





Theme

System Integration

Empowering underwater technology since 1978



Editorial

By Niels Erik Hedeager, CEO

2015 was a year of adaptability. Adaptability in the sense that various adjustments had to be made company-wise in order to ensure continuous and successful business solutions in our MacArtney universe.

Record year

We must all be prepared to address the many troublesome acts of adjustment. Luckily, the MacArtney Group has proved strong and well-founded in our survivability and adaptability to market changes and to subsequent business challenges. We are therefore very proud to announce that the MacArtney Group landed an all time high revenue in 2015.

We now face a year of continued low oil prices on the world market. The oil price crisis has become more painful and lengthy than expected. Nevertheless the MacArtney Group have prepared for yet another exciting year and look forward to presenting our wide and cuttingedge range of products to you all.

Still focusing on technological progress

The present issue of In Depth magazine distinctly reflects the continuous technological progress we have been making on the basis of field experience, intensive testing and constructive customer dialogue.

I am pleased to be in a position to assure you that we are all prepared to provide our customers and business partners with second to none customer service and with our usual state-of-the-art systems living up to customer expectations and often even surpassing these.

MacArtney is focused on ensuring that customer needs and expectations are identified and realised to achieve full customer satisfaction and build mutually beneficial and sustainable relations.

Customer focus - at all times

Our customers are at the centre of everything we do. Therefore, MacArtney continuously strives to understand, address and adapt to complex customer challenges and contexts. We use this knowledge to design and develop our systems, solutions, products and services to offer optimal value to the end users.

I hope you will enjoy this latest issue of In Depth magazine, which primarily centres on System Integration and System Solutions.

Featured Novelties

ISO recertification - passing with flying colours

Attaining certification and recertification according to an ISO standard provides MacArtney with a certificate confirming and consolidating our position as a serious and competent supplier of underwater technology products, systems and services complying with international standards of quality

MacArtney is certified according to ISO 9001:2008, which is a quality management standard giving guidance to and setting up minimum requirements for the Quality Management System. MacArtney holds a multisite certificate currently containing MacArtney DK, MacArtney UK, MacArtney Inc. and MacArtney Norway. MacArtney DK has been certified since 1996.

The standard is based on a number of quality management principles including a strong customer focus, the motivation and implication of top management, the process approach and continual improvement. Using ISO 9001 helps ensure that customers get consistent, good quality products and services, which in turn brings many business benefits.

Thus, ISO certification represents a management tool which is used by companies and organisations worldwide. It is essential to be in a position to provide a consistent and extremely high quality. In this context the certificates represent a guarantee that the MacArtney Group is able to meet customer requirements.

In addition to the ISO certification, MacArtney also holds the OHSAS 18001:2008 certificate as well. OHSAS 18001 is an Occupational Health and Safety Assessment Series for health and safety management systems. It is intended to help an organisation to control occupational health and safety risks.



Visionary plans of expansion

MacArtney headquarters in Denmark will soon be expanded into the neighbouring grounds of the present address.

As part of the inherent growth strategy MacArtney's Board of Directors has decided to consolidate the company's physical and geographical position by investing in essential room for expansion. This has led to the acquisition of the neighbouring premises, which means that MacArtney in future will add 3,400 m² of property and more than 10,000 m² of land to the existing facility.

More space for our activities

For some time now, we have been trying to find more space and now we will have more than twice as much space at our disposal

- both in terms of buildings and outdoor facilities. We are looking forward to preparing the new property plans intended to give preference to our workshops, warehouse and canteen.

Present and new premises blue and orange lines

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The NEXUS MK VII highly versatile and configurable multiplexer (topside unit, subsea unit, control tablet)

NEXUS MK VII - the future-proof telemetry choice

Representing the latest generation of the MacArtney telemetry systems, the NEXUS MK VII is an advanced and highly versatile multiplexer providing a vast number of HD video, standard video, Gb Ethernet and serial data channels

During the last two decades, MacArtney has built up a strong and versatile track record of supplying in-house developed and manufactured NEXUS multiplexers and complete NEXUS telemetry solutions to OEMs, system providers and operators on a global scale. The NEXUS range includes several standard models spanning from advanced fibre optic and HD-video capable systems, through electric coax cable compliant multiplexers to bespoke customer specified or completely customised telemetry solutions.

Highly efficient and configurable

Providing a highly efficient link between surface and seabed, the NEXUS MK VII carries all signals over one single mode optical fibre via CWDM (Coarse Wavelength Division Multiplexing). The NEXUS MK VII is highly configurable and allows for an easy upgrade/modification path when operational or applicational requirements change. Multiplexer options can be installed between jobs or even at sea without the need for an electronics workshop. The NEXUS MK VII represents a more modular multiplexer holding an alternative configuration modified in the sense of adding circuit boards and pre-configured wiring-kits. The NEXUS MK VII therefore constitutes an absolutely future-proof telemetry choice.

Typical applications

Typical applications for the NEXUS MK VII include ROV and ROTV systems requiring an HD video and multibeam sonar survey sensor setup, cable trencher systems, towed camera and sensor systems and seabed monitoring applications including landers and observatory systems.

Power switching and software enabled interface selection

Power switching is software controlled via PC software or using a tablet which is online via LAN or WiFi. Sensor power status, telemetry link, leak alarm etc. is also continuously monitored by the software. Advanced features include programmable fuses and software enabled interface selection. The protocol is open and can be integrated into customer software for monitoring convenience. A touch screen display on the topside front panel also allows for easy monitoring of selected parameters during setup and operation.

As standard, the subsea unit housing is manufactured from hard anodised aluminium. Connectivity interfaces include SubConn[®] anodised aluminium connectors, SubConn[®] Coax (HD video) connectors and a MacArtney OptoLink fibre optic connector.

Superior performance

Gathering high-quality, real-time data from multiple sensors working in perfect unison and ensuring that all data are efficiently transmitted to the surface for analysis is an immense undertaking.

Together with MacArtney's highly versatile data acquisition solutions, the NEXUS multiplexers and telemetry systems have acquired tremendous brand presence and demonstrated proven performance and superior support provided by the MacArtney teams with specialist knowledge and expertise.



