

In Depth

Online at www.macartney.com/in-depth

Issue 2, 2012



At the NEXUS of solutions

Theme: MacArtney multiplexer solutions, pages 3 and 4



Solutions pay off

Our strategy to provide solutions and more MacArtney products is paying off, and last financial year marked an all time record breaker. This strategic focus has also paid off for our many customers, who have continuously challenged us with an increasing number of requests for complete solutions.

The composition of such solutions can vary enormously in scale and complexity. Often, the majority of attention is firmly assigned to 'the action end' of the system - such as the sonar, the sensor or the ROV. Behind the scenes, however, less conspicuous, but equally vital products work to ensure that solutions run impeccably.

This issue of In Depth takes a look at some of the products that bind underwater technology solutions together, hereunder especially our range of NEXUS multiplexers.

Looking into the core and centre of things in connection - the Latin word 'nexus' does well in describing the role of this vital telemetry product. Hence, from its position at the very heart of underwater technology solutions, a NEXUS multiplexer facilitates the interfacing and integration of high-tech equipment and plays a pivotal part in the transmission of speed-of-light signal communication between subsea units and topside surface control.

At MacArtney, we pride ourselves in products like the NEXUS, which we believe represent our ability to 'think in systems'. By ways of skill, knowhow and ambition, we will always strive to remain at the very 'nexus' of underwater technology solutions - locally, as well as globally. Through this issue of In Depth, I am delighted to share a little about how we do this.

Niels Erik Hedeager, CEO

OptoLink Single Fibre

The OptoLink Single Fibre Connector is a small, however, notable addition to MacArtney's successful OptoLink range. Designed for subsea equipment manufacturers the rugged stainless steel design warrants the robustness and reliability of the connector, whether mounted on the deck of a vessel under harsh sea conditions, on an offshore platform, or at full ocean depth.

The OptoLink Single Fibre is deliberately developed to offer reliable and efficient fibre optic connectivity in a minimal sized connector. Especially in proportion to the fact that (as a standard) the OptoLink Single Fibre features a full ocean depth rating of 6000 metres - the connector is very compact indeed.



▲ The OptoLink Single Fibre connector is available in a bulkhead (BCR) and cable mount (CCP) configuration with minimal attenuation between the mated connector pairs. Furthermore, it is available in both single and multi mode. The connector has low insertion loss and back reflection and is perfect for high-speed data and video transmission



▲ CSIRO's BOAGS system is empowered by OptoLink Single Fibre connectors (image courtesy of CSIRO)

Finally, the OptoLink Single Fibre Connector is engineered for minimal weight. This entails that the connector applies a minimum amount of strain on for instance small and medium sized ROVs, thus allowing them to carry more equipment.

Single Fibre at CSIRO

Australia's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), uses OptoLink Single Fibre connectors on their Benthic Optical, Acoustic Grab System (BOAGS), a state of the art water column and seabed assessment system, deploying multiple technologies to capture images, video and sediment samples. Moreover, CSIRO uses OptoLink Single Fibre connectors for improving reliability and ease of use of their Towed Seafloor Observation Camera platform.

Mac API - The world's only third party



▲ MacArtney is able to deliver an API connector to suit the specific need of subsea equipment (from left to right)

DNV certified

From draft to delivery, the entire Mac API connector range is designed to comply with API standards 16D and 17E - for use in critical and strictly regulated environments. What is more, the range

is certified by DNV and MacArtney is currently the world's only supplier of third party certified API connectors. MacArtney's API connectors feature a compact, however, rugged design that is ideal for securing critical connectivity

See what others can't



▲ The ARIS Explorer 1800

MacArtney is pleased to present the ARIS Adaptive Resolution Imaging Sonar - a unique high-definition system manufactured by Sound Metrics Corporation. Through the use of DIDSON acoustic lens technology, the ARIS is able to generate superior near video images in challenging water environments, where optical systems are ineffective.

