Wave&TidalEnergy NETWORK

COMMUNICATION HUB FOR THE WAVE & TIDAL ENERGY INDUSTRY

Test Tanks & Facilities

INDUSTRY UPDATES

Pembrokeshire and the Haven Waterway Enterprise Zone

AUTUMN 2015 | £7.50

Wales
Cymru

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Interesting Times

We have now been publishing Wave & Tidal Energy Network for almost 2 years and we have noticed a genuine advance in the industry recently.

This may be down to several factors however the lead has definitely been taken by the Welsh Government who have sponsored a long term focus on the industry in Wales.

WALES FOCUS

We start in this edition with a feature on the Pembrokeshire and Haven Waterway Enterprise Zone. We will then move on in forthcoming editions to highlight North Wales followed by the Swansea Bay Tidal Lagoon mammoth project, then finally an overview of Marine Energy in Wales as a whole.

TEST TANKS & FACILITIES

In an industry that relies on weather and operating conditions which could be, at most times, described as 'challenging', equipment using test facilities, which has very little personal risk, is essential.

We therefore have a substantial section devoted to what is available in the industry throughout the UK and Ireland.

EDITORIAL CONTRIBUTIONS

Please feel free to contribute to the next edition. This will be our Winter issue as the feedback we have received from the industry in general points towards a quarterly publication.

Your contributions will be vital to this success so please do not hesitate to get in touch.

FEATURES – GET INVOLVED

As the magazine grows so will the individual features on all sorts of areas within the industry.

These features emanate from our discussions with leading experts during our visits to conferences and events, as well as our editorial team bringing up subject areas when looking at the industry as a whole.

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.

You will find our 'Forthcoming Features' tab on our website in the magazine section.

MAGAZINE AND WEBSITE INTERACTION – QR CODES

As with our sister publication Wind Energy Network we have pink and green flashes indicating more information online.

QR codes have been substituted in the printed version which means that you can scan the code with your smart phone and it will direct you to the featured company or organisation micropage held within our website, so that you can access much more information in all sorts of interactive formats.

These have already become very popular as it links the printed magazine in a very interactive way – a great marketing tool for our decision making readership to find out about products and services whilst reading an interesting article.

Duncan McGilvray - *Editor*
Wave & Tidal Energy Network

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Pembrokeshire and the Haven Waterway Enterprise Zone

OUR COVER IMAGE IS CREDITED TO MARINE ENERGY PEMBROKESHIRE, OUR SPONSORS, FOCUSING ON MARINE ENERGY IN WALES.

The feature contains 30 pages and includes a varied mix of companies and organisations which builds a very positive picture of just how the industry has progressed in a fairly short time.

MARINE ENERGY IN WALES
We start in this edition with a feature on the Pembrokeshire and Haven Waterway Enterprise Zone – following editions will include…

- North Wales
- Swansea Bay Tidal Lagoon
- Overview of Marine Energy in Wales as a whole

TEST TANKS & FACILITIES
Testing without risk is essential – we have therefore highlighted what is available to the industry.

FOUNDING PARTNERS
Now into our 5th edition we welcome the continued support of our 'Founding Partners'.

Their professional and valued feedback is extremely helpful to our team and we would like to again thank them for their support, advice, ideas and time – it is much appreciated.

Duncan McGilvray - *Editor*
Wave & Tidal Energy Network

OUR FOUNDING PARTNERS:

SMARTBAY IRELAND · Intertek · Seiche · KLÜBER LUBRICATION · JBA consulting · HR Wallingford Working with water · Mobil Industrial Lubricants · JLT · Royal HaskoningDHV Enhancing Society Together

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KLÜBER LUBRICATION

KLÜBER LUBRICATION

INDUSTRY UPDATE

Joining forces under one banner

UK motor specialists ATB Laurence Scott, ATB Morley and ATB Special Products, subsidiaries of ATB Group Austria Antriebstechnik AG, have joined forces under one banner, ATB Group UK Ltd.

COMBINED EXPERIENCE

ATB Laurence Scott, ATB Morley and ATB special products are amongst Britain's oldest manufacturers of electric drive systems, with over 300 years of combined experience. This rich heritage in the electrical engineering industry serves as testament to the reliability and quality of the companies' products and to their ethos of designing equipment to customer-specific requirements.

As of September 1st the companies will merge into one legal entity, ATB Group UK Ltd. The group will focus on niche markets, close customer relationships and utilising its extensive experience and competencies as electrical engineering businesses, to provide customers with the optimum motor solution across numerous industries.
The merger will unlock operational benefits, as the companies will be able to share resources and facilities, allowing for a more flexible approach to future business.

CONTINUOUS INNOVATION

Continuous innovation will be a key focus for ATB Group UK, which will utilise its development and manufacturing expertise to bring a range of new products to market. In October of this year, the group will unveil its VFD motor for mining applications, which uses the latest technology and topology.

ONE MISSION

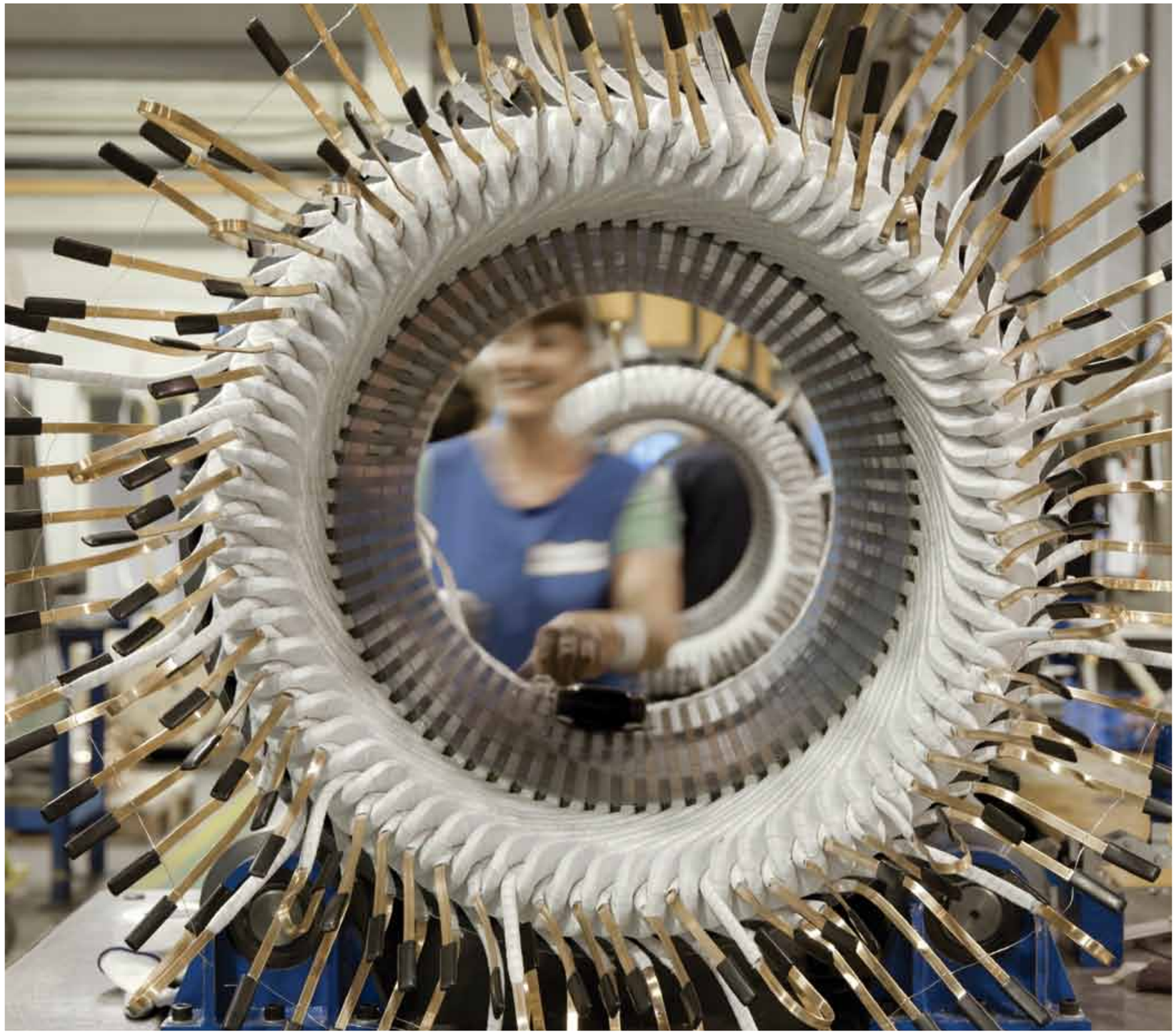
The companies will continue to operate from their existing sites, but now under one management team, with one mission; helping customers to create world leading solutions in terms of performance and reliability.

Although ATB Group UK is a recent establishment, its electrical engineering roots trace back to 1883 with the Laurence Scott business. Accordingly, the group will adopt the tagline 'Electrical Engineers Since 1883'.

NEW CHAPTER FOR THE MANUFACTURER

Whilst the established brands of Special Products, Morley and Laurence Scott will be preserved, this merger signals the start of a new chapter for the manufacturers. And if the future of these companies is to be judged by their past achievements, they are confident that ATB Group UK will be successful in driving UK motor manufacturing into a new era.

ATB Group UK



KLÜBER LUBRICATION

KLÜBER LUBRICATION

Driving down tidal energy costs

Sustainable Marine Energy's (SME) PLAT-O becomes the first tidal energy system to generate power off the south coast of England. In doing so, the company has demonstrated that the cost of tidal energy is rapidly coming down with systems like PLAT-O coming on stream.

HUGE ACHIEVEMENT

Jason Hayman, Managing Director of SME, said: *"It's a huge achievement for the team. PLAT-O has been generating power consistently, reliably, and most importantly, has behaved as we predicted it would. The mooring solution we have developed and employed is as steady as a rock.*

The installation operation went very smoothly and it absolutely goes to show that tidal energy devices can be installed in a low cost and efficient manner. Developing systems and deploying them in these strong tidal flows is a massive challenge but we have nailed it. The cost of tidal energy is coming down rapidly with systems like PLAT-O coming on stream."