MacArtney supplies next generation of FOCUS ROTV system to the Russian Academy of Science

The MacArtney FOCUS ROTV systems constitute an extremely professional show window as far as MacArtney's engineerical competences are concerned. FOCUS 3 is the latest generation ROTV in the FOCUS and TRIAXUS ROTV family

The FOCUS 3 has been designed and developed on the basis of requirements made by the Institute of Oceanology of the Russian Academy of Science. Their primary and unique demand on the vehicle was a performance of operation at a depth of up to 1000 m. Until then, the max. operational depth of the MacArtney ROTVs had been 400 m.

The demand on depth required a larger wing span of the main foils to overcome the drag on the cable. The bigger wing section and size of vehicle makes more space available for installation of more sensors. To achieve operations down to 1000 m a longer cable with a larger diameter was required, as well. Due to this the FOCUS 3 ROTV will be supplied with the MacArtney MERMAC S30 winch, which is the next size up winch from the MacArtney standard MERMAC S winch series. The MERMAC S30 will hold 4250 m of the 13 mm double armoured tow cable that are being used with the 1000 m rated FOCUS 3 system.

Carbon fibre and aluminium

The vehicle is constructed using carbon fibre technology for the wing sections whereas the instrumentation pods are made from anodised



THE FOCUS 3 FEATURES

- 1000 m depth rating
- Carbon fibre wing sections
- Instrumentation pods made from anodised aluminum
- Neutral to heavy trimming in water
- Bigger wing area
- Increased payload capacity
- Pressure vessels with higher pressure rating
- Internal and external cargo rails
- Size: 1250 x 1950 x 1850 mm

aluminium. This allows for repairs of the vehicle to be made on site in case of an accident or in an emergency. Moreover, it facilitates integration of sensors on the vehicle locally. Carbon fibre is an extremely strong material featuring reliable capabilities of bending, torsion and stretching.

Contents of the order

The scope of supply for the FOCUS 3 ROTV system to the Russian Academy of Science includes:

Three 1000 m rated FOCUS 3 vehicles, one FOCUS topside control unit, one MERMAC S30 winch with 4250 m double armoured fibre optic tow cable with terminations.

Two of the vehicles were prepared for acoustic survey, each with a sensor package consisting of the following equipment: dual frequency side scan sonar, subbottom profiler and multi-beam echo sounder. The third vehicle was provided with a camera, light and P/T package and a magnetometer. For positioning all three vehicles were supplied with an INS (Inertial Navigation System) and an USBL (Ultra Short Base Line) transponder.

MacArtney novelty meets the harsh challenges of subsea operations

The LUXUS brand of MacArtney instrumentation represents cameras, lights, controllers, and accessories – together with the latest novelty having now been launched: a slip-ring based pan-and-tilt unit

LUXUS Dual 360° P/T heavy-duty pan-and-tilt unit

The novelty recently introduced to the market is the LUXUS Dual 360° P/T. It is a heavyduty pan-and-tilt unit suitable for a wide range of actuation tasks and intended for many applications in subsea tooling. It represents a unique and powerful addition to MacArtney's LUXUS range of underwater cameras, lights, and media controllers.

One solution - multiple applications

Being rugged and durable enough for virtually any environment, LUXUS Dual 360° P/T is ideal for heavy-duty operations involving various tools and instruments like work class ROVs, rock dump ROVs, trenchers and ploughs as well as for surveillance operations.

Unique product features

The unique properties of the LUXUS Dual 360° P/T feature qualities like a high torque of 100 Nm and a payload of 100 kg. Besides, this LUXUS product is the first pan-and-tilt unit to be featuring unlimited movements of both 360° pan and 360° tilt. This is made possible by means of the mounted slip rings enabling full-scale activation and thus facilitating operation at all angles.

Integration and combination

LUXUS Dual 360° P/T is very easily integrated with existing underwater vehicles, systems and sensor platforms. It is ideal for combination with MacArtney's other LUXUS products like the LUXUS HD Ethernet camera, the LUXUS Power LED, and the LUXUS High Power LED lights. The LUXUS Dual 360° P/T can be controlled via the LUXUS P/T Controller which has just been launched or directly by means of the software that comes with the unit, installed on a PC.

LUXUS P/T Controller

The LUXUS P/T Controller is a state-of-the art controller unit. Being easy to operate it contains a power supply and all necessary functions to make the most of the LUXUS 360° P/T. Equipped with a joystick and keypad specially designed and manufactured to operate this piece of equipment.

The primary function of the LUXUS P/T Controller is to digitally govern the functions of the LUXUS Dual 360° P/T unit. The controller features a user-friendly screen to display the performance of the P/T and is easy to use on location. The joystick with multiple speeds and the key pad make the operation of the P/T very simple.

The LUXUS P/T Controller is equipped for voltage inputs of 90-240 VAC 50/60 Hz.



We take pride in following up on feedback from LUXUS users and wish to continuously enable even more flexible and efficient use of our cameras and lights.

Ron Voerman, Managing Director of MacArtney Benelux

LUXUS Dual 360° P/T

LUXUS P/T controller



MacArtney system supplies are typically an engineered solution integrating products from our own product portfolio; connectivity products, multiplexers, LARS and ROTVs and third-party equipment from world leading instrument manufacturers

Unique role as system integrator

makes MacArtney an attractive business partner

Much water has run under the bridge since MacArtney's establishment in 1978. From acting since our opening as a trusted supplier of commodities for the underwater technology industry we have undergone a significant development

Formerly being the provider of proprietary products produced by other manufacturers, MacArtney is now a provider of integrated solutions. A versatile player in the world of underwater technology, a system integrator assuming responsibility and expert guidance on the part of our customers in matters of considerable importance to them, viz. the accomplishment and completion of technologically demanding jobs and projects. MacArtney is virtually a one-stop shop.

Empowering underwater technology

System integration is a targeted strategy pursued by the MacArtney Group for the strict purpose of upgrading and raising company appearance and strength both in terms of professional skills and global presence. This makes us a reliable supplier reflecting integrity and professionalism.

The MacArtney staff of technicians receive training in all MacArtney systems and solutions as well as in third-party products to enable them to attend to the assignments they are undertaking with the highest degree of competence. This ensures qualified engineering as well as essential knowhow in all fields relevant.

