MacArtney
UNDERWATER TECHNOLOGY

In Depth

Q3 2010

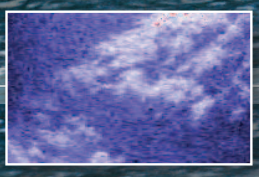
The strongest link - pages 1 and 2

New MacArtney API technology for blow out preventers and subsea completetion

Acoustic imaging reveals new detail of lost town - page 6

Providing the full package at MacArtney UK - page 4

Pressure testing in motion - page 5


New solutions through new technology

I see activities in the underwater industry becoming increasingly reliant on advanced technology. Challenges at depth or in shallow, murky waters require advanced solutions. While we provide complete systems for all depths, we also develop new technology for integration into bigger systems, as with the infrastructure package for Hydril's new blow out preventers.

In the oil and gas industry, equipment must withstand great depths as drilling moves into deep water. Vital equipment becomes increasingly reliant on technological advances to ensure reliability. New products, like the new American Petroleum Institute (API) certified connector range, underline our commitment to subsea completion and blow out preventers.

As drilling goes deeper, so must supporting equipment, which must also withstand enormous forces. Pressure testing has taken a step forward as we offer testing of moving parts inside the test tank. This addition to our scope of solutions and services is a useful tool for observing the effect of deep water on underwater equipment.

In this edition of In Depth we also cover a new application for existing technology. Sonar imaging opens turbid waters for underwater archaeology and helps safeguard valuable historic sites. Sonar pictures provide historians with a view of artefacts long since lost to the waves in the drowned English town of Dunwich. Identification and study of this site will help planners make informed decisions about coastal planning.

Niels Erik Hedeager, CEO

The strongest link

Hydril's new blow out preventer includes a power and communications infrastructure package from MacArtney.

Blow out preventers can make the difference between safety and disaster at offshore drilling sites. Installed to protect lives and the environment, there can be no room for error. MacArtney's new American Petroleum Institute (API) approved connector helps ensure Hydril's new blow out preventer system will function if needed.

When failure cannot lead to disaster
Critical to safety and to the environment, blow out preventers, or BOPs, are advanced valves that react to sudden pressure at an oil well, shutting down the well and averting blow outs.

They are essential for preventing loss of life at drilling sites and for stopping leaks that are potentially catastrophic for personnel, for the environment and financially.

Risks and standards
Automatic BOP systems constantly monitor the well and are designed to be fail-safe devices.

Not only must they be periodically inspected and tested, the American Petroleum Institute sets standards that are clear about the types of risks against which such equipment must be protected. New designs are rigorously tested and certified and each element must meet stringent requirements before being API certified.

The size of the preventers and the depth at which they are deployed makes them impractical to bring to the surface often for testing.

And as drilling sites are in increasingly deeper waters, BOPs have become more advanced. They must withstand the increased pressures at depth and they must also be reliable enough to permit increased intervals between tests or servicing.

Systems and equipment on the BOP can be submerged for up to a year between servicing and must therefore be resilient to the harsh underwater environment.

Ensuring reliability
When Hydril was designing their new BOP Control System, they needed a complete infrastructure package that met the strict standards for testing and reliability stipulated by the American Petroleum Institute. The connector system within the complete unit needed be able to withstand submersion for extended periods and accommodate several failure modes stipulated in the American Petroleum Institute Pressure Controls guidelines.

These stipulations included the requirement for the umbilical or termination assembly to function even when fully flooded with seawater and continue to operate for an extended period without conductor failure.
A comprehensive design, build, test and deploy, programme was implemented to fulfil the requirements of outfitting Hydril with three rig packages and just as many spares and test units.

The brief was to fulfil American Petroleum Institute standards 16D for testing when assembled and the harder to attain 17E for functionality when flooded.

Functioning when flooded
Ensuring that connectors for the infrastructure system would function even if the cable was flooded required the combination of several design features.

A boot was fitted behind the connector to ensure that any water entering the cable cannot penetrate to the connector and the connector will continue to work for its intended lifespan even with water flooding in the cable right up to the boot.

For 17E standard certification, the cable is as important as the connector. The cable was selected for its ability to withstand wear underwater. The conductors inside the cable are also protected to prevent water ingress shorting the connections.

