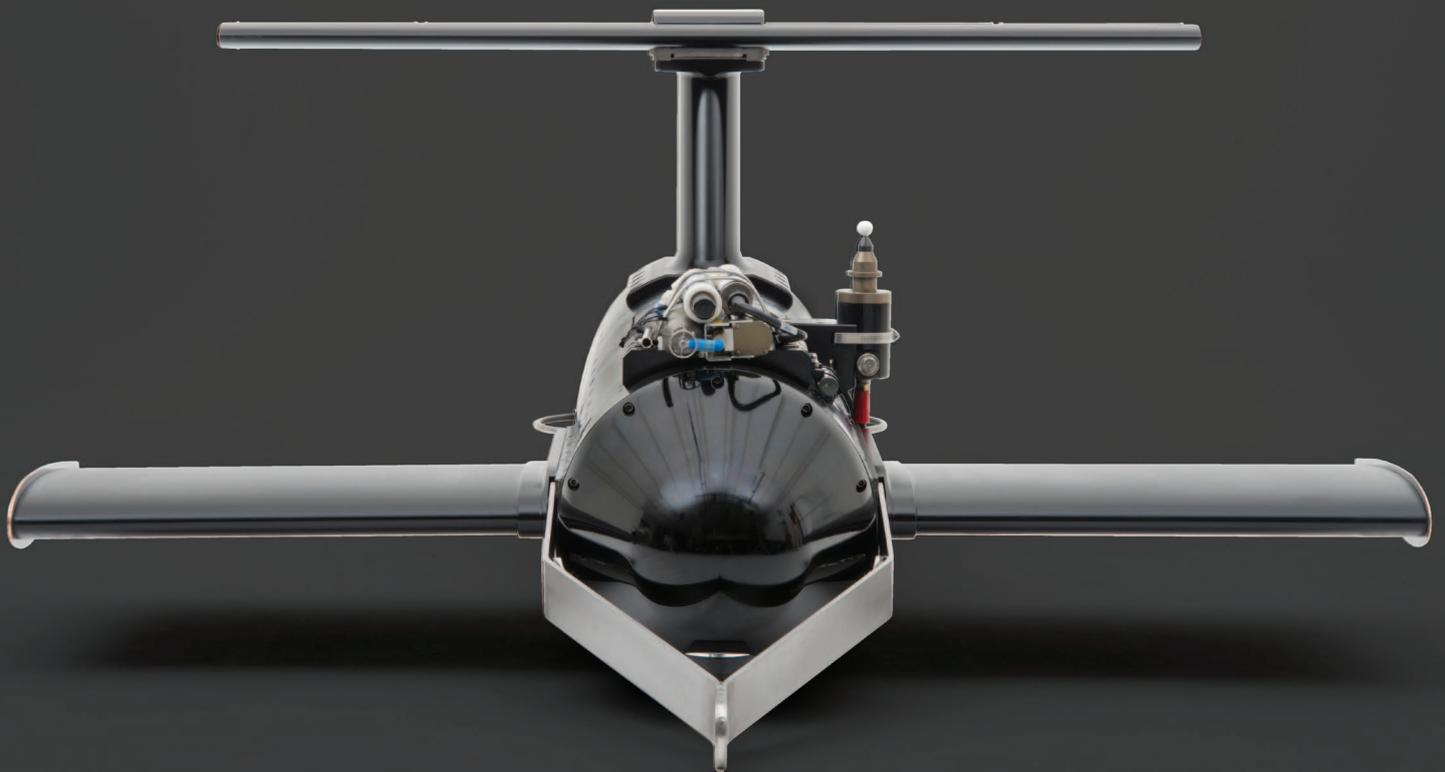




In Depth

Online at www.macartney.com/in-depth

Issue 1, 2014



MacArtney ROTV technology

Theme: Discover the new FLEXUS and other remotely operated towed vehicle systems by MacArtney, pages 8-10





Editorial

More than two decades of continuous technological progress based on field experience, intensive testing and constructive customer dialogue is behind the latest generation of MacArtney remotely operated towed vehicle systems. Widely deployed and trusted by offshore surveyors and oceanographers our ROTVs are among the most advanced, effective and reliable solutions available.

FLEXUS - more than an ROTV

Within this issue of In Depth, we are delighted to introduce the FLEXUS, a brand new rugged, cross-application ROTV system featuring a powerful NEXUS MK E multiplexer. When not in use onboard the FLEXUS vehicle, the NEXUS can easily be installed on another application, hereby offering great flexibility to the FLEXUS user. We like to think of the FLEXUS as 'more than an ROTV' and trust that it will become a welcome addition to the toolbox of marine science institutes, coastal monitoring authorities, engineering contractors and surveyors worldwide.

With the addition of the FLEXUS system, MacArtney is looking to further strengthen its position as an industry leading supplier of remote technology and underwater instrumentation platform solutions.

Together, our FOCUS-2, TRIAXUS and FLEXUS towed systems offer our clients a wide spectrum of remote possibilities which is further enhanced by our ability and long track-record of also supplying custom designed systems.

You can read much more about the FLEXUS, TRIAXUS and FOCUS-2 on page 8-10 in this issue of In Depth.

Niels Erik Hedeager, CEO

Featured products and solutions



▲ SubConn® coax connectors

New SubConn coax connector series

MacArtney is pleased to announce the introduction of SubConn® coax connectors - a brand new series within the industry leading SubConn® underwater connector range.

The new connectors will primarily be used for facilitating the transmission of High Definition (HD) video signal within underwater technology systems and for interfacing HD video based equipment such as cameras and telemetry systems.

SubConn® coax connectors

The SubConn® coax connector series will embrace two primary connector models including a coax-only connector option and a combined coax and electric connector option with six electric pins for handling power and signal on interfaced equipment. With the latter option, users are enabled to fully control and power equipment using only a single connector, hereby allowing for design optimisation of underwater systems.

Both connector types are available with an impedance of 50 or 75 Ohms and can be delivered with dedicated SubConn® coax cable. The entire SubConn® coax connector and cable assembly is designed to sustain an unbroken passage of signal between interfaced units, hereby minimising signal attenuation caused by noise interference.

Trusted design, tested to last

The new coax connectors harness the same rugged quality and basic SubConn® design that has been trusted by marine industry operators for decades. Both new connector models feature a standard A-size footprint and are held in place by means of the characteristic SubConn® locking sleeves.

