

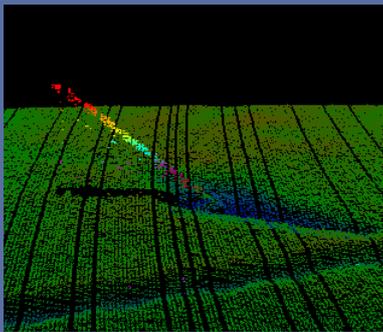


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The SUBSEA newsletter

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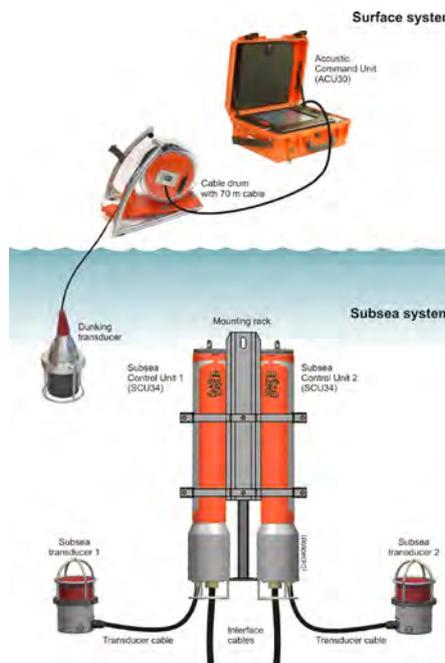
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New emergency Acoustic BOP Control System

The next generation of Kongsberg Maritime's Emergency Acoustic BOP (BlowOut Preventer) Control System, the ACS 500 uses the new proprietary 'Cymbal' signal processing protocol for optimal data communication at long distances.



With a depth rating of 4000m, it is a robust, reliable and user-friendly system designed for use in emergency drilling or production situations, when the primary BOP control system has failed. The ACS 500 has already been supplied for use aboard a drill ship working in deep water areas.

Extra level of safety

“As a leading developer of acoustic subsea systems for the offshore oil & gas industry, Kongsberg Maritime's new ACS 500 benefits from the technical knowledge we have acquired

over decades of subsea acoustic R&D and product development, and project experience across a wide variety of applications that are dependant on acoustic communication,” comments Finn Tore Knudsen, Senior R&D Engineer/ Underwater navigation, Kongsberg Maritime. “With an industry leading 4000m depth rating, a wider number of projects can benefit from the extra level of safety and confidence that our new Emergency Acoustic BOP Control System can provide.”

The ACS 500's portable surface system consists of an Acoustic Command Unit (ACU), which is used for sending acoustic command signals for the BOP when the primary control system isn't available, and a dunking transducer that has 70m of cable and can be carried by a single person. Kongsberg Maritime offers a choice of two dunking transducer heads; a standard 4000m depth version using a 30 degree conical main lobe and a wider one for shallower waters. The ACU is a required part of the safety equipment on an oil rig and along with the dunking transducer, may be taken on to a lifeboat or into a helicopter and used to close the well if a Blow out accident should take place.

Read more on page 2

It is housed in a splash-proof portable case, with carrying handle and strap for easy deployment and features an internal rechargeable battery with over 10 hours of operation per charge.

It is easily operated via the PC display using a touch screen/trackball combination. An alternative operator function on the ACU, which may be specified by the customer, is the EME Emergency system, which may perform a single automatic and predefined sequence of BOP valve operations with a two-hand/two-button operation. The ACS system may also be operated from Kongsberg Maritime's High Precision Acoustic Positioning system, HiPAP, which is normally installed aboard the floating drilling unit.