MAJOR MILESTONE

Matt Slatter, Chairman of SME, said: *"It has been a very busy and very exciting time for the team at SME. The completion of our testing programme in the Solent is a major milestone and the culmination of three years of hard work. PLAT-O has lived up to expectations and we are now focusing on the deployment of system at the European Marine Energy Centre and the build of the second PLAT-O. With the support of Scottish Enterprise, we are building the team to deliver a farm of systems generating up to 1MW of power at EMEC by the end of 2016."*

HYDRO TURBINES

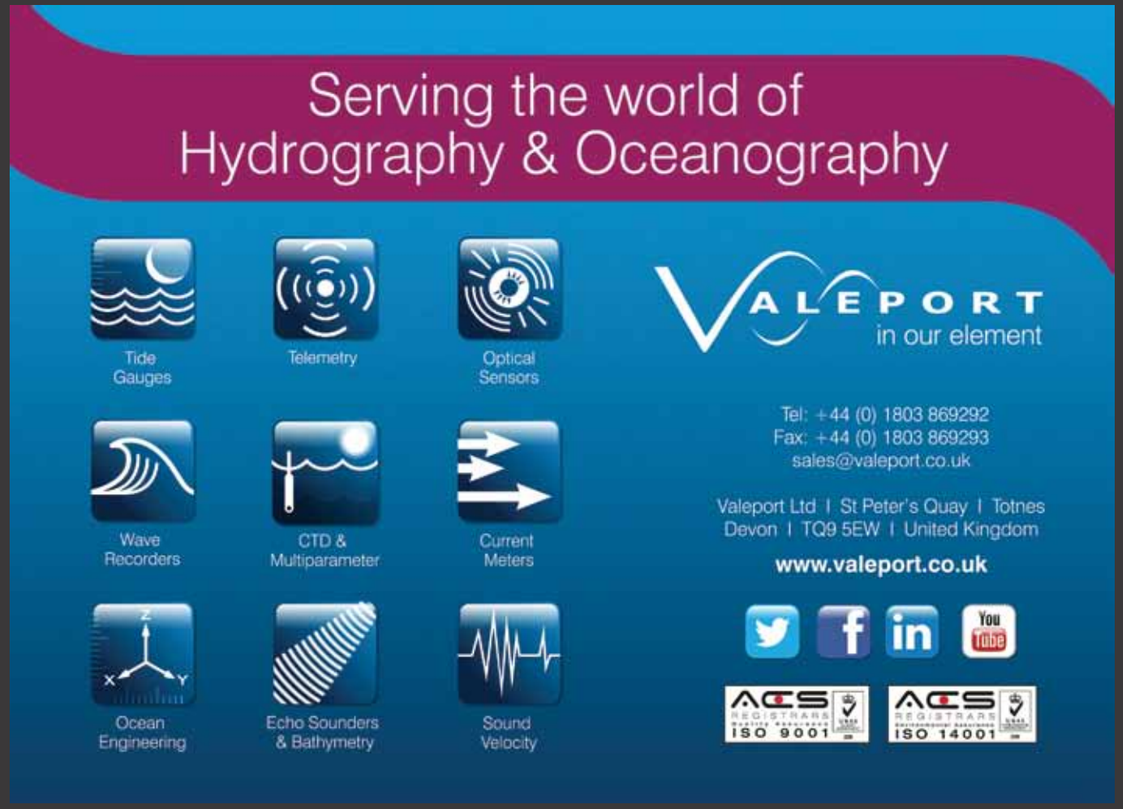
PLAT-O was fitted with two SCHOTTEL HYDRO turbines and Niels A. Lange, Managing Director of SCHOTTEL HYDRO, said: *"The emerging tidal energy business calls for a way to make this predictable source of power accessible and commercially viable to satisfy future energy demands. The co-operation between SME and SCHOTTEL HYDRO provides an answer to this need.*

The submerged PLAT-O platform and the installed SIT turbines combine the advantages of ease of installation, maintenance access and safe operation in rough sea conditions. The installation of the array at EMEC will further demonstrate that the cost-effective delivery of tidal power to the grid is possible and profitable for commercial projects."

LEASK MARINE

Leask Marine, an Orkney based company, provided the multi-cat, C-Salvor, along with deck crew and a dive team with extensive experience working in strong tidal environments for the marine operations. Douglas Leask, MD of Leask Marine, said: *"This is the first substantial marine operation that we have carried out with SME and it was very straightforward. The plans were clear and the team were very professional to work with. We have worked with other tidal energy devices and, in comparison, PLAT-O is an extremely well designed system that enables low cost operations."*

Sustainable Marine Energy



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HAVEN WATERWAY ENTERPRISE ZONE WALES

WALES LEADING THE WAY IN WAVE & TIDAL TECHNOLOGY

We continue our focus on Wales and its far-sighted energy requirements concentrating on self-sufficiency and green energy.

This edition spotlights Pembrokeshire and the Haven Waterway Enterprise Zone.

Wave & Tidal Capability in Pembrokeshire

YOU MAY ALREADY KNOW PEMBROKESHIRE IN WEST WALES AS A FANTASTIC PLACE TO VISIT FOR A HOLIDAY. WITH ITS PICTURESQUE VILLAGES, STUNNING SCENERY AND DRAMATIC COASTLINE.

However, did you also know that Pembrokeshire offers one of the very best locations in the UK for wave and tidal resource and is home to a growing wave and tidal industry? If not, you better read on and find out why Pembrokeshire is fast becoming the hub of the UK wave and tidal industry.

A CLASS APART

A number of other factors set Pembrokeshire apart from other UK and Welsh locations and provide an inviting package for potential investors including…

- Excellent port facilities at Milford Haven and Pembroke Dock
- An experienced workforce with transferable skills
- Grid connection possibilities
- World class research facilities
- A history of collaborative working in the marine sector
- The Welsh Government's 'Haven Waterway Enterprise Zone' offering competitive operating costs for businesses

RAPID DEVELOPMENT

The profile of Wales as a potential location for marine energy projects has increased dramatically over the past 12 months, demonstrated clearly by the growing number of developers from across the globe, who are showing an active interest in developing projects in Welsh waters.

FIRST WAVE DEMONSTRATION ZONE

Pembrokeshire is soon to be the home of Wales' first Wave Demonstration Zone. With the potential to support wave arrays generating a capacity of up to 30MW for each project. Located 13 km off the South Pembrokeshire coast, the site will be a collaborative approach being led by Wave Hub and partners including Marine Energy Pembrokeshire and Pembroke Port.

SUPPLY CHAIN AND SKILLS CAPABILITY

As well as offering one of the very best wave and tidal resources in the whole of the UK, Pembrokeshire is home to a wealth of experienced supply chain organisations with exceptional capability.

All offer the necessary skill set to help design, build and develop marine energy devices. From consultancy and advisory services through to build, operational and decommissioning services, Pembrokeshire can offer the complete supply chain package for developers.

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Welsh Government

ECONOMY

Activity in the Wave and Tidal sector is having a very positive impact upon the economy in Wales. A study carried out by Marine Energy Pembrokeshire in 2015 indicated that in terms of total investment to date, wave and tidal technology developers have already spent over £34.5 million and have directly created 99 person years of employment so far. And potential benefits could be greater still.

Regeneris Consulting and the Welsh Economy Research Unit at Cardiff Business School estimates that the wave and tidal industry could support anywhere between 70m and 840m of Gross Value Added (GVA) to Wales.

It is now time to look at Pembrokeshire as the perfect place to build and grow your Wave and Tidal business.

MAJOR FEATURE

Throughout this major feature you will find contributions from…

- Specialist Boat builders /Marine Engineers Mainstay Marine (formerly Mustang Marine)
- Consultancy and Project Development company MarineSpace including a personal interview with their Technical Director Joe Kidd
- Structural/Mechanical Engineers Ledwoods
- Mainport Engineering
- Specialist Engineering Services M & A Engineering
- Civil Engineers JOP
- Instrumentation/Electrical Engineers Hornbill

And many more!

THE HAVEN WATERWAY ENTERPRISE ZONE

Based on existing and potential new energy sites, from inception in March 2014 Haven Waterway Enterprise Zone offers a unique location, with access to energy related specific infrastructure as well as deep water port facilities and sea conditions that are ideal for the development of both wave and tidal stream marine energy.

Tidal Energy Ltd has consent for deployment of the first Welsh designed and produced Tidal Flow device which will be located in Ramsey Sound.

ESTABLISHED INDUSTRY BASE

The Enterprise Zone offers to both renewable and traditional energy companies an established industry base and supply chain together with a skilled workforce, an established distribution infrastructure, plus a variety of sites to suit a range of needs and a network of universities with expertise in a range of energy-related fields.

The availability of a deep sea port combined with marine conditions suited to both wave and tidal technologies plus the added benefit of having grid access makes Haven Waterway Enterprise Zone an especially attractive location for marine energy companies as they move to demonstrate small and larger arrays.

Enterprise Zones in Wales are led by the Welsh Government.

BOUNDARIES

Enterprise Zones sit within agreed geographical boundaries. Businesses located within these boundaries are able to benefit from Enterprise Zone incentives, support and infrastructure investment.

A number of key sites are included within the official boundary of Haven Waterway Enterprise Zone, extending from the immediate Haven area to the surrounding areas of Honeyborough, Thornton and Haverfordwest airport.

HOW IT WORKS

Haven Waterway Enterprise Zone work closely with Pembrokeshire County Council and other key stakeholder organisations to provide the best possible conditions for businesses to succeed in the Zone.

Driven predominantly by a private sector led Board, so the support and delivery provided is flexible and responsive enough to meet clients business needs. The Board is responsible for advising the Minister for Economy, Science and Transport on the opportunities and needs for the Zone.

The focus of the Haven Waterway Enterprise Zone Board remains on positive job growth and ambition.

As a devolved Government, clients are offered easy access to key decision makers to fast-track their move. Listening to the needs of the client is important to be able to put everything in place to make it happen, drawing on support from a Board made up of industry specialists.

Working with Pembrokeshire County Council and committed to delivering flexible and tailored support to all businesses locating to or growing within their Zone.

BUSINESS SUPPORT

Knowing the type of support clients need to succeed and the commercial pressures faced and giving a single point of contact to take clients through the outstanding package of support available, as a business locating to the area.

An excellent package of Welsh Government training support is available to employers.

Haven Waterway Enterprise Zone has close links with key research departments in local universities and colleges to support with industry led academic research.

COMMUNICATIONS - ROAD & RAIL

Connected to Wales' capital and London by rail, Pembrokeshire will benefit from the UK Government's high speed rail network from Swansea to London. There are good road links directly to the M4 motorway which can be easily reached via the A40 and A477 trunk roads in under an hour. Cardiff, the capital of Wales, is approximately a two hour drive away.

AIR

Pembrokeshire benefits from an airport, located adjacent to the A40 trunk road just 2 miles (3.2 kilometres) north of Haverfordwest and Cardiff Airport can be reached within a two hour drive.

SEA

Fishguard and Pembroke Dock both operate regular ferry routes directly to Ireland from Pembrokeshire. Milford Haven is a natural deep water port handling over 25% of the UK's energy supply. It is one of the finest deep water ports in the world, the third busiest port in the UK and the twelfth busiest in Europe

Welsh Assembly Government

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= Click to view video

Adapting to change

BARTLETT ENGINEERING CO. WAS ESTABLISHED IN 1966 BY ROY SCOURFIELD - THE FATHER OF PRESENT OWNER RICHARD SCOURFIELD. THE COMPANY HAS EVOLVED OVER THE YEARS AS IT HAS ADAPTED TO CHANGES IN SURROUNDING INDUSTRIES AND CUSTOMER'S NEEDS.

The company was taken over by Richard and Karen Scourfield in 1992. Richard's apprenticeship with the CEGB and previous employment as a rotating plant fitter and welder left him fully qualified to run the workshops whilst "K" being an accounting technician and with previous experience as an Office Manager is in control of the administration side.

EXPANSION

The company has expanded greatly since 1992 with new workshops being built and large investments made in new CNC fabrication & machining machinery to keep the company at the forefront of new technological developments in the engineering industry.

In addition to the partners the company now has a total of four employees –two mostly involved in the fabrication side and two dedicated machinists. Bartlett Engineering is a strong believer in the importance of training and skills based apprenticeships.

TRAINING

Although only a small company they endeavour to train apprentices whenever possible and provide them with a position within the company upon completion of their apprenticeship should they wish to stay. The downside of this policy is that so far none have left them and that means they have less opportunity to offer new places!

When they are unable to employ an apprentice they still continue to offer work experience through Coleg Sir Gâr, allowing their students to gain experience on machines and work that they otherwise may not come into contact with. In the past they have also worked with Prestige Training who brought their trainees to their works to gain experience in all machine operations associated with fabrication techniques.

CUSTOMER BASE

The company's customer base is wide both in location and types of industry and with their 24-hour 7 day a week dedicated service they appeal to a broad spectrum of companies.