Multiple applications

By offering a combination of high resolution and rapid refresh rate, the ARIS can be used for a broad variety of tasks. When mounted on a submersible vehicle, the ARIS can be used for conducting a detailed inspection of and search for geological formations, man-made objects or aquatic life. The ARIS can also be used to observe and monitor fish, mammal and crustacean activity in turbid waters. Finally, the ARIS is ideal for replacing divers in certain recovery operations and for use as an effective security sonar in dark and challenging water conditions.

Monitoring silver eels

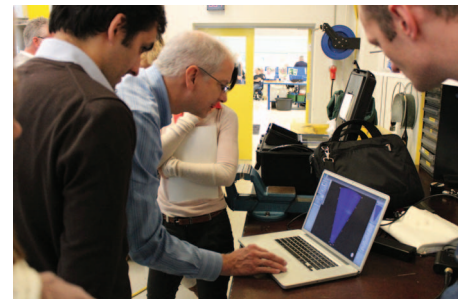
Recently, the Zoological Society of London and The Environmental Agency have been conducting a pilot study to monitor the population of endangered silver eels in a city location near London. The aim of this study is to quantify mature eel movement in a tributary of the River Thames. Initially the DIDSON system was successfully deployed and footage was continually recorded. In late 2012, the new ARIS 1800 system will replace the DIDSON - providing access to finer imaging and more detail.

The European silver eel

Recruitment of the European silver eel (*Anguilla anguilla*) has declined by up to 95% in some parts of Europe with reports of adult eel populations beginning to show a similar downward trend. This decline is believed to be a multifaceted, synergistic problem, with contributory factors including climate change and changes in oceanic currents, overfishing, pollution, coastal and riverine development, and disease - with effects impacting throughout the eel's life cycle. Despite efforts at regional, national and European levels, recruitment has not rallied. Empowered by the ARIS, the Zoological Society of London and The Environmental Agency will continue to investigate and keep abreast with this worrying development.



▲ The ARIS is used for monitoring silver eel population in challenging urban riverine environments (image courtesy of the Zoological Society of London and The Environmental Agency)



▲ ARIS Day: Sound Metrics Corporation demonstrates the ARIS at MacArtney's Danish Headquarters. The event was part of a dedicated effort by MacArtney, to continuously support the ARIS product. Attendees included representatives from all MacArtney offices, representing the Sound Metrics range of products

arty certified API connector range



o right: 4-pin, 12-pin, 24-pin and hybrid API connector)

for underwater equipment solutions. The Mac API range is widely applied for riser monitoring, drilling control and BOP (blow out preventer) systems where quality of systems and components can make the difference between safety and disaster.

Within an API context, the PBOF cable is as important as the connector. Every element of the cable is tested to ensure its integrity so that it can function even if water ingresses the hose. A boot fitted behind the connector ensures that any

water entering the hose cannot penetrate it so that the connector will continue to work for its intended lifespan - even if fully flooded. Double test ports on the API connector itself allow pressure testing of both sections. The connector is tested to full ocean depth and will work at temperatures ranging from -15 to +60 degrees Celsius.

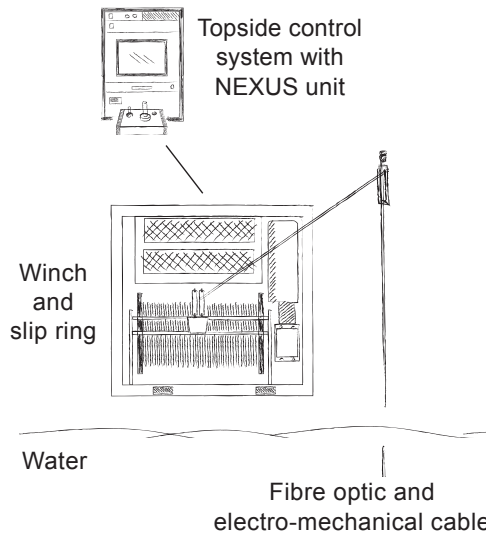
Versions

The Mac API range features a 4, 12 and 24 pin power and signal connector and a hybrid power and fibre solution, designed to minimise the number of connectors needed to operate subsea equipment. MacArtney is also able to deliver a pure fibre optic API solution.