Testing when assembled
Critical to the design was ensuring that the connector could be tested for integrity once assembled.

MacArtney designed and integrated double test ports on the API connector itself to allow pressure testing of both sections after mating and before the connection is lowered into the water.

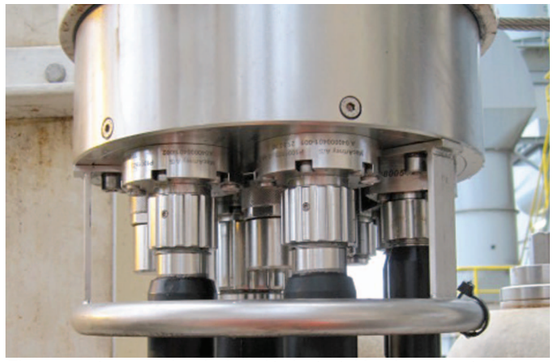
Thorough testing at each stage
Each system needed to be fail-proof on delivery and was tested at various stages of production and completion. Every element in the cable was tested individually before construction to ensure that they were entirely intact and fully functional.

The cable, and then the connector and cable were pressure tested before completion. The entire cable and connector unit were ultimately pressure tested prior to inclusion in the infrastructure package.

Complete system delivery
The system has evolved over several years into a comprehensive high reliability power and communications infrastructure package for semi-submersible drilling rigs in operation around the world.

The complete infrastructure package includes fibre optic media converter, multiplexer, MUX cable, slip ring, subsea stress termination, subsea FITA terminations, all subsea harness cable and POD connections.

The birth of a new range
The connectors have achieved a type certification that controls various design parameters and governs the production, testing procedures and metrics.
MacArtney can vary the connector form factor of these connectors provided they fall under the type certification requirements and now offers a range of API (American Petroleum Institute) approved connectors.



The connectors are also designed to be testable when mounted via two access points.

API connectors have a wide range of uses for subsea completion and blow out preventers.

Providing the full package

MacArtney UK's new premises houses a wide range of specialised services

When MacArtney UK opened the doors of its 3000m² purpose built premises in the heart of the oil and gas industrial district in Aberdeen it was with plans to become a one stop underwater technology shop.

Eighteen months later this promise has been fulfilled and faster delivery times, system solutions and local access to the global MacArtney network are all made possible by the many specialised workshops and services that are available.

Complete package
The underwater technology market is increasingly calling for complete, turnkey solutions that ensure element compatibility. Often products need to work together as systems and a wide range of knowledge is essential for providing these integrated solutions.

Having all this knowledge under one roof is convenient and helps to ensure that systems function as intended from the outset.

Specialised services in one location
MacArtney UK has grouped a wide range of skills and services in one location and offers complete packages for supply, service and repair.

The workshops offer computer controlled machining, fibre optic work, slipring service and repair and cable moulding and assembly. In addition to the workshop facilities the UK operation provides winches, slip rings, cables, connectors, underwater vehicles, cable terminations and a wide range of other technologies.

MacArtney Group engineers have 30 years experience designing solutions that solve problems and challenges found in the underwater technology market.

MacArtney UK has a 300 m² workshop entirely dedicated to cable and connector moulding. Ten full time moulding technicians produce thousands of cable mouldings for UK customers and for the rest of the MacArtney group. This UK facility is ideal for large orders and production work.

The advanced machining workshop houses four Computer Numeric Controlled (or CNC) machines. They accurately machine all types of metal and plastic parts including mould tools, standard metal terminations and pressure vessels for the MacArtney group.

MacArtney UK also has the largest certified slip ring repair workshop outside of Focal Technologies own facility in Canada. Three fully trained engineers perform complete refurbishments and fibre optic testing on slip rings. This Aberdeen facility uses the same equipment and processes as Focal do in their own workshops in Canada ensuring equally high standards of slip ring servicing and repair.

Technicians in the fibre optic workshops produce MacArtney's standard Optolink fibre optic connector range and can carry out a wide range of other fibre optic work, including OTDR testing and fusion splicing.

Faster delivery
The Aberdeen workshops provide UK customers with short delivery times and fast reaction times.
Working in close cooperation with all the workshops in the MacArtney group, they ensure that orders – large or small – can be delivered quickly and to a uniform high standard.