Full redundancy

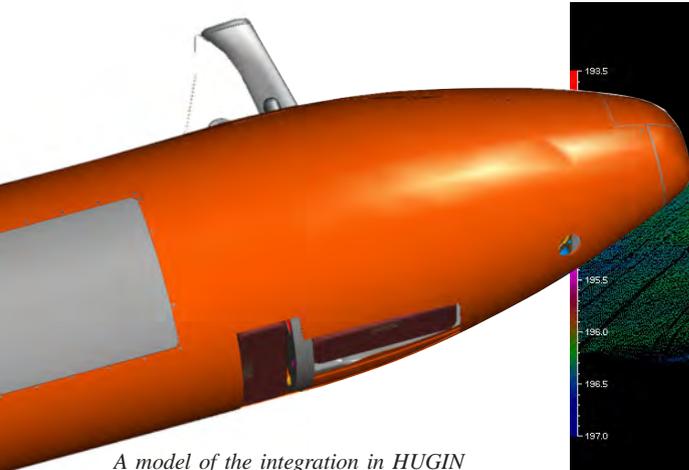
For full redundancy, the ACS 500's subsea system consists of two separate Subsea Control Units (SCU) and two Subsea Communication Transducers along with two interface cables to the BOP. The SCUs are mounted on the BOP and translate acoustic command signals from the ACU into operational commands, which are used to operate hydraulic control valves on the BOP.

Once the command signal has been given (by the operator), a confirmation signal is transmitted by the SCU to the ACU. For improved reliability, the control system can also read the status of the SCU including various hydraulic control valves and sensor read backs.

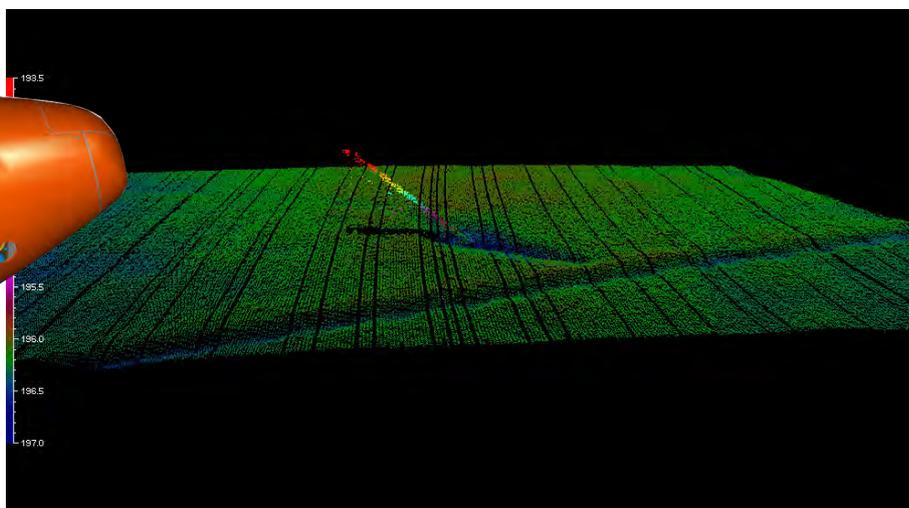
For further technical information contact Arne Furdal, Product Manager ACOM.



New EM 2040 available for HUGIN 1000 AUV



*A model of the integration in HUGIN
The TX transducer is the unit nearest
to the front*



This result image was obtained outside Horten, Norway with HUGIN running at 10 metres altitude in single sector mode with high ping rate. The pole is approximately 3.6 metre long

Kongsberg Maritime's next generation multibeam echo sounder EM 2040 has now been integrated on the HUGIN 1000 AUV. With improved resolution and depth rating of 6000 metres, this provides a massive step up from the EM 2000 used in deep-water HUGIN versions so far. It also gives substantial advantages compared to the EM 3002 used in HUGIN vehicles rated to 1000 metres.