Work which has been carried out has varied from building a three drum yarrow style boiler to assist the rebuilding of the 1899 Norwegian Royal Yacht to machining of compressor and vessel internals for local refineries, as well as recent involvement with the Delta Tidal Stream project in Pembroke Dock involving both their fabrication & machine shop facilities.

SPECIALIST SERVICES

The company offers specialist services including tracking down and sometimes holding in stock the more unusual types of metal e.g. hastalloy, specific stainless steels etc. This has led to them being the first port of call for many when they have work to be carried out on unusual specifications often in the hope, especially for emergency work, that they will either have some in stock or, using their range of specialist suppliers, will be able to get some delivered within hours rather than days.

MACHINE CAPACITY

The same applies to their machine capacity – working on such varied and unusual items has led over the years to the company building close working relationships with other specialist engineering companies throughout the UK.

On the rare occasions when they are unable to undertake part or all of a job themselves they are able to subcontract the work as required to companies that they know through experience will work to the same high standards as them.

Bartlett Engineering

Click to view more info

Growing to meet ever increasing client needs

Hornbill Engineering is quickly approaching its third decade in the electrical, control and instrument business, with their head office in Swansea and a local office in Pembroke Dock.

The company has grown over the years to meet the ever increasing demands on their clients and is respected by blue chip companies across the world serving long term clients in fulfilling their engineering and technical needs.

VERSATILITY

Hornbill`s versatility and attention to client requirements has made them a turnkey solution offering a full life cycle local service – their team of proactive multi-disciplined engineers and specialist managers are highly trained and have practical experience with the relevant regulation and construction standards.

INDUSTRY EXPERIENCE

The company has significant experience in renewable energy projects such as wind-onshore, photovoltaic, biomass, tidal, waste to energy and energy storage.

Hornbill are NERS Lloyds registered company for non-contestable works and are an independent connection provider (IPC) who are able to make the connections from power generation plant to the grid. Additionally Hornbill are highly experienced with DSTATCOM units for the interrogation of renewable energy sources to meet utility interconnection requirements.

ACCREDITATION

The High Voltage team can offer the full installation, commissioning and maintenance service. Hornbill`s services are fully supported by their accreditation system for ISO 9001, ISO14001 and OHSAS 18001, NICEIC. UVDB Verify, Lloyds Register, EUSR and Safe Contractor Scheme.

Clients can therefore be assured of receiving a high quality service time after time and their management section is able to carry out a wide range of services including fire and gas detection, CCTV security systems, air conditioning & refrigeration.

Hornbill Engineering

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HAVEN WATERWAY ENTERPRISE ZONE WALES

NEW BASE ANTICIPATING FUTURE WELSH GROWTH

BAKER CONSULTANTS HAS CONSOLIDATED ITS PRESENCE IN WALES AND THE SOUTH WEST WITH A NEW OFFICE IN SWANSEA. THIS FOLLOWS INCREASED DEMAND IN THE REGION AND GROWTH IN THE RENEWABLES SECTOR.

Baker Consultants has consolidated its presence in Wales and the South West with a new office in Swansea. This follows increased demand in the region and growth in the renewables sector.

EXPERIENCED TEAM

Building on Baker Consultants' many years of experience in providing ecological services to projects throughout Wales, the new Swansea office covers both terrestrial and marine environments and will be a permanent base for two of their ecologists – Diana Clark, Senior Ecologist and Helen Hedworth, Marine Consultant.

Diana has more than nine years consultancy experience, including extensive experience in providing ecological advice in relation to planning applications, Environmental Impact Assessments and protected species work, covering renewable energy, housing and commercial schemes. The new base will allow her to work more closely with existing and new clients in the region, including ongoing support for schemes in Carmarthenshire and Pembrokeshire.

Helen is a bioacoustics expert with specific interest in the impacts of sound on the marine environment. Her recent work has included wind farms and port developments in Germany and Brazil. Alongside other members of Baker Consultants' marine team, Helen advises clients and regulators on marine ecology and noise monitoring from consenting through to post-construction monitoring, on projects ranging from offshore wind, wave generation or tidal lagoon developments, to those affecting the coastal environment.

STRATEGIC ASSISTANCE

This increased staff capacity in South Wales also means that Baker Consultants are now able to provide more geographically strategic assistance to projects located across the borders and southern and south-west England.

Baker Consultants

Click to view more info

Diana and Helen in the new office

On time and on budget

JOP Ltd have been based in Pembroke since 1972 and undertake civil construction projects and term maintenance for industrial clients in the Haven Waterway Enterprise Zone and across the UK.

They have a track record of excellent safety performance and completing works on time and to budget. The company undertake groundworks, roadworks, drainage, demolition, confined space works, trenching and the construction of bespoke reinforced concrete structures in civil, marine & petro-chemical environments.

CAPITAL PROJECTS

Undertaking a wide range of capital projects working in conjunction with their clients as principal contractors or as sub-contractors to design, mechanical or electrical contractors.

BUSINESS ETHOS

JOP Limited's Managing Director Luc Jenkins commented; *"Our business is based on respect – respect for our clients in fulfilling their needs to a high standard whilst providing the quality of service and attention to detail needed to satisfy their requirements.*

"Respect for our employees for their commitment, skills and service driving our business forward.

"Respect for the environment within which we work and an ongoing commitment to continuous improvement in safety on all our sites."

GROWTH THROUGH COLLABORATIVE WORKING

Luc recently completed the 'Growth through collaborative working: Effective implementation of BS 11000' course facilitated by Bob Meakes of the Institute of Collaborative Working Wales & Cardiff Business School.

The company have a long history of working with clients to find cost effective solutions to their civil engineering requirements and are excited to be taking this next step towards engaging with partners new and old to maximise the benefits to both organisations.

Simply put, BS 11000 is a standard for collaboration which organisations can follow to work with each other in carrying out tasks and achieving shared goals. Together they can engage at a new level above the traditional adversarial contract to create additional value, improved performance and strategic benefits for organisations.

CERTIFICATION

JOP Limited is certified to Green Dragon Level 2 Environmental Standard and is a registered waste handler working with each client's individual project requirements to ensure zero environmental incidents and co-ordinate any waste for recycling and are a certified BS EN ISO 9001:2008 company with complete project specific Quality Assurance and Quality Control documents for each individual aspect of their activities.

JOP Limited

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Serving a diverse industry base throughout the world

Ledwood Mechanical Engineering is regarded as one of the most respected Mechanical Engineering Specialists based in Pembroke Dock and renowned as a leading independent engineering, fabrication and construction company serving a diverse industry base throughout the world.

CONVENIENT LOCATION

With extensive manufacturing facilities and quayside location they are conveniently positioned to supply and transport a variety of structures and finished components for the marine and renewable industries anywhere in the world.

Ledwood has been the supplier of a wide variety of high integrity equipment to the oil and gas industry including a 100 tonne flare buoy, constructed at the their facility in Pembroke and shipped direct to the Zafiro field located off the West African shore, where it was used to support the flare system of a large Floating Production and Storage Vessel (FPSO).

The company has also supplied wind turbine towers for the renewable industry in Wales.

DIRECT ACCESS

The location of the fabrication facilities, with its direct access to the Milford Haven Waterway makes it ideally suited to the construction and load-out of a range of equipment for the marine and renewable industry.

SEAGEN 2 PROJECT

The company has been involved with the development of marine structures and turbine installation for a number of years and supported Marine Current Turbines, a Siemens company, with the design and development of a number of critical fabricated structural components for the SeaGen 2 project.

Wind turbine towers for the renewable industry in Wales

PREFERRED SUPPLIERS

Ideally situated in Pembroke with quayside facilities and a high quality professional manufacturing capability placed the company in the forefront of preferred suppliers for a number of marine projects around the coast of the UK.

BESPOKE SERVICES AND COMMITMENT

Tailored specifically to individual projects Ledwood's wide range of services encompasses: project management, detailed design, procurement, fabrication, construction, commissioning and maintenance.

Driven by a strong commitment to their clients, the company is sized to deliver cost effective and often innovative solutions within the marine and renewable industry and have a long history of compliance accreditation with safety as a key note to all their work.

Ledwood Mechanical Engineering Limited

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MarineSpace
Making Sense of the Marine Environment ™
Consultancy, Consenting and Compliance Services for Offshore Renewable Energy Developers
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PROVIDING EXPERT SUPPORT TO ALL MARINE DEVELOPMENT SECTORS

Joeseph Kidd, Technical Director

2016 will see MarineSpace Limited – an established marine environmental consultancy with offices in Milford Haven, Southampton and Peterborough – celebrate a decade of providing expert support to projects across all marine development sectors.

INCEPTION

"When I started the business back in 2006, I wanted to offer offshore industries something new in terms of marine environmental consultancy services," said founder Stuart Lowe. *"Coming up to 10 years on, I feel we have achieved this, and are now able to offer a variety of services, ranging from technical input to geological, geophysical and ecological issues, consenting and permitting services, environmental assessment, marine archaeology advice and specialist knowledge of marine nature conservation."*

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PROJECTS

MarineSpace is currently working on projects across a wide range of sectors, including offshore wind, wave and tidal, marine aggregates, ports and harbours, oil and gas, subsea cables and government projects.

WALES FOCUS

The Welsh coast has become a particular focus for the Company's work, with the Pembrokeshire office at Milford Haven providing the base for members of the team involved in some of latest success stories – *"Whilst we work on projects around the UK and overseas, Wales is a real priority for us,"* said Technical Director Joseph Kidd. *"Our team have been involved in tidal array projects at Anglesey Skerries and St David's Head, are currently undertaking work associated with the North Wales Tidal Demonstration zone off Anglesey and also assisting the developer of the Swansea Bay Tidal Lagoon project."*

COMPREHENSIVE RANGE OF SERVICES

"With respect to Tidal Energy Limited, we have been their lead environmental consultants since 2012, delivering a comprehensive range of services for their fascinating and challenging projects, including DeltaStream."

DELTASTREAM DEMONSTRATION PROJECT

The DeltaStream demonstration project is a fully grid-connected consented tidal energy project located in Ramsey Sound, Pembrokeshire. MarineSpace continues to provide consent compliance support to this project, building upon previous work which has involved regular consultation with the key statutory and non-statutory marine stakeholders in the region.

WIDER ROLE

At a wider UK level, MarineSpace also fulfils the role (jointly with Aquatera and EMEC) as the Secretariat for the Offshore Renewables Joint Industry Programme (ORJIP) for Ocean Energy, a national collaborative programme of environmental research with the aim of reducing consenting risks for wave, tidal stream and tidal range projects.

CONCLUSION

Stuart Lowe added *"The requirements of offshore industries are ever-changing, but our dedicated, flexible, skilled team are able to constantly adapt and develop to ensure we continue to provide the same high-level of services our clients have come to expect from us over the last 10 years."*

MarineSpace Ltd

Click to view more info

Machining expertise

M&A Engineering Limited are a leading provider of on-site machining, machine shop conventional heavy machining and CNC medium machining services which operates from their purpose-built Milford Haven facility.

ADDITIONAL SERVICES

In addition to machining services, the company also provides site joint integrity services, including controlled torque, tensioning and joint certification. The company can design and manufacture specialised site machine tools, specific to their customers engineering requirements.

CUSTOMER BASE

The company's customers are some of the largest in the world and are proud in providing specialist services as well as executing engineering solutions and on-site services designed to maintain the integrity of production and process plants.

INDUSTRIES

The company serve the petrochemical, marine, metals and energy/power industries along with many other industries requiring solutions and expertise to overcome their problems.

INVESTMENT

By investing in the best machinery, employing only the most skilled engineers and always striving for an exemplary level of customer service, they are able to provide engineering solutions which set them apart from the competition. Their work is of the very highest standard and has led to the company building an enviable reputation both locally, nationally and internationally.

