Accreditation Allows 'Tsunami' to Make Waves

When Andrews considered a new coastal hydrographic vessel, a smaller RIB best suited their customersâ€™ survey needs, but would it meet the strict requirements for MCA Accreditation? Roy Jarman, Andrews Survey, and Ed Cookson discuss the modifications Andrews had to put in place.

Andrews Survey, in Great Yarmouth, carries out a wide range of hydrographic, geophysical and geo-technical projects. These range from cable & pipeline landfalls harbour investigations, the charting of coastal erosion and beach profiles, pre and post-dredge surveys, windfarm SIs and resource mapping. When Andrews considered a new hydrographic work-boat therefore they sought to offer as wide a range of offshore survey work as possible. Customer requirements included rapid mobilisation, minimum cost of transport, and powerful data acquisition.

Workboat Criteria

The vessel would need to be fully equipped for bathymetric surveys; capable of working in confined harbour areas yet also suited to surveys over thousands of line kilometres, for example for resource mapping. For surveys up to 20 miles offshore it would need MCA Accreditation. A vessel that could provide data acquisition at higher speeds would meet important requirements when surveying the difficult transition zone, where greater speeds can lead to far greater data coverage.

It would also need to be sufficiently narrow to be taken on by road by trailer, drawn by Landrover. A vessel under 2.9m beam would not require special police escort.

Ideally, it should be operational during hours of darkness to accommodate travel to the worksite during the reduced daylight hours in winter to take advantage of high water times. Rapid transport to remote sites anywhere in the world at short notice would require a vessel sufficiently small to be transported in a standard 20 ft container.

Several vessels offered the deckspace but were just too wide for road transportation without falling foul of the law; or alternatively would require extra expense and delays in organising police escorts. A smaller vessel seemed most suitable. The company eventually settled for a 7m RIB, which met all of the low-cost transport requirements and was manoeuvrable in tight spaces. A further benefit was the speed of the vessel - up to 45 knots. But would it meet the strict requirements for MCA Accreditation?

Meeting MCA Accreditation

The MCA code of practice is in accord with the Merchant Shipping (Small workboats & pilot boats) Regulations 1998. Its primary aim is to set standards of safety and protection for all on-board. Workboats can be considered for six categories dependant upon the distance from land the work is to be carried out1.

To use a workboat for up to 20 miles from a safe haven the vessel should be designed to meet MCA Category 3, normally associated with a larger vessel. This is because Category 3 requires the vessel to carry equipment sufficiently â€˜substantialâ€™ to meet electrical and fuel safety standards, means of escape, plus a relatively large amount of extra kit including lighting, bilge pumps, radar reflectors and search lights, life raft, jackets and flares. A Category 3 vessel also requires non-slip surfaces, an enclosed area and must meet stringent stability tests. It also requires an RYA Coastal Skipper Certificate with DoT endorsement, or a DoT-endorsed RYA Advanced Powerboat certificate. The endorsement requires the skipper to undertake a medical, first-aid course, sea survival course and to hold a VHF certificate. A second person capable of assisting the skipper should also be on board. Annual examinations of the vessel need to be carried out to maintain compliance with the code.

Survey Instrumentation

As mentioned, Category 3 accreditation suggests a larger vessel. In choosing the more manoeuvrable, more easily mobilised 7m RIB, Andrews met the stability requirements, but would need to procure a covered version, giving even less deck-space. Meeting the standard required a complete redesign of the deck area. To gain space Andrews replaced bunks with seats from within the standard cuddy of the RIB. The mounting positions of the throttles, which should be accessible from both the standing and seated driving positions, were modified to ease the operation of the workboat.

Both dual-frequency and single-frequency echo sounder transducers were mounted in the hull of the RIB. This arrangement together with dual-pinger transducer wells allows high-speed transit to and from site as neither protrude beneath the hull.

Other sensors include towed magnetometers and towed sidescan sonar, the latter using soft tow and swell compensation linkage. For environmental work, the RIB carries drogues for current tracking, an Aquatracker UV sensor to monitor dye release, and a Van Veen grab for intertidal samples.