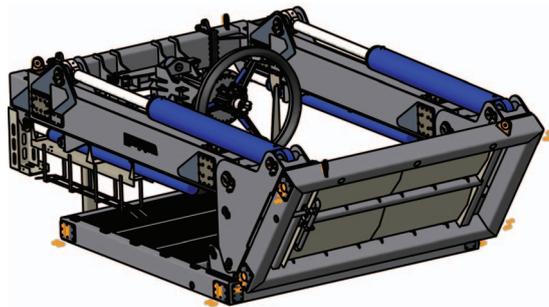
To ensure optimal performance and durability in harsh underwater environments, SubConn® coax connectors have been tested to endure 600 bar pressure corresponding to the hydrostatic conditions at 6000 metres water depth.

Cost effective HD for multiple underwater applications

Developed on the basis of industry demand, MacArtney is anticipating the new connectors to form part of multiple underwater technology applications. As an example, flange mounted SubConn® coax connectors will be used to provide the standard HD video interface on MacArtney NEXUS multiplexers and on the MacArtney LUXUS HD Camera.

The SubConn® coax connector series is also expected to handle the HD video demands of several other products and system types, not least owing to a significant advantage in terms of cost effectiveness when compared to similar connector solutions.

Unique foldable MERMAC A-frame for IKM Subsea



▲ The unique design of the foldable MERMAC A-frame allows the system to be easily converted between ultra-compact transportation mode (left) and 6 metres overboard reach (right)

IKM Subsea has appointed MacArtney to design and supply a versatile and uniquely customised foldable A-frame to form part of a hireable total ROV system.

IKM Subsea

Norwegian ROV company IKM Subsea specialises in the production, hiring out and operation of high tech ROV and trencher systems for offshore oil, gas and shipping industry clients based in the North Sea region and Asia. The backbone of the IKM ROV fleet is the Merlin WR200 - a new generation, electric-powered, work class vehicle featuring a track record of high performance and reliability.

Meeting requirements for harsh environments

Two of these Merlin WR200 ROVs currently serve the North Sea spot market for ROV jobs as part of hireable total ROV systems including LARS, ROV, TMS, tooling and trained personnel. Beyond reliability and performance, versatility is a key requirement for this type of system, which takes on several task types under harsh conditions in differing vessel and rig environments.

► The state-of-the-art Merlin WR200 ROV system is the backbone of the IKM Subsea fleet. Beyond the new A-frame, MacArtney has supplied umbilicals, deck cables, slip rings, lights, connectors, penetrators and inertial sensors for these systems (courtesy of IKM)

Another vital parameter is compactness, as the system must be transportable by road without special needs for tunnel closures and escort.

Like all component within the IKM Subsea ROV system, the A-frame needed to fit this bill of requirements. The solution was found in a MacArtney frame design capable of 6 metres of overboard reach while handling the deployment and recovery of an ROV stack of up to 5,5 metres in height. In compliance with the need for versatility and use in multiple environments, the MacArtney system is fully certified for compliance with Norsok (Z015), DnV (Lifting Appliances), CE

(Machinery Directive) and ATEX (Zone 2) standards.

Foldable A-frame

Acceding to the demands for compactness and transportability, MacArtney engineers customised the frame skid, adding a unique extra joint supported by hydraulic pistons. This joint allows the frame to fold at an extreme angle to enter transportation mode.

What is more, this design modification also allows for even easier deck level access to mobilisation, demobilisation and maintenance of ROV equipment and tooling.





Powerful MERMAC winch system for seafloor mineral exploration

Odyssey Marine Exploration (Tampa, Florida) has recently procured a powerful MacArtney MERMAC R50 AHC (Active Heave Compensation) winch for use onboard the R/V Dorado Discovery.

In partnership with St. Vincent Bay Exploration (SVBE) based out of Moss Landing, California, Odyssey will use the winch to deploy various seafloor exploration systems and equipment in the Pacific Ocean.

Deep-Ocean Exploration Pioneers

Principally renowned for its remarkable achievements as a world leading deep-ocean explorer of shipwrecks and sunken treasures, Odyssey Marine Exploration also holds a proven track record in the exploration and development of seabed mineral deposits.

The company leverages the expertise of one of the industry's most experienced teams of ocean explorers as well



▲ The R/V Dorado Discovery

as leading deep-ocean technology to advance the science of seafloor exploration and assessment.

Dorado Discovery

Odyssey operates the R/V *Dorado Discovery*, which is the first commercial purpose-converted research vessel designed to conduct a broad array of deep-ocean mineral exploration services. With this platform and specialised equipment, Odyssey is able to perform precision geophysical, geotechnical and geochemical surveys, detailed mapping, sampling, environmental assessments, drilling, and resource evaluations at depths up to 6000 metres.

◀ The arrival of the 'mighty MERMAC' was quite a headturner



MacArtney supplies custom swivel solution for next generation

MacArtney has been selected to supply a custom designed Moog Focal swivel solution for a next generation tidal turbine developed by Orkney based tidal energy pioneer, Scotrenewables Tidal Power (SRTP).

Scotrenewables Tidal Power

Founded in 2002, SRTP has become a leading tidal turbine developer holding an extensive track record of innovation and performance. SRTP is primarily known for developing the innovative floating tidal energy converter known as the Scotrenewables Tidal Turbine (SRTT).

Developing the next generation of tidal turbines

The SRTT is an innovative floating hydrokinetic tidal stream system designed for ease of installation, operations and

maintenance, coupled with efficiency, robustness and survivability in harsh offshore environments. Nine different scale models and a 250 kW prototype known as the SR250, have been tested extensively over the past 10 years - both offshore and in a laboratory environment. Building on the success of SR250, SRTP has designed the SR2000, a larger commercial scale turbine more suited for tidal array deployment. This next generation turbine will reach a rated power of 2 MW, making it one of the most powerful tidal turbines in the world to date.

Custom swivel takes tidal megawatts ashore

Like with the SR250, the main structure of the SR2000 comprises a floating cylindrical tube to which dual horizontal

axis rotors are attached on retractable arms. The rotors extract the kinetic energy of the tidal flow, which is converted to electricity through a power take-off system for export to shore.