Engineering Excellence
LEDWOOD

LMEL are a quality fabricator of steel structures in the wave & tidal industry

Contact Peter J. Cornish to discuss your requirements
T 01646 623 600 | www.ledwood.co.uk

SAFE WORKING ENVIRONMENT

Every member of the M & A Engineering team take responsibility to protect themselves, colleagues, customers and the community they impact. This ensures a safe and accident-free work environment.

CASE STUDY – REPAIR OF PIN LOCATIONS FOR FORWARD JACK UP LEGS

When existing locations for locking pins were found to be worn, M & A Engineering Ltd was asked by Northwestern Ship repairers to assist in the repair of pin locations on the vessel MV Wind, a task that meant cutting out existing plates and welding in new sections at each of three locations, on forward, port and starboard legs.

The project involved machining the pins in the same plane relative to each other and the design of a system able to accurately carry out the work in-situ.

M & A Engineering Ltd

Click to view more info

Independent manufacturer

Consort Equipment Products Limited is an independent British manufacturer and has been based in Milford Haven, Pembrokeshire, Wales since 1966. The company manufacture electric heating products, crossflow fans, metal sheet components and enclosures. It operates from a 100,000 sq ft modern production facility which is BSI ISO 9001 accredited.

BESPOKE SERVICES

Since the early 1990s Consort has been supplying a wide range of industries with bespoke metal enclosures and pressings. In particular, it has had great success supplying the gaming, automotive and rail sectors. It is part of the procurement chain for Bentley Motors Limited, Bell-Fruit Games, Trico Ltd and Excel Precision Engineering.

This diverse range of customers has been possible due to Consort's consistent investment over the years in the best and most versatile CNC equipment available.

INVESTMENT

Most recently, Consort has made a major investment in new automated CNC laser cutting and punching machines together with a panel forming machine which allow bespoke sheet metal fabrication such as enclosures and cabinets in a range of materials.

With cutting-edge technology of the Salvagnini L5-30 Fibre Laser, the ability to cut complex profile or special shaped bracketry and gussets are possible. The Salvagnini P2XE Panel Former delivers high quality panels from a punched/cut sheet with maximum flexibility and automation.

The Trumpf TruPunch 5000 machine has a maximum processing flexibility through the use of up to 90 station automatic tooling carousel which reduces set up times. It also has the ability to form up to 20mm flanges/features within a programme which optimises productivity. These machines are significant additions to the existing CNC capability consisting of Trumpf punching machines, Edwards Pearson brake presses, RAS folding machines and Luna rolling machine.

ACHIEVING HIGH STANDARDS

With extensive press shop facilities up to 750 tonnes, welding, dry powder paint shop and assembly facilities, Consort is accustomed to meeting the high standards demanded by a wide variety of customers globally.

It is an extremely flexible manufacturer of high quality sheet metal enclosures and components and has the full capability to supply the energy sector with bespoke components.

Consort Equipment Products Limited

Click to view more info

Llywodraeth Cymru Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

Meet the man with two hats

David Jones is Project Director for Marine Energy Pembrokeshire (MEP) and is also the CEO for the Pembrokeshire Coastal Forum (PCF) – so what is it like to be a man where one hat is not enough!?

BACKGROUND

Coming from a fishing family and growing up in a Welsh seaside resort, David has always had a close link with the sea. Working as a diver has seen him travel to many parts of the world where he has also completed a degree in Coastal Management and Marine Biology. He volunteered for a number of projects around the Welsh coast and was fortunate to have been offered paid employment working in an area which he loves.

David has always been interested in sustainability and particularly energy.

MARINE ENERGY PEMBROKESHIRE (MEP)

David described his role in MEP is first and foremost about what the barriers in the industry are and how to overcome those barriers and, as his MEP designation suggests, directing projects. He has now been in the position for some 6 years.

PARTNERSHIP

MEP is a partnership between technology developers, the supply chain, academia and the public sector working together to establish Pembrokeshire as a 'centre of excellence' for sustainable marine energy generation.

It provides support and guidance for the marine energy sector in a variety of ways. MEP's working group consisting of 22 wave and tidal developers from Europe and beyond, and meets regularly to share development opportunities and to discuss best practice on specific topics.

BUSINESS SUPPORT

MEP provides business support to the sector, providing a conduit for information between industry, public sector agencies and Government and also holds fully booked annual seminars attracting hundreds of delegates from across Europe and beyond.

PEMBROKESHIRE COASTAL FORUM (PCF)

PCF is a partnership that works together to ensure there is a joined up approach to using the marine environment sustainably. Since 2000 PCF and partners have developed a number of projects that are viewed as best practice including the Pembrokeshire Marine Code and Outdoor Charter. They also focus on stakeholder engagement and education.

UNDERWATER LITTER PICKERS!

David has volunteered for Neptune's Army of Rubbish Cleaners or NARC for short since 2007. The group is made up of voluntary divers who carry out underwater litter picks aimed at a problem that is often out of sight and out of mind.

As well as the more common finds such as plastic bags, shopping trolleys, bikes, cans, tyres, lost angling gear, the group have stumbled upon some more surprise discoveries over the years including satellite dishes, a Mitsubishi van and even a kitchen sink!

10,000 weights, equating to more than a tonne of lead, have been brought up from the seabed and at least 6,500 hooks and endless fishing line have been bagged over ten years of diving. Just this year has seen NARC lift 2 tonnes of net and over 140 lobster pots.

ED'S NOTE
Find out more about MEP in their article found on pages 36 & 37

Marine Energy Pembrokeshire (MEP)

Click to view more info

Llywodraeth Cymru Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

Excellent training opportunities

Pembrokeshire College is the largest provider of post-16 education and training in the county of Pembrokeshire. Situated in a modern, purpose-built campus in Haverfordwest, they offer young people, adults and companies excellent training opportunities across a broad spectrum of subject areas. w

STATE-OF-THE-ART-FACILITIES

With approximately 2,000 full-time and 13,000 part-time students, the college is very proud of their state-of-the art campus which houses an excellent array of facilities and equipment; most notably the award-winning £3.2m Construction Centre and the £4m Engineering Wing.

WORKING WITH INDUSTRY

As a college they are continually working to develop their relationship with industry and have established strong links with companies across Pembrokeshire and beyond.

They are committed in helping to grow the Pembrokeshire economy and have representation on many corporate boards including the Energy Sector Development Group and the Haven Waterway Enterprise Zone Board.

Through liaising with industry the college has created training facilities that provide the best environments for equipping learners with the skills required by employers across a number of sectors including care, construction, engineering, hospitality, leisure, business and the arts.

RESEARCH FOCUS

The expertise of the lecturers has led to them being called upon to provide specialist research for a number of projects. Most recently they have been commissioned to carry out research into the effects of tidal stream electricity generation on the marine environment of Ramsey Sound.

AN INTERNATIONAL REPUTATION

The college has an established reputation for delivering expert training both at home and abroad. The breadth and scope of their training surpasses any other training company in Pembrokeshire and includes bespoke training which has seen delivery of training in Kuwait, Peru and Jordan.

TOTALLY BESPOKE

With a team of experienced and qualified assessors the college is able to create individual training courses and fully bespoke training programmes for companies which exactly match their business needs and can also offer a full consultancy service with ongoing support/development to help businesses to grow and meet their corporate goals.

Pembrokeshire College

Click to view more info

= Click to view video

Bridge Innovation Centre

Bridge Innovation Centre encourages and supports start-ups, incubation and growth of knowledge-based businesses in Pembrokeshire.

T 01646 689201 E pstp@pembrokeshire.gov.uk www.bridgeinnovation.co.uk @bridgeinnovator www.facebook.com/bridgeinnovation

COMPLETE ENGINEERING SERVICE

MainPort Engineering Limited established in November 1990 to provide a complete engineering service to the petro chemical, food process, water treatment, manufacturing and power generation industries and has successfully traded with these industries for the last 25 years.

EXPERIENCED STAFF

The company's staff are all competent time served tradesmen and are fully experienced in the petro chemical and power generation industry and are aware of the stringent safety & Permit to Work Systems associated with these Industries. All employees have undertaken the Client / Contractor National Safety Training Initiative and carry the CCNSG Safety Passport and all Safety Systems have been audited and accredited to OHSAS 18001.

All work produced by the company is carried out under quality assurance procedures to BS EN ISO 9001 & BS EN 1090 (CE Marking) and welders are all coded in compliance with A.S.M.E. section IX and BS 4870 in (carbon steel, stainless steel, chrome moly, inconel etc).

DEDICATION

The company is dedicated to providing the highest quality workmanship, using the latest technology, meeting agreed delivery dates and executing the custom work exactly in accordance with the designers concept and customers specifications.

Engineering & Construction Industry Association (Membership No 93993), Engineering & Construction Industry Training Board (Active Member) IOSH Graduate & Chartered Members, Associated Members of the Welding Institute.

APPRENTICESHIP PROGRAMME

MainPort Engineering have an enviable and extremely successful apprenticeship programme, with 7 apprentices of mixed disciplines being introduced into the industry annually.

The success of this apprenticeship programme was recognised by winning two major local and National Awards, The Employer of the Year by Pembrokeshire College and also The Skills and Training Large Employer / SME from the Engineering Construction Industry Training Board at Covent Garden.

MainPort Engineering

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Llywodraeth Cymru
Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

The UK's most attractive marine energy site

Pembrokeshire provides the highest concentration of wave resource in Wales and has significant tidal streams. In addition there are a number of other factors that set the area apart from other UK sites providing an attractive package for marine energy investors and developers.

These include excellent grid connection possibilities with a 400kV transmission line, world class research via a joined up Welsh academic approach, excellent port facilities and support services provided through the UK's third busiest port complex with a history of collaborative working within the energy and marine sectors.

SUPPLY CHAIN

Pembrokeshire is already home to an energy sector supply chain and workforce which supplies 25% of the UK's refined oil products, 30% of the UK's gas requirements and Europe's largest CCGT gas fired power station. All the facilities on the Haven are close to steel fabricators, ship repairers, boat and barge builders, marine and other engineering of various specialisms.

MARINE ENERGY PEMBROKESHIRE FORUM

In addition to this, Marine Energy Pembrokeshire is an established forum where technology developers, academia, consenting bodies plus local and regional government meet to develop the sector and work to establish Pembrokeshire as a 'centre of excellence' for marine energy. Marine Energy Pembrokeshire also provides support and guidance for the marine energy sector and raises awareness of the regions key development opportunities.

BRIDGE INNOVATION CENTRE

Designed with the interests and needs of marine energy developers in mind, the Bridge Innovation Centre is run by Pembrokeshire County Council and was established as the central hub of the Pembrokeshire Science and Technology Park.

The Centre provides a unique environment for innovation and business growth with knowledge sharing, collaboration and networking.

HAVEN WATERWAY ENTERPRISE ZONE

The Pembrokeshire Science and Technology Park forms part of the wider Haven Waterway Enterprise Zone. SMEs and new starts within the Haven Waterway Enterprise Zone may be entitled to apply for the Welsh Government's Business Rates Grant Scheme, offering financial support for business rates liabilities incurred.

Companies located within specific areas of the Zone may be entitled to apply for Enhanced Capital Allowances to cover the capital cost of investment in plant and equipment.

Bridge Innovation Centre

Click to view more info

WAVESUB PROGRESS AT HAVEN WATERWAY ENTERPRISE ZONE

Marine Power Systems (MPS), a Swansea-based company that is developing revolutionary technology designed to capture the energy from ocean waves, is continuing with its progress through preparing to test its unique WaveSub device at the Haven Waterway Enterprise Zone in Pembrokeshire, South West Wales.