Customer focus - at all times

Our customers are at the centre of everything we do. Therefore, MacArtney continuously strives to understand, address and adapt to complex customer challenges and contexts. We use this knowledge to design and develop our systems, solutions, products and services to offer optimal value to the end users.

Our engineers work closely with the customers, our project managers, technical department and sales team in order to provide optimum system solutions to the most complex challenges of the underwater industry.

In addition, we practice a standard procedure of allocating one single point of contact to the individual customer to ensure proper and optimal project management and superior contact.





Moon pool ROV launch and recovery system designed for full integration in ship. The system consists of a number of customised winches and sheave systems, all powered by one common electrical control system





Oil and gas

Solutions from seabed to surface, supplying the entire value chain. Trusted and reliable MacArtney products and systems are widely used at shallow offshore fields and ultra deep waters alike. Main segments are ROVs, seismic and CSEM survey, cable/pipeline surveys, drill support, construction, IRM and decommissioning.

Defence

Supplying connectivity products, instrumentation, deck- and-over-the-side handling equipment. The main function covers various fields like hydrography, harbour surveillance, coastal and fisheries inspection, submarines and MCM.



Ocean science

Handling scientific equipment data and instrumentation. The main users are universities and research institutes, coast and port authorities, environmental authorities as well as waterways authorities.



Civil engineering

Providing underwater technology products and solutions to a wide range and variety of projects, operators and developers within dredging, telecommunication, ship building, tunnel inspection, dams and structures as well as inspection.

Supplying state-of-the-art solutions to wave, tidal

and offshore wind applications and projects. Main

customers are tidal and current energy providers,

wave energy providers, hydro power and offshore

Project management and engineering

The MacArtney Group houses dedicated engineering, project management, workshop, construction and design departments offering a broad range of advanced engineering disciplines and services, within:

Acoustics

- Robotics
- HydrodynamicsHydraulics
- Electronics Software
- Fibre optics
 - Mechanics

MacArtney - a system solution provider and a system integrator

The lines of business of the MacArtney Group comprise a broad spectrum of significant and large-scale business areas.





wind.

Renewable energy

Diving

Underwater cameras, lights and media controller solutions for the professional diving industry for inshore diving, offshore diving, diver training schools and hyperbaric treatment.



NEXUS multiplexer - heart of 'The Living Bridge' project

The Living Bridge Project exemplifies the future of smart, sustainable, usercentered transportation infrastructure. Typically, bridges only stir the public's interest when they have to be replaced at great cost or fail

The Living Bridge Project will create a self-diagnosing, self-reporting 'smart bridge' powered by a local renewable energy source, tidal energy, by transforming the landmark Memorial Bridge into a living laboratory for researchers, engineers, scientists, and the community at large. The lead institution of this project is the University of New Hampshire, UNH, with its departments of Civil Engineering, Mechanical Engineering, Sociology, and the Center of Ocean Engineering. MacArtney is among the primary industrial business partners.

Several hundred sensors monitoring structure, traffic, and environment

To advance the state of smart service systems and clean energy conversion, the Living Bridge Project team will design and deploy a structural and environmental monitoring system that provides information for bridge condition assessment, traffic management, and environmental stewardship.

The "self-diagnosing, self-reporting smart infrastructure" is achieved through the installation of approximately 250 sensors on the lift bridge that will continually monitor traffic, environment, and the structural condition of the bridge. These sensors will specifically collect data on such conditions as traffic, stress, vibration, wind speed, temperature, and humidity. The sensors will be powered by tidal energy through a turbine system installed at a bridge pier.

The bridge will have the capacity to sense its environment, communicate with people, and even 'feed' itself with electric energy.

MacArtney's scope of supply

In the heart of the underwater technology part of the "Living Bridge" is a customised MacArtney NEXUS MK E multiplexer. The NEXUS MK E multiplexer has been modified to connect to and acquire data from the underwater sensor system as well as to monitor the tidal turbine that generates the power to the complete bridge monitoring system. The customised NEXUS system which has six digital sensor channels, two channels for analogue video, one RS-232 controller link, one 10/100 Ethernet channel and two 110 VAC power switching channels, forms the central underwater power and data connection point of all the sensors and communicates with the overall Living Bridge control system by means of DSL modem technology via an underwater cable.

The MacArtney scope of supply also includes the underwater infrastructure connectivity system as well as an underwater sensor package consisting of sensors for conductivity, temperature, depth and turbidity, two ADCP current profilers and an RPM monitor for the tidal turbine. Furthermore, two of the MacArtney LUXUS compact underwater cameras for online inspection of the subsurface equipment are included. Via the NEXUS MK E, the data from the underwater sensor system is available online to the public and to the operators of the bridge.





Custom winch MERMAC S30C

for IT International

MacArtney has supplied a MERMAC S30C winch, cable and termination to IT International of Halifax, Nova Scotia, for their core sampling business group

MERMAC S winches are available with several purpose dedicated features and options which make them ideal for use with side scan sonars, corers, CTD systems, towed vehicles and other instrument and equipment types.

All electric winch

Based on demands made on the SWL and cable capacity of the winch, MacArtney chose to use a customised version of the MERMAC S30 all electric winch. This winch gives the operator feedback to the line tension on the main umbilical, quiet operation and extreme ease of use. Due to the flexible design of the MERMAC S30C, the system can also handle IT International's future use of tow sledges, subbottom profiling and side scan sonar systems.

The winch has been supplied with a Focal Model 180 slip ring, 1500 m Ø = 17.3 mm armoured coax cable fitted with a TrustLink

stainless steel stress termination to connect to the corer. The winch system will be used with IT International's NEPTUNE 3000 CPT Corer system.

MacArtney MERMAC S winches combine reliability with controllability and are supplied with variable speed, tension read-out and control via an integrated load cell. A PLC on the winch controls the electrically driven level wind and transmits encoder and load cell data to a display showing winch speed, paid out cable length and alarms. The PLC can also interface to other control systems. Optional PC software offers fully automated profiling capabilities.

The MERMAC S winches can be adapted to suit various cable diameters and are also available with interchangeable drums. Spare drums can be spooled with different cable sizes and swapped as needed for swift change of winch application.