Realising the importance of the mooring system as a critical underpinning technology for successful floating marine energy converters, SRTP has developed an innovative and unique single point catenary mooring system featuring a patented mooring turret. At the heart of this turret and comprising a key element in the overall SR2000 system, sits a custom designed Moog Focal swivel supplied by MacArtney. The swivel allows the SR2000 to self-orientate in the tidal flow, while signal transfer and electricity flow to the onshore grid, is handled using a single marine export cable.

ation with Odyssey

Active heave compensation winch

Marking the latest addition of cutting-edge equipment onboard the *Dorado Discovery* the MacArtney MERMAC winch system offers a multitude of features to empower Odyssey and SVBE exploration missions.

As a member of the standard MacArtney MERMAC R family of winches, the system was readily available for delivery and rapid deployment. Boasting a potential cable capacity of 7775 metres and a pulling force of 195 kN on the bottom cable layer the MERMAC R50 AHC system offers powerful and versatile performance of any subsea equipment handling operation.

Enabled by its integrated Active Heave Compensation system, the winch is able to actively filter out the effects of vessel movement caused by high sea states hereby allowing Odyssey to expand its window of operation.

Fitted with a drum mounted disc brake system, the winch can perform extremely accurate and safe equipment handling. Moreover, even when performing at full tension, the MERMAC R50 has a very low noise output.

Further, adding to the list for features and benefits, the Odyssey MERMAC R50 system was delivered with a long list



▲ The MERMAC R50 winch in operation onboard the R/V *Dorado Discovery*

of performance boosting options which are available with all MERMAC winch systems. These included internal cable water cooling, central lubrication points, emergency system recovery and the unique MacArtney Remote Access Tool allowing MacArtney winch and handling experts to remotely troubleshoot and service the winch in real time.

“The MacArtney winch has performed flawlessly through the at-sea acceptance test and in the trials of our new deep water seafloor drill. The Active Heave Compensation of the winch, allows precise landing of the drill on the seafloor with all motions removed,” said Tom Dettweiler, Director of Mineral Exploration at Odyssey Marine Exploration Inc.

ation Scotrenewables tidal turbine

Going full scale

Once constructed, the SR2000 will undergo an intensive four-year testing programme at the European Marine Energy Centre (EMEC). In parallel, SRTP are developing a 10 MW commercial demonstrator array project to be installed in UK waters in the coming years. Due to the floating design, SRTP expect the technology to deliver energy at lower cost than competing technologies, with a target of being competitive with offshore wind in first commercial array projects.

“Marine renewable energy is a key strategic focus of the MacArtney Group and we are proud to contribute to the sweeping development of technology taking place at the EMEC in these years” says MacArtney Renewable Energy Sales Manager, Jens Henrik Gadeberg.



▲ The new SR2000 will be based on the successful SR250 prototype turbine (picture) featuring two horizontal axis rotors attached on retractable arms (courtesy of Scotrenewables)



MacArtney and Teledyne ODI join forces for MEUST underwater infrastructure challenge

In partnership with Teledyne ODI, MacArtney France will provide the underwater mateable connectors needed to realise the Mediterranean Eurocentre for Underwater Sciences and Technologies (MEUST) neutrino observatory project.

MEUST

The MEUST project is a second generation deep-sea neutrino observatory infrastructure project integrated in the European network of neutrino telescope KM3NeT and deep sea observatory EMSO. This new infrastructure is the km3 scale successor of the revolutionary ANTARES underwater neutrino telescope for which MacArtney supplied all the cables and connectors. The MEUST infrastructure will be installed in the Mediterranean Sea approximately 45 kilometres off Toulon, France, at 2500 metres water depth.

Detecting the undetectable

The neutrino is the most elusive of the elementary particles and as they travel almost unimpeded through all matter, observable collisions with atoms are rare. However, because trillions of neutrinos pass through the earth every second, there are sufficient impact flashes to be detected by an array of sensors. These flashes can only be detected if all light sources are filtered out and therefore, the absolute darkness at 2500 metres depth is the best place to observe them.

Scaling up the successful approach deployed by ANTARES, the MEUST project will utilise a vast array of underwater photomultiplier sensors to detect and study neutrino collisions. Compared to ANTARES, MEUST will ultimately increase the sensitivity of neutrino detection by more than a factor twenty (20x).



▲ Also known as a 'Cherenkov Light Sensor' a DOM is a 17 inch diameter pressure resistant glass sphere equipped with 31 photomultiplier tubes (courtesy of Nikhef)

which user ports allow the connection of lines using interconnection cables equipped with wet mateable connectors. MacArtney France will supply Teledyne ODI wet mateable connectors to equip the node and the interlink cables between detection units and between detection units and nodes.

The infrastructure

The MEUST underwater infrastructure is mainly composed of several instrumented neutrino astronomy mooring lines called DU (Detection Units), which are connected to a seabed infrastructure of nodes and cables. One DU is comprised of neutrino detecting DOM (Digital Optical Modules) on an 800 metre flexible line.

The present phase of the project is bound for installation in 2014 and includes the main cable and one node onto which the first lines will be connected soon after.

The seafloor connectivity infrastructure needs to provide power and transmit data between instrumented mooring lines and shore. This is achieved by means of a telecommunication cable connected to an offshore node, onto

MacArtney and Teledyne ODI

Teledyne ODI wet mate interconnect technology is installed on many subsea observatory projects around the globe and a strong foothold of service, support and reliability was established with the ANTARES and other neutrino observatory projects. "A significant contribution to the success of these programmes lie with the technical expertise, local engineering, business development and capability of the MacArtney France team" says Teledyne ODI and continues: "This open collaboration has been very successful for over ten years and has set the template for continued success with the expanded MEUST observatory. There is a need for local technical expertise to assist in qualifying and defining configuration enhancements and on-site engineering support as well as leading the commercial negotiations and achieving the awards. The MacArtney France team fills this role with unequalled dedication and finesse to our mutual benefit. The entire Teledyne ODI team is proud of the relationship and cooperative business development successes that have been realised through working closely with MacArtney France and we look forward to continuing this successful model".