Theme: The NEXUS of solutions

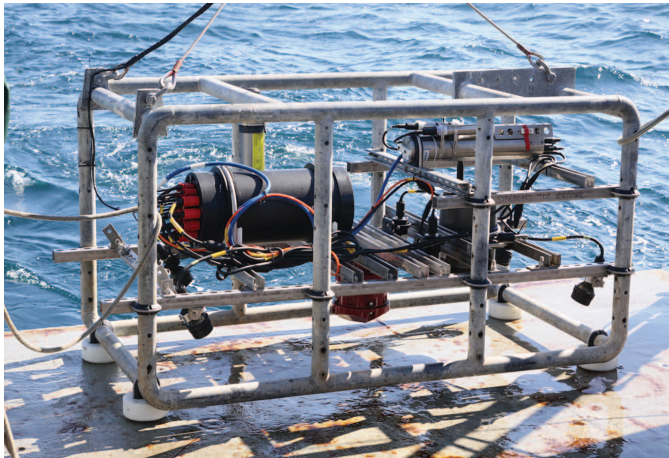
A multiplexer, or 'mux', as it is often called in everyday speech, is a telemetry system that interfaces multiple real-time electrical signals between subsea units and surface control, typically by means of fibre optics.

MacArtney's NEXUS multiplexer range is developed in close collaboration with customers and forms the backbone in many multiplexing systems installed around the world. The range includes several plug-and-play systems, ranging from standard in-stock multiplexers such as the MK III, IV, V and the non-fibre optic MK E - to the custom MK C which is often used to interface advanced trencher and ROV systems. The NEXUS range is powered by Focal multiplexer boards.



▲ NEXUS MK IV subsea pressure housing bottle
▼ installed on ROV

Visualising the consequences of disaster



▲ NEXUS MK C on MILET toolsled

In April 2010, 80 kilometres off shore, and 1.5 kilometres below the surface of the Gulf of Mexico, an explosive blowout underneath BP rig 'Deepwater Horizon', caused the most disastrous oceanic oil spill in the history of subsea drilling. For several months, authorities battled the enormous quantity of crude oil that would eventually go on to affect the ecosystem and economy of the entire gulf region.

In immediate continuation of the disaster, biological oceanographer, Dr. Ian MacDonald and his colleagues at Florida State University (FSU) and the Florida Institute of Oceanography (FIO) have been researching the impacts of the spill on life in the deep-sea realm of the Gulf of Mexico.

Understanding these impacts is crucial for charting the Gulf's recovery and preparation for future accidents. In the aftermath of Deep Water Horizon, Ian MacDonald and his colleagues are continuously involved in a broad array of consequence mapping efforts.

In the toolkit for carrying out this kind of investigative surveying, FSU has assembled the MILET (Modular

Instrument Lander and Equipment Toolsled) deep sea imaging system. Originally developed to expand the frontiers of deep-sea biochemistry and benthic image surveying in underexplored regions of the Gulf, the flexible MILET system can be used on a wide array of vessels and can carry the latest camera, sonar and sensor technology. The system is empowered by a winch and multiplexer system solution supplied by MacArtney. The multiplexer part of the system comprises a built-to-order, plug-and-play NEXUS MK C system - popularly nicknamed the 'mega mux' due to its vast number of connectivity options. The advent of high resolution digital cameras, high band width data exchange and improved acoustic navigation, all interfaced by the NEXUS multiplexer, makes the use of a lowered deep sea imaging system more powerful, giving Ian MacDonald and FSU scientists immediate access to high quality results - to be used for visualising the consequences of disaster.

