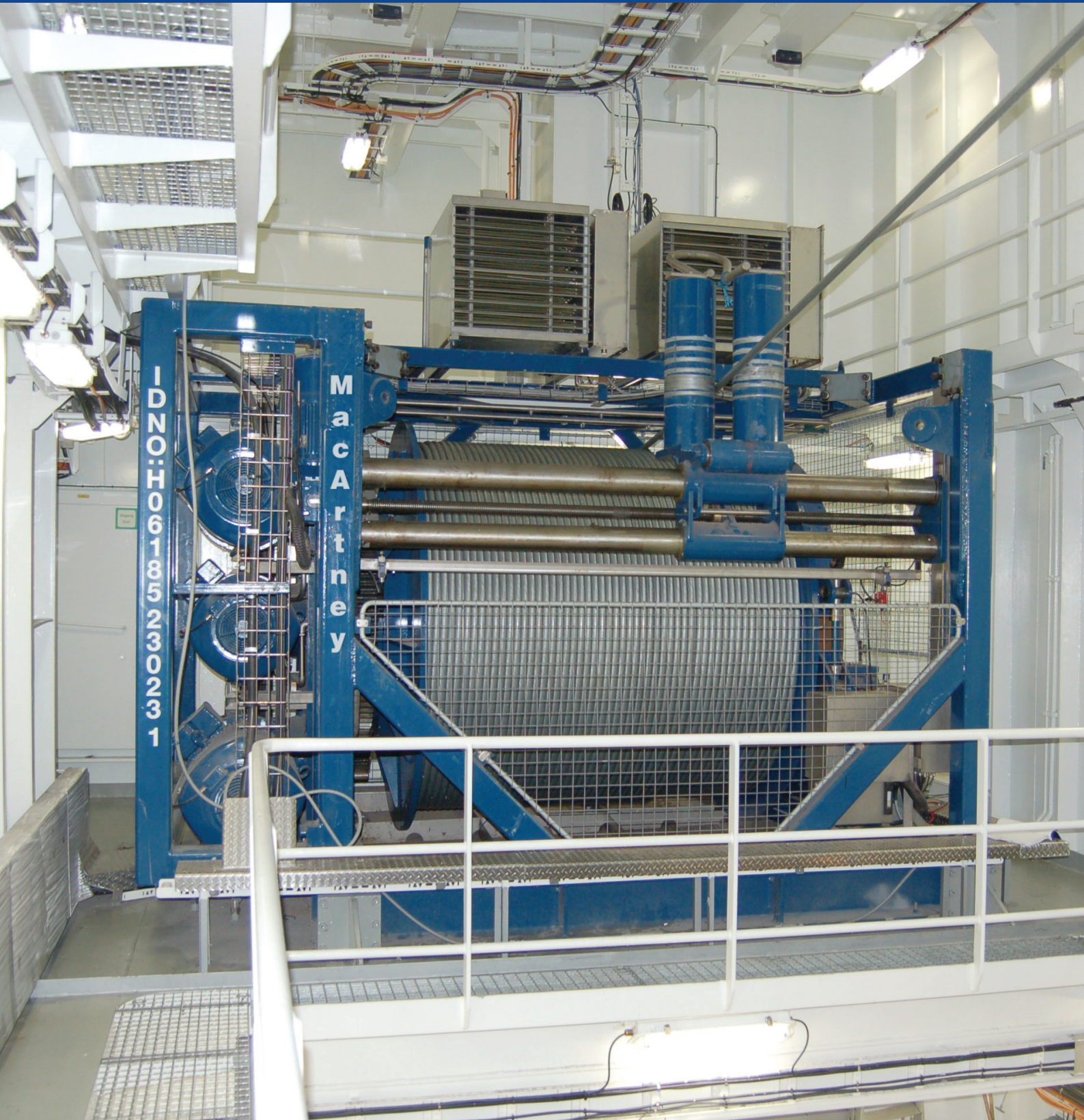


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**CONNECTORS/CABLES/WINCHES;
OFFSHORE RENEWABLES**

New generation of AHC winch systems

The MacArtney Group rolls out the next generation of active heave compensation (AHC) winch systems

As the offshore oil and gas industry increasingly exploits oil and gas occurrences at ever greater water depths and in harsher climatic environments, the requirements put on the technology employed to overcome the challenges of these environments are also increasing. Providers of underwater technology systems and the offshore industry are therefore entering into partnerships in order to specify and develop new technologies to address the increased demands of the market.