The EM 2040 integrated with HUGIN

is a single RX transducer system, which gives a maximum coverage sector of 140 degrees. The system has a large frequency range and can operate at 200, 300 or 400 kHz. All modes are available on HUGIN 1000. At 400 kHz the sensor can operate on internal trigger, resulting in ping rates exceeding 20 Hz at low altitude. With 0.7 degree resolution, 25 μ s pulse length and dynamic focusing, resolution and sounding spacing better than 10x10 cm

can be achieved at low altitude. The EM 2040 has so far been used on a HUGIN 1000 operated by WTD71, a research institution under the German MoD; and on one of Kongsberg Maritime's own HUGIN 1000 vehicles.

Several sea trials have been conducted in April/May both in Horten and in Eckernförde in Germany with very promising results.

FEMME 2011 in Trondheim

The 13th Kongsberg Maritime FEMME conference took place in Trondheim last month (April 12th - 15th). It was another successful event, which brought together a wide variety of our multibeam echosounder and hydroacoustic product users from the world over, who all engaged in the spirit of sharing information, experiences and ideas, to make this one of the best FEMME conferences ever.

In addition to being a lively forum for debate and information exchange, FEMME also gives us a chance to show participants the latest developments in our hydroacoustic offering. A particular highlight in Trondheim was the new EM2040, which has new features such as dual swath pinging; roll, pitch and yaw stabilisation and near-field focusing. The EM2040 proved a hit with the customer delegates, who all appreciated the technical innovation that our subsea department has put into this exciting new product.

One of the major topics during the conference was backscatter, with several of the participants taking to the stage to discuss how it can be used to improve survey data. The Canadian Hydrographic Service gave an interesting case study on backscatter, where the backscatter from multiple KONGSBERG sources was compared. Related to this, the French research organisation IFREMER demonstrated an interesting software tool, similar



to Google Earth to merge bathymetric data, water column data, backscatter data and even sub-bottom data within a 3D environment.

An important topic that several speakers demonstrated was what can go wrong during mobilisation of deep water multibeam systems and what it takes to install the right gear. John Hughes Clarke, University of New Brunswick told the conference about the Squamish Delta research project that used a KONGSBERG survey launch, and explained what the impact can be on the analyses when the settings are incorrect. This he said, is especially important when you are surveying in a remote area with high mountains as GPS data quality can be downgraded due to the bad reception.

Another interesting item demonstrated was the integration of CARIS Bathy DataBase directly with the KONGSBERG SIS software module, which is another example how we are able to

provide fast turn-around solutions for the survey community. Both Kongsberg multi-beam systems and Kongsberg SIS are providing better algorithms and solutions to produce cleaner data. This was an interesting development for the participants as it is possibly one of the first steps of making multi-beam processing absolute.

The FEMME conference enabled us to show our expertise within hydroacoustics and seafloor mapping. During the conference we received requests for improvements and new functionality in our systems, but there were also many complements for our products and the expert team behind them. FEMME is a biennial event and will return in 2013.

FEMME 2013

Kongsberg Maritime is pleased to announce that the FEMME 2013 Multi-beam user Conference will take place in United State of America (east coast) 23th - 25th April 2013.



Opening address by Kjell Magne Olsen, Director PRIMAROperated by the Norwegian Hydrographic Service (NHS)

Challenging but successful AUV demonstration in Australia

From 4th – 14th April Kongsberg demonstrated the complete AUV based Mine Hunting System to the Royal Australian Navy (RAN) in The Coral Sea outside Cairns, Queensland.



The Kongsberg AUV team in Cairns



HUGIN and Minesniper installed on HMAS LEEUWIN

Kongsberg presented the well proven Portable AUV System, installed in a 20 foot and a 10 foot container. In addition to HUGIN 1000 MR, Kongsberg (KOG) for the first time also presented Minesniper, the Mine Disposal Vehicle (MDV), now integrated into the HUGIN portable system. It was the first time anyone has demonstrated a complete Mine Hunting System based on AUV technology.

The trials were performed as a 10 day 24 hour operation, and covered both shallow and deep water scenarios. The missions included both Mine Hunting and Rapid Environmental Assessment operations, in depths from 17m to 400m. The sea state varied from 2 to 5 throughout the trials.

