

# A world's first in underwater repair: the insertion of a complete, prefabricated replacement hull section at anchor

**T**his year marks the 45th anniversary of Hydrex. We will be looking back at some of the many key operations our teams performed since the company was founded in 1974. We will do this by republishing an article from the vault of the Hydrex Magazine each month.

In 2011 we were the chief subcontracting company for the inspection, planning and repair work when the bulk carrier *Navios Sagittarius* had run aground and suffered severe damage to its hull.

It is hard to convey in a short article and a few photos the complexity and difficulties involved in

carrying out a successful salvage operation of this magnitude to a vessel which had run aground so heavily and was so badly damaged and at risk, all under highly variable weather conditions and constant pressure to complete the repairs in the shortest possible time.

It was the first time that an entire hull section had been prefabricated and inserted into a ship's hull after cutting away the damaged plates, with the ship still afloat. This permitted the vessel to continue on a major voyage without the need to drydock. ■



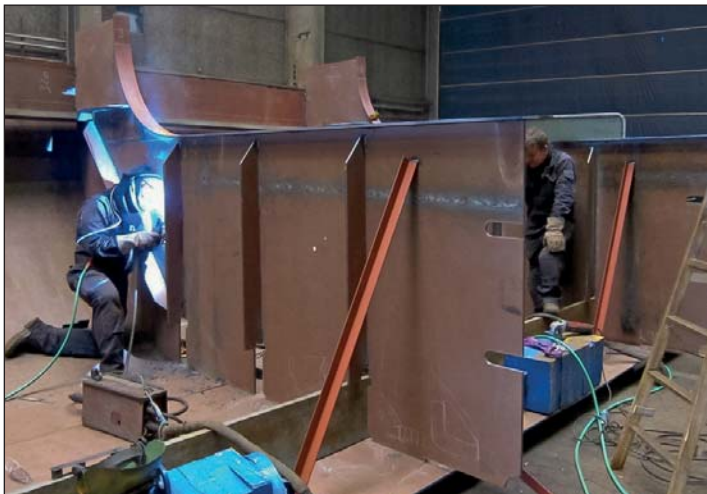
*This article was first published in January 2012.*

## Navios Sagittarius: behind the scenes at a remarkable salvage operation

**I**n 2011 Hydrex was the chief subcontracting company for the inspection, planning and repair work when the bulk carrier *Navios Sagittarius* had run aground on the Tonneberg Banke, about 23.5 miles east of Frederikshavn, Denmark.

On the 23<sup>rd</sup> of July, a Hydrex diving team contracted by the salvors of the bulk carrier carried out a preliminary video inspection which found large penetrations, indentations and cracks in the hull, and heavily deformed plates. However, it was impossible to get a full picture of the damage with the ship still aground.

On July 28<sup>th</sup>, after about 3,000 tons of cargo had been transferred to the lightering vessel, by pressurizing certain tanks and with the assistance of tugs, the *Sagittarius* was refloated. The vessel was towed to Frederikshavn for a detailed underwater inspection, extensive bottom repairs, and reloading of cargo.



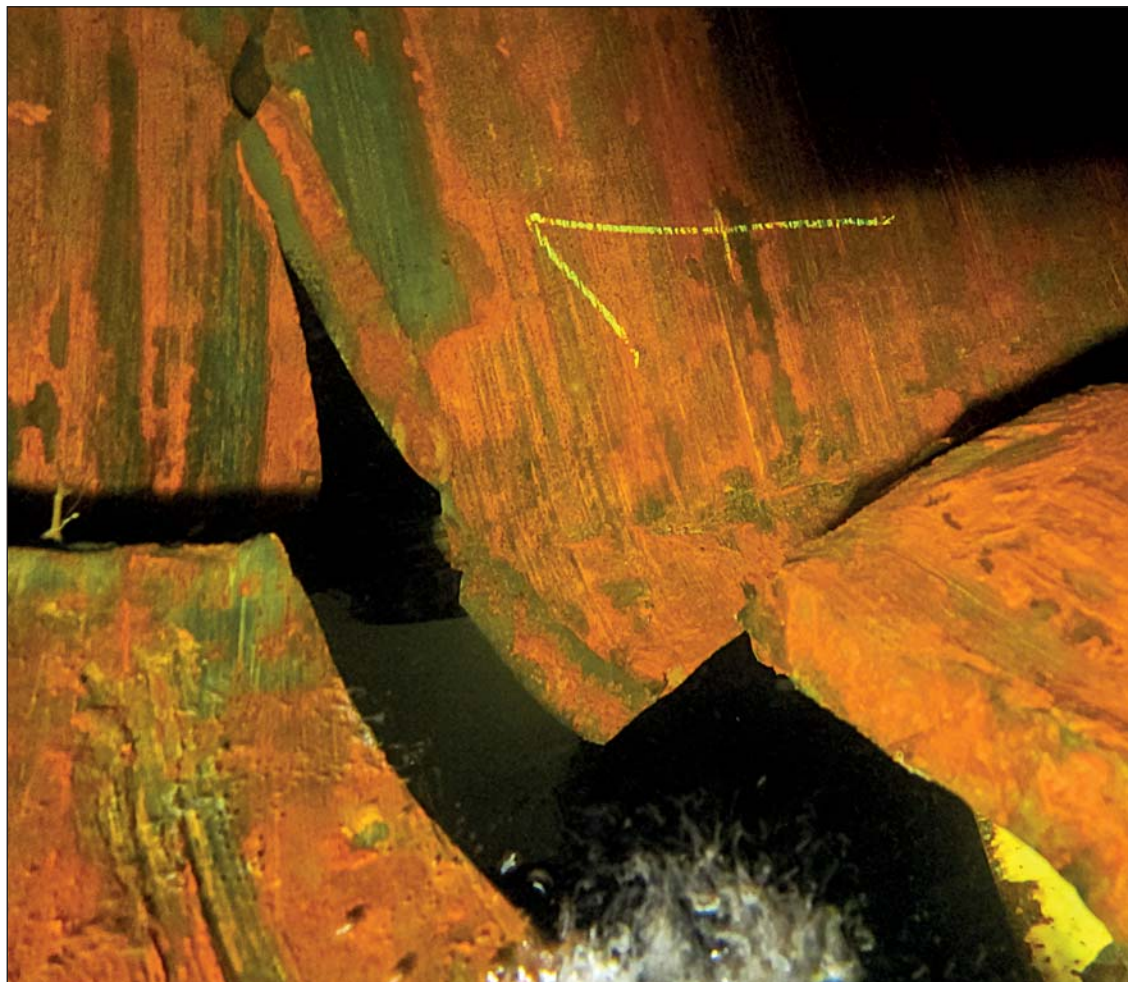
*Fabrication of the section used to repair the 5 x 5 meter hole in the aft section of the hull, port side.*