The MacArtney Group has been developing and supplying winch systems for the offshore market for many years. Experience from delivering more than 400 winch systems, a dedication to supply smarter solutions and close collaboration with the ROV operator industry, has formed the background for MacArtney's development of a new generation of AHC winch systems.

The new MacArtney AHC winch has been well received by ROV operators, with seven systems delivered since its introduction in the autumn 2006 and another 12 systems in the order book. An AHC winch was recently delivered to Oceaneering AS in Norway. The company performs a wide range of services for the oil industry on the Norwegian Continental Shelf and Europe using ROV systems and underwater technology – from remote construction support and survey to drilling and completion support, structural and platform inspection as well as maintenance and repairs.

MacArtney A/S

The MacArtney Group is a worldwide organisation of companies specialising in the sale and service of underwater technology systems and products. The Group's headquarters in Esbjerg, Denmark, established in 1978, supports subsidiary companies in Norway, Benelux, the UK, France,



Three powerful electrical motors drive the AHC winch chosen by Oceaneering

Germany and the United States. Each independent company has been incorporated to meet the indigenous requirements of the local area while being fully supported by the parent company, MacArtney A/S, which co-ordinates activities such as product development, system integration, training, quality assurance, financial support and marketing.

Underwater technology covers a highly diverse market which includes: offshore oil and gas geophysical exploration and development and production; diverse mili-

tary activities, including mine countermeasures; civil engineering; underwater security; ocean sciences; environmental studies; and research and leisure activities.

MacArtney's policy is to deliver tried and tested technical systems solutions to the problems encountered in this harsh working environment. The organisation is controlled by an established certified DNV - ISO 9001:2000 quality assurance programme, which was established in 1993.

The company has shown a sustainable

growth and financial stability over the past couple of decades and is currently rated AAA by the international financial company Dun and Bradstreet.

MacArtney employs more than 160 qualified people worldwide.

Winch products

A correctly designed cable handling system can substantially extend the working life of most underwater systems; ROVs, towed systems, corers, ploughs, diving systems and so on. Traditionally MacArtney has supplied "systems solutions". These are integrated systems of cables, slip rings, winches, sheaves and launch and recovery systems. All systems are engineered, tested and certified to suit the customer application.

All winches and cable handling systems are manufactured under control from the headquarters in Esbjerg, Denmark, facilitating co-ordinated engineering, design, production, system integration and certification.

One of the objectives of the MacArtney winch engineering team is to standardise the winch designs wherever possible, which has proven to be a strong marketing factor. It cuts costs, shortens delivery time, standardises spare parts and reduces documentation and certification time. However, time has confirmed the Group's capability of understanding customers' often special requirements for highly purpose built systems.

These systems include varieties such as subsea winches, traction systems with 10,000-metre cable for offshore pipe inspection that require full ATEX certification and NORSOK compliance, as well as all electrical AHC winch systems with a SWL (safe working load) of up to 12 tonnes and a speed of up to 140 metres per minute.

Standard products are available in the following categories:

- Manually driven winches for deck storage
- Stainless steel electrical winches
- Oceanographic winches
- ROV winches
- Right angle winches
- Launch & recovery systems

Most of MacArtney's winch systems, from the smallest stainless steel winch to the biggest AHC ROV winch, are electrically driven winches. This is a result of huge improvements to core technology of



The PLC-controlled level wind

the frequency converters available on the market today and many years of constant development work within the Group.