An evaluation team from Royal Australian Navy and Defence Science and Technology Organisation (Australia) followed the trials and the team will

summarize the results in a final report internally. The Kongsberg team included personnel from Horten, Kongsberg, Trondheim and Singapore, plus our agent from LOPAC Ltd. in Canberra.

“They all contributed to the operational success and I am proud to be a member of such a skilled and motivated team,” stated Svein Otto Schjerven, Manager Sales and Marketing HUGIN AUV, Kongsberg Maritime.

Subsea Division in Horten appoints new Product Sales Manager

Arild Brevik came aboard mid-January as Product Sales Manager for the recently implemented group; Acoustic Communication and Control. Arild graduated with an MSc in electronics from Norwegian University of Science and Technology (NTNU) in 91 and also has 1-year of Officer training at the Royal Norwegian Naval Academy.

His recent positions has been marketing manager at HAPRO and Business Development Manager at Kitron Development, where main business area has been product development, industrialization and manufacturing services.

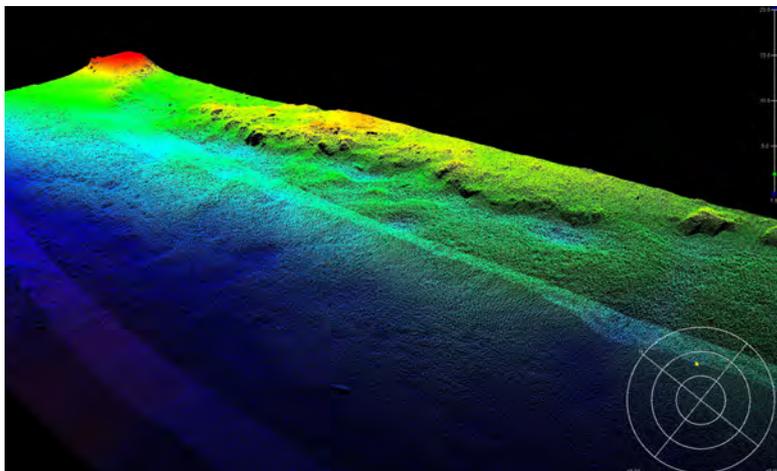
Prior to this Arild ran his own company for 12 years, providing the Norwegian market with development systems and consulting services for electronics development. Covering Military, Telecom, Medical and Maritime electronics. He has served for a total 5 years in the Royal Norwegian Navy, mainly aboard Coastguard Vessels as operative officer with responsibility for fishery inspection.

Acoustic Communication and Control will cover the following product areas: ACS, Acoustic Monitoring and Control, Acoustic Link for Telemetry and Acoustic Network for Telemetry based on the cNODE® Modem.



EM 2040 impresses participants at US HYDRO Conference

Our Subsea division has conducted another successful demonstration of the EM 2040 multi-beam echo sounder system at the US Hydrographic Conference during the last week of April.



The Hydrographic Society of America (THSOA) has hosted the US Hydro Conference on odd years since 1999. On even years the conference is held in Canada and is hosted by the Canadian Hydrographic Service. It is one of the most important conferences of the year for the North American hydrographic community and is also attended by a significant number of international hydrographers. This year US Hydro was held in sunny Tampa, Florida at the Waterside Marriott Hotel. The location made it a perfect venue for conducting on-water demonstrations, and several exhibiting companies participated, providing attendees with plenty of opportunities to get out on the water.

Demonstrating Kongsberg’s diversity, the conference team consisted of personnel from multiple countries and various business groups such as Kongsberg Underwater Technology Inc. (Seattle, USA), Kongsberg Maritime (Horten, Norway), Kongsberg Maritime Ltd. (Aberdeen, Scotland) and Hydroid Inc. (Pocassett, USA).