Marine Power Systems was co-founded in 2009 by Dr Gareth Stockman and Dr Graham Foster. The company has carried out significant modelling and prototype testing to date; currently working towards the testing of a purpose-built quarter scale model prototype of the WaveSub.

REVOLUTIONARY DEVICE

The revolutionary WaveSub Wave Energy Converter developed by the company is a unique, patent protected, award winning device. The WaveSub solves the four main challenges facing all developers looking to capture wave energy.

1. Developing efficient energy capture in any sea conditions
2. Securing the technology's long-term survivability in a harsh environment
3. Ensuring the devices are easy to deploy, recover and service
4. Guaranteeing they are cost efficient to build in relation to the power they produce

NEXT STEP

Marine Power Systems has already tested sub-systems through its work in Milford Haven over a number of years. The next step is to manufacture and assemble the WaveSub device in Pembroke Port and test the device in the Haven Waterway Enterprise Zone.

Successful completion of the quarter scale trials and further funding prospects will enable the company to build its first full-size WaveSub demonstrator, taking MPS a step closer to commercialisation.

Dr Gareth Stockman (left), Dr Graham Foster (right)

MAIN OBJECTIVE

Working towards a low levelised cost of energy (LCOE) is one of the main objectives for Marine Power Systems. A low LCOE is a primary metric, which takes into account factors such as capital, operations, maintenance, performance and insurance costs. The WaveSub performs well in all of these domains.

Dr Gareth Stockman, Managing Director of Marine Power Systems, said: *"This is an exciting time at Marine Power Systems and we are proud of the progress that we have made. We have been working hard on the development of the WaveSub device and have received a lot of support from the local supply chain, Pembroke Port itself and Marine Energy Pembrokeshire, which we are very grateful for.*

LEADING THE WAY

"The results of our work so far have been extremely promising and this is a crucial time to be in the wave energy field. We have further testing ahead but with what we have already achieved, we feel MPS is one of the key companies leading the way in terms of technological advancements in harnessing wave energy.

"There is now greater recognition and understanding of the revolutionary potential of the device we have created. This will ultimately generate global interest, as the WaveSub can harness the energy in a broad spectrum of waves, in almost any offshore environment using the unique technology we have developed."

Marine Power Systems

Click to view more info

Surface preparation and protective coatings

Ledwood Protective Coatings (LPC) operate one of the largest purpose built Surface Preparation and Protective Coating Facilities in Wales.

STATE-OF-THE-ART FACILITY

Within this facility there is a state-of-the-art temperature controlled painting booth and automatic media recycling system. The company also offers a complete service covering onsite surface preparation and protective coating, including the very latest metal spray application.

SPECIALIST SERVICES

Ledwood Protective Coatings Ltd are specialists in surface preparation and protective coating application.

KEY SERVICES INCLUDE…

- Blasting
- Steel and Non Ferrous Preparation
- Protective Coatings
- Surface Repairs

Based at facilities in Pembroke Dock, LPC have the capability to repair and complete coatings to a diverse range of components and steel structures prior to delivery to site.

FACILITY SPECIFICATIONS

Their Blast Booth measures over 55,000 cubic feet with internal dimensions of 33.4m x 8m x 6m high. Their Painting Booth measures over 125,000 cubic feet with internal dimensions of 39.5m x 12.0m x 7.4m high.

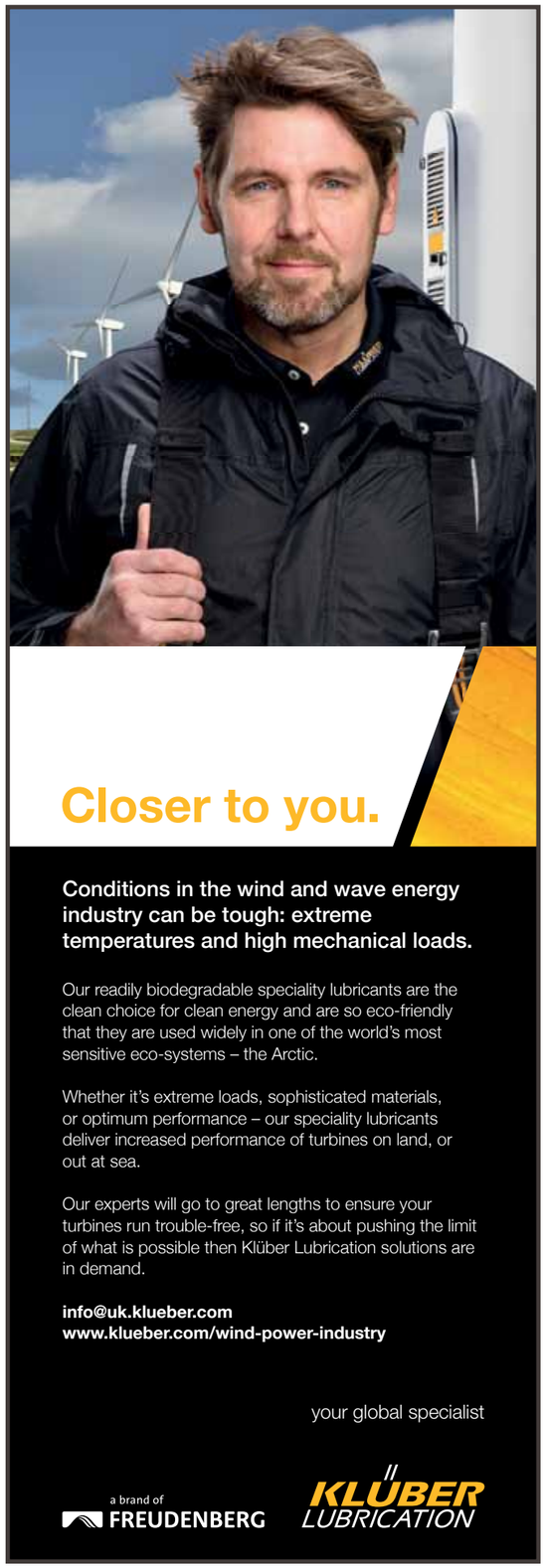
Both facilities offer long run off and run in for large components and a reinforced floor to manage low loaders, with no size restrictions to the motorway network and deepwater port facilities.

ACCREDITATION

The company are accredited to ISO 9001 and ISO 18001 as well as a behavioral safety policy and system - operatives are ICATS qualified with training and continuous monitoring by their own in-house SMT ICATS Trainer.

Ledwood Protective Coatings (LPC)

Click to view more info



Llywodraeth Cymru Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

Boatbuilding design and construction expertise

Mainstay Marine Solutions carries on a long legacy of boat building with a core management team who have been designing, building and maintaining workboats for over 30 years in their deep-water facilities in Pembroke Dock, on the Milford Haven Waterway in South West Wales.

Responsive and exacting, the company meets client's critical deadlines and ensures vessels or waterside infrastructure's time in service is maximised, safely.

CAPABILITIES

Competencies in design and marine engineering ideally adapt to the demanding marine renewable environment. Their capabilities are showcased in a 20 meter aluminium BMT Nigel Gee wind farm support catamaran capable of transporting up to 12 turbine technicians up to 25.5 knots and the tidal energy's 150 tonne, 20m high DeltaStream tidal energy device.

MANAGING MULTIPLE CONTRACTS

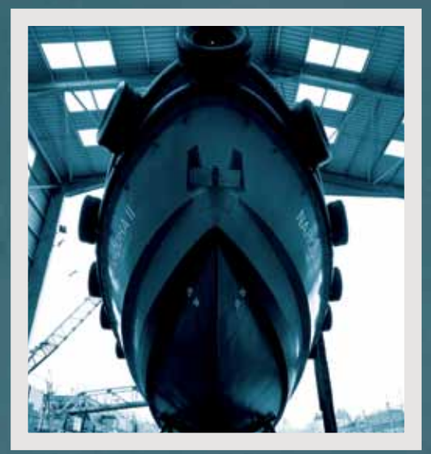
The company is well equipped to manage multiple new build and maintenance contracts simultaneously. Key facilities combine to offer 4000m2 of covered workshops and include four new-build halls, four slipways – two of which are covered, a fifth 'roll-on roll-off' slipway and wet basin.

COMPLEX PROJECTS

Marine device fabrication projects are complex and are an intricate culmination of many component parts and processes and the company understands that time and precision are critical.

It is this intimate understanding of the processes and the supply chain which set them apart from many other marine or mechanical engineering and fabrication businesses.

Not only do they have the skills and technical requirements of building large scale submersible and semi-submersible marine structures, they can also support and facilitate the project management process to ensure device and support vessels are delivered on time to the highest quality.



SPECIFIC EXPERTISE

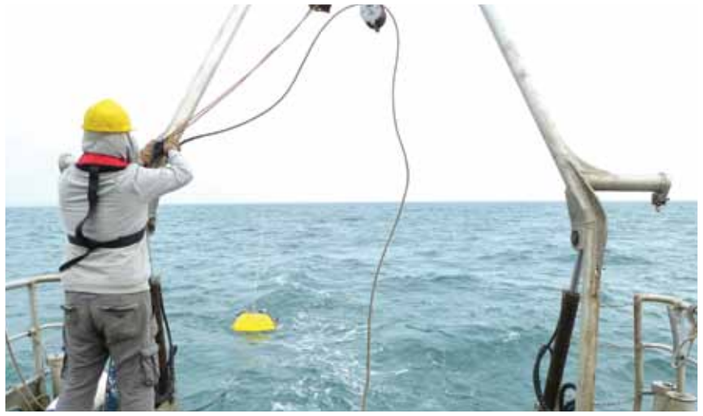
With specific marine engineering expertise, optimum location for marine based projects and extensive experience in this emerging and fast growing sector, Mainstay Marine Solutions is a partner of choice for marine energy device and support vessel fabrication projects.

Mainstay Marine Solutions Ltd

Click to view more info

Wave Energy research for Pembrokeshire

LCRI Marine, a collaboration of all the leading academic marine institutions in Wales, is a project that aims to enable and support a sustainable marine energy sector in Wales by providing independent and world-class research.



The group are involved in the development and application of tools which optimise the performance of the technology that recover energy from waves, tidal streams and tidal ranges around the Welsh coast. In particular, they consider the likely effects that these devices have on the environment and the effect that the environment has on devices.

PROJECT

The project which is led through Swansea University's College of Engineering, is helping to promote the waters off Pembrokeshire for electricity generation from wave power. This region has recently been highlighted as an area of excellence for wave power, via the creation of The Crown Estate Wave Demonstration Zone. In July they announced the creation of six demonstration zones for wave and tidal energy around the UK coast, with two located in Wales; wave energy in Pembrokeshire and tidal energy off Anglesey.

ATTRACTIVE LOCATION

Pembrokeshire is particularly attractive for the development of commercial wave energy extraction projects due to the proximity to port facilities in Milford Haven and strong electrical grid connections. Detailed knowledge of the wave conditions however is lacking, which hinders accurate estimates of wave energy extraction levels.

While there has been a wave buoy off the coast of Pembrokeshire for many years, it does not provide adequate information for the renewables industry to have high levels of confidence.

STATE-OF-THE-ART DIRECTIONAL WAVERIDER BUOY

LCRI Marine recently purchased and installed a state-of-the-art directional waverider buoy which provides a much more detailed description of the sea state, enabling both industrial developers and potential investors to have greater confidence in the suitability of the area. The new buoy not only provides wave height information but, crucially, information about the wave spectra.