Not only can MacArtney UK provide a full range of products and services from their Aberdeen base, making delivery more convenient, they can also offer service and testing on site.

MacArtney UK offers:
- Metal terminations and machining
- Cable moulding workshop
- Slip ring repair workshop
- Fibre optic workshop
- Extensive cable stock
- Spooling facility
- Pressure test facilities
- Testing and certification
- Fully offshore certified technicians

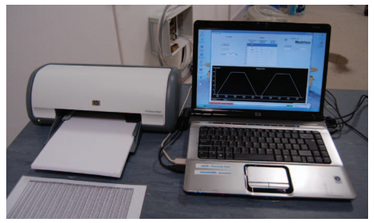

Computer controlled machining ensures precision


Skilled engineers ensure consistent standards


MacArtney UK has extensive warehouses

Pressure testing in motion


Deep water puts enormous pressure on underwater equipment, as demonstrated with this polystyrene cup taken down to simulated full ocean depth. This classic demonstration shows the compressed cup to the left and the original size on the right.


Software for the computer controlled pressure tank can be customised. It logs data, pressure per second and a range of other perimeters.

The pressure tank can run cycles of testing to simulate real use in the water, including repeated descents, ascents and extended periods at depth.

Knowing how equipment is going to perform at depth is critical for ensuring reliability deep underwater. Unexpected delays due to failure and resulting ship down time can be costly. Testing in pressure tanks is an excellent way of ensuring that products can withstand pressures right down to ocean depth.

However, if you want to be sure that moving parts function as expected under pressure then they need to be pressure tested while working.

Working under pressure
When Sub Atlantic designed and built a specialist ROV for 6 kilometre operations with electric thrusters, they wanted to check the current draw of their motors at 6 kilometre depth. They needed to find a pressure tank that could perform cycles of pressure tests while the motors were running.

Not only did the tank need to allow a working connection between a power source and the equipment, it also had to be large enough to accommodate the thrusters.

MacArtney UK in Aberdeen was able to help them with this unusual request. Their 600 mm diameter pressure test tank had ample room for the electric thrusters.

The four lid penetrations allowed the thrusters to be lowered into the 1500 mm deep tank and connected to the Sub Atlantic motors.

Testing at simulated depth
A computer controlled testing programme ran cycles of testing to a pressure of 600 bar – at which it was held for an extended period to realistically test the thrusters and measure the current draw at a simulated depth of 6 kilometres.

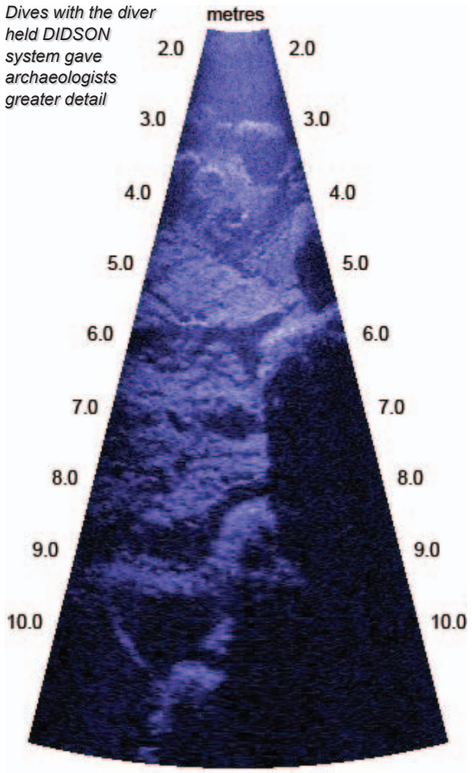
Advanced testing facilities
MacArtney UK's tank, which can even accommodate a cable reel for testing, is computer controlled and offers computer generated profile programming.

Electrical and optical measurements are real time, and equipment inside the tank can be monitored via camera.

Penetrators are incorporated into the lid of the tank for connectors and can be interchanged to allow for a range of connector types.

An overhead crane facility ensures that even very heavy items up to 2000 kg can easily be pressure tested.

