

FAST SOLUTION FOR HYDROGRAPHICAL AND ECOLOGICAL SURVEY

Innovative Twin-hull Survey Vessel

The Dutch government closely monitors morphological processes and water quality in its national waters, a task that falls to the measuring and information divisions of the Dutch Directorate-General of Public Works and Water management (Rijkswaterstaat). These divisions are currently undergoing a process of change. The *Scheurrak* may be the first in a series of new survey vessels for future Rijkswaterstaat deployment. Several transition processes have been initiated within Rijkswaterstaat, aimed at enhanced outsourcing to commercial firms on the one hand, and on the other more mutual co-operation within the organisation. This objective of organisational modification has been taken into account in the design and development of survey vessel *Scheurrak*. Increased employment of commercial parties will inevitably demand more verification measurements, whilst greater internal Rijkswaterstaat co-operation implies a larger working area for survey ships. With increased functionality and speed, the *Scheurrak* replaces three traditional survey ships and has taken over their tasks. It has been quite a challenge to unite hydrographical and ecologically related requirements in this new survey vessel.

Design Requirements

The *Scheurrak* is intended for day surveying; it lacks sufficient sleeping accommodation for night-time operations. As a significant number of the intended survey areas are quite far from possible ports (30NMs), the first requirement was to build a fast ship offering an increased number of hours spent surveying at the site as compared to traditional, slower survey vessels. This means that in the near future the working area for the *Scheurrak* will expand even further: it may even be that the vessel is deployed for surveys along the entire Dutch coast. Besides carrying out its own survey activities there will be an increasing need for Rijkswaterstaat to employ commercial contractors. This means that the *Scheurrak* will also be deployed to perform verification measurements to evaluate their work. The second design requirement was that the vessel had to provide a broad, very stable measuring platform with sufficient working space for hydrographical and ecological surveys. The need for this space and stability was one reason for choosing the catamaran concept, which has resulted in a favourable length/width ratio of 25 by 10 metres. The third design requirement was a shallow-draught vessel (1.1m below the waterline), so that surveys could also be conducted in very shallow water.

The Scheurrak

The *Scheurrak* is a rapid, shallow-draught and modern research/survey vessel that can be deployed in a flexible manner both with regard to widespread geographical area of operation and set up of measuring and data collection infrastructure. The catamaran is built of aluminium to save weight, but nevertheless weighs 80 tons. As a result, draught reached 1.2m, which is 10cm deeper than the original design requirement. At water level the *Scheurrak* has a length of 23.95m, while overall dimensions are 26.5m in length and 10.3m width. She is equipped with two MTU propulsion engines providing 1,100HP each and each coupled to two Hamilton water jets. Whereas the traditional survey vessel reached a maximum survey speed of 5-6 knots, the *Scheurrak* improves this, travelling at a nominal 6-10 knots and maximum 14 knots. The new vessel also allows running and surveying longer under higher wave and wind conditions than did traditional survey vessels. A stable survey vessel providing adequate working space and a pleasant working environment, the *Scheurrak* is equipped with the most modern acquisition and processing systems, logically laid out onboard the ship. The ecology laboratory is professionally arranged and the hydrographic working area large. Measuring systems are placed at an optimal spot, all as much as possible in line with each other. The measuring and data collection infrastructure has been organised in a modern and flexible way so that non-standard survey activities can easily be implemented. A measuring arm fitted to the underside of the ship is standard-equipped with 8101 Reson multi-beam echo sounder, but the arm can quite simply be equipped with other sensors, such as single-beam echo sounder or ADCP. The measuring arm can be retracted from the water during transit.

Hydrography

For currently planned hydrographic surveys a multi-beam echo sounder has been installed to enable rapid mapping of a large area. The multi-beam transducer array is mounted on the measuring arm, specially developed for this ship and situated centrally on the underside, between the two hulls. This instrument holder can be folded in and out like an aircraft wheel, so that in this position after completion of measuring activities the multi-beam sensor may be rinsed with fresh water. Other instruments may also be attached to the measuring arm, so that, for example, maintenance activities related to the multi-beam can be conveniently carried out on the *Scheurrak* without her having to go into dry-dock. The construction of the measuring arm is such that no vibration occurs, even under high survey speed of 14 knots. The *Scheurrak* is a Rijkswaterstaat ship allowing onboard validation and processing of obtained data both during survey and transit from one site to another or in harbour. Data can then be sent by data link to shore for rapid processing into a final product.

Ecology

Transportable containers are normally used for ecological measurements on board RWS survey vessels. The *Scheurrak*, however, has an

integrated ecology laboratory installed. For water sampling, a standard sampling frame can be launched into the water through a 'moon-pool' that pumps up the water sample for immediate analysis in the ecology laboratory.

Flexible Measuring

Because designing the *Scheurrak* began from scratch, this way of thinking has also been applied to design of the measuring instrumentation. Whereas onboard traditional survey vessels one finds rigid hardware configuration in which sensors are strictly fixed to the acquisition computer, onboard the *Scheurrak* a more flexible approach has been adopted.

A 'pseudo' network configuration means several PCs and sensors are connected by means of Ethernet switchboxes, offering the possibility of transferring sensor information to any PC as desired. Moreover, sensors and/or PCs not belonging to the standard configuration can also be integrated into this measuring network.

Deployment

For a thorough exploration of the operational deployment possibilities of the *Scheurrak* two quite different survey areas were selected: a river, the Nieuwe Merwede, representing relatively broad water where we could examine the operational capability for bathymetric production surveys, and the western Wadden region, a much more differentiated area of broad to narrow waters and mild to steep slopes. It was possible here to truly explore the boundaries of operational deployment capability. It was found that the *Scheurrak* operates optimally in wide waters while performing bathymetric production surveys. Maximum survey speed is 7m/s (14 knots), twice as fast as traditional survey vessels. The high (25 knots) transit speed means the new vessel can easily be deployed in a large area and that consequently several verification surveys in different areas can take place in one day. Surveying in broad waters is no problem; transects longer than 200m and with ample manoeuvring space can be well surveyed using the *Scheurrak*. For protection of the water jets it is advisable always to keep some decimetres of water beneath them. However, due to its size and because the measuring arm is not located on the bow of the ship, the *Scheurrak* is less suitable for use in narrow waters with transects of less than 200m. It is also less fitted for use in areas with steep slopes because such conditions may lead to jamming and/or heavy wear on the jets. Given these limitations, careful consideration must be given to the use of the *Scheurrak* for coastal surveys. She is, however, perfectly suited for surveying on wide waters at high speeds.

<https://www.hydro-international.com/content/article/innovative-twin-hull-survey-vessel>