The demonstration equipment included the EM 2040 with a 1x1 degree transducer configuration and the Seapath 330+ vessel position, heading and attitude system. The EM 2040 is the first multibeam echo sounder to bring all the advanced features of Kongsberg’s deep water multibeam to the shallow water

sounding environment. The Seapath 330+ uses state-of-the-art dual frequency GNSS receivers, inertial technology and processing algorithms to provide surveyors with the best possible accuracy in position, attitude and timing. The combination, a complete, fully integrated, high performance multibeam echo sounder survey system from one supplier, provided a very advanced surveying system that was one of the highlights of the conference.

The equipment was installed on a vessel

of opportunity contracted from SeaSub Systems Inc. More than 60 attendees were able to view the system in operation over the two and a half day conference. All were very impressed by the EM 2040’s capabilities and features and Many of them commented specifically about the system’s ultra-clean data and high-resolution bottom back-scatter imagery. The Kongsberg Maritime AS, Subsea Division would like thank the University of South Florida and our internal colleagues for their valuable assistance in making this demo possible.

Training schedule for autumn semester 2011

HiPAP Operator – HiPAP LBL Operator – HiPAP Technical

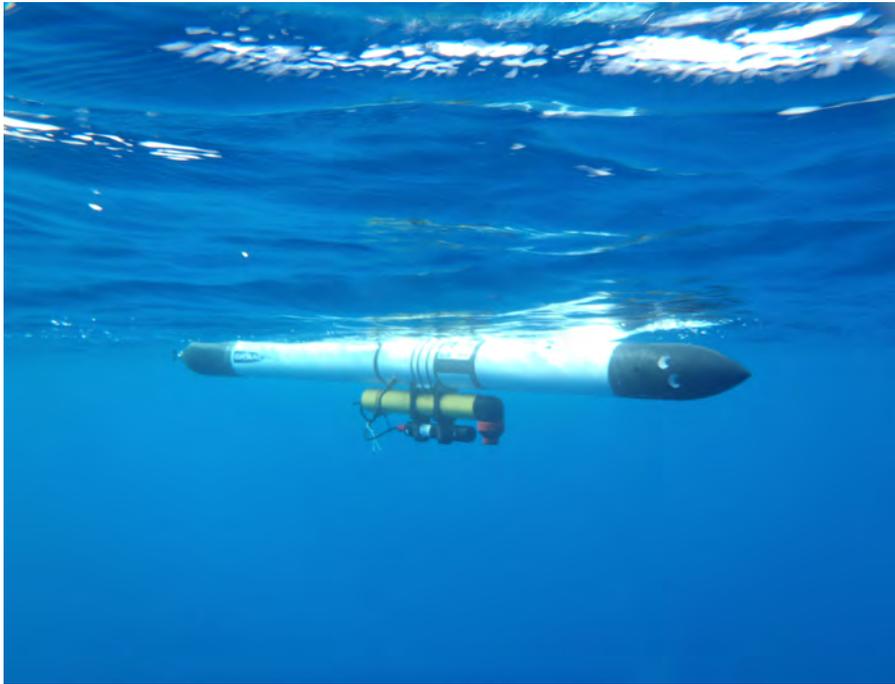
Week	Date	Course
34	August 23-25	HiPAP LBL Operator Course
35	August 30 – September 1	HiPAP Technical Course
41	October 11-13	HiPAP LBL Operator Course
44	November 1-3	HiPAP Technical Course
46	November 15-17	HiPAP LBL Operator Course
47	November 22-23	HiPAP Operator Course
49	December 6-8	HiPAP Technical Course

**Position Reference System Operator course:
APOS/HiPAP – Artemis – DARPS**

Week	Date	Course
27	July 4-8	PRS Operator Course
38	September 19-23	PRS Operator Course
44	October 31 – November 4	PRS Operator Course
49	December	PRS Operator Course

Booking please contact:
Tel.: +47 33 03 41 00, Fax.: +47 33 04 76 19, e-mail: km.training.horten@kongsberg.com

Successful test of cNODE® Underwater Wireless Network



Folaga AUV carrying cNODE during test of communication network



Deployment of cNODE in Trondheimsfjorden during sea test

The Kongsberg Maritime Subsea division in Horten has been conducting a development program for using cNODE® in a network configuration, enabling it to interface to various sensors, and communicate sensor data via wireless among other nodes in the actual network. In addition to telemetry functionality, cNODE®s are also intended for navigation and positioning

usage. In-house product development of cNODE® as well as collaborative projects like NNN-UTS completed in 2010 followed by a UAN project are still ongoing.

