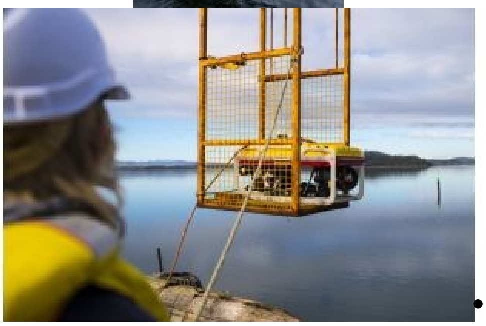
NEW IMCA ROV CLASSIFICATIONS AND APPLICATIONS MOVING TOWARDS RENEWABLES

Trends and New Technology in the ROV Industry



Over the past few years, the requirement for ROV support in the oil & gas sector has been hampered by the downturn in the sector. However, the continued investment in renewable energy has provided opportunities for manufacturers to continue their R&D projects to create the next generation of ROV systems.

In view of this, the IMCA guidelines for the Safe and Efficient Operation of Remotely Operated Vehicles (IMCA R 004 Rev4) has been updated. The guidelines now include an expanded list of ROV classifications based upon the increased diversification of tasks performed by ROV systems around the globe.

The revised classifications are as follows:

- Class I – Pure observation ROVs.
- Class IIA – Observation class vehicles with a payload option.
- Class IIB – Observation class vehicles with light intervention/survey and construction capability.
- Class IIIA – Standard work class vehicles with a payload of <200kg and through frame lift of approx. 1000kg.
- Class IIIB – Advanced work class vehicles with a payload of >200kg and through frame lift of up to 3000kg.
- Class IVA – Towed vehicles, typically ploughs used in subsea cable burial operations.
- Class IVB – Tracked vehicles utilising HP water jetting and specialised rock cutting tools, again used in the burial of subsea cables and pipelines.
- Class V – Prototype or development vehicles.
- Class VIA – Autonomous Underwater Vehicles (AUV) weighing <100kg.
- Class VIB – Autonomous Underwater Vehicles weighing > 100kg.

Class I vehicles are used in a purely observation role, providing the client with a relatively inexpensive and highly portable method of performing general visual inspection or close visual inspection of various subsea assets. Their generally compact size limits the vehicles' capabilities to operate in areas of high currents; however they have been successfully used in operations in which these vehicles have been deployed from a work class vehicle, acting as a mothership.

Class IIA systems typically have a suitable payload that allows the fitment of additional camera systems and subsea sensors providing a basic survey/NDT (non-destructive testing) capability. They also have a higher thrust-to-weight ratio than the Class I vehicles allowing them to operate in conditions similar to the larger ROV systems. These systems are still highly portable and generally do not require a dedicated launch and recovery system (LARS) for operation.

Class IIB systems are still predominantly observation class but with a significant payload allowing the use of lightweight manipulator systems thus providing a light intervention capability. Even though these ROV systems require a dedicated LARS (launch and recovery system) and control van, they require a much smaller footprint area on a vessel compared to the Class III vehicles and therefore can be deployed from a much wider range of support vessels.

Class IIIA systems are the general work horses of the industry and can successfully perform the vast majority of tasks required in a typical field construction role including survey, metrology, construction and intervention. These systems typically require significant deck space on a vessel in order to accommodate the LARS, control van, and workshop van, etc. and are therefore more suited to the current DP (dynamic positioning) class of support vessels.

Class IIIB systems are the heavy weights of the oil & gas sectors and were developed to provide a high capacity hydraulic capability in order to remotely override the blow out preventer (BOP) used during the drilling and work over phases.

Class IVA towed systems are technically the simplest in design and operation and are loosely based on a typical agricultural plough, being towed along by a vessel. The simplicity in design and operation provides an economic method of cable burial over a large distance and as such are used primarily in trans-ocean projects.

