

'Tricolor' Salvage Using Long Range Kinematic GPS

MV Tricolor is a 1987-built Norwegian flagged vehicle carrier which, in the early hours of 14th December 2002, was struck by MV Kariba, a 1982-built Bahamian flagged container ship, in the French Exclusive Economic Zone, some 20 miles north of the French coast in the English Channel.

MV Tricolor, carrying 2,862 expensive automobiles, sank as a result of the impact of the striking and was eventually declared a total loss. In December 2002, the French authorities ordered the MV Tricolor to be removed, as it was perceived to represent a danger to shipping and the environment.

In July 2003, a start was made on the actual salvage of the wreck, which was lying on its port side in this busy part of the Channel. At the time of writing, September 2003, three major sections of the wreck, including the bow and the stern, have been successfully removed from the sea bottom and transported to Zeebrugge in Belgium.

This salvage operation is considered to be one of the largest of its kind. The 190m long, 32m wide wreck will be cut into nine sections of 2,000-3,000 Tonnes each using two work/lifting platforms, Buzzard and Vagant. The actual cutting is carried out by means of diamond-coated cable, from bottom to top, which means that eight cutting cables have had to be installed with a high degree of accuracy beneath the wreck.

The installation of the cutting cables, exactly between the beams of the vessel, is done using high-precision directional drilling equipment, positioned and orientated by means of a Long Range Kinematic GPS system. This was one of the considerations for choosing such an ultra-accurate positioning system for an otherwise straightforward salvage operation.

Structural weakness of the wreck in the wake of the sinking and turning over of the Tricolor, plus the enormous weight of the sections, means that the accurate positioning of all tools and vessels is of utmost importance. Cutting has to take place exactly between the main beams of the frame, which required an initial accurate survey of the position of the wreck and subsequent accurate positioning and orientation of the directional drilling equipment on board of the platforms. Directional drilling is performed using in-tool gyros from a starting point determined by the LRK system.

Positioning

To obtain the highest possible positioning accuracy during the project, use was made of Aquarius2-22 LRK receivers fitted with multiple antennas to provide both position and heading, in combination with the Dredge Track Presentation System belonging to Dredging International, one of the partners of the salvage project team.

The Long Range Kinematic GPS station Oost-Duinkerke, just south of the historic town of Nieuwpoort was used as reference station. The wreck of the Tricolor lies some 42km away from this station, which forms part of the LRK network of the Coastal Department of the Belgian Ministry of the Flemish Community.

The Belgian LRK network consists of four permanent Aquarius reference stations, installed at the beginning of 2002. The network works together with the Dutch Rijkswaterstaat network, thus providing complete coverage of the coastal zones and river areas of both Belgium and Holland. The stations have been established with the purpose of covering the coastal waters with a range of some 60km and an accuracy of several centimetres.

Tests have shown that by using powerful Aquarius transmitters it is possible to obtain this centimetre-accuracy up to baseline lengths of 50-60km. This system enables the user to execute high-accuracy hydrographic surveys such as multibeam echo soundings, offshore construction work and scientific observations. Prior to the actual removal of the wreck of the Tricolor, multibeam surveys and geophysical surveys were carried out to provide the data necessary for drilling and salvage operations.

Removing Wreck Segments

After a section has been cut off, it is lifted by large crane barges and transported to the shore, where final dismantling takes place. This phase too demands accurate positioning; this is essential in order to prevent further damage to the sections, tools and work vessels. The LRK system has proved itself to be an indispensable piece of equipment for this part of the operation.

Upon completion of each segment removal, an extensive side-scan sonar search is made at the wreck site and the route to port to determine the location of any vehicles dropped from the cargo. The manufacturers of the on-board vehicles have insisted that all vehicles are recovered and completely destroyed in order to avoid (damaged) parts appearing on the automobile market, creating a source of possible claims.

This project clearly shows that, even for a - quite unconventional - salvage operation it pays to use the best possible positioning equipment and other survey sensors: operations go more smoothly, results are better and unnecessary risks are avoided.

Salvage of the Tricolor is being carried out by the 'Combinatie Berging Tricolor', a consortium consisting of: SMIT Salvage B.V., Scaldis Salvage & Marine Contractors N.V., URS Salvage & Maritime Contracting N.V., and Multtraship Salvage B.V. The salvage contract was awarded to the consortium by Wilhelm Wilhelmsen and Gard Services. LRK positioning has been provided by Thales Navigation BV of The Netherlands, in co-operation with Asicon of Belgium.