▲ An overview of the MEUST project featuring detection units and seabed infrastructure. The entire detection array is installed at 2500 metres of depth (courtesy of Nikhef)

The LUXUS Droplate is ready for launch



▲ *The LUXUS Droplate is a flexible, off-the-shelf alternative to custom built underwater camera platforms and drop camera systems*

MacArtney is pleased to introduce the new LUXUS Droplate - a simple and innovative underwater camera platform enabling marine operators to perform instant and effective underwater investigations by means of three LUXUS Power LED lights and any LUXUS camera.

A rugged and stable inspection platform

Manufactured from high density polyethylene with a frame shielding the onboard cameras and lights from impacts on the seafloor, the LUXUS Droplate provides the ruggedness and stability needed for performing any basic visual

inspection task in harsh underwater environments.

One solution - multiple applications

The LUXUS Droplate does not require a specific handling system and can be readily deployed from a small boat or basic vessel of opportunity. Efficient operation of the onboard camera and light equipment is achieved using a LUXUS Multi Media Controller and a Kevlar TV cable - while integrated lifting handles make for easy deployment and recovery of the system. A small MacArtney hand winch can also be used. The LUXUS Droplate is primarily targeted towards

oceanographic and basic inspection applications. The system provides a flexible, off-the-shelf alternative to custom built towed systems and traditional drop cameras.

This versatility in applications, coupled with minimal deployment and handling requirements, make the LUXUS Droplate an extremely flexible and cost effective solution.

Plug-and-play inspection

The LUXUS Droplate can be supplied as a plug-and-play solution complete with cameras, lights, controller, cable and winch system.

MacArtney delivers ROV system for DBB

MacArtney has delivered a powerful and versatile Sperre SUB-fighter 7500 ROV system for DBB ROV Services A/S, a major Danish ROV contractor for offshore drill support, inspection, survey and support jobs in connection with installation of offshore wind turbines.

The new ROV is bound to join DBB's modern fleet of underwater vehicles and is the fourth Sperre SUB-fighter system in operation for DBB ROV Services.

DBB ROV Services A/S

Along with DBB Salvage and DBB Jack-Up, DBB ROV Services A/S is part of the DBB Group.

Besides work performed on offshore drilling rigs, the Sub-fighter ROVs are also engaged in supporting the other two

DBB companies - in particular on the offshore wind turbine market. Here, this type of ROVs has become one of the most used vehicles with a reputation and track record as an extremely robust and easy to maintain ROV, designed and built for the harsh North Sea environment.

The Sub-fighter ROV can also be delivered as a crawler with caterpillar tracks for tasks where most of the work takes place on the seabed - for instance with jetting systems and cable trackers.

► *With more than 40 systems manufactured and delivered by Sperre AS, the SUB-fighter 7500 ROV system boasts an impressive track record of harsh environment offshore operation (courtesy of DBB ROV Services A/S)*





MacArtney ROTV technology

The involvement of the MacArtney Group in the design and manufacture of remotely operated towed vehicle (ROTV) systems reaches back to 1989, when the development of the first generation of FOCUS systems was initiated. The range was later expanded to include the TRIAXUS oceanographic data acquisition ROTV, the FOCUS-2 towed survey system and most recently, the brand new and highly versatile FLEXUS system.

MacArtney takes pride in the success and track record of our ROTV systems which are widely used by surveying contractors, pipeline inspection specialists and oceanographic institutes across the world.

Common to all MacArtney ROTV systems is the efficiency, flexibility and high data quality offered to marine industry operators who often regard the optimal utilisation of ship time as alpha and omega. With this in mind, MacArtney ROTV systems are designed to offer a multitude of sensor options and empowered by a unique hydrodynamic design, the systems are highly stable and able to effectively collect quality data at high speeds.

The MacArtney ROTV family



FOCUS-2

Based on the original and successful FOCUS vehicle design, the FOCUS-2 is a second generation, highly controllable subsea survey system deployed extensively by surveyors and inspection contractors worldwide.

Featuring a strong and light carbon fibre hull, cutting-edge computer technology, fibre optic NEXUS telemetry and handled by a powerful MERMAC winch system, the FOCUS-2 system provides high data acquisition capacity in a streamlined and versatile package.

The FOCUS-2 system operates to 400 metres depth at speeds of up to 10 knots with fully pre-programmable horizontal and vertical movement.

The high speed, capacity and stability of the FOCUS-2 enables operators to increase productivity while decreasing total project cost.

Applications:

- Pipeline inspection
- Large area searches and MCM
- Site surveys and sea floor mapping
- Cable route surveys
- Fisheries and hydrographic research



TRIAXUS

Introduced in 2000, TRIAXUS marked the natural step from existing 2D towed vehicle technology to a true 3D towfish. TRIAXUS is based on state-of-the-art technology and is developed for highly efficient oceanographic data acquisition. TRIAXUS is designed to undulate within an 1 to 350 metre operational envelope with a horizontal offset that allows for vertical profiling to be carried out in an undisturbed water column.

TRIAXUS is able to operate at speeds of up to 10 knots and vertical velocities of up to 1 metre per second. The TRIAXUS has been designed using carbon fibre technologies and enabled by NEXUS multiplexer technology, the vehicle features numerous Gigabit ethernet channels and up to 9 serial channels. The TRIAXUS system can operate multiple sensors simultaneously and is available in an extended 'E' version featuring an even larger payload capacity.

Applications:

- Ocean science
- Fisheries research
- Hydrodynamic studies
- Environmental impact studies



FLEXUS

The FLEXUS system is to be introduced in 2014, hereby marking the latest addition to the MacArtney ROTV family. Developed for coastal monitoring applications the FLEXUS represents a simple, compact and rugged yet extremely versatile oceanographic data acquisition system.

FLEXUS is based on a towed vehicle featuring a broad range of innovative features and benefits. The vehicle can be controlled vertically and is able to operate at a tow speed of up to 10 knots and with a vertical velocity of up to 1 m/s. FLEXUS is able to carry out several different oceanographic monitoring tasks and can easily be reconfigured for new applications. Another unique benefit of the FLEXUS is the dual use of its NEXUS MK E multiplexer, which can easily be demounted and used on other sensor platforms such as CTDs and camera sled systems.

Applications:

- Coastal monitoring
- Ocean science
- Fisheries research
- Seabed surveys

Introducing FLEXUS - more than an ROTV

MacArtney is delighted to introduce the FLEXUS, a new innovative and highly flexible data acquisition system developed by MacArtney.