Wave spectra describe the energy within different frequencies of a given wave condition and is vital for wave energy developers to predict how well their devices will work in a given area. Additionally, the LCRI marine project is setting up computer simulations of the region so that spatial variability in resource about the region can be quantified and the areas that are most suitable for project development identified.

DEMONSTRATING COMMERCIAL VIABILITY

It is believed that this study will demonstrate the commercial viability of wave energy extraction in the area and hence encourage investment in Welsh based projects and lead to growth of the renewables industry in the region.

Iain Fairley
Swansea University/LCRI Marine

Click to view more info

= Click to view video

Swansea University - New Bay Campus opened September 2015

MAINSTAY MARINE SOLUTIONS

Our Design, Fabrication, and Engineering capabilities make us the partner of choice for Marine Energy Device projects.

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E enquiries@mainstaymarine.co.uk
W www.mainstaymarine.co.uk
@mainstay_marine

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Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

A port for all seasons

The natural deep waters of Milford Haven's harbour have brought nearly 60 years of sustained investment in energy infrastructure to South West Wales. Day in day out, the Port of Milford Haven safely handles ships that feed refineries, storage facilities and LNG terminals. The Port is an essential gateway for up to a third of the UK's seaborne energy imports.

TRANSFERABLE SKILLS

The oil industry has nurtured a highly trained and specialised local workforce that's proved its skills are transferable to new sectors. Fabricators, engineers and designers lead a number of companies based in the port with an outstanding track record of trade in local and international markets.

Ysbryd y Mor (Spirit of the Sea) - The DeltaStream test device towers over Clive Adshead from Tidal Energy Ltd (R) and Port of Milford Haven's Chief Executive, Alec Don

As the technology to harness renewable energy has developed it has become clear that Pembrokeshire can be more than a gateway for imports from distant shores. Lying off the region's own shores are some of the best wave and tide energy resources in Western Europe.

PEMBROKE PORT

Pembroke Port, owned and operated by the Port of Milford Haven will be key to unlocking the potential of these offshore renewable energy fields. Chief Executive Alec Don has made clear his determination to attract a nascent marine renewables industry here. *"Pembroke Port has a deep water dock with extensive laydown areas, slips and construction facilities alongside. It's also home to some of the UK's leading marine engineering and fabrication companies,"* said Alec.

WORLD LEADER

"For more than a century this port was a world leader in shipbuilding, turning out more than 200 ships for the Royal Navy alone," Alec continued. *"Oil and gas opened a new chapter for us and local companies quickly became world class. Wave and tidal energy present new opportunities and you can bet your bottom dollar local businesses will adapt rapidly to the challenge."*

INDUSTRY COLLABORATION

The Port is already collaborating in two high profile projects to develop innovative tide and wave generation devices. With two test sites just offshore and National Grid's 400KV connection close by, the port will be well placed for development, fabrication and eventual wide-scale deployment of wave and tide generating systems.

Port of Milford Haven

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Llywodraeth Cymru Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

Creating a Centre of Excellence for marine renewable energy

Marine Energy Pembrokeshire (MEP) is a not-for-profit partnership working to create a centre of excellence for marine renewable energy in Wales. The partnership provides a unique model for collaborative business support for marine energy development.

WORKING GROUP

Members of its working group comprise marine energy technology developers, supply chain companies, academia and statutory bodies. Membership has grown rapidly since it was established in 2010. There are now 80 MEP working group members, with 23 technology developers including world leading companies from Sweden, Australia, Singapore, Canada, Ireland and America.

PREFERRED LOCATION FOR DEVELOPERS

Attracted initially by Wales' excellent wave and tidal stream resource, the announcement of two marine energy demonstration zones and the allocation of €100.4 million of EU Structural Funds prioritised by the Welsh Government for marine energy have served to cement Wales in the minds of developers as one of the preferred locations for marine energy development on a worldwide scale.

These developers now share an active interest in deploying their projects in Welsh waters. Quarterly, MEP meetings act as a forum for bringing industry and supply chain companies together with government and academia to share best practice and to discuss barriers to deployment. Gavin McPherson from Nova Innovation comments that *"MEP is a unique forum for informed discussion, promoting a collaborative approach to marine energy development. This is extremely useful for a developer considering a project in Wales."*

SHAPING POLICY

The partnership provides a strong voice for the marine energy industry in Pembrokeshire and Wales and provides regular industry updates which help shape policy. MEP is currently assisting in a Ministerial Task and Finish group helping to create a clear path for marine energy in Wales and is also working closely with North Wales to ensure the alignment of activities across the country.

The partnership has a seat on the Marine Energy Programme Board and Offshore Renewables Joint Industry Programme in order to champion Welsh interests. They have also forged links with Ocean Energy Europe and will be exhibiting at the Ocean Energy Europe Conference in Dublin.

EXTENSIVE DATABASE

MEP have a marine energy contacts database in excess of 700 and provide regular news feeds across the sector. Their website is the primary communication tool and ranks on the first page out of 21 million results for the search term 'marine energy'.

Marine Energy Pembrokeshire (MEP)

Click to view more info

ED'S NOTE
Find out about MEP's Project Director, David Jones in his interview on page 24

Llywodraeth Cymru Welsh Government
HAVEN WATERWAY ENTERPRISE ZONE WALES

CONSULTANCY IN THE WAVE & TIDAL INDUSTRY

A personal insight

JOSEPH KIDD IS THE TECHNICAL DIRECTOR AT MARINESPACE LTD, A MARINE CONSULTANCY OPERATING ACROSS A RANGE OF INDUSTRIES INCLUDING WAVE & TIDAL, WHOM WE ASKED TO GIVE US AN INSIGHT INTO BOTH HIS COMPANY AS WELL AS A LITTLE BIT ABOUT HIMSELF.

Joseph Kidd's presentation at Scottish Renewables Marine 2015 conference

BACKGROUND

Joseph has a broad academic and professional background with qualifications in Mechanical Engineering, Applied Meteorology and Renewable Energy and more recently extensive experience in project development and consenting.

His professional background includes experience on both the regulatory side with four years assessing large scale energy projects at the Environment Agency and on the industry side where he spent a number of years supporting renewable energy project developers whilst at PMSS. He then found himself at the forefront of the growth of the tidal sector in his role heading up the project development team at Marine Current Turbines (MCT).

He joined MarineSpace in 2014 and has continued to play a leading role in the growth of the marine energy sector, particularly in Wales where he is well placed to support the increasing numbers of technology developers and project developers looking at potential opportunities there.

Joseph is an experienced Project Manager specialising in the development and consenting of renewable energy projects – from initial site selection, contracting site surveys and feasibility studies, securing leases, EIA management and stakeholder engagement, through to successfully securing consents, managing licence conditions and project due diligence.

REDUCING PROJECT RISK

Through his experience of the various challenges associated with developing marine energy projects he is particularly interested in helping to reduce project risk wherever possible. One important area of project risk is consenting and MarineSpace is part of the secretariat funded by The Crown Estate, Marine Scotland and Welsh Government to manage the Offshore Renewables Joint Industry Programme (ORJIP) for Ocean Energy. The programme encourages all stakeholders involved in marine energy to work collaboratively across both industry and geographically to achieve successful outcomes.

THE BIGGER PICTURE

Joseph is keen to help push the marine energy sector forward, particularly close to home where he sees a real window of opportunity for Wales to take a world leading role. He is optimistic that the building blocks are there to achieve this in Wales with good wave and tidal resource, grid infrastructure near the areas of interest with available capacity, strong political support together with a significant pot of project funding available and an enthusiastic, competent supply chain.

Having experienced the frustrations of trying to get pre-commercial arrays financed, he is well aware of the commercial challenges that the sector faces at a global level but he has been encouraged by a recent build-up of momentum with new and lesser known technology developers learning important lessons from the first movers that bodes well for the future.

MarineSpace Ltd

Click to view more info

ED'S NOTE

Find out more about MarineSpace in their article on pages 20 & 21

TEST TANKS & FACILITIES

Ireland's Ocean Energy Test Facilities

Ireland is actively committed to exploiting its abundant wave, tidal and offshore wind energy resources and dedicated to developing an indigenous ocean energy industry in the process. The Offshore Renewable Energy Development Plan (OREDP), published by the Department of Communications, Energy and Natural Resources (DCENR) in 2014, sets out ambitious targets in relation to energy generation, electricity exports and job creation to be achieved by harnessing this ocean energy wealth.

A key attribute of the ongoing effort to achieve these goals is the presence and continued improvement and expansion of several excellent test and demonstration facilities covering each stage of offshore renewable energy technology development.

LIR NATIONAL OCEAN TEST FACILITY (NOTF)

The LIR National Ocean Test Facility (NOTF) at University College Cork is an internationally recognised centre of excellence for the development and testing of early stage ocean energy concepts. LIR is located in the brand new UCC Beaufort Building in Ringaskiddy, Co. Cork, opened by Taoiseach Enda Kenny in July 2015.

UCC BEAUFORT BUILDING

The Beaufort building is a state of the art offshore renewable energy test facility which houses state-of-the-art facilities for wave simulation and small scale testing of wave, tidal and floating offshore wind devices. These include a Wave Flume, which also incorporates tidal flow, 25m x 18m Ocean Wave Basin and a new Deep Ocean Basin with a movable floor and the ability to generate individual waves of up to 1.1m. This will allow wave energy devices to be tested in laboratory conditions representative of the extreme winter storms experienced off the Irish West Coast.

Companies utilising the facilities at LIR can also access several electrical and mechanical test rigs for linear actuation, turbine testing and grid emulation, ideal for the testing and development of components.

SCIENCE FOUNDATION OF IRELAND (SFI) MAREI CENTRE

The new Beaufort facility also houses the Science Foundation of Ireland (SFI) MaREI Centre. Made up of a dedicated team of researchers with a track record of successfully delivering over 200 commercial contracts as well as over 30 years' experience leading and participating in national and international research projects, ranging from engineering and IT to ecology and marine governance, MaREI is well placed to provide technical support to offshore renewable energy technology developers availing of the LIR.

GALWAY BAY

The Galway Bay ¼ scale marine test site offers developers a unique opportunity to smoothly negotiate the difficult transition from the laboratory to the sea. The fetch-limited wave climate in Galway Bay is proven to be an excellent scaled approximation of the conditions devices can be expected to encounter at exposed locations along Ireland's Atlantic coast. The test site is ideal for developers wishing to undertake low-cost sea trials and validation of devices and components in a representative, real-sea environment. The site is located 1.5km offshore, in close proximity to port facilities. The Galway Bay test site water depths range from 20 to 23m. It is fully licenced for the testing of ocean energy devices and components.

SMARTBAY IRELAND

SmartBay Ireland manages the Galway Bay test site and offers full range of end-to-end support services to developers. This includes pre-deployment planning, design and deployment of mooring configurations, ongoing O&M and data acquisition, transmission and processing.

The Galway Bay test site underwent significant improvements in 2015. These included the deployment of a power and data cable connected to shore and the installation of Ireland's first subsea ocean observatory. The ocean observatory will enable the use of cameras, probes and sensors to permit continuous and remote live underwater monitoring and provide ocean science researchers with unique real-time access to assess ongoing changes in the marine environment.

COLLABORATIVE PROJECT

Access to this data and power cable also offers significant and unique benefits to the developers of wave energy devices and components undergoing trials at the site. The installation of the observatory has been a collaborative project between the Marine Institute, the Sustainable Energy Authority of Ireland (SEAI), SmartBay and MaREI, funded under the Science Foundation Ireland Research Infrastructure Call.