MacArtney MERMAC S winches often form part of complete vessel winch and handling solutions.

> MERMAC S30C delivered to IT International

Both IT International and MacArtney are extremely pleased with the outcome of our joint project and expect other exciting jobs in future.

Lars F. Hansen, President of MacArtney Inc.



Arctic loading tower houses MacArtney winch solution

MacArtney has supplied a comprehensive MERMAC winch system solution for installation on an arctic loading tower unit. The application covers a total of six MacArtney winches for a variety of purposes in the loading tower

The MacArtney winches in question are to be applied in connection with transfer of oil from the storage tank on shore to oil tankers, evacuation in emergency situations, and with operation of the gangway. In addition, a general utility winch is also part of the system. The order for the winch solution was placed by Dutch Bluewater Energy Systems B.V. whose core business is to design, engineer, construct, install and deliver Floating Production, Storage and Offloading (FPSO) systems, Floating Storage and Offloading (FSO) systems and Single Point Mooring (SPM) systems.

> The winches are all designed to be remotecontrolled via radio as the loading tower is unmanned during operations. Three of the winches are containerised due to the harsh climatic conditions





FOCUS 2 for the WTD 71 was subjected to a SAT mid-February. The test was made out of Eckernförde, Kiel on board the M/V Elizabeth Mann Borgese of the Leibniz Institute for Baltic Sea Research Warnemünde. The MacArtney team subsequently instructed the WTD personnel in handling of the FOCUS 2 ROTV system

WehrTechnische Dienst takes delivery of a MacArtney FOCUS 2 ROTV system

WehrTechnische Dienst - Bundeswehr Technical Center for Ships and Naval Weapons, Maritime Technology and Research (WTD 71) - is a research institute within the German navy whose aim is to develop new underwater technologies for the German Navy. For that purpose WTD 71 has chosen the MacArtney FOCUS 2 ROTV system – a highly stable and flexible instrumentation platform as the basic tool for their development efforts

With the purpose of testing SAS sonar technologies for mine classification, a full scale on-site demo of a Raytheon ProSAS installed on a FOCUS 2 ROTV system was organised for WTD 71. The advantages of the FOCUS 2 ROTV as a flexible instrumentation platform was recognised by the researchers at WTD 71, who instantly came up with new ideas for other applications where a FOCUS system could be of good use for WTD 71 research activities.

Scope of supply

As a direct result of the demo, a set of requirements for integration of various sensor configurations were defined by WTD 71 and in consequence the FOCUS 2 has been supplied with a number of standard off the shelf products:

- MacArtney LUXUS compact low light cameras
- ORE Trackpoint 3 USBL transponder
- Valeport MiniSVS Sound Velocity Sensor
- Imaginex FL forward looking sonar

Additionally, the FOCUS system has been prepared for installation of:

- Raytheon ProSAS synthetic aperture sonar
- Reson multibeam sonar
- Kearfott INS

Finally, a special interface has been developed for integration of a range of WTD 71 developed sensors.

The NEXUS based multiplexer telemetry system which is an integral part of the standard FOCUS ROTV system, is capable of multiplexing and transmitting data from all of the above sensors in real time to the surface and thus enable the researchers to evaluate the sensor data and performance instantly.



enabling mono buckets to stand firm on the seabed

The click-on suction pump unit installed on top of the mono bucket

Handling system for the click-on pump unit



The offshore wind industry is always looking for ways to reduce costs. In their search the Danish company Universal Foundation A/S has found a way to install their mono bucket by using the force of Mother Nature

Universal Foundation is an offshore foundation company responsible for bringing the mono bucket to the offshore wind industry. A unique concept in offshore wind engineering, the mono bucket combines the key benefits of a gravity base foundation, a monopile and a suction bucket. It is a ground breaking foundation solution for the latest generation of offshore wind turbines which will significantly contribute to lowering the Levelised Cost of Energy.

Click-on suction pump unit

Installation of the mono bucket depends on one key installation tool, a reusable click-on suction pump unit. MacArtney has delivered this complete 'click-on unit system' containing the click-on subsea pump unit, a winch installed with lifting umbilical and Focal electric-fibre optic slip ring, an A-frame and a control and power container, which is mounted on a flatbed for the click-on unit. The MacArtney scope of supply also included various junction boxes, all harness cable infrastructure and more than 150 SubConn[®] connectors, a complete SCADA system with integrated PC for controlling valves and pumps and for data acquisition.

Full contact with the seabed

The system is an important integration part of the process of installing the suction bucket to the seabed. With the subsea pump frame installed on top of the suction bucket, installation is effected by evacuating water out of the bucket by which the structure is sucked to the seabed. The evacuation process creates a water-vortex inside the bucket that levels out any slope in the soil top layer, thus enabling full contact with the seabed without any seabed preparations.

Trial installation in the UK North Sea

Universal Foundation joined forces with Statoil, Dong Energy, E.ON and Statkraft in a trial installation campaign. The trial installations have been completed across a range of challenging soil conditions including soft clay, moraine clay and boulder bank clay – with sand spikes and layers - clay crust, sand and silt. The result was 29 successful installations in 24 days across three major 'Round 3' offshore wind sites at Dudgeon, Dogger Bank and Hornsea. Installation cycles of only 7 hours were achieved at Dogger Bank. The reduced equipment spread and short installation cycles make installation highly cost-effective. This campaign verified and furthered findings from previous installations which remain on site in the North Sea.

The Trial Installation Project proves that installation is achievable across a range of challenging seabed conditions in the North Sea and is a major step forward for suction bucket technology.



Theme System integration

Considerable growth in GLOBAL HYDROPOWER

New hydropower projects are developing all over the world: from South America over Europe and the Middle East to Asia. In 2010, global hydropower investments were \$110 billion and the globally installed capacity was 1,000 GW, which is expected to reach 1,450 GW by 2020

For the hydropower industry the recent opening of Iran, one of the largest potential hydropower markets in the world, to foreign business presents yet another new and exciting opportunity. Apart from the design and construction of hydropower projects, many opportunities exist in specialised monitoring equipment and systems:

- Hydropower facilities need regular inspection of underwater concrete structures as well as of turbines, penstocks, head race tunnels and draft tubes.
- The reservoirs behind the larger dams are subject to sedimentation issues and over time they will fill up. Consequently, they need regular bathymetric monitoring to estimate and update the expected lifetime of the reservoir, hence the dam.
- Run-of-river hydropower facilities are subject to turbine abrasion from suspended silt and sand particles in the water.