Dr. Ian MacDonald, Professor of Oceanography (FSU & FIO)

"On behalf of the FSU and FIO, I'm excited about the prospective application of the 'mega-mux' in our MILET system. The concept is fairly simple - create a powered platform with a broad array of high-bandwidth interfaces to a deep-ocean unit. At present, MILET supports a USBL-navigated, video and SLR camera platform for benthic surveys, with effective operating depths of 2500 metres. In the near future, the FSU expects to add an Edgetech chirp sub bottom profiler and additional video feeds. In the long term, the MILET is envisioned to carry an in-situ mass spectrometer and other instrument systems. The convenient modular interfaces made possible by the MacArtney NEXUS MK C multiplexer, will be of key importance to the success of these planned upgrades."

Live from the volcano

At about 4 am, on October 10th, 2011, months of frequent and strong seismicity around the Canary Island of El Hierro suddenly seized, only to be replaced by a disturbingly harmonic tremor, indicating the opening of a volcanic vent. Soon after, dead fish and a large stain of pale coloured water smelling of sulphur could be observed in the waters south of the island. Occasionally, plumes of water, gasses, ash and juvenile magmatic



▲ The El Hierro submarine Volcano grows and gets closer to the surface - a new Canary Island in the making? (image courtesy of IEO)

material would penetrate the surface and spew to an altitude of up to 20 metres - a major submarine eruption had commenced.

A fortnight later, the brand new surveying vessel Ramón Margalef, from the IEO (Spanish Institute of Oceanography), had

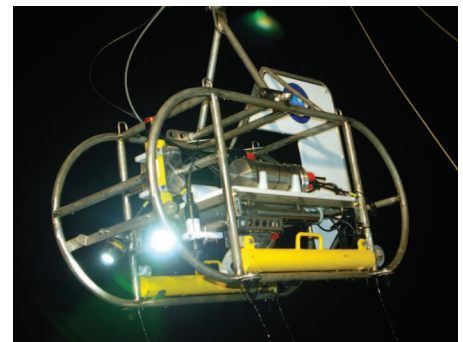
arrived to the site. The primary mission of this vessel was to observe, survey and provide detailed information about the eruptive activity occurring under the sea. For purposes like this, the Ramón Margalef is equipped with the latest echo sounder technology, sensors, ROV and not least, the 'Politolana' towed camera sledge.

Interfacing the Politolana

The Politolana camera sledge is able to descend to 2000 metres in difficult sea conditions, not least thanks to the relative simplicity of operational requirements and the extreme robustness of its structure. At the heart of this structure sits an equally robust MacArtney NEXUS MK E electrical multiplexer, which like all MacArtney products, is designed and tested to face rough conditions.

Carrying the NEXUS MK E subsea bottle, the 'Politolana' was lowered into the actual volcanic eruption and in successive approximations researchers were able to place the underwater vehicle just feet away from the lava flow coming from the volcano. Here it was subjected to the pyroclastic flows from the crater and to acidic water (pH 4.8). The vehicle and multiplexer withstood numerous high risk dives and has made it possible to obtain valuable information that is being analyzed. Facilitated by the

NEXUS multiplexer, IEO was enabled to use multiple items of equipment simultaneously, and considering the literally explosive context, such simultaneous and effective extraction of data was of key priority. Through the interfacing of multiple live video and photographic signals, the MK E allowed IEO to document development, and extract the information through the existing coax cable mounted on the vessels launch and recovery system. Moreover, the multiplexer was able to interface a set of lasers, used for measuring the size of magma formations and the volcanic crater.



▲ Onboard the Politolana, the NEXUS MK E returns from its journey to the volcano (image courtesy of IEO)

► Scan to watch the Politolana and the NEXUS MK E dive into the volcano



Interfacing IKM Subsea

MacArtney Norway has recently signed another frame agreement with international ROV supplier and operator IKM Subsea. Besides umbilicals, deck cables, slip rings, lights, connectors, penetrators and inertial sensors, the agreement includes six NEXUS MK C multiplexers, for use with IKM's advanced Merlin ROV and TMS systems.