Based on a simple and rugged, yet extremely flexible remotely operated towed vehicle, the FLEXUS composes a highly versatile and user friendly system suitable for a multitude of oceanographic, monitoring and survey applications.

The vehicle

Like the more advanced MacArtney TRIAXUS and FOCUS-2 ROTV systems, the FLEXUS is based on a towed vehicle featuring a broad range of innovative features and benefits. The FLEXUS vehicle is suitable for several mission types including effective and detailed mapping of physical and chemical parameters in the water column. The vehicle can be controlled vertically and is able to operate at a tow speed of up to 10 knots and with a vertical speed of up to 1 m/s.

In terms of flexibility, the FLEXUS is able to carry out a broad variety of different scientific monitoring tasks and can easily be reconfigured for new applications. With regards to instrumentation, CTD packages, transmissometers, fluorimeters and sensors for PAR, turbidity and dissolved oxygen are among the broad variety of oceanographic equipment mountable onboard the FLEXUS vehicle. The system may also be equipped with traditional survey sensors including side scan sonars.

Flexibility + NEXUS = FLEXUS

The high level of flexibility offered by the FLEXUS vehicle is enabled by a powerful MacArtney NEXUS MK E electric multiplexer which comprises the heart and backbone of the FLEXUS system. By means of the NEXUS MK E multiplexer, the FLEXUS vehicle can be used with existing marine winch and cable solutions and coupled with the compact footprint of the vehicle itself, it is fully deployable from even smaller sized vessels of opportunity.

Moreover, featuring multiple channels and connectivity options on the subsea multiplexer unit, the NEXUS MK E allows FLEXUS operators to combine systems and sensors in several ingenious ways to perform an extensive range of operations and yet, the potential flexibility of the FLEXUS does not end here.



▲ The FLEXUS is the latest addition to the MacArtney family of ROTV systems

More than an ROTV

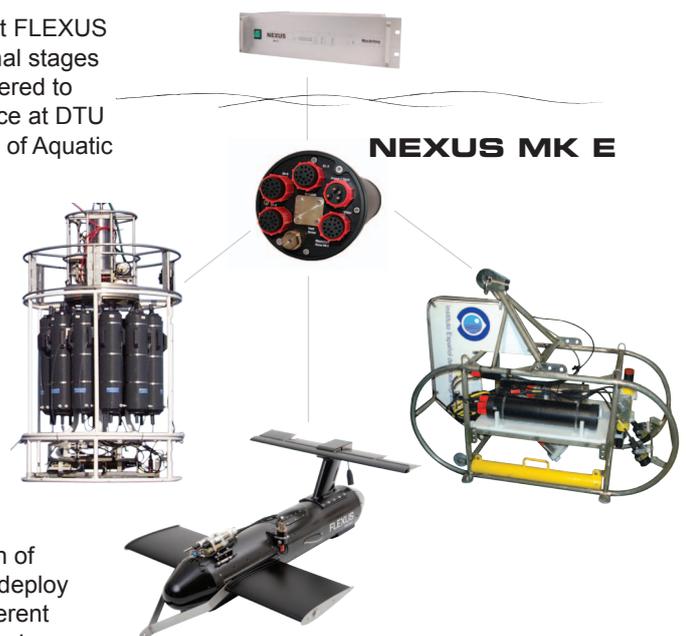
While the NEXUS MK E can be used onboard the FLEXUS vehicle, it can also be easily demounted for use with other applications on other sensor and instrument carrying oceanographic platforms, including CTDs, landers, corers, drop camera systems and bottom tow sledges. In sum, this vast degree of cross-application flexibility makes the NEXUS enabled FLEXUS system a highly competitive choice as an all round and cost effective monitoring and data acquisition tool.

The first system

At the time of writing the first FLEXUS system is undergoing the final stages of testing before being delivered to the section for Marine Service at DTU Aqua - the National Institute of Aquatic Resources at the Technical University of Denmark. DTU Aqua conducts research, provides advice, educates and contributes to innovation in sustainable exploitation and management of aquatic resources - will deploy the FLEXUS to boost its oceanographic capabilities.

According to Tommy Nielsen of DTU Aqua, the institute will deploy the FLEXUS for several different purposes including hydrography, undulating CTD measurements, underwater photography, echo sounder measurements, side scan sonar operation and special equipment testing.

"The FLEXUS is capable of true plug-and-play versatility and can be easily rigged and refitted for new missions" says Tommy Nielsen and continues: "coupled with easy system maintenance and the opportunity to use the onboard NEXUS mux for our CTD and benthic sledge, the FLEXUS promises to live up to its name". On the sparse launch and recovery requirements of the FLEXUS Tommy Nielsen says: "We will be testing the FLEXUS system off our small vessel 'Havfisken' which is basically a modified traditional fishing boat".



▲ The FLEXUS suite: When not in use onboard the FLEXUS vehicle, the NEXUS MK E multiplexer can be demounted and used on other sensor platforms such as CTDs and camera sledge systems



MacArtney upgrades MMT FOCUS-2 systems

MacArtney has performed a major upgrade of two FOCUS-2 ROV systems belonging to Swedish marine survey contractor and specialist, MMT.

Both vehicles have been fitted with new state-of-the-art equipment to carry out geophysical survey missions for clients within oil, gas and renewable energy industries.

400 meters, with the onboard MacArtney control systems and software working to ensure vehicle stability and optimal data gathering conditions.

Technical Director of MMT, Martin Wikmar, comments on the acquisition of the upgraded systems: "The fully equipped FOCUS-2 systems will provide our clients with quality, high resolution data collected at a higher survey speed than offered by, for example, a fully equipped ROV operating at the same water depth. This makes the FOCUS-2 system a very cost efficient solution for cable route surveys, offshore wind farms surveys and pipeline inspection".

Upgrades boost performance and cost efficiency

Complementing the side scan sonar and sub bottom profiler already onboard, the MMT FOCUS-2 systems have been fully equipped with a multibeam echo sounder, an inertial navigation system and a doppler velocity log. These upgrades entail that a complete subsea geophysical survey can be carried out at a speed of 6 knots and down to a water depth of

◀ In the hands of MMT, the upgraded FOCUS-2 vehicles will be put to good use on demanding geophysical survey missions (courtesy of MMT)



Advanced TRIAXUS ROV for CSIRO

MacArtney has supplied a TRIAXUS remotely operated towed underwater vehicle to the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia's national science agency, and one of the largest and most diverse agencies in the world.