Our diver/technician team examined the hull, took measurements and photographed and videoed the damage. They reported two very large holes in the hull, one about 5 x 5 meters aft on the port side and the other about 8 x 1.8 meters near the forepeak on the port side, as well as many smaller holes, cracks and indentations.

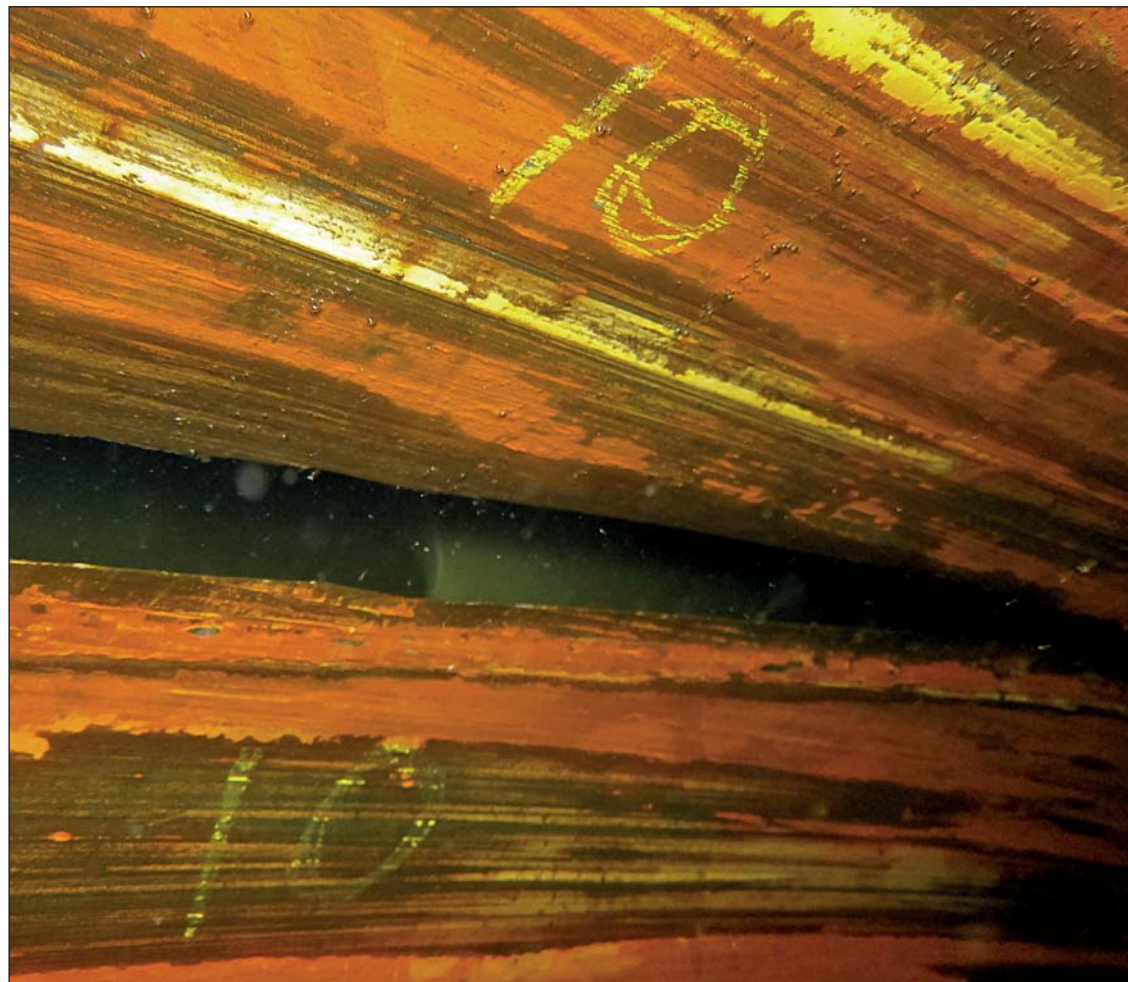
Using these measurements and the original drawings of the ship, the naval architects were able to produce final drawings from which a section and a doubler plate could be fabricated and installed. As fabrica-