▲ NEXUS MK C topside for IKM TMS/ROV

The multiplexer solution delivered by MacArtney consists of complete topside units installed into 19" rack boxes complete with diagnostics on both LED level and an extensive GUI for various data concerning the systems health, a TMS stack and a ROV stack. The TMS and ROV stack are delivered ready for IKM to build into their own subsea pressure housing. IKM builds several new ROV systems each year, and the systems are highly esteemed for their extreme performance, reliability and an intuitive human-machine interface. Within an extremely high-tech and demanding offshore market, ROVs are utilised for an ever increasing number of tasks. This places demand on the flexibility and quality of ROV and multiplexer systems alike. Separating the IKM MK C from the bulk of multiplexer systems, is the very high number of serial, video, HD and ethernet channels available.



▲ IKM Subsea Merlin work class ROV (image courtesy of IKM)

This multitude of connectivity options allow IKM Subsea to accommodate complex customer requirements for interfacing equipment. Through a continuous development of the multiplexer program, MacArtney is sure to deliver multiplexers to IKM that will meet demands of the future.



Local wheels on global support

At the time of writing, a big Ford pickup, hauling a huge trailer, is leaving MacArtney's workshop in Houston, Texas. This impressive 'rig' comprises the new MacArtney Inc. mobile workshop and from now and onwards, this vehicle will be taking underwater technology service and support to the facilities of MacArtney customers in any corner of the Gulf of Mexico area. In practice, the mobile workshop will perform a vast array of repair and maintenance tasks, including cable terminations, electrical and fibre optic tests.

This actual mobilisation of service capabilities, is part of the MacArtney's efforts, to put action behind its words of 'local access to global support'. According to President Lars F. Hansen,

MacArtney Inc. is experiencing an ever increasing need to be close to customers, and with the new service vehicle, MacArtney Inc. is able to minimise downtime of equipment and offer flexible support, a controlled environment and specialist tools to clients - when and where they need it.

Driving MacArtney Benelux

At the same time in Rotterdam, MacArtney Benelux is also on the road to mobile local support, as the design for an ambitious service vehicle project is currently being finalised.



▲ MacArtney Inc. mobile workshop



▲ MacArtney Inc. technicians performing on site maintenance of subsea equipment

Global Network news

USA

MacArtney Inc.
*Lars F. Hansen
President
Houston, USA*



After welcoming eight new colleagues, taking the total headcount to 21, and the successful opening of two new offices on the western seaboard, MacArtney Inc. is consolidating operations and looking ahead.

Both new offices are off to a promising start and the flow of customer visits within the local markets is already well under way. With the new MacArtney Inc. setup we are able to draw on a broad range of resources across our offices; while bringing service and support closer to the customer.

Brazil

MacArtney do Brasil
*Gavin Gracie Hunting
Managing Director
Macaé, Brazil*



Our office, operations and sales are maturing nicely and the experience already gained in our market has allowed us to cater more precisely to the needs of our clients. This past September, with the help of the Danish MacArtney engineering team, we hosted a well attended workshop for Petrobras on MacArtney's AHC winches.

After much hard work this past year, significant progress has been made on our local oceanographic and ROV winch manufacturing programme. Shortly, we hope to be able to meet our client's requirements with various local projects.

United Kingdom

MacArtney UK Ltd.
*David Buchan
Managing Director
Aberdeen, UK*



MacArtney UK Ltd. has just completed a record year in terms of turnover, allowing us to present a very healthy bottom line. The target for next year is yet again an ambitious one.

Since the publication of the latest In Depth, we have welcomed a number of new colleagues, and the headcount at the MacArtney Group's UK operations has now passed the 50 mark. We are looking forward to an exciting and very busy 2013 and despite the fact that we have only been at this location for three and a half years, we are already having to look at ways in which we can expand our facility.

France

EurOceanique S.A.
*David Mazzochi
Managing Director
Rousset, France*



At EurOceanique our experienced team is always keen to find intelligent solutions and provide expert service for our broad range of customers. To further strengthen this effort, we have secured the accession of skilful new colleagues and expanded our premises.

In the time to come, we will strive to retain and develop a strong presence as a key supplier to renewable energy projects in France and expect to land even more relevant contracts on hydrographic system sales. Finally, we expect to introduce a new pressure testing centre in the beginning of 2013.