The TRIAXUS underwater vehicle will be utilised on Australia's Marine National Facility research vessel, the *Investigator*.

This instrument will be used in a diverse range of oceanographic research activities. Currently fitted with a CTD, laser optical plankton counter, transmissometer, fluorescence and PAR sensors, the TRIAXUS is well suited to many aspects of plankton research, however, utilising the CTD the TRIAXUS is also intended to be used in investigations of frontal features, air sea interactions and much more.

The R/V *Investigator*

Currently undergoing the final stages of construction, the highly advanced CSIRO research vessel, *Investigator*, is bound to provide a significant contribution to Australia's ocean research capacity and deliver increased opportunity for participation in research programmes at a global scale.

Beyond the MacArtney TRIAXUS system, the *Investigator* will feature a broad range of scientific systems and equipment to support scientists in oceanography, climatology, fisheries, marine ecosystem, environmental and geoscientific research.



▲ The TRIAXUS acquired by CSIRO is of the extended 'E' type featuring an even higher payload capacity

According to Ocean Science Sales Manager, Hans Jørgen Hansen: "MacArtney is delighted to see its TRIAXUS system contribute to the capacity of such an illustrious vessel and is keen to continue its close and long-standing cooperation with CSIRO."



◀ The CSIRO TRIAXUS will be deployed off the new research vessel R/V *Investigator* (courtesy of CSIRO)

Corporate news

MacArtney steps up presence in offshore Asia

Driven by a major strategic expansion of its operations in Singapore, the MacArtney Group is significantly growing its presence and activities in all Asian markets for underwater technology.

Over the next few months, MacArtney Singapore is securing several new staff members, implementing a major expansion of stock and workshop facilities and opening a dedicated slip ring repair and service center. What is more, the MacArtney Singapore operations will be streamlined to provide direct local access to global MacArtney support for all Asian and Asia Pacific markets.

MacArtney in Asia

With experienced and long standing MacArtney sales professional, Steen Frejo, at the helm as

Managing Director, the MacArtney Singapore area of operation has expanded to encompass the entire Asian and Asia Pacific region including major markets such as China, Japan, South Korea, Taiwan and support for MacArtney's Australia based office.

In addition, MacArtney Singapore will actively manage the coordination of the entire Asian representative network.

Empowered by local market expertise and access to clients, these MacArtney representatives comprise an invaluable asset to the regional success of MacArtney products and systems. With the expanded MacArtney Singapore operations, MacArtney is able work even closer with its regional representative network which will also benefit from direct access to the Singapore based stock of MacArtney and SubConn® products.

Demand for local supply with global support

To local offshore oil and gas, marine renewable energy, oceanographic and defence industries, the expansion of MacArtney Singapore will mean shorter lead times and better local service for



▲ At OI China 2013, MacArtney and SeaTech China put pen to paper on an exclusive representative agreement

underwater technology systems and products. Further adding to the list of the advantages, direct MacArtney technical support is enabled through the limitation of time zone differences - and with local language proficient sales and technical staff in place at the Singapore office, MacArtney clients and representatives alike will have access to Asian as well as English language support. "The expansion of MacArtney Singapore will definitely bring us much closer to our Asian customers than what has been possible so far", says Steen Frejo and continues: "What started as a one-man regional sales outpost, has now become a fully fledged MacArtney location with local access to global support".

A good start

Since the official opening one year ago, MacArtney has received a warm welcome by all Asia Pacific marine technology markets and segments. Spearheaded by a surging interest in integrated MacArtney system solutions, this development is present across the entire MacArtney portfolio. A good example is the Asia based demand for MacArtney winch and handling solutions which has recently seen a MERMAC S winch system delivered to a defence client in Taiwan, a powerful Active Heave Compensation MERMAC R winch ordered by a Chinese scientific institute and a complete MERMAC research vessel winch solution ordered by a Japanese oceanographic institute.



MacArtney
UNDERWATER TECHNOLOGY
ASIA PACIFIC OPERATIONS

▲ With Group operations in Singapore (regional HQ), Australia and representatives in Japan (Marimex Japan and Nishiyama Corporation), China (SeaTech China), South Korea (GeoTech System Corp and Shinyang Technology) and Taiwan (Royalty Technology Instrument), MacArtney is geared for catering to the need for underwater technology solutions in the Asia Pacific region



MacArtney and University of Copenhagen team up with Sequoia for PiE 2014

A slice of PiE for the talent of tomorrow

In October 2014, Sequoia Scientific of Seattle, USA, MacArtney and University of Copenhagen will team up to organise the fourth edition of Particles in Europe (PiE) - a bi-annual conference focusing on particles in the aquatic environment.

Centred around the informal sharing of academic knowledge as well as hands on experience and ideas, PiE appeals to researchers, students, monitoring agencies, environmental and government employees alike. Anyone interested or actively engaged in modelling or managing particles should attend the conference, which is particularly renowned for reaching out to the marine science talent of tomorrow.

The conference

The PiE 2014 conference will take place in Esbjerg - the offshore capital of Denmark. Besides being the hometown of MacArtney, Esbjerg is known for its status as a 'World Energy City' and for being the gateway to the Wadden Sea National Park. Guided by experts from the University of Copenhagen, PiE 2014 attendees will experience a unique guided tour through the National Park



▲ The Isle of Langli (Wadden Sea National Park). (courtesy of VisitWestDenmark)

which comprises one of the world's most valuable and fascinating tidal areas featuring vast biodiversity and aquatic phenomena. In extension of the Wadden Sea guided tour, the conference will also embrace a dinner visit to the Fisheries and Maritime Museum of Esbjerg.

The majority of the PiE 2014 conference will take place at the Esbjerg Conference Hotel, where a diverse range of speakers will highlight the latest development within the realm of particle monitoring, management and technology.

The organisers expect that the conference will embrace approximately 30 presentations over two days.

For the curious, the conference will also offer the opportunity to learn more about Sequoia instruments and pay a visit to MacArtney, where a guided tour will offer an insight into the world of underwater technology.