Standard and customised solutions for the hydropower industry

In our capacity as system integrator, MacArtney is well-positioned to offer standard and customised solutions for a wide range of these needs. For example, for run-of-river hydropower installations in regions with high particulate loads (e.g. the Himalayas, the Andes) MacArtney has complete access to the world-famous LISST (Laser In-Situ Scattering and Transmissometery) sensors from Seguoia Scientific. Inc., which are used for silt monitoring in hydropower turbines and reservoirs from Ecuador to Bhutan. MacArtney's system integrator skills and decades-long experience with LISSTs means that we can accomplish any conceivable silt monitoring setup the customer might have. This is of particular importance and interest in Iran and Pakistan, which have some of the most turbid rivers in the world.

Customised survey equipment

Another example is customised survey equipment for reservoir siltation monitoring. Many reservoirs are subject to rapid siltation, and incomplete knowledge of the siltation rate and the volume will affect the lifespan of a hydropower facility. MacArtney has a range of underwater vehicles and multiplexer systems that allow us to customise survey equipment for a particular need or for existing sensors and other equipment that the survey company may already have.

Inspection tools

A final example is inspection tools for detection and monitoring of cracks in civil work structures. For this type of jobs, complete turnkey system solutions are available from MacArtney. An example could be a turnkey system consisting of a portable winch with cable and an ROV being equipped with camera and/or sonar systems for acoustic imaging if the turbidity prevents the use of standard cameras. Optional slip rings, hand cranks or electrical motors make these systems a reliable way to store and easily transport inspection-type ROVs in one convenient package, which can be mobilised in a matter of a few hours.





dotOcean acquires CORMAC M4C winch

MacArtney Benelux has delivered a CORMAC M4C stainless steel winch to Belgian dotOcean specialising in sediment and soil characterisation systems and instrumentation

The CORMAC M4C winch is intended for use together with the dotOcean DensX sediment density profiler. DensX is an in-situ, direct measurement mud density method using safe X-ray technology and an automated winch.

Being fully controlled by dotOcean's software for controlling the DensX, this customised CORMAC M4C winch is supplied with a constant tension function and PC control. The winch is fitted with a special frame for housing the winch and the DensX.

CORMAC M modular stainless steel winches

MacArtney CORMAC M winches are dependable and versatile systems capable of handling multiple marine applications and tasks. These winches feature a modular and compact design allowing for flexible system installation on vessels with confined deck space. The CORMAC M series includes five different standard winch models. Operators choose between a broad range of specifications including speed, pull, motor size and cable capacity.

Ultimate application

Dutch Rijkwaterstaat (RWS) is the end user of the integrated dotOcean/ MacArtney solution and it will be deployed from different vessels within the RWS fleet. In consequence, the winch design was adapted so the level wind can vary between 0° and 90° depending on the winch position in relation to the vessel's A frame. Due to the request for portability in order to be used on different vessels, the complete solution has been designed to fit onto a standard block pallet for transportation purposes.

The winch is delivered with the MacArtney type 2019/B power/signal cable, fitted with a standard TrustLink stress termination. The Focal model 180 slip ring has been fitted with SubConn® DBH13 Ethernet connectors, allowing for transfer of the up to 100 Mbit Ethernet signal necessary for operating the DensX.



MacArtney and dotOcean delivery of an integrated solution comprising dotOcean's DensX density profiler with a MacArtney winch system for Government Agency RWS

The MacArtney Group and dotOcean operate successful partnerships in Europe as well as in the North American market which enables our customers to have access to the extensive range of products of both companies.

Producing real-time, high resolution 3D maps of the seafloor

MacArtney and EdgeTech have successfully completed a demonstration of the new 6205 sonar system in Holland on board the sailing vessel Spartivento.

The 6205 produces real-time, high resolution, three dimensional (3D) maps of the seafloor while providing co-registered simultaneous dual frequency side scan imagery. The system is particularly suited for shallow water hydrographic surveys where swath widths of 10-12 times water depth can be achieved.

Several potential customers witnessed the demonstration. It focused on getting the European customers aware of the benefits of using the 6205 combined swath bathymetry and side scan sonar as a cost-effective alternative to traditional multi-beam sonar systems. During the past 1-2 years, several systems have been delivered by EdgeTech to the US market.

MacArtney sales effected

In Denmark, the first 6205 sonar has been sold to GEUS (The Geological Survey of Denmark and Greenland). GEUS are using their 6205 sonar system for shallow water seabed surveys. Subsequently, an additional order for a 6205 sonar system was placed by Dong Energy which was intended for application in small ad hoc surveys.

The GEUS system configured as 230 kHz bathy frequency plus 230/550 kHz side scan frequencies and the DONG system comes with 550 kHz for bathymetry and 550/1600 kHz for the side scan sonar. The order for DONG also includes a complete Applanix POS MV WavemasterII system, radio for RTK correction signals and the SonarWiz swath bathymetry software.



High-frequency phase differencing bathymetric sonars have become a popular tool for shallow water surveys and form an integral part of the surveyor's toolkit

University of Gothenburg acquires leading-edge winch for scientific research

Antarctica expedition benefits from a state-of-the-art remotely operated vehicle (ROV) winch supplied by MacArtney. An icebreaking polar supply and research vessel is to map out underwater conditions in the icy waters in terms of subsurface and marine life

The winch system, which was acquired through Swedish SubSea Solutions on the part of University of Gothenburg, will be put to good use on board the icebreaking polar supply and research vessel R/V Sonne designed to carry out scientific research and supply to research stations in Antarctica. She is now operating in Antarctica to carry out various underwater explorations, and on board the vessel a MERMAC R10 AHC ROV winch with active heave compensation (AHC) has been installed to ensure dependable and high-quality performance of the studies in question.