The AHC winch

The active heave compensated ROV winch Oceaneering has chosen for several ROV systems in its fleet is designed for an umbilical of 3400 metres in length and 34 millimetres in diameter. It will be used in connection with Oceaneering's medium to large sized work-class ROV systems, but can also be used for trunks.

The basic winch design features an incorporated and very compact protection frame, direct drive level wind, variable speed, fail safe brake, PLC (programmable logic controllers) control, motion reference unit (MRU) and IP56 protection of electrical parts. As with all of the winches from MacArtney, there are fork lift pockets and pad eyes for lifting.

Oceaneering's AHC winch is the latest generation of super high-speed AHC winch systems with a SWL of up to 12 tonnes at cable speeds from 0 to 120 metres per minute. The active heave compensation is based on input from a Kongsberg (Norway) MRU 5, which forms an integral part of the system. This feature allows for safe and controlled docking of an ROV into the TMS (tether management system). The time difference from input to output in the control system is extremely short, securing an oper-

ational mode without phase shift.

Three powerful electrical motors supply more than 100 kilowatts of power that, through planetary angled gears and an overall ring gear, drives the winch. All functions of the complete winch system, as well as the AHC functionality and a whole string of other control options, are made available through the highly advanced built-in PLC control system. MacArtney is in possession of some of the most advanced and complex control systems available on the market today. The HMI (human-machine interface) operators panel has an ethernet connection which works as a web server. From here all winch operations can be monitored from any computer with internet access. PLC programmes can also be modified and monitored.

As with the majority of MacArtney's winch designs, the AHC winch incorporates a separate drive for the level wind, which is synchronised with the drum through the use of encoders (rotating counters) and controlled by the PLC. The quality of spooling with such a system is unique. Imagine the accuracy of dividing the rotation of the level wind trapeze spindle into 4096 pulses, compared to a conventional diamond spindle with fabrication tolerance and a mechanical gear exchange from the drum. In most cases this gear exchange involves compromises as the theoretical



Programming the PLC

ratio is not possible in reality.

The separate drive also allows for a change of cable diameter when needed (with this system between 31 to 45 millimetres). The operator is only required to change the cable parameters in the software – as opposed to replacing an expensive diamond spindle and gear train. Adjustable turning points for the level wind at the drum flanges compensate for changes in the cable's physical dimensions due to wear.

From the HMI operator panel or via any PC connected to the winch, basic parameters such as load, speed, length of cable out, remaining cable on the drum and actual layer, as well as cable characteristics and alarms and shutdowns, are

available on the screen. The screen layout can be altered to suit customer requirements.

The HMI also allows for interface with other software systems communicating with the winch control system. This feature is among others used with the MacArtney FOCUS-2 and TRIAXUS towed vehicle systems, where cable length, load and cable speed are parameters used by the vehicles' control systems to control the flight characteristics of the underwater vehicle.

System options

System options to the AHC system as well as to all other MacArtney PLC-controlled winch systems include wireless remote control, touch screen remote control station, control of winch by other customer signals (i.e. depth sensors) and constant tension with preset upper and lower values.

The MacArtney PLC control system may also, depending on the type of operation, include various operational modes, such as:

- Deck handling (decreased speed range on the joystick)
- Stop at pre-programmed depth
- Emergency recovery

- Automatic stop at eight turns of cable left on the drum

Other customer specified features as well as an endless number of operational stations with safe command transfer between them are also available.

The AHC winch systems for Oceaneering have been delivered according to DNV Rules for Certification of Lifting Appliances and the electrical installation and components have been delivered according to DNV Rules for Classification of Mobile Offshore Units.

Future

The new generation AHC winch for Oceaneering is one of the most advanced ROV winches on the market. The MacArtney Group continues to develop new winch systems to suit the increasing demands from the offshore sector. Design criteria for future winch systems include faster and more powerful AHC winch systems in order to reduce down time due to weather. Workers' safety in terms of reducing the noise level and demands for environment friendly technology are also parameters. As well as more compact designs, MacArtney's winch engineers are addressing in their design efforts solutions to reduce the running costs of the systems. ■