Beating downtime

MacArtney Medium Voltage Inline Terminations are engineered to make offshore inline connections faster, easier and more effective. Cables can be terminated on site or ahead of cable laying and the actual mechanical connection of the two halves takes less than an hour, making it an ideal solution for applications with limited time windows, such as tidal energy units. The short

connection time also means that valuable ship and downtime is reduced.

MacArtney's proven and dependable medium voltage inline termination connector solutions are often used to connect dynamic cables from offshore renewable wind, tidal and wave energy converters to static export cables. They are also used to interconnect subsea units.



► *EDF (Electricité de France) launches one half of a MacArtney MV inline termination on export cable ready to connect to a subsea power conditioning unit (image courtesy of EDF)*

MacArtney welcomes

MacArtney A/S: Christian Kronborg Højen • Dan Ravn Christensen • Jane Frank Lund • Jeppe Hedeager • Jesper Wowk Lambertsen • Kristian Aasted Tobiasen • Lasse Jørgensen • Lene Rysgaard Rasmussen • Linda Munkgaard Christensen • Line Louise Vase • Lola Rosenfeldt Knudsen • Marianne Holm • Ole Skovgaard • Randi Thiim • Thomas Højbjerg Hestehave • Thomas Peter Lorenzen
MacArtney Norway: Arvid Massen • Stephen Brand
MacArtney UK: Brett Laurensen • Calum Smith • Calum Stewart • Claire Ross • Clarke Davidson • David Mayhew • Dominika Macuk-Pabich • Fiona Lourie • Michael McKessar • Peter Shaw • Sarah Pirie • Sonya Stewart
MacArtney Inc.: Maureen T. Perry • Anita Kestler • Nathaniel Borden • Don Bryan • Beto Campos • Jeff Conger
MacArtney Benelux: Jeroen Verduyck • Leendert Adrianus Klink
EuroOceanique: Brigitte Harani • Christel Mayor • Jean-Michel Rouquet • Pauline Gougay • Stéphane Burri • Thomas Leotardi
MBT: Alexander Schmidt • Jürgen Herde
MacArtney Australia: Cathie Lynette Barrett



Norway

MacArtney Norge AS
Mats Ekström
Managing Director
Stavanger, Norway

After a year in our new facilities, the move has already proved itself to be worth it. We have even experienced new customers who have simply become aware of MacArtney thanks to our new location.

We are working hard to continue growth and to further our service offerings. At the moment, our dedicated service technicians are undergoing a customised training program. All in all, 2012 has been a successful year and we have great expectations for 2013, where we will face a lot of new and exciting challenges.



Germany

MBT GmbH
Torsten Turla
Managing Director
Kiel, Germany

German governmental bodies have recently published updated figures on Unexploded Ordnance (UXO) in the North and Baltic Sea. The increasing age of the UXO and the growth of the German offshore wind industry, make survey, salvage and Explosive Ordnance Disposal (EOD) operations more important and challenging than ever. Especially cable laying requires far more efficient methods for carrying out preceding UXO surveys. Together with potential clients and manufacturers of magnetic sensors, MacArtney has developed a concept for combined acoustic and magnetic UXO survey, based on the FOCUS-2 system. Sea trials are to take place in spring 2013.



The Netherlands

MacArtney Benelux BV
Ron Voerman
Managing Director
Rotterdam, Netherlands

At MacArtney Benelux we are pleased with the progress shown by the LUXUS cameras and lights series.

We expect to introduce more additions to the range in the forthcoming year.

At as well our office in Rotterdam as our new Belgian sales office, we are currently busy with a multitude of exciting orders, and expect to carry on the positive tendencies in the year to come.



Australia

MacArtney Australia Ltd Pty
Cathie Lynette Barrett
Office Manager
Perth, Australia

MacArtney Australia is pleased to report that the new Oceanian office is off to a good start. After a period of settling in and implementing procedures, our operations is now up and running.