The actual winch system

The system supplied is an electrically driven winch ensuring robust and advanced handling systems which safely control the launch, operation and recovery of work class and inspection ROV systems. The winch is extremely dependable, offers high performance and is easy to use. Its design is compact and consists of modular systems. Several components are standardised, making it easy to specify, adapt or upgrade to the performance and capacity required.

MacArtney Vice President of Sales & Marketing Hans-Jørgen Hansen says: *MacArtney is very pleased to provide quality underwater technology to empower the important scientific ocean research that is undertaken by the* University of Gothenburg and its marine science partners.

The MacArtney Group success is based upon being in a position to accommodate customer needs and expectations and on using group experience and expertise to provide reliable, advanced technology.



MERMAC R10 AHC - Remotely Operated Vehicle (ROV) winch to go on its first expedition to Antarctica

Costumer focus - at all levels

Supply of a complete service to our customers is a necessity. Whether a single connector or a complete ROTV system, our customers can call upon our technical support to assist them

In this publication you often read about our larger projects, the headline makers, the projects with the 6- or 7-figure price tags. However, on a daily basis MacArtney offices support customers throughout the world on a much smaller scale but no less important.

A recent order from one of our customers, Sustainable Marine Energy, UK, perfectly illustrates this principle and how even a small project can involve technical and manufacturing personnel from a number of areas within the company.

Every job matters – whether small or big

Sustainable Marine Energy delivers commercially viable solutions to the tidal industry. Their main product is PLAT-O, a tidal energy system fitted with SCHOTTEL SIT turbines. PLAT-O is a moored, buoyant platform providing a systems integration solution, exporting grid-compatible power from multiple TECs.

Of course each tidal generator requires its own mechanical and electrical instrumentation connections and this is where MacArtney stepped in to assist with supply of fibre optic interconnects.

Four operational levels constitute the procedural steps to be taken to live up to our performance standards.

Define: Initially it became clear that whilst some areas of the customer requirements could be met by a standard solution, an additional area within the system could only be met by a custom product and an outline solution derived for the total package.

Clarify: A meeting was held with our internal technical expert in this area and the outline requirement refined, both standard and custom, fully defined and an accurate quotation produced for the customer.

Manufacture: Both standard and custom assemblies needed to be made up. Whilst this is primarily handled by our fibre optic workshops, the custom element of the project involves additional technical input from other areas of operation, our machine shop to manufacture the custom metal work associated with this work and our drawing office to produce the drawings for machine shop and fibre workshop.

Installation: The final stage is on site installation where our fibre optic technician attended the customer's premises.

Whilst this project was not particularly demanding or high value as can be seen, every customer benefits from the technical support provided by all the MacArtney Group on a crossorganisational basis with every purchase.

Worthwhile?

When contemplating a supplier for your next project, keep in mind that when purchasing from MacArtney you not only get a product but a complete team supporting your work. How much is that worth to you?

Candice Russell, Production Engineering at Sustainable Marine Energy: MacArtney have been very straightforward to work with. They have listened to our requirements and come up with good solutions. They have been extremely flexible and able to fit in with our work schedule.



MacArtney MERMAC winch for MH370 search

MacArtney has received an order for a MERMAC R40 winch for South China Sea Rescue and Aid Bureau to be used in the search for Malaysia Airlines flight MH370

In 2015, top ranking government officials from both Australia and China had a meeting and discussed about the search for Malaysia Airlines flight MH370. China has offered to help by deploying their vessel to search for the missing plane, a Boeing 777-200ER, which disappeared over the sea between Malaysia and Vietnam. 239 passengers and crew vanished on the flight from Kuala Lumpur to Beijing on March 8, 2014.

The plane's transponder stopped transmitting and the passenger jet seemingly disappeared without a trace. Following an intensive search involving planes and ships from 14 countries and a session of careful flight data analysis,



MERMAC R40 winch to take part in the search for the wrecked plane, flight MH370

it was determined that the plane had diverted south. Since then, resources have been focused on a swathe of the Indian Ocean, about 2000 km west of Australia - the so-called 'Seventh Arc'.

MERMAC R40 winch – a sturdy and advanced vehicle handling system

MacArtney won the tender to supply a MERMAC R40 winch for Benthos deep tow sonar system. The winch is to be installed on board the search and rescue vessel Nan Hai Jiu 102 and the search for flight MH370 is going to be reinitiated in June 2016.

The MacArtney MERMAC R electrically driven winch delivered is a robust and advanced vehicle handling system which safely controls the launch, operation and recovery of work class and other systems.

Featuring high power and speed, minimal maintenance requirements, a rugged and compact design, Active Heave Compensation (AHC) and a unique remote diagnostics tool, the MERMAC R series represents cutting-edge winch solutions.

Hydrostatic Pressure Vessels

Sophisticated hydrostatic pressure vessels

MacArtney has introduced a range of highend in-house developed hydrostatic pressure vessels. Having so far provided worldwide access to cutting-edge hydrostatic test facilities and services, we now design and supply our own range of pressure vessels to customers who need to set up their own pressure test facility capable of putting almost any type of underwater equipment to test.

Pressure vessel design, manufacture and services

Empowered by experienced in-house drawing, design and mechanical engineering departments, MacArtney is able to supply pressure vessels to accommodate any custom specification, size and pressure force requirement. From relatively unsophisticated non pressure-regulating tanks, to highly advanced, large-scale, temperature regulating vessels, featuring software controlled testing schemes and internal video monitoring.

Tested to work - underwater

When it comes to quality, safety and performance in harsh underwater environments, we always place the highest of demands on our products and systems. Therefore, we have been testing our own and customers' equipment for decades. When it comes to hydrostatic pressure testing, we have managed to develop a tried and trusted system concept based on the advanced pressure vessels currently being deployed by MacArtney and customer test facilities in Denmark, Norway, the UK, North America, France, Holland and Germany alike.

Based on the experiences from our own and existing customer requirements, a range of four highly capable and versatile standard pressure vessels has been designed on the basis of this concept and technology. If required, we can even supply a complete test environment including all equipment, systems and ancillaries.