A match made underwater

The partnership between Sequoia and MacArtney to host the PiE 2014 conference is far from a coincidence.

While Sequoia, in its role as an internationally renowned manufacturer of portable, field, and submersible laser particle sizers focuses on delivering state-of-the-art instruments to ocean science operators, MacArtney holds an extensive track record with regards to integrating oceanographic systems and developing underwater data infrastructure products, instrument deployment solutions and sensor platform technologies.

For more information, conference programme, registration, abstract submission and more, please visit the Sequoia PiE 2014 website at:

www.sequoiasci.com/about/pie/



◀ The MacArtney Group headquarters as seen from above

Chronicle of a MacArtney legend

After more than 31 years at the service of the Group, MacArtney icon Anders Andersen has retired. This is his story.

The early years

In 1982, successful foreman Anders Andersen wanted to try something new and influenced by his background in mechanics, electronics and electrical systems, Anders took a leap of faith to join a newly started local 'underwater technology' company. Back then, MacArtney had its headquarters lodged between a bicycle shop and the local seaside pub and as employee number five, Anders was hired to establish a MacArtney workshop and service department. Here, he was readily joined by three more employees - who are all still with MacArtney today.

A Norwegian fairytale

Headed by Anders, the workshop became a success and as MacArtney grew bigger and eventually moved to the location that houses the current group headquarters, Anders had switched to a more sales oriented career path. One day, MacArtney founder Martin 'Mac' MacArtney once again called upon Anders to start up something new. This time, MacArtney was set to open a subsidiary in Norway,

bringing MacArtney underwater technology solutions closer to the important offshore market on the Norwegian continental shelf. Anders accepted



the challenge and embarked upon what he describes as "a Norwegian fairytale" with reference to the immense transformation that MacArtney Norge went through over less than two decades.

In the beginning in 1996, Anders spent 14 days in Denmark and 14 days in Stavanger, where MacArtney Norge AS had been established in a modest leased office by the docks in Sandnes. Headed by Anders and empowered by talented and dedicated people, MacArtney Norge was to be developed from scratch. Business grew at a steady pace, without ever producing a single year of negative results. As a devoted advocate of the loosely translated concept "no sweets without sweat", Anders has always claimed that:

"Any business can be a success for the individual who has the drive, passion and work ethic to do what it takes..."

MacArtney Norge eventually outgrew the Sandnes office and moved to a 750 m² facility at Forus, Stavanger, where the company stayed for years to come. Anders Andersen, however, was not done expanding and in August 2011, a brand new and purpose dedicated MacArtney Norge headquarters was ready for occupancy at Fabrikkeveien 34, where the company is still housed today. Colloquially known as 'The Black Diamond', the new building was hand drawn by Anders and marked the final chapter of his Norwegian fairytale.

Only months later, Anders journeyed back to MacArtney in Denmark to fill a role as Business Development Manager, drawing on his vast experience and network to secure new MacArtney representative agreements in India, Russia and Poland.

Mr. Focal pumps his bicycle

Anders Andersen has always believed that "nothing comes from nothing" and through his entire career, he has strived to be present in the field, meeting

interesting clients and pursuing new business opportunities. Anders is renowned for claiming that the best way out of a potentially bad situation is to "pump your bicycle and get going". This attitude has led to numerous remarkable achievements, including many significant orders for MacArtney winches and not least rotary systems and slip ring products from Focal Technologies.

Beyond the daily operation of MacArtney Norge, Anders was heavily involved in the role of MacArtney as the official distributor of Focal swivels for Floating Production Storage and Offloading (FPSO) vessels on the Dutch and Scandinavian markets. His work within this field has offered a massive contribution to the growth of MacArtney and Focal alike and during his final visit to Focal in 2013, MacArtney's 'Mr. Focal' was honoured with a 'personal slip ring' featuring the expressive serial number 'ANDERS'.

A look to the future

Following his retirement, Anders is looking forward to spending more time with his family, hereunder his grandchildren, and to reading all the books that he has amassed over the years. From his summer cottage on the Isle of Fanoe, only a stone's throw from the MacArtney headquarters, Anders will, however, be looking back at his time at MacArtney with great gratification and pride.

"MacArtney is a pioneer company in its purest form with a strong set of values that have been well preserved over the years - despite the massive global expansion".

Says Anders and continues:

"MacArtney will continue to grow and bring new quality products and solutions to the market, not least fuelled by a fundamental desire and ability to listen to- and understand the client, before progressing to solve any challenge that he might present".

◀ During his last visit to Focal Technologies (Moog Focal) Anders was honoured with a personal slip ring with the serial number 'ANDERS'

Back at headquarters, the MacArtney legend was honoured with a reception featuring gifts, flowers, hugs, warm speeches and a well deserved standing applause



EurOceanique is now MacArtney France

In January 2014, long standing MacArtney Group member, EurOceanique, carried out a name change to become MacArtney France.

MacArtney France

Founded in 1994 and operating out of modern office and workshop facilities in Rousset, MacArtney France employs a strong and experienced team of engineers, sales professionals and technicians supporting the entire range of MacArtney systems and products.

Under the locally established name EurOceanique, the company has operated as a MacArtney Group member from day one. With the name change, MacArtney France looks to emphasise its ties to MacArtney Group and make explicit that French and Southern European underwater technology customer and operators benefit from as well dedicated local service as global MacArtney Group support.

Global support for complex underwater projects

Another key factor in the name change is found in the demand pattern that

guides the current strategy of the MacArtney Group. Over the past decade, demand has gradually shifted from being based primarily on items and products, to focusing on complete underwater technology system solutions, requiring more project management and engineering resources.

Through the MacArtney Group headquarters in Esbjerg, Denmark, MacArtney France has access to highly trained and multidisciplinary engineering and project management departments dedicated to develop and deliver solutions for even the most complex subsea challenges.

"The success of MacArtney France is based on understanding our customers' needs and on being able to provide full support for their projects, from draft to delivery" says David Mazzochi, Managing Director of MacArtney France, and continues: *"With the name change, we wish to reinforce the fact that handing over a*

project to us, means handing it over to a global underwater technology expert with more than 35 years of experience and full support of projects at any scale".