Introducing network configuration for acoustic communication opens up a range of applications: Long distance communication can be performed by relay messages between several nodes. Another example is to monitor a designated subsea area with a network of cNODE®s with integrated sensors; this data will be available real time.

One of the cNODE®s in the network is designated to be a master node, and can be connected to a satellite communication link for transfer of data. Subsea the network is self configuring.

HiPAP and cPAP® can be used for communication with the network and the cNODE®s can be used for both positioning and telemetry purposes. cNODE®s with floating collar are easily deployed and picked up since they have an acoustic release functionality, controlled via their own acoustic

link. Operating depth could be down to 4000 m water.

The network also supports mobile nodes, an example of this could be an AUV with a cNODE® aboard.

Suitable applications for cNODE® networks would be ocean monitoring of environmental and marine biological parameters, and detecting and monitoring industrial parameters around offshore installations, for example pressure and temperature or gas leakage.

In collaboration with partners on the UAN project, an at sea test of an acoustic wireless network based on cNODE® was carried out in the Trondheimsfjord from May 18th -27th.

“The network sea test included six cNODE®s, two of them mounted on AUVs. The team experienced challenging sound profiles in Trondheimsfjorden due to layers of fresh river water. Nevertheless we got proof that the cNODE® network features are working,” says Thor Storm Husøy, project manager from Kongsberg Maritime Subsea, Horten.

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Kongsberg Maritime at the 10th Offshore Mediterranean Conference 2011 in Ravenna



Every two years, Ravenna in Italy hosts the Offshore Mediterranean Conference for Global Energy and Mediterranean offshore opportunities. The conference closed on Friday the 25th of March, confirming OMC's international position in the offshore market with the participation of:

- 1203 delegates
- 12 official delegations (Algeria, Angola, Australia, Azerbaijan,

China, Egypt, Kazakhstan, Mali, Norway, Qatar, Turkey and Turkmenistan)

- 240 papers from 22 countries
- 10,438 visitors from 38 countries
- 469 exhibiting companies from 25 countries

(Data received from the OMC 2011 official report)

There was high levels of interest in the full range of systems that were highlighted on the Kongsberg Maritime

stand at OMC 2011, which include:

- Hydrography (EM 2040, Geo Swath Plus 500 KHz, EM 710),
- Underwater Instrumentation (HiPAP 500, cNODE Maxi-Midi-Mini),
- AUV (HUGIN 1000)
- Kongsberg Seatex position reference systems
- Underwater Cameras
- Dynamic Positioning System with an Integrated Vessel Control System bridge concept which included K-Pos, K-Bridge, K-Chief and K-Thrust; all of which interfaced to a KM vessel simulation system that highlighted the system functionality.

The Kongsberg Maritime participants during this exhibition were Tore Osvold from KM Horten, Bill Hone from Geo-Acoustics, Robert Dadini, Stefano Zagarria, Salvatore Russo and Simone Di Giacomo from the Kongsberg Maritime Rome office.

OMC 2011 is a joint Conference with MOC 2012, which will be held in Alexandria Egypt next year.

Two REMUS 100 AUVs to Royal Norwegian Navy

Hydroid, Inc., a subsidiary of leading manufacturer of Autonomous Underwater Vehicles (AUVs) Kongsberg Maritime, has announced that it has delivered two REMUS 100 AUVs to the Royal Norwegian Navy (RNoN). The REMUS AUVs were procured by the Norwegian Defence Logistics Organization (NDLO) Naval Systems Contracting Division on behalf of the RNoN and will further enhance the RNoN mine countermeasure capability.