Going deep

With a pressure capacity of up to 690 bar, the MacArtney standard pressure vessels can readily simulate the hydrostatic operating conditions existing at 7000 metres of ocean depth. In further support of simulating realistic subsea operation and getting accurate results, the entire testing process is computer controlled - with real-time electrical and optical measurements. Moreover, in-house developed control software enables plug-and-play testing, bespoke test programmes and repeated pressure cycling. Other pressure vessel benefits include lid integrated penetrators and the user friendly 'clamp-lock' system which allows for swift test mobilisation and turnaround. Optional features include live video monitoring and in-vessel temperature control.

Our hydrostatic pressure vessels are available with on-site installation and operators' training. Once installed, the vessels require minimal maintenance and have a long service life.



A MacArtney hydrostatic pressure vessel installed within a brand new test environment

Tidal turbine

successfully connected with electricity grid of island

Complete MacArtney connectivity solution helps French marine renewable energy pioneer SABELLA succeed in making cable installation connecting a tidal turbine to an onshore grid

The successful operation was carried out in the Fromveur Passage, off the island of Ushant, France, and the future outcome of connecting the two halves is a coverage of 15 to 20 percent of the Ushant island's electricity consumption needs. The 'Sabella D10' tidal stream turbine project includes two drymate GreenLink inline terminations, one linked with the turbine, the other one connected to the export cable. They are eventually lifted out of the water and connected to one another.

Over the past years, Sabella has developed an original concept for a screen of tidal turbines being positioned on the seafloor. In accordance with a permit issued by the French government, Sabella therefore plans to keep the D10 tidal turbine submerged for one year to conduct various trials.

Following the gradual increase in the speed of the Fromveur Passage currents, Sabella's D10 tidal energy turbine has produced 10 MW/h of electricity under real operating conditions. Having been deployed last June, the turbine started delivering limited quantities of power to Ushant island in November 2015.

MacArtney ensures return of power

For successfully transmitting the harnessed tidal power to the onshore grid, the 'Sabella D10' relies on a purpose-built subsea connectivity solution from MacArtney. Based on MacArtney's GreenLink inline termination technology the power is transmitted back to the onshore grid via the dynamic subsea export cable. The solution also comprises a couple of hang-off stress terminations, a customised flange including various medium- and low-voltage fibre-optic connectors for the turbine nacelle, a junction box jumper cable, and various test cables.

Pre-orientated in the direction of natural tidal currents and empowered by symmetrical rotor blades, the turbines effectively capture the energy generated by the shift between ebb and flow. The rotor is activated even by modest current motion and powers a generator, which exports the electricity produced to the onshore grid via a submarine cable anchored and embedded at its landfall.

Commercially viable solutions

Proven and dependable, MacArtney GreenLink inline termination solutions are often used to connect dynamic cables from offshore renewable wind-, tidal- and wave-energy



Final fixation of GreenLink inline terminations to its plate (Photo: Courtesy of SABELLA)



Deployment of tidal turbine in the Fromveur Passage

converters to export cables. In addition, they are widely used to interconnect subsea units and can be combined with the GreenLink hub to support more devices in an array.

Termination of cables can take place either at cable manufacturing facilities or on site prior to cable laying. The actual mechanical connection of the two GreenLink halves takes less than two hours, making it a good solution for marine renewable applications with limited time windows, like e.g. tidal energy units.

> SABELLA has involved MacArtney with a great challenge and in a French national premiere: the connection of a tidal power system and the first step of the USHANT Island decarbonisation.

Jean François DAVIAU, President of SABELLA

MacArtney GreenLink inline termination designed to make offshore medium voltage termination jobs faster, easier and more efficient, thus saving valuable ship time

Green

Link



Our global network of sales representatives

Continuously strengthening our global outreach and customer support through strategic local presence in key markets is a longstanding cornerstone of MacArtney strategy

The MacArtney Underwater Technology Group is dedicated to maintaining a strong global presence. We aim to be accessible around the world and around the clock. With 15 group operations supplemented by 26 representative companies spread across the world and 24/7 phone service, we provide global access to local support.

Globally local underwater solutions

MacArtney operates an extensive network of local and regional contacts and customers within the realm of oil and gas, defence, ocean science, shipbuilding, civil engineering, renewable energy and diving industries.

During the past year, MacArtney has boosted presence in various parts of the world such as:

ISRAEL: Vsense Technologies Ltd. - an industrious and innovative technology company operating out of Kibbutz Einat in the Tel Aviv metropolitan area.

COLOMBIA: EnvitecK S.a.s. - founded in Bogota in 2012. Main customers are DIMAR (Colombia's maritime authorities), INVEMAR (Marine and Coastal Research Institute), IDEAM (the meteorological and hydrological institute of Colombia) and a large range of Colombia's most prestigious universities. Their business areas are underwater technology supplies for ocean science, defence and oil and gas. CHILE: ALAKALUF Ltda. - a leading marine technology provider based in Punta Arenas with local offices in Santiago, Valpariso and Concepción with extensive expertise in supplying marine scientific and renewable energy solutions for all relevant industries and operators in Chile.

PERU: Isetek S.A. - a Lima-based company with 22 employees having a long-lasting relationship with other advanced companies in the underwater technology business, first and foremost Sea-Bird Scientific.

BRAZIL: Okeanus Ltda. - a technical consulting company offering products, services and sales representation in the field of oceanography, hydrology, meteorology and environmental monitoring to the offshore and scientific markets in Brazil.

These last four agreements, together with Clerdisa Ldta. (covering Uruguay and Paraguay), mark a South American strengthening of the global MacArtney representative network within the scope of just six months. They also represent an important leg in MacArtney's ongoing thrust to increase our local presence in all South American markets for underwater technology.

ITALY: Geomarine S.r.l. - is a leading Italian geophysical and geotechnical marine survey service provider based in Senigallia on the coast of the Adriatic Sea.

Network access and sales

In their capacity as MacArtney sales representatives, our network has access to the entire range of MacArtney products, systems and integrated solutions. Our representative network administers the promotion and sales of MacArtney products on the individual markets. We expect our network to be working closely with each other on a worldwide basis, thus drawing on the vast experience with advanced subsea solutions that resides within the network.