Acoustic imaging reveals new detail of lost town



Dives with the diver held DIDSON system gave archaeologists greater detail

Off the coast of the Dunwich in Suffolk lies half a medieval town long since abandoned to the encroaching sea. Despite many diver and sonar surveys, the extent and detail of the well-known site are still unknown as poor visibility frustrates its study.

In June 2010, acoustic imaging technology was introduced to archaeological survey of the site, revealing hitherto unknown detail of the underwater remains.

Hidden secrets from the past

The site of the sunken town of Dunwich has been the subject of debate for several centuries and the question of how much of the ancient capital of East Anglia remains just off the coast has been the subject of countless diving and archaeology projects. Since the 1300's, historic buildings have been lost to the relentless encroachment of the North Sea but attempts to gain any detailed view of what lies beneath the water, the silt and the sand off the coast have been frustrated by the poor visibility near the seabed.

Tidal and wave currents keep fine sediments from the seabed in suspension, causing the very poor visibility within lower metres of the seawater that limits diving and hampers archaeological survey. This is a particular problem off Dunwich because the site is dispersed over the seabed and many of the remains are fragmentary. Conventional optical systems generate blank screens in such conditions and the industry has turned to sonar imaging as an alternative. Modern side scan sonar and multi-beam echo sounders have located and visualised the site but the resolution is limited and the images lack the detail needed to differentiate carved stonework or building materials from naturally occurring geological formations.

Although considerable advances in side scan sonar and multibeam echo sounders have enabled detection and visualisation of wrecks and sea floor sediments, these are still limited by resolution. Diver survey is still required to identify targets where the remains are not discrete wrecks.

Advanced technology gave results

In June 2010, a team working with the BBC and MacArtney Underwater Technology employed new technology to examine the Dunwich site. Marine Archaeology Professor, David Sear, based at the University of Southampton's School of Geography teamed up with divers including Andy Rose from the diving instructor company, Learn Scuba, based in Lowestoft, and enlisted the help of sonar imaging expert, Mike Sawkins from the MacArtney Underwater Technology Group. They deployed a special sonar camera, the diver held (or DH) DIDSON.

Each diver clipped onto a shot line which had been previously positioned over the ruins using GPS navigation and side scan sonar data. The divers could then undertake circular sweeps of the sea bed around the shot line, gradually increasing their radius of survey. A set of data was taken hanging over the ruins at a distance of between 8-15 metres and the second set for close up visualisation at 1-5 metres within the ruins.

Television presenter and historian, Dan Snow, (left) and Mike Sawkins from MacArtney (right) with the DH DIDSON system.

The combination of high frequencies, acoustic lenses and very narrow beams increased the image detail and gave archaeologists greater detail of the site than ever before available:
The DIDSON diver held system enabled us to see for the first time the worked and rubble masonry on the seabed from the ruins of St Katherines Chapel and St Nicholas Church lost to the sea in c.1550 and 1480 respectively. This ability starts to open up the options for marine archaeology in near shore shallow turbid waters around coasts," explained Professor Sear from the University of Southampton's School of Geography

Changing underwater archaeology

Recent surveys of the coastline of the UK have highlighted the extent of non-wreck marine archaeology associated with buildings and settlements that to date are unprotected by law and largely unexplored. Such areas are often subject to development and as such require effective techniques for assessing heritage and archaeology as part of development control and planning.

This field trial, which was the first ever use of the DIDSON imaging system for non-wreck marine archaeology, could change the way archaeologists examine offshore sites where visibility is low, especially where the coastline is silted by rivers or eroded away by the sea.

MacArtney Group news

MacArtney UK

David Buchan
Managing Director
United Kingdom

The UK market remains busy with strong activity in all workshops and sales. The Oil and Gas, ROV and Renewable Energy markets are all buzzing with new and interesting enquiries.

Also seeing increased use is the 600 bar pressure test facility. We are therefore looking forward to the end of the financial year at the end of September and expect results to be even better than anticipated.

We are also pleased to welcome our new Human Resources Supervisor, Pamela Corringham.

EurOceanique

David Mazzochi
Managing Director
France

EurOceanique is enjoying the increasing activity that started before the summer period and has continued. Our activity levels are breaking company records.

The workshop is still growing in capability and in staff members, and we will be employing another technician this September.