SEAI is currently developing the Atlantic Marine Energy Test Site (AMETS) off Annagh Head, West of Belmullet in County Mayo. The test site is an integral component of Ireland's Ocean Energy Strategy and will facilitate grid-connected testing and validation of full-scale wave energy converters in an open ocean environment. Currently two separate berths are being developed at the site at water depths of 50m and 100m respectively. AMETS experiences an extremely energetic wave climate, with an annual wave power resource of 70 KW/m at 100m water depth. Individual waves in excess of 23m have been observed by wave buoys deployed at the site.

Present activity around AMETS includes final preparations to ready the site for hosting testing. It is anticipated that a foreshore license will be in place by the end of 2015. SEAI is working closely with Mayo County Council to update port facilities in the area which will provide access to the test site and work is expected to begin shortly on the onshore electrical substation. SEAI is also actively engaged with the local community, keeping them informed about developments around the site. A highly well-received public information day was held in Belmullet in June.

WORLD CLASS TESTING FACILITIES

With a full suite of world class testing facilities, expertise in research and engineering and attractive funding and enterprise support for innovative companies, Ireland is Open for Business for the testing and demonstration of ocean renewable energy technologies.

Ocean Energy Ireland

Click to view more info

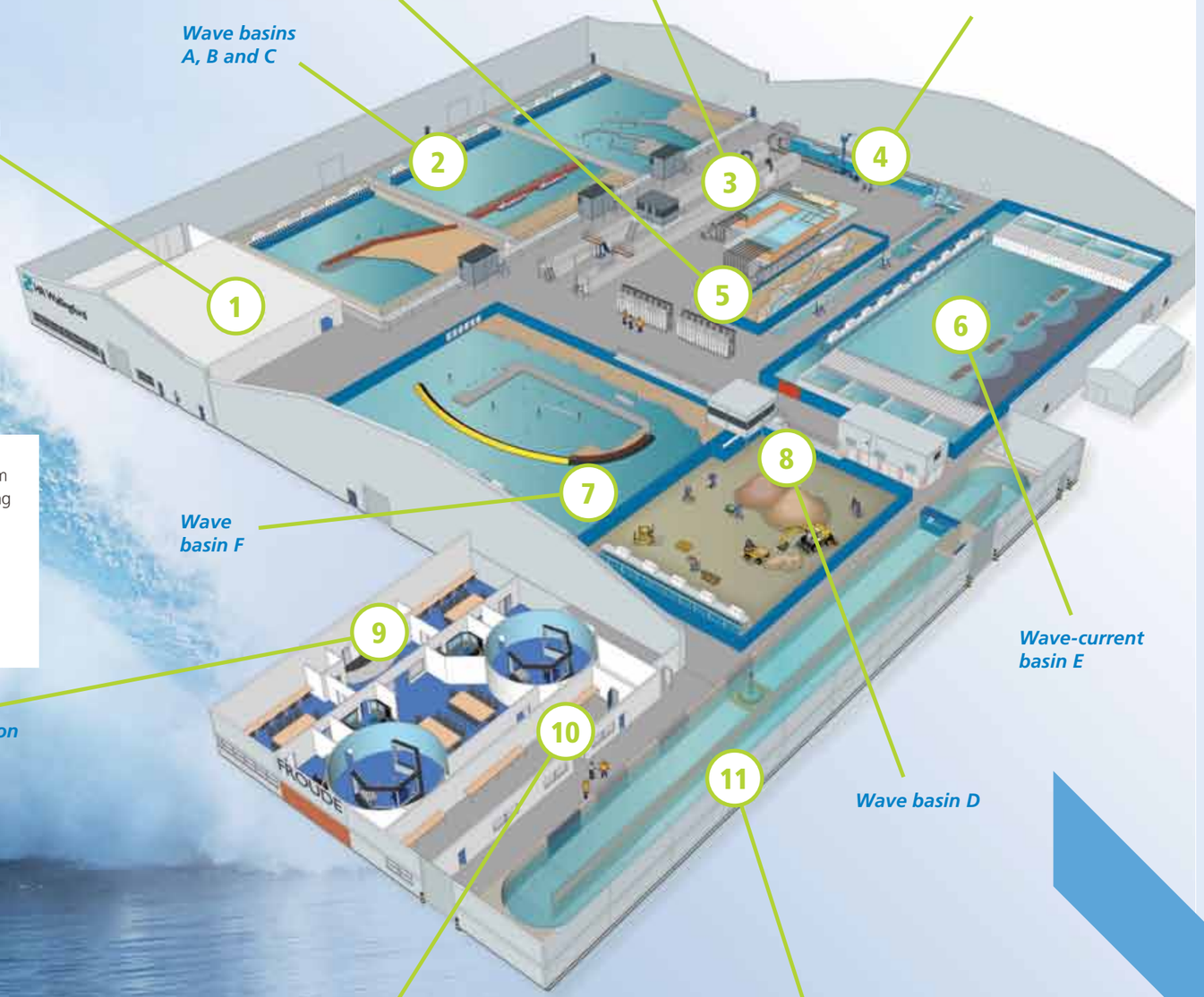
= Click to view video 1

= Click to view video 2

TEST TANKS & FACILITIES

Modelling Confidence

Developments in exposed marine and coastal environments are high risk: fast currents, deep water, a shifting seabed and energetic waves present significant technical challenges for engineers. How can they reliably optimise designs to avoid over-engineered solutions and spiralling project costs? Samantha Dawson, renewables business manager at HR Wallingford, explains the critical role that scaled physical models can play in this process.



SOLVING PROBLEMS

HR Wallingford works with organisations around the world to solve problems involving water and it's interaction with structures and the environment. At their world-leading physical laboratories in Oxfordshire, UK, physical modelling facilities extend to over 15,000 m2 and include seven wave basins, three flumes and the 75m long Fast Flow Facility which celebrates its first birthday at the end of October 2015. The past 12 months have seen the highest demand for physical modelling projects in HR Wallingford's 65 year history.

In many cases, HR Wallingford's engineers and scientists apply a combination of advanced computational models and physical models to optimise designs.

"We use advanced computational models to simulate the natural processes of waves, currents and sediments, but their interaction with structures, such as wind turbines or breakwaters, is more difficult to quantify, especially when it comes to the movement of sediment and structural performance," explains Samantha. *"This is where scaled physical models come in. As the name suggests, a lot of the physical processes are recreated naturally, allowing us to assess the potential impact of the sea on coastal and port structures."*

UNDERSTANDING SCOUR

Scour occurs when currents and waves remove sediment from around the base of structures such as bridge piers and monopile foundations for offshore wind farms and underwater tidal turbines. In the worst cases, this can lead to the failure or collapse of the structure. Physical model facilities that can generate currents and waves, as well as manage sediments, are needed to analyse potential scour patterns.

HR Wallingford's Fast Flow Facility is a 75m long, 4m wide flume capable of generating waves up to 1m high and currents up to 5m3/s. Since it's opening in October 2014, the facility has been in continuous on a range of renewable energy projects, for clients such as DONG Energy, Norfolk Marine and Meygen.

FOUNDING PARTNER

REDUCING RISK AND UNCERTAINTY

The use of physical modelling has long been applied to reduce risk and uncertainty, although the models are often limited by scale. The ability to carry out physical modelling at larger scales in the Fast Flow Facility reduces scale effects and enables closer representation of the conditions present in the natural environment. This provides greater confidence in the assessments and thus a reduction in the risks associated with offshore developments.

As offshore wind developments exploit the wind resource further offshore and as wind turbine technology advances there is a requirement to carry out physical modelling at larger scales to meet the challenges associated with deeper water sites and larger or more complex foundation structures (e.g. jackets, gravity bases, floating, suction buckets).

The ability to model and hence understand the hydrodynamic (wave and current) and sediment response to the placement of these structures offshore is vital to the successful delivery of projects. The Fast Flow Facility allows these interactions to be examined at a larger scale and in more detail, helping to optimise designs and minimise the water based risks and uncertainty.

RELIABLE DESIGNS

Breakwaters are structures built to protect coastal infrastructure from the forces of waves. Although they vary in size and composition, at some of the world's largest ports there are breakwaters over 4 km in length. Building a breakwater of any size involves a significant capital investment and mistakes are costly to fix when problems occur post-construction. Physical models constructed in one of HR Wallingford's seven large wave basins are used to optimise the design of a breakwater in a low risk environment and help to ensure that it does not fail during its design life.

COMPLEX STRUCTURES

Breakwaters are often complex structures containing tens of thousands of rock (or sometimes concrete) 'armour units' closely packed and specifically placed, typically in multiple layers by size and shape. *"Our physical models are constructed in exactly the same way as the full size structures, just at a smaller scale,"* explains Samantha. *"We use specialist materials to ensure that the model responds appropriately at this size. The action of the waves and currents can cause the armour units to move around, sometimes a little and sometimes a lot, which can have catastrophic results."*

HR Wallingford's experts quantify the extent of the movement and determine the impact this will have on the performance of the structure at full scale. Physical models are also used to understand how beaches and sediments near the shoreline move around and how they react to interventions such as near-shore groynes, beach replenishment schemes or off-shore reefs.

INTERNATIONAL RECOGNITION

Despite advances in computational models, physical modelling remains the most reliable way of investigating the performance complex nearshore and offshore structures. With a world-class suite of modelling facilities and internationally recognised expertise in coastal and maritime engineering, HR Wallingford is uniquely placed to help clients understand the complex challenges of the marine environment.

Samantha Dawson
Renewables Business Manager
HR Wallingford

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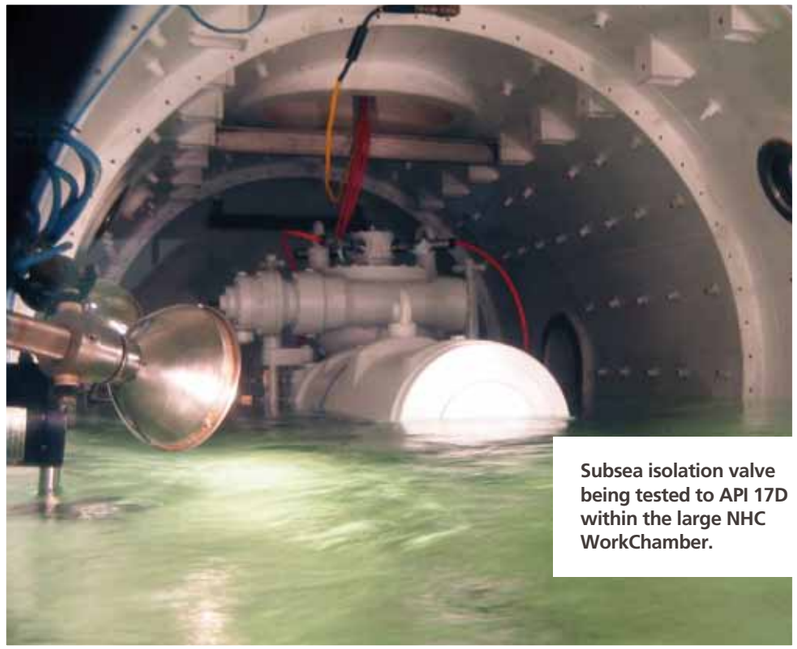
Growth and development for testing department

The National Hyperbaric Centre (NHC) has become the preferred choice for many companies wishing to perform equipment tests and trials.



Subsea isolation valve being tested to API 17D within the large NHC WorkChamber.

National Hyperbaric Centre in Aberdeen is renowned for its involvement with the diving industry, in particular within the field of hyperbaric medical treatment and research and now more recently as the Centre of Excellence for subsea safety training. However, the centre is also a UKAS (United Kingdom Accreditation Service) recognised testing facility, fully equipped to conduct a variety of tests and trials for a whole range of industries.