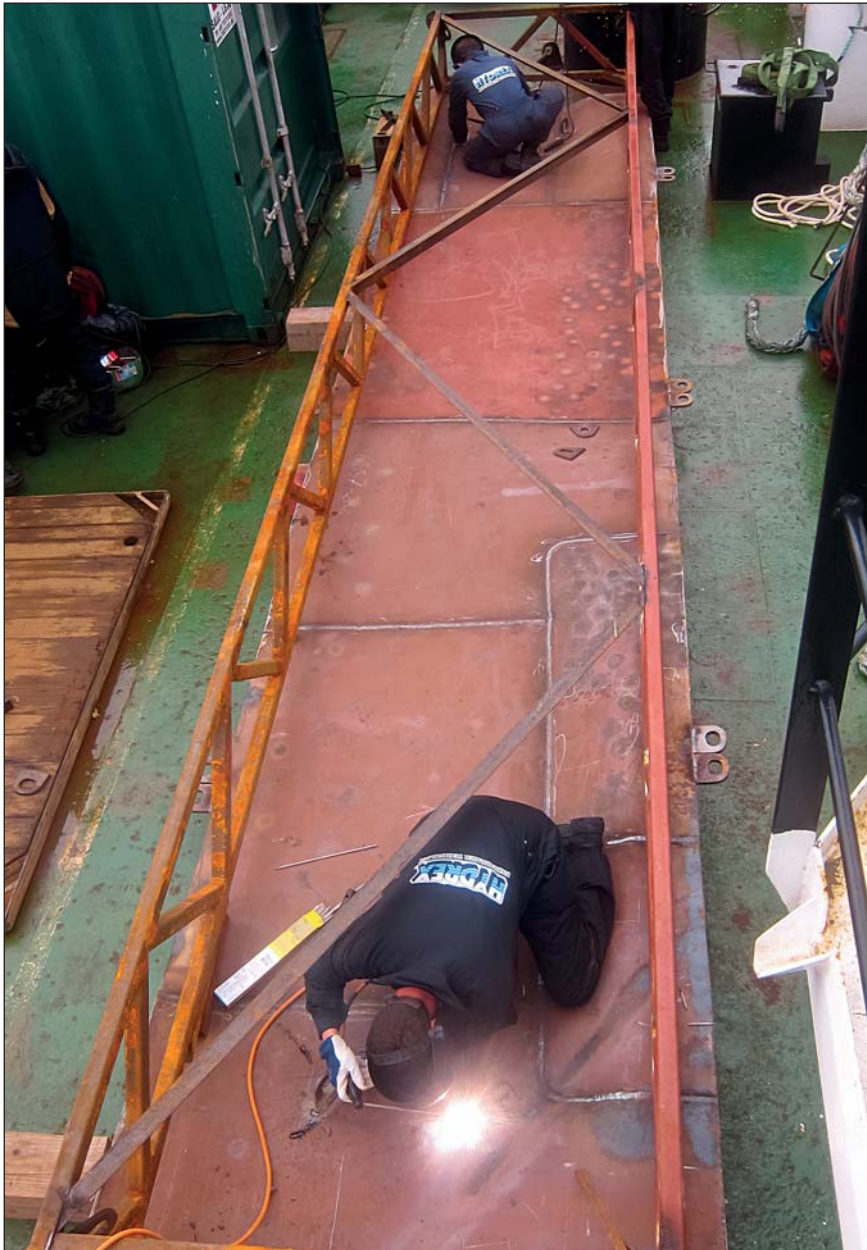
tion of the section and the doubler plate was completed, preparation for installation began. In the case of the section it was necessary to cut through the hull plates where the hull was distorted and broken. Our divers proceeded to cut a hole in the hull about 5 x 5 meters in size.

The prefabricated insert was lowered into the water and rigged into place with chain blocks. While work was going ahead with the section, another Hydrex team worked on the fabrication and installation of the 8 x 1.8 m doubler plate in the area of DBBT



*Severe damage to the hull as revealed by the detailed video inspection carried out by Hydrex divers.*





*Preparing and lowering the doubler plate into the water so that it could be welded in place to repair the 8 x 1.8 m rip in the hull near the forepeak.*