"We are pleased to be able to collaborate with the Royal Norwegian Navy, which has once again selected REMUS for its shallow water AUV capability," said Graham Lester, Director of Hydroid Europe. "REMUS vehicles have been proven to withstand the harsh conditions associated with Norwegian waters, so are ideal for the Royal Norwegian Navy."

The REMUS 100 is a compact, light-

weight, autonomous underwater vehicle designed for operation in coastal environments up to 100 meters in depth. The vehicle can be configured to include a wide variety of standard and/or customer specified sensors and system options to meet unique autonomous mission requirements.

"The REMUS 100 is the U.S. Navy's tool of choice for shallow water mine countermeasure operations," said Christopher von Alt, President and one of the co-founders of Hydroid. "The system's technology and versatility is helping to keep humans out of minefields worldwide, and we're confident it's an excellent choice for the Royal Norwegian Navy as well."

Hydroid's REMUS AUVs are modular



and may be fitted with a large number of different types of sensors. They have been used to aid in hydrographic surveys, harbor security operations, debris field mapping, scientific sampling and mapping, as well as many basic and applied research programs funded by ONR, DARPA and the United Kingdom Ministry of Defense. With over 200 vehicles in the field, Hydroid is currently the AUV market leader with systems in use worldwide.

Cutting Edge Subsea Digital Camera



Kongsberg Maritime launch its most advanced underwater digital stills camera at the Ocean Business 2011 technology exhibition in Southampton April 5, 2011. The OE14-408 is the latest underwater digital stills camera to be revealed in Kongsberg Maritime's

market-leading portfolio of underwater and harsh environment cameras and imaging systems.

The OE14-408 provides superb image and colour quality and has a range of newly enhanced features since the previous OE14-208 model. These include 10 mega pixels per image (double the pixel resolution), improved colour depth and dynamic range, Ethernet upload connectivity, a much faster flashgun refresh rate and a more compact housing for ease of deployment. When used in conjunction with Kongsberg Maritime's new dedicated flashgun (the OE11-442), the camera offers accurate exposure control via

through-the-lens (TTL) flash metering resulting in striking image clarity. The flashgun recharge rate has been doubled, allowing improved productivity for inspection operations.

The OE14-408 has a 5 x zoom capability and is depth rated from 4500m to 9000m. Each image is framed and temporarily stored on the inbuilt 8GB Solid-State Storage. The images can be the uploaded 'on the fly' via USB2 or Ethernet, meaning that they can be transmitted immediately to the surface or to shore – and viewed anywhere on the globe, therefore increasing operational efficiency of ROV or lander deployment.

Training for REMUS 100



Hydroid to Offer First Open Enrollment Training Session for REMUS 100 AUV September session to focus on basic operations and maintenance training. Hydroid, Inc., a subsidiary of Kongsberg Maritime, the leading manufac-

turer of Autonomous Underwater Vehicles (AUVs), announced today that the company's first ever Open Enrollment Training will be held during the week of September 12, 2011, in Pocasset, Massachusetts. During the September

Open Enrollment Training, Hydroid's highly experienced and trained technicians will walk participants through all aspects of the REMUS 100 system, with a focus on basic operations and maintenance training, ideal for new and existing operators of REMUS systems looking for initial or refresher training. The training course is an intensive 5-day program designed to provide a maximum of 8 participants with the knowledge and understanding of the basic system specifications; components; capabilities and limitations; the skills and hands-on experience of the operations and maintenance of the REMUS system. Trainees will complete the training program with the skills necessary to properly and safely operate the REMUS system.

For more information on Open Enrollment Training please contact Lorna Bandstra at 508-563-6565 or e-mail: LBandstra@hydroid.com.



KONGSBERG

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