Andrews also redesigned the data acquisition system using much more compact computers, specially ruggedised to take the pounding at higher speeds, and capable of running off smaller 24V batteries.

Tsunami

The result is Tsunami, a â€˜rapid responseâ€™ hydrographic vessel for coastal studies, capable of working in relatively inaccessible areas and travelling between survey sites in a short time, Figure 1. Powered by twin 100hp outboard engines, it is capable of speeds between sites of 45kn and is fully-equipped for inshore and harbour surveys. Bathymetric surveys can be conducted while the RIB is travelling at 20 knots or more, reducing survey times and cost appreciably.

Twin engineâ€™s allow the vessel to return to port even when one engine fails. The design allows the RIB to be very manoeuvrable under

strong cross winds and currents as the thrust from each engine can be adjusted to help maintain a straight course even at low speeds.
The vesselâ€™s construction consists of a cuddy with built-in survey computers, echo sounders, and GPS positioning above an aluminium hull into which are mounted dual-frequency echo sounder transducers.
Relatively small and lightweight, the RIB allows surveyors to work in very shallow waters and to manoeuvre in tight areas within harbours and estuaries. Bathymetric measurements can be gathered right into the beach and integrated with land data. It is also well suited to difficult tidal regions. Suitable for towing between sites by Landrover, the RIB is designed to reach remote sites rapidly by road or by sea.
The Andrews onboard survey system is an advanced marine data-logging and positioning system developed for hydrographic projects including pre- and post-dredge surveys, pipeline routes and the charting of coastal erosion and beach profiles.

Transition Zone Coverage
Speed & Flexibility Provide the Key
One of the main criteria in commissioning Tsunami as a coastal monitoring vessel was use in the intertidal area or transition zone between the beach and deeper water where the surveyor encounters most difficulty in obtaining data. Here, surveyors can be faced with exposed, shallow gradients, or conversely cliffs, difficult ground to traverse from shifting dunes to soft muds, a limited survey window between tides, and in some areas access restrictions to protect local habitats. As the tide recedes it can reveal sand banks, rock outcrops or lagoons that could leave survey vessels stranded until the next tide.
While readings on land and further offshore are easily achieved every few metres - in the offshore case a mass of data can give readings every 5cm - many clients allow surveyors some leeway in the tidal zone perhaps recognising the difficult balance between coverage and quality at reasonable cost. There are also health and safety implications for surveyors when working in intertidal areas.
Despite such difficulties in obtaining full coverage, it could be argued that this is the very region where coverage should be at its best as it is this part that is most dynamic and vulnerable to change and is the region with the greatest implications for coastal stability. For example, beach heights can change by many metres during a single storm event.
Faster data acquisition can be more efficient, more economical, and can reduce health and safety risks.

Rapid Data
In practice, the more rapid the data acquisition the better the coverage and the lower the Health and Safety implications.100 per cent data coverage in the one tide will require the most rapid, accurate method for each environment. Against this, rapid acquisition will require more careful longterm planning and overseeing and the availability, sometimes at short notice, of a range of different suitably-equipped survey vehicles and vessels.
Nowadays, RTKGPS can map height and position of terrain by running across it, land or sea. In the latter case RTK can avoid the need for tide gauges. Overall the objective is to provide a safe platform for survey personnel and equipment relevant to the survey environment. Close continuity between the land, offshore and transition zone survey teams is required to conduct the work as rapidly as possible. To achieve these aims Andrews often have to call upon a variety of survey â€˜craftâ€™. These have included beach buggy-type Argocats, shallow-draft landing craft, even helicopters and hovercraft. By their use, Andrews estimate that they have been able in recent years to extend survey coverage in the transition zone from around 90 per cent to 99 per cent.
Tsunami, capable of bathymetry at 20kn and 45kn between sites, provides the speed and flexibility in the transition zone and as such has become a key element of Andrewsâ€™ inshore services.

Note
The Safety of Small Boats & Pilot Boats - A Code of Practice. Published by MCA and available from HMSO, St Clements House, Norwich NR3 1BQ
www.andrews.co.uk