Class IVB tracked vehicles provide a significantly more accurate method of burying cable and pipeline, although this process is considerably more time consuming than using the plough method. The benefits however are a controlled depth of burial and accurate positional data along with the capability of burial through areas of seabed rock formations.

Class V prototype or development vehicles allow the manufacturers to create one off designs in order to facilitate a particular task. A typical design that has been developed is the current range of Rock Grabbers that are being used to clear pathways in subsea boulder fields around Western Europe in order to facilitate burial of the various subsea cables.

Class VIA AUV systems come in many guises, from the typical survey data gathering type used by many oceanographic institutes, to the more complex military applications such as counter mine operations.

Class VIB AUV systems provide a significantly larger platform that enables a much wider range of survey equipment to be fitted. These systems are potentially capable of performing survey and intervention tasks, however much of this is still under development and therefore limited to commercial applications at present.

Trends in ROV Applications

As the technology utilised in remotely operated vehicles continues to mature there are some significant increases in the types of operations now being performed ‘remotely’.

The current trend in the renewable sector involving the installation of offshore windfarm sites has created a requirement for long-term installation, repair and maintenance (IRM) tasks that will require diver-less intervention due to the environmental conditions such as high current and low visibility encountered at these locations. Similarly many of the various deepwater operational tasks previously carried out by semi-submersibles can now be performed from an ROV support vessel utilising remote technology, thereby significantly reducing the operational costs.

The continued development of subsea sensor technology will no doubt expand the role of ROV/AUVs over the next decade, utilising the advances in acoustic positioning and laser technologies to accurately map both the seabed and subsea structures and create very accurate real-time 3D models from point cloud data streamed to the surface. The continued advances in subsea acoustic data transmission will allow the ROV/AUV to communicate directly with subsea asset control systems in the event of a topside communications failure thus providing an additional override facility.

Advancements in electrical motor technology has also seen an increase in the number of ‘electrical’ propulsion ROV systems, however these are typically being used in regions that may be environmentally sensitive to hydrocarbon releases. Large electric vehicles generally consume significant amounts of power, and that power has to be transmitted to the vehicle along the main umbilical/tether and thus is the limiting factor for a purely electric system. The use of hydraulics as a power source is therefore a more efficient method of providing both a work capability along with propulsion and will no doubt continue for the foreseeable future utilising more environmentally appropriate fluids.

The latest developments in hybrid ROV/AUV technology appear to offer some major benefits for the subsea industry mainly relating to operational costs. The idea of having AUV systems permanently docked in subsea ‘stations’ ready for deployment at a moment’s notice is definitely possible with current technology; however long-term reliability and maintenance may be the key factors that prevent this becoming a feasible option.

The requirement for accurate seabed/pipeline survey is certainly one area where the hybrid systems can seriously challenge the current method of utilising work class ROVs. Although the sensors utilised on both systems are comparable in technical performance, the control system onboard the AUV can react significantly quicker than a human pilot to the dynamic conditions experienced subsea and, therefore, provide a much more stable platform from which to gather the data.

In this case what does the future hold? Entirely autonomous vehicles cruising the world’s oceans or, indeed, hybrid technology whereby a skilled technician constantly monitors operations whilst the control system performs the auto-pilot function? Either way, there will always be a requirement for skilled personnel to provide the necessary back-up when things do not go according to plan.

The Underwater Centre has been providing Remotely Operated Vehicle (ROV) pilot technician training for over 15 years. Their ROV courses give graduates experience of flying work class and observation class ROVs in an open-water, tidal environment, as well as taking their technical understanding and know-how and applying it to the repair and maintenance of ROVs. The operational experience gained on their range of ROV courses means that, as well as being developed and run in accordance with guidelines set out by the International Marine Contractors Association (IMCA), these courses go beyond those guidelines. The Centre works closely with key industry stakeholders, such as IMCA, Technip, Fugro and Kongsberg and is continuing to work with accrediting organisations who monitor and verify the course content externally.

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