection shortcuts. Premature coating-failures offshore can increase in-house coating-budgets by ten or even a hundred-fold.

All parties, from owner to main-contractors and sub-contractors, must make sure Quality Control & Assurance is a top priority at all times. Small details in large numbers can escalate offshore repair-costs rapidly.

When large figures are at stake, the price-difference between well-trained, certified coating-inspectors with sound offshore corrosion-protection experience and less qualified inspectors often drawn from industries with little offshore experience, is "penny-wise, pound-foolish".

If hiring experts seems expensive, try hiring amateurs!

INTERVIEW

Jon Herbert talks to Howard Jess and Gunnar Ackx.

ED'S NOTE

This is an abridged version please see the complete article 'Offshore coatings – Failure or Cost-saving Opportunities?' By using this link.

Click to view more info

ULTIMATE PROTECTION FOR OFFSHORE WIND FARMS

Over the past ten years, the steady growth of large wind farms situated hundreds of miles offshore (the 'Far Shore' sector) has prompted the need for new technologies that can meet the demands of operating with increasingly hostile environments.

DEVELOPMENT

In 2011, Protective & Marine Coatings (PPG) developed SIGMASHIELD 1200, a solvent-free, phenolic epoxy coating developed to give more resilient long-term protection to offshore installations. The product has outstanding anticorrosive performance as well as excellent impact and abrasion resistance.

KEY ISSUES

Greg Bausch says: *"One of the key issues facing stakeholders is the need to balance protective performance with the cost and complexity of maintenance for these installations. We know that corrosion rates for unprotected steel can be as much as ten times the corrosion rate for inland structures. "Therefore, coating systems specified for such critical locations must be easy to apply at construction-stage and proven for offshore exposure in order to give the specified high durability level with minimal maintenance."*

SOLUTION

"SIGMASHIELD 1200 fully addresses these requirements and is applied during new construction as a two-coat system (no primer needed) to the splash zone and foundations of the tower.

"The product is easy to apply using heavy-duty, cold single-feed airless spray equipment, and exhibits excellent edge coverage with no shrinkage at high-film thickness – even in critical areas. These attributes improve both the efficiency and productivity of the in-shop painting process, and ensure that long in-service periods and minimal maintenance will be met.

OTHER RELATED FACTORS

"Once in service, critical areas of the structure such as the transition zone, boat landings and access ladders will be securely protected from damage as a result of drifting ice, driftwood, other debris and the mooring of inspection vessels.

"The product also exhibits good resistance against a wide range of chemicals and solvents, and is resistant to well-designed cathodic protection."

Greg Bausch
Global Segment Power
Protective & Marine Coatings (PPG)

CORROSION CONTROL FOR WINDFARMS

The offshore wind industry benefits from transferable supply chain skills, predominately from the marine and oil & gas sectors. However, in doing so, the industry mustn't repeat the mistakes of these sectors. The challenge of corrosion control using protective coatings is one of these areas.

Barrier has developed innovative processes and expertise, built on extensive experience in the established offshore industries, which are applied to the offshore wind market.

TRIAL APPLICATION

Before any coatings are applied to a major structure, a trial should be carried out with the coating system to ensure operatives are familiar with it and what equipment works best for the coatings.

The coating specification is important as it details how the system is to be inspected, when and by whom. Too many specifications assume coatings can be applied to within microns of a specified dry film thickness (DFT), when in practice it is plus or minus hundreds of microns for a high-build coating.

Robert Bowles

Of course, no coating or applicator is perfect. Perfection would come at an unacceptably high price. Therefore there will be minor breakdown over the life of the coating before first major maintenance – this should be planned for.

REPAIRS AND MAINTENANCE

The sooner minor repairs are made, the less costly they will be and less likely to break down again before first major maintenance. They should also be logged, and fed back to the applicators/industry so that ways can be found to reduce these on future projects.

LESSONS LEARNED

Unfortunately, this is not the case in the oil & gas industry, where the same mistakes have been made for the past 40 years.

COATING APPLICATION

In my experience, a coating that can be applied reliably is as important as one with 'high performance'. It should also be tolerant of over-application, and not be specified at its minimum thickness to achieve a maximum performance.

However, as important as the coating is the contractor charged with its application. The applicator should have a proven track record and an experienced workforce. Unfortunately, there is no independent grading of coating applicators or a database of coating failures and causes, which means the due diligence of the operators and main contractors has to be robust.

CONFUSION, CONFLICTS AND COSTS

Specifiers often include 'just in case' standards, which are not relevant to the application. This leads to Confusion, Conflicts and Costs. The ideal is to focus on the areas where the coating is most likely to breakdown.

Cost savings can also be applied for inspections, essentially not repeating the 'man marking' process of the oil & gas industry, which often leads to three or more inspectors checking each other's work. If quality is built in, only one inspector is required and another person monitoring the inspection regime.

Expectations need to be realistic, the industry will not achieve an offshore 30 years to first long-term maintenance using a cheap coating and an inexperienced applicator. Neither will coatings be maintenance-free for 30 years.

However, utilising specialists that have developed innovative coatings systems and application methods, while learning from experiences in other sectors, will help deliver the construction and operational targets of the offshore wind industry.

Robert Bowles
Chairman
Barrier Group

A NEW OPERATIONS AND MAINTENANCE STRATEGY FOR COATINGS

The cost of operations and maintenance in the offshore wind industry is well known. This is particularly acute with protective coatings where small areas of damage can cause serious issues if unchecked. It's estimated that a coating system can cost €15-25 per m² at fabrication, rising to 5-10 times that amount for onshore repair, rising to 40-60 times the fabrication cost for repairs offshore.

Predominantly due to multiple lifts and laydowns it is almost impossible to ensure that there is no damage to protective coatings through the fabrication and installation processes. It is also understood that any repair should be treated as a weak point. However if you had knowledge of repaired areas in the coating system you could tailor maintenance strategies to focus on these high risk areas.

POTENTIAL PROBLEMS

Potential problems include tracking repaired areas, understanding what was done to repair these and in some instances even knowing what coating system was used at new construction.

SOLUTION

AkzoNobel have recently brought to market Interplan Mobile; which has been used in the offshore oil & gas industry for a number of years. The system, which can support fabrication, installation and O&M, has three main components…

- **Report** – used at fabrication facilities to record coatings application, deviations from specification and any repairs or rework required
- **Survey** – used during operations to record the condition of coatings. If a daily report was used at new construction, potential areas of weakness can be given closer attention during maintenance
- **Repair systems** – used to build the maintenance plan; highlighting priority areas and offering coating repair systems

WEB-BASED

Interplan Mobile is web-based allowing data to be viewed instantaneously by all concerned parties. The system can suggest maintenance based on risk management, giving cost estimates for work required. It can also reduce inspection time and remove cost from the fabrication and maintenance process and is currently being rolled out and will be used on a number of upcoming offshore wind substations.

AkzoNobel

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