MacArtney Norway

Anders Andersen
Managing Director
Norway

We have just returned from the ONS exhibition in Stavanger. MacArtney Norway has exhibited at this biannual event for over 24 years and watched it grow year by year. ONS was visited by 47,000 people this year and after all the visits and meetings that we have held, we were pleased to welcome a number of new customers and were delighted to catch up with existing customers. They confirm MacArtney as a serious system provider.
This exhibition is one of the most important for the MacArtney Group and we have already booked our place for 2012, where we are planning to be bigger and more distinctive than ever before.

MacArtney Benelux

Ron Voerman
Managing Director
The Netherlands

MacArtney Benelux has now completed the move to new premises. We are very busy and will soon be welcoming new colleagues to help us with the amount of work.

The new video controller, the P1, has been launched very successfully onto the underwater camera market and a new series of controllers will be produced soon.

The smaller C3 controller is still available and a series of 5 is currently in production.

This financial year was very exciting and we are looking forward to the next.

MacArtney Offshore

Chris Howerter
Managing Director
United States

Our office continues to grow with two new employees in our service department.

We have new sales support staff for our workshop and a fully capable winch and NEXUS service technician.

We are looking to boosting our relationships with our customers in those areas.

Our office is at full operating capacity now and we look forward to the coming years.

MBT GmbH

Torsten Turla
Managing Director
Germany

MBT has received the contract for a complete hydrographic instrumentation package for Abeking & Rasmussen's SWATH concept for various applications, including off-shore, pilot support, coast guards, survey and diving support.
We are also proud to announce two further contracts for DIDSON sonars. DIDSON is increasingly seen as the standard investigation tool for fish stock monitoring in inland waters in Germany.
The FAT for the TRIAXUS system for the Institute of Hydrobiology, Hamburg is scheduled for October. This is the second system for German fishery research.

Latest news in brief

Read the full story on www.macartney.com under the “news” section

Royal visit to the MacArtney stand at the Rio Oil & Gas exhibition in Brazil

We were delighted to welcome HRH Prince Joachim of Denmark to our stand at the Rio Oil & Gas conference. Our stand was part of the Danish delegation that included other Danish companies, including Maersk Oil, VIKING NKT and Welltec.
The Prince was shown innovative MacArtney solutions, like the electric AHC winch that compensates for wave movement and API connectors with their dual pressure test valves that can be tested while mounted.

HRH showed particular interest in the NEXUS fibre optic multiplexer, which has continued to evolved as an independent product since it was first designed for the MacArtney FOCUS ROTV system.

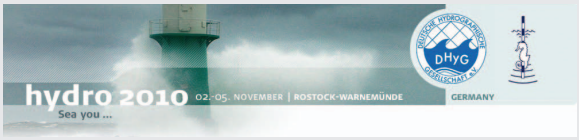
Faster delivery times for underwater connectors as SubConn Inc acquires Cornerstone

SubConn customers are set to benefit from faster lead times and increased product support as the leading connector manufacturer recently purchased the assets of their main supplier of inner machined parts, Cornerstone.
This acquisition has brought the entire manufacturing process of underwater connectors under one roof and will streamline production.
Along with the machining capabilities, SubConn now has an additional 11,250 square feet of space and doubled its production capacity. With an increase in headcount of approx. 30%, they have gained a skilled engineering workforce and increased their engineering potential for new product development and customer support.

Meet us in person on our stands at these exhibitions

SEL European Coastline Fair
Parc des Expositions du Pays de Lorient,
Brittany France
5th - 7th October 2010

Meet us on stand 110



Hydro 2010
Rostock-Warnemünde, Germany
2nd – 5th November 2010

Meet us on stand 63 and 64

We will also be visiting:

The Saudi Arabia International Oil & Gas Exhibition & Conference
Damman, Saudi Arabien
10th - 12th October 2010

OTD - Offshore Technology Days
Arenum Exhibition Center, Bergen, Norway
13th - 14th October 2010

This newsletter is produced by the MacArtney Underwater Technology Group • MacArtney A/S, Gl. Guldagervej 48, 6710 Esbjerg V, Denmark • Editor: Stephanie J. C. Pedersen • Editor in chief: Niels Erik Hedeager, CEO