There is a sense that stakeholders within the Oceanian underwater technology business are truly becoming aware of our local presence. Giving evidence to the gradual acceleration of business, connector shelves are often refilled and the warehouse is stocked with cable and assemblies ready for shipment. MacArtney Australia remains determined to follow up on this positive development in the future.

Corporate expansions

MacArtney boosts presence in offshore Oceania

On the 3rd of September 2012, MacArtney Underwater Technology opened the doors to its first subsidiary in Oceania.

Located in the major offshore hub of Perth, MacArtney Australia provides an increased sales base, offering access to larger stock and capacity, resulting in even better service and faster delivery. In addition, the new subsidiary offers local access to global knowledge and know-how within underwater technology, with direct access to sales, advice and services for all MacArtney products.

Finally, MacArtney Australia offers a standing stock of SubConn[®] connectors and cables for immediate delivery.

According to recently appointed Office Manager, Cathie Lynette Barrett, the new subsidiary has already come a long way in terms of getting settled within the local market for underwater technology. In fact, the office was not past its first week of operation, before exciting orders started to come in.



▲ *MacArtney Channel Sales Manager Steen Frejo and Cathie Lynette Barrett inaugurate the new premises*

International executives to strengthen MacArtney board

The MacArtney Underwater Technology Group is pleased

to reveal the accession of two new members to its board of directors. The new board members, Slimane Bouabbane and Jón Ferrier, are both senior executives with well developed international profiles and vast professional experience, obtained through residence and employment in organisations across the world. MacArtney CEO Niels Erik Hedeager is keen to welcome the new board members and is confident that they will provide a valuable injection of international and professional experience, to further empower the global focus of MacArtney Underwater Technology.



▲ *Jón Ferrier and Slimane Bouabbane*

Underwater technology from coast-to-coast

With two recently opened offices on the western seaboard, MacArtney Inc. has continued the expansion in the US.

From its base in Victoria, Canada, MacArtney Pacific North West Operations strengthens MacArtney's relationship with underwater technology customers, especially OEMs and the renewable energy industry, located on the American north-western seaboard. Out of San Diego, California, MacArtney West Coast Operations will serve the subsea requirements of major OEM, offshore, ocean science and defence clients within the area. Exclusively for the state of California, MacArtney has secured a representative agreement with Brock Rosenthal's Ocean Innovations, to manage sales of SubConn[®] connectors. All other system and item sales in California and SubConn[®] sales in other West Coast states, will be handled directly by MacArtney West Coast.



▲ *MacArtney Inc. offices*

The new offices complete MacArtney's coast-to-coast coverage of the North American underwater technology market and provide an increased sales base, with access to larger stock, capacity and even faster delivery for local MacArtney and SubConn[®] customers. The offices have a strong team in place, bringing in vast experience from the underwater technology industry. In February 2013, both new offices will host open house events, where interested parties can experience the capabilities of the new MacArtney Inc. setup.

Belgian office extends MacArtney's presence in Benelux

MacArtney has further strengthened its local presence in Benelux with the opening of a new sales office in Belgium.



▲ *Jeroen Verduyssen*

Located in Brakel near Brussels, the Belgian office will be in the hands of area manager Jeroen Verduyssen. Jeroen has been active in the offshore industry for more than 10 years. As an electronics engineer, he has been involved in seismic, ROV, and side scan sonar operations. The past few years, he has been employed as a sales engineer. As a member of the MacArtney Group, the new office offers local access to global knowledge and know-how within underwater technology, with direct access to all MacArtney products and services.

Meet us in person on our stands at these exhibitions

- Underwater Intervention 2013, New Orleans, USA, 15th - 17th January 2013, stand no. 320 and 322
- Subsea Tieback 2013, San Antonio, Texas, USA, 5th - 7th March 2013, stand no. 915
- Ocean Business 2013, Southampton, UK, 9th - 11th April 2013, stand no. B1
- Ocean Technology Workshop 2013, Newport, Rhode Island, USA, 21st - 24th May 2013
- Energy Ocean International 2013, Warwick, Rhode Island, USA, 10th - 12th June 2013, stand no. 606