

# When the Boat Comes in

In the November/December 1998 issue of Hydro international I summarised considerations related to the design of a new hydrographic survey vessel. A new hydrographic survey launch (catamaran type) for the Kingdom of Bahrain and first experiences with her are described here. The online and off-line survey equipment set-up implemented with onboard database will undoubtedly lead to discussions in collegial hydrographic services.

The arrival of the MÅrsk chartered container ship "Global Myth"™ on the evening of 8 December 2000 became a historic day for the Bahrain Hydrographic Section. There on the poop deck, on top of two 40'™ containers was "Al Masaha"™, the new hydrographic survey launch for the Kingdom of Bahrain. Up there in the dark she looked really tiny, but when loaded onto the wharf she became quite large. The small group of office staff assembled at the wharf approached her with great anxiety. For more than a year, weekly photos had been e-mailed to Bahrain showing the building progress - but on those screen views everything was somehow unreal. Facing the real thing, a dream had come true.

Al Masaha (Arabic for Survey (Directorate)) is a catamaran built by Q-West in Wanganui, New Zealand. She is 19.1 metres long, 7.1 metres wide, has a draft of 1.6 metres and is made of marine grade aluminium. She has a maximum speed of 24 knots and an optimum continuous speed of 21 knots.

## General Layout

Al Masaha is configured to provide a survey platform and accommodation both for her own crew and the crew of a smaller open survey boat. Her hulls each contain:

- A forecabin that is dedicated to stowage and anchor chain
- Accommodation areas providing a total of six berths and one toilet and shower unit
- Engine rooms which house the two 770 HP Marine Volvo Penta engines, a 30 KVA generator supplying power for daily operations, and an 11 KVA generator for overnight power supply
- Fuel tanks (one forward and one aft in each hull) of a total capacity of 8 tons, providing an endurance of more than five days, with twenty hours of optimum speed and sixty hours of surveying speed of 10 knots
- Steering compartments, one containing a Simrad Robertson autopilot system

## Main Deck

The main deck superstructure contains the galley and dining/rest & recreation facilities, the captain's cabin and the main toilet/shower compartment, plus some minor storage space. The galley is fitted with modern electrical appliances and the R&R-area has a radio, TV and VCR.

The aft deck has a good working area for deploying instruments and space for a 4-metre dinghy. The starboard transom has a built-in staircase leading to a platform near the waterline. A folding ladder next to the platform enables easy transfer of equipment between the boat and a dinghy, and easy access for diving operations.

The foredeck is accessible via narrow side decks or through a window-type hatch from the main cabin. All decks are fitted with secure aluminium life rails that make berthing and anchoring operations particularly safe.

## Bridge

The bridge on Al Masaha is very spacious and has the vessel's control panel at the front, a hydrographic on-line system on the port side and the off-line system on the starboard side. The control panel contains all instruments and alarms for monitoring engines and generators, plus power supply for the different systems and appliances, e.g. the galley and the lights. In the middle of the panel in front of the helmsman is a SIMRAD CA-40 combined radar, echo sounder, GPS receiver and chart plotter, which enables the helmsman to control the navigation of the ship while surveying and cruising. A laptop linked to the on-line system has been fitted on top of this panel to facilitate steering the boat along the survey line. VHF/HF radios and the internal intercom system are all within reach of the helm position.

## On-line Survey Set-up

The on-line survey system consists of a Trimble 4000 RS GPS receiver fitted with a ProBeacon for positioning, a SIMRAD 501 P echo sounder for sounding and, for data acquisition, the Trimble HydroPro software package is used. Middle East Navigation Aids Services (MENAS) Gulf wide differential GPS system provides the differential signal for the GPS receiver. Half of the six double wall sockets are UPS, backed up by the battery banks in the engine room to keep the computers running in case of a power failure.

During survey operations, an on-line PC stores all recorded data. A second on-line PC runs and stores the Simrad 501P echo sounder images for later data processing. The on-line and off-line systems are networked so that data can be transferred for back-up and initial QA the next day.

Additional instruments on Al Masaha are an Anchoz Standard 20 gyro and a TSS DMS 2-05 motion sensor. These were included to prepare the vessel for survey with a multibeam echo sounder system, the specification for which is currently being prepared by the Hydrographic Section.

During on-line data acquisition the Simrad Autopilot system is used. This is guided by a fluxgate compass, which due to the delayed update rate is only able to hold the launch to within +/- 3 degrees; the equivalent of +/- 5 metres. Interfacing the gyro, when completed, will achieve a higher degree of accuracy in steering, and thereby better stability in guidance.

## Off-line Survey Set-up

The off-line PC, as well as holding HydroPro data and Simrad image files, contains the databases for the hydrographic data management system, i.e. survey log, soundings, tide and S-57 repository databases. The data management concept is:

- Data obtained at sea can only be verified at sea
- Data, whenever possible, should be quality-assured at the location during initial survey.
- Data must be readily available for updating databases at the office

#### Onboard Database System

The hydrographic database system, while having the primary function of producing all navigational charts of Bahrain digitally, in addition to the production of customised chartlets, is maintained on-board to provide information on any object at sea. Dubious objects found during surveying can immediately be checked with information held in the database. If a known object is found to have missing attributes, these can be updated. If the object is new, it will be entered in the database and all available attributes included right at the scene.

#### Evaluation

When you are buying a boat that is built half-way around the world from where you are an important consideration is whether fitted components can be serviced and repaired at your location. During both the planning and the building phase of Al Masaha, this was discussed in detail and, as a result, there are only a few items onboard which do not have local support.

Early operational experience with Al Masaha did bring to light some deficiencies. The fresh water capacity of 1 ton proved insufficient to operate under local conditions over the planned five days at sea. A water purification system, capable of producing 400 litres per day, had to be installed. The launch, whilst very spacious, also needed more lockers for storage. During my time as captain of survey vessels I have been accustomed to good facilities for storing the necessary items being used onboard a boat. Al Masaha has some of her potential storage space hidden behind bulkheads but, with minor changes here and there, this will be overcome and she will eventually be turned into an even more capable vessel than she is now.

During my twenty plus years as a hydrographic surveyor I have had the chance of taking over five new ships from shipyards; four of the SKA-79 class in Denmark, and now Al Masaha here in Bahrain. Although SKA 11 was my previously preferred boat I must admit that Al Masaha now has pride of place. There are still some minor changes to be made, but she is the smoothest running vessel I have ever commanded and surveyed with. The span between the propellers makes her extremely manoeuvrable and she can spin around on the spot. Even in congested waters you can easily manoeuvre her to cover the entire survey area. She is also very quiet. On other vessels when increasing speed, you hear the roar of the engines; on Al Masaha you don't. Acceleration is smooth and constant and you don't realise that you are actually doing 21 knots until you look at the log.

#### Conclusion

It seems that the specifications set up by myself and Mr Graeme Lindsay (Survey Operational Manager) ten years ago for a new hydrographic survey vessel have been fulfilled and for the Hydrographic Section of the Kingdom of Bahrain.

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