MacArtney global highlights



Norway
MacArtney Norge AS
Mats Ekström
Managing Director
Stavanger, Norway



At the start of the year where we celebrate our 20 years anniversary we are busy with customer visits and strive to make ourselves even more visible. We have recently re-organised our workforce in accordance with the ever increasing requirements set by our customers. Our focus areas are winch and handling systems, underwater infrastructure and ROV systems.

Since the latest issue of In Depth, MacArtney Norge has sold two ROV systems of the new Sea Owl XTi type. We are confident that this new model will live up to the Sea Owl heritage when the system is ready to work. Internally, our service department is growing and in compliance with our strategy, we are getting more and more work outside our facilities. Additionally, we are working against the goal of obtaining our own QA certificate in accordance with ISO 9001:2008. The certification process is planned for December 2014. Upon completion, MacArtney Norge will be the third company in the Group to hold its own certificate.



North America
MacArtney Inc.
Lars F. Hansen
President
Houston, USA



MacArtney Inc. is looking forward to a promising year within all North American markets for underwater technology. This positive forecast is especially fuelled by a booming oil and gas sector in the Gulf of Mexico. However, equally important to the development is the excellent reception which all the new MacArtney operations have received within their respective local markets.

We are experiencing a constant rise in demand for our MERMAC and CORMAC winch series from all maritime segments and the recent delivery of a MERMAC R50 to Odyssey is a good example of this development. Beyond winches, the Moog Focal rotary product line has had a very good 2014 so far and equally, we are starting to see a major rise in market interest for Gisma connectors, with major orders inbound from US based offshore operators.

In response to this development, we have recently manned up on several fronts and are expecting this trend to continue starting with the employment of two new service technicians for securing even faster delivery and rapid-response offshore service, whenever this is needed.

MacArtney France adds pressure test facility

MacArtney France is pleased to announce the addition of a modern and fully equipped pressure test facility to its workshop in Rousset. Being unique to the French market for underwater technology, the new facility represents a notable extension of the MacArtney France service portfolio.

Empowered by the newly installed pressure vessel system with a height of 1100 mm, an internal diameter of 650 mm and a pressure capacity of up to 600 bar - the test facility is able to submit underwater connectors, cables, mouldings, junction boxes and other types of equipment to extensive ocean depth pressure tests. For optimal accuracy, the pressure vessel system is capable of pre-programmed and fully computer controlled operation with all measurements undertaken and recorded in real-time. To ensure flexible connectivity to equipment tested inside

the tank, six penetrator passes are incorporated into the vessel lid. Moreover, an overhead crane with a capacity of 4000 kg ensures that even very heavy or unwieldy equipment can be pressure tested.

The MacArtney France pressure test facility offers reinforced safety operations and is available for rental on an hourly or daily basis, with all testing performed by fully trained and certified MacArtney technicians.

MacArtney pressure test facilities

With the new test facility, MacArtney France becomes the fifth MacArtney



▲ The MacArtney France pressure test facility

Group location to offer professional pressure testing services to local and global customers. Comparable facilities are present at MacArtney Norway, MacArtney UK, MacArtney Benelux and at the group headquarters in Denmark.

MacArtney welcomes

MacArtney A/S: Tommy H. Mikkelsen • Jan Slyk Pedersen • Ole Aarup Mikkelsen • Christian Frøsig • Karin Gottorp Mølgaard • Lars Dinesen • Hans Kristensen • Jacob Rønberg • Jesper Liniger • **MacArtney Norge:** Fred Erkers • Chaib Chamlali • Arne Vidar Rise • Marie Oma • **MacArtney UK:** Thomas Ivanic • Robin Inkson • Connor McLeod • Sarah Wilken • Ravi Krishna Sunkara • Rowan Smith • Rowan Duffy • Rochelle Scorgie • Paul Watson • Dean Proctor • Lauren Reid • **MacArtney Inc.:** Nicholas Hartman • Derrick T. Williams • Scott A. Walters • Jose S. Gonzales • **MacArtney Benelux:** Nick Dubbeld • Martin van Dorp • Satish Bhugwansingh • **MacArtney France:** Frédérique Vernadat • **MBT:** Joerg Viol • **MacArtney Singapore:** Steen Frejo • Ching Peng Hoe • Kang Wen Shuen



France
MacArtney France S.A.S.
David Mazzochi
Managing Director
Rousset, France



After having successfully implemented the change of name from EurOceanique to MacArtney France, we are pursuing a dedicated effort to enjoy a good start to the new year, in terms of projects, contracts and business development.

The first quarter has already seen the opening of a new state-of-the-art pressure testing facility - an important addition to our service portfolio, which has been well received by clients in all local marine sectors. In fact, we are generally experiencing good progress within our service department.

On the contract side, MacArtney France has secured a couple of interesting orders from local navy clients along with the important MEUST subsea connector order described in this issue of In Depth.

Finally, we will start implementing a full ISO 9001:2008 Quality Management system in February 2014 with the aim to become certified within a year.



Germany
MBT GmbH
Torsten Turla
Managing Director
Kiel, Germany



Since January 2014, MBT has been operating a new moulding workshop and first orders from local SubConn® customers have been processed. Concurrently, we have been organising a series of SubConn® workshops to take place after Oceanology International 2014. The workshops will take place at several locations in Germany including Kiel, Bremen and Karlsruhe. The agenda of the workshops will comprise an introduction to new SubConn® products, SubConn® handling and care instructions and a demonstration of the support available through our new moulding facility.

Furthermore, we have recently received an order from the German Federal Office for Agriculture and Food for an equipment package for the setup of a subsea fish stock monitoring observatory. Systems to be delivered include a NEXUS MK VI multiplexer, fibre optic cables and two digital stereo low-light cameras. Additionally, an order was recently placed for a 20 t SWL MERMAC winch for the autonomous drill rig "MeBo200", designed by MARUM and Bauer Maschinen GmbH.



Meet us in person at these exhibitions

Sea Japan 2014, Tokyo, Japan, 9th - 11th April 2014 (stand no. R-05)

Thetis MRE 2104, Cherbourg, France, 9th - 10th April 2014 (stand no. A13)

ONS 2014, Stavanger, Norway, 25th - 28th August 2014 (stand no. C355)

Oceans 14 MTS/IEEE, St. Johns, NF, Canada, 14th - 19th September 2014 (stand no. 37-38)

The full list of exhibitions and conferences is available at www.macartney.com/exhibitions