GLOBAL CHOICE

The testing facilities at NHC form one of the biggest and most diverse test houses in the world and are the first choice for many companies wishing to perform pressure and altitude trials.

NHC houses a range of pressure chambers which can simulate depths of up to 8,000msw (26,000ft) and altitude of up to 15,000m (50,000ft) in either wet or dry conditions and at variable temperatures. NHC also has a large outdoor Test Tank which is ideal for ROV trials and demonstrations as well as being fully equipped to conduct manned diving trials.

VARIED PROJECTS

The centre has accommodated various projects over the years such as pressure testing subsea control modules, umbilicals, valves, actuators, ROVs and submersibles for a variety of companies in the subsea, aviation, defence and renewables industries.

Technical Sales Executive, Volkan Alper commented: *"Testing is becoming an increasing necessity to ensure the safety and functionality of both new and old equipment as companies continue to push the boundaries within extreme subsea environments."*

COMMITMENT

NHC's Testing department is committed to providing a thorough and intensive testing service and is a regularly audited UKAS EN17025 Approved Testing Facility. Live video monitoring along with full instrumentation and logging devices allow results to be produced with incredible detail.

EQUIPMENT INVESTMENT

A Pressure Cycle Tester was installed during 2014, which increased the multiple endurance cycle and long duration capabilities of the chambers. Investment is continuously being made to enhance the NHC Testing facility, ensuring the National Hyperbaric Centre stays at the forefront of the pressure testing industry providing clients with next-level equipment assurance.

National Hyperbaric Centre (NHC)

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TEST TANKS & FACILITIES

EMEC and FloWave working together…

The new wave energy generator does exactly what it did in the laboratory

The project at FloWave Ocean Energy Research Facility aims to replicate Scotland's seas in all their complexity and the initiative aims to de-risk new wave and tidal prototypes, so they can perform 'right first time' when tested full-scale at sea

JOINING FORCES

Two of the world's leading ocean energy test centres have joined forces – for a ground-breaking project to recreate scaled versions of Scotland's oceans in the laboratory.

EMEC, the European Marine Energy Centre in Orkney and FloWave Ocean Energy Research Facility at The University of Edinburgh first began working together in 2012 to share their expertise in ocean and laboratory testing.

WORLD'S LEADING TEST CENTRE

For more than a decade EMEC has been the world's leading test centre for new wave and tidal machines. Completed in 2014, FloWave's 25 metre circular test tank is the only facility in the world to combine both waves and tides.

Now they have kicked off an ambitious programme to use real-life ocean data from EMEC to replicate Orkney's seas in the FloWave tank.

EXPENSIVE AND RISKY

"Testing full-scale ocean energy technologies at sea can be an expensive and risky business," says FloWave Chief Executive Officer Stuart Brown.

"The closer you can replicate real ocean conditions in the laboratory, the better you can refine your prototype and validate how it might perform - before testing part-scale or full-scale devices at sea.

"To date, test tanks have only been able to generate waves or tidal flows – but anyone who has been to Orkney will know, Scotland's oceans are much more complex and usually combine both. At FloWave our unique facility gives us the ability to create both waves and tidal currents at the same time," Brown says.

"This is similar to the way an airliner would be tested in a wind tunnel during development and is a real world first for the ocean energy sector. Ocean technology developers now have a clear pathway from the computer to the laboratory to EMEC and, if required, back to FloWave again." Brown concludes.

ACCUMULATING IMPORTANT DATA

Through the initiative, EMEC is providing a wealth of data to FloWave – gathered over years by 'Waverider' buoys, radar and ADCPs (Acoustic Doppler Current Profilers) – which FloWave is using to develop accurate models to replicate the complex sea states encountered in Orkney as closely as possible.

This challenging work is being led by Research Engineer Sam Draycott, now in the third year of a four year industrial doctorate in offshore renewable energy at FloWave.

VALUABLE RESULTS

The results will be incredibly valuable, according to EMEC Managing Director Neil Kermode: *"Developing a marine energy technology is not a linear process. You may start in a test tank before you bring an idea to sea and then once you find out what works and what doesn't, you end up back in the laboratory.*

"At EMEC we have spent a lot of time recording wave and tidal data and are focused on measuring the things that are important to developers. Our interest is in monitoring the conditions at a site, so that developers can use that data to aid their design process and we can then validate the performance and potential power production of their technology.

"EMEC is purpose-built for sea trials with ready-made test facilities, but working offshore can be expensive. That's why it makes perfect sense to utilise the unique capabilities of FloWave to develop representative EMEC conditions in the test tank. By sharing this data, we will help accelerate learning from lab to sea and back again and enable the UK to stay at the very forefront of this industry as it continues to mature."

CREATING REAL-SEA CONDITIONS

Lindsay Roberts, Senior Policy Manager for industry body Scottish Renewables said: *"Real-sea testing of marine energy devices allows developers to gain a unique understanding of the way their machines work, but not everyone is ready to jump straight in at the deep end. FloWave provides real-sea conditions in the centre of Edinburgh, in all weathers and through all 12 months of the year, speeding up opportunities for the eventual deployment of devices to the sea in places like Orkney.*

"Replicating EMEC's sea conditions at FloWave will help developers ensure their devices are ready for Orkney's powerful waves and tides and provide a cost-effective route to the later stages of real-world testing and eventual commercialisation."

COLLABORATION

EMEC and FloWave are the most advanced test facilities of their kind in the world. Through this collaboration they are making each centre's offering even more compelling – and together they ensure the UK remains the world's foremost destination for ocean energy research, testing and demonstration.

EMEC

FloWave

Credit Mike Roper, courtesy of EMEC

Keeping marine renewables afloat

ORE Catapult's National Renewable Energy Centre in Blyth, Northumberland has been undertaking research and development and conducting testing and demonstration activity on innovative marine energy technologies since 2002.

Tekmar trials at ORE Catapult's docks

TEST FACILITIES

The marine test facilities include a 3MW drive train test facility, a shallow water test facility comprising of two still water docks and a simulated seabed and the UK's only accredited electrical and materials laboratory.

The site, an ex-shipyard has adapted disused dry docks to create a real-life testing ground for trialling new technologies in a controlled onshore environment. The facility is used to perform equipment trials, prove installation techniques and conduct performance verification and witness tests for the offshore energy sector.

IMPORTANT INDUSTRY ROLE

The two still water docks and a simulated seabed have enabled ORE Catapult to play an instrumental role in the testing and trialling of novel cutting devices for rock trenching equipment, such as IHC Engineering Business Ltd's Hi-Traq ROV trenching technology, submerged testing of ROVs and cable protection system trials.

Other projects have included the development of power take-off systems for marine renewable devices, cable joint integrity tests, as well as novel pipeline and cable infrastructure installations, helping to reduce the risk of failure offshore and accelerate the marine energy technology generation cycle.

3MW drive train facility

CASE STUDY

The 3MW drive train test facility is used for the testing of tidal turbine drive trains and individual components. Commissioning partner Atlantis Resources Ltd tested its AR1000 1MW turbine and in just two weeks of full testing, the marine energy developer secured performance data equivalent to four months of tidal exchanges, enabling the development of the next generation AR1500 (1.5MW) tidal turbine which will be installed in the Pentland Firth as part of the MeyGen Project.

BRINGING INNOVATIVE PRODUCTS TO MARKET

ORE Catapult's world-leading research, testing and demonstration facilities help to bring innovative technologies to market, lower costs and provide the industry with confidence and reassurance, helping to encourage further investment and the wider supply chain to make the transition into the marine renewables industry.

ORE Catapult

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Delivering challenging high-speed seakeeping tests for Korea

QinetiQ International Maritime Consultancy & Software (IMCS) has successfully undertaken seakeeping model tests on a high-speed planing hull-form for Korean Research Institute of Ships and Ocean Engineering (KRISO). KRISO, established in 1973 as the Republic of Korea's national maritime research agency, is a leader in technology development in ship and ocean engineering, striving to develop, commercialise and research original technology.

Examples of technology development areas include the development of platforms for multipurpose unmanned vehicles that can avoid collisions with obstacles, and technology for voluntary navigation at high speeds.

OCEAN BASIN FACILITY

To carry out KRISO's seakeeping tests, the company utilised their recently upgraded wave-maker in their Ocean Basin facility. The Ocean Basin is one of the largest basins in the world and is ideal for such tests. The new wave-maker system which was installed in late 2014 comprises of 122 independently-actuated paddles which can generate regular, irregular, long-crested and short-crested waves up to 0.75m in height. In addition the wave-maker system can damp reflected waves offering efficiencies and time-savings in running trials, by reducing waiting times between trials runs.

The testing model was built using advanced five-axis CNC milling techniques and manufactured in carbon fibre to help meet the demanding model weight requirements. The QinetiQ team fitted out the model with bespoke data logging and autopilot control equipment.

In the basin, the free-manoeuvring model was controlled remotely using wireless technology. Two-way real time communication and on-board data logging allowed feedback and logging of parameters such as depth, pitch, roll, rudder angle and shaft speed. In addition state-of-the-art infra-red motion capture technology with 19 cameras was used to track and log the position of the model.

TESTING

QinetiQ's Towing Tank and Ocean Basin are used for a wide variety of tests to understand and optimise the performance of vessels and devices and were also involved in the design of a concept tidal turbine.

For this client, they used a combination of CFD (Computational fluid dynamics) and model tests to predict the amount of power generated by the turbine. The company tested the full scale turbine in the towing tank to simulate the flow of current and hence predict power generation.

On top of the physical testing, the company also worked with the client to perform analysis on the mooring arrangement and to consider the likely deployment and maintenance requirements of the turbine.

VALUE

The value of QinetiQ's independent advice is to provide clear, scientific data to support its clients' business case.

QinetiQ

State-of-the-Art hydrodynamic model scale testing laboratory

Edinburgh University's 'FloWave Ocean Energy Research Facility' is a State-of-the-Art hydrodynamic model scale testing laboratory. Since becoming formally operational in Q1 2014, FloWave has undertaken many major test campaigns on behalf of wave and tidal energy technology development supply chain from within North America, Europe and Asia and recently expanded this experience into testing its first floating wind turbine technology.

FloWave's first floating wind customer test was conducted in July 2015 on behalf of the Spanish company EnerOcean S.L., supported by grant funding from the EC-FP7 MaRINET project and used a purpose built model of their W2P concept. The triangular W2P semi-submersible platform accommodates two conventional horizontal axis wind turbines and has the capacity to also host wave energy extraction devices around its perimeter.

TESTING

The testing undertaken subjected the structure to combined wave and tidal current conditions, whilst also simulating thrust forces and turbine gyroscopic forces caused by the wind. Performance measurements of the W2P motions and mooring forces were captured during the tests for both wind turbine only and wind turbine and wave energy extraction.

Pedro Mayorga Founder and CTO of EnerOcean commented *"I am delighted to have tested at FloWave. The test data is proving to be invaluable as we plan our next phase of product development that will see a fully operational scaled up platform tested at sea. We are actively seeking new equity for this and the Flowave tests are helpful for that. Testing at lab scale has helped significantly de-risk this next development phase and I am confident that this will enable us to secure the necessary investment."*

OPPORTUNITIES

A growing number of floating wind turbine development projects have emerged over recent years providing opportunities to deploy offshore wind in deeper water locations with potentially promising Levelised Cost of Energy figures. FloWave expects to be supporting a number of these projects in the near future.

FloWave

Intertek Energy and Water Consultancy Services delivers marine expertise worldwide. We help clients reduce cost and secure compliance through all stages of a development: project concept, feasibility and design, through construction and operation, to decommissioning.

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