Training sessions to prime our sales representatives

Within the past year, several of our sales representatives have participated in training courses at MacArtney's headquarters in Denmark conducted to prime them for the sales representation of MacArtney solutions. More than 35 participants representing most of our network have been trained in product knowledge and in-depth familiarity with system solutions.

All MacArtney training courses are followed up by a training course satisfaction survey and on the question of "Your experience doing business with MacArtney?" Geomarine replies: Basically very good feeling in doing business with MacArtney, answers and quote in time, list price and technical documentation very clear, fluid procedures, excellent marketing material.

According to Ole A. Mikkelsen, System Sales Manager and managing MacArtney's global sales representative network, a large amount of time has been spent on servicing our sales representatives globally:

We experience a lot of drive and enthusiasm on the part of our sales representatives for which reason considerable travelling has been made during the past year to both South America, Israel and Italy. It's all about supporting our network the right way by providing service and meeting their customers. Our publications "SubConn[®] underwater and harsh environment connectors" and "MacArtney systems, products and services" seem to be a favourable door opener which gives access to frequent contact and increases subsequent business relating to our wide range of products.



MacArtney makes new record revenue despite the oil crisis

Like many other companies, the MacArtney Group has been affected by the sharp decline in oil prices. Even so, the MacArtney accounts for the year 2014/2015 are still a bit of a treat in particular when considering that a large proportion of our turnover stems from supplies to projects in the oil and gas sector which has been characterised by a very low oil price in 2015.

MacArtney's revenue reached a record level. The management report states that "Based on the worldwide decline in oil prices Management considers the revenue and profit to be very satisfactory". MacArtney Singapore

Expansion and growth in Asia

New premises: An ambition to provide even better service to our customers in the Asian market has resulted in a relocation of MacArtney Singapore to bigger and more spacious environments.

Our new premises integrate several workshops, viz. a fibre optic workshop as well as a dedicated slip-ring repair workshop and a moulding workshop. In consequence, MacArtney Singapore is in a position to deal with more jobs at a time and to carry out higher-quality service to their customers in the Asian Pacific markets.



Moulding workshop



Office facility



New MacArtney branch office, China

More and more countries in Asia are investing into ocean science, especially China. With more research vessels being built, there is an increased demand in Oceanographic equipment and launch and recovery systems.

MacArtney's commitment in the very important and growing Chinese market has led to a decision to improve our service in the local market in China and we see a need for MacArtney to be physically present in such a competitive market. MacArtney's office in China is conveniently located in ZhuHai allowing for easy access to most customers in Guangzhou. Our presence in China will enable us to be closer to our customers and we are confident that we are able to support both our customers and distributors in order to grow together.

MacArtney Singapore has taken on a new System Sales Manager, Mr. Steven Yang, who has many years of experience in this industry. Being based in the new MacArtney branch office in Zhuhai Mr. Yang's primary job is to attend to the comprehensive job of servicing the Chinese market.



Mr. Frejo welcomes Mr. Steven Yang

Distributorship agreement with Chinese business partner

MacArtney Singapore has signed a distributorship agreement with Jessn Marine Equipment Company Ltd., Beilun NingBo, China. With this new collaboration MacArtney looks forward to servicing the ocean science industry and to provide better in-country after-sales service. Steen Frejo, Managing Director of MacArtney's Asia Pacific Operations: The many years of experience of Jessn Marine in manufacturing marine equipment and their widespread sales network represent a perfect match to MacArtney's portfolio of high-quality underwater technology systems and products. He goes on: Our collaboration with Jessn Marine will enable us to cover most parts of China and to provide strong support in both sales and after-sales service.

When it comes to connectivity, MacArtney keeps maintaining and developing our longstanding collaboration with SeaTech China.





dotOcean and MacArtney join forces in penetrating new markets

An ambition to become a market leader in the North American underwater technology market across the various segments like oil and gas, defence, ocean science, renewable energy, civil engineering, diving, etc. has led to the signing of a business agreement between dotOcean and MacArtney.

dotOcean is a Belgian company developing pioneering measurement instruments, sensor networks and data acquisition platforms for the maritime and offshore industry by implementing user based innovation that significantly enhances the processes of the customers. dotOcean is specialised in sediment measurement systems.

The partnership

MacArtney has now signed an agency and sales representative agreement with dotOcean covering the North American continent. The dotOcean products being quite ground-breaking, this new partnership represents a door opener to new business in MacArtney's traditional markets like oil and gas, defence, ocean science, renewable energy, civil engineering and diving.

"

in consequence of the very fine relations already existing between dotOcean and the MacArtney Group in the European markets. Besides, our decision is based on our strong presence in North America and our expertise within system integration which – together with the leadingedge dotOcean products – brings considerable muscle to our future cooperation.

We decided on dotOcean

Lars F. Hansen, President, MacArtney Inc.

The partnership has become reality in continuation of the sound partnership already established in Europe. Promotion and sales activities in the North American markets will consist in organising product presentations and in-situ demonstrations to call attention to the state-of-the-art products available with the two business partners who expect a considerable boost to future activities.

Global partners MacArtney and Moog Focal expand long-term business alliance

MacArtney has accepted responsibility for the in-field sales and after-sales support of Focal products in the commercial marine markets of the north-west region of North America via its office located in Victoria, BC in Canada.

Moog Focal Technologies Corporation and the MacArtney Group have agreed to intensify their multi-service partnership aiming at expanding their long-term business cooperation in favour of their extensive customer portfolio.

Representing a wealth of marine experience and knowledge and having many years of experience attending to Focal products, the MacArtney Group considers the strengthening of their Focal business relations quite essential. An increase in global sales and servicing capacities fortifies the foundation for a strong business alliance between the two companies.

Local sales and service support across North America

Today, MacArtney Inc. operates a number of separate sales offices in strategic locations across North America offering an extensive product portfolio focusing on system solutions, after-sales service and maintenance to the offshore oil and gas, ocean science, marine renewables and defence markets.

Trained MacArtney Inc. technicians servicing Focal slip rings







www.macartney.com

Front cover: MacArtney system solution installed on board an arctic loading tower, see p. 9 Produced by the MacArtney Group · Editor: Inge Lise Muff Laursen · Editor-in-chief: Niels Erik Hedeager · 2016 · Vol. 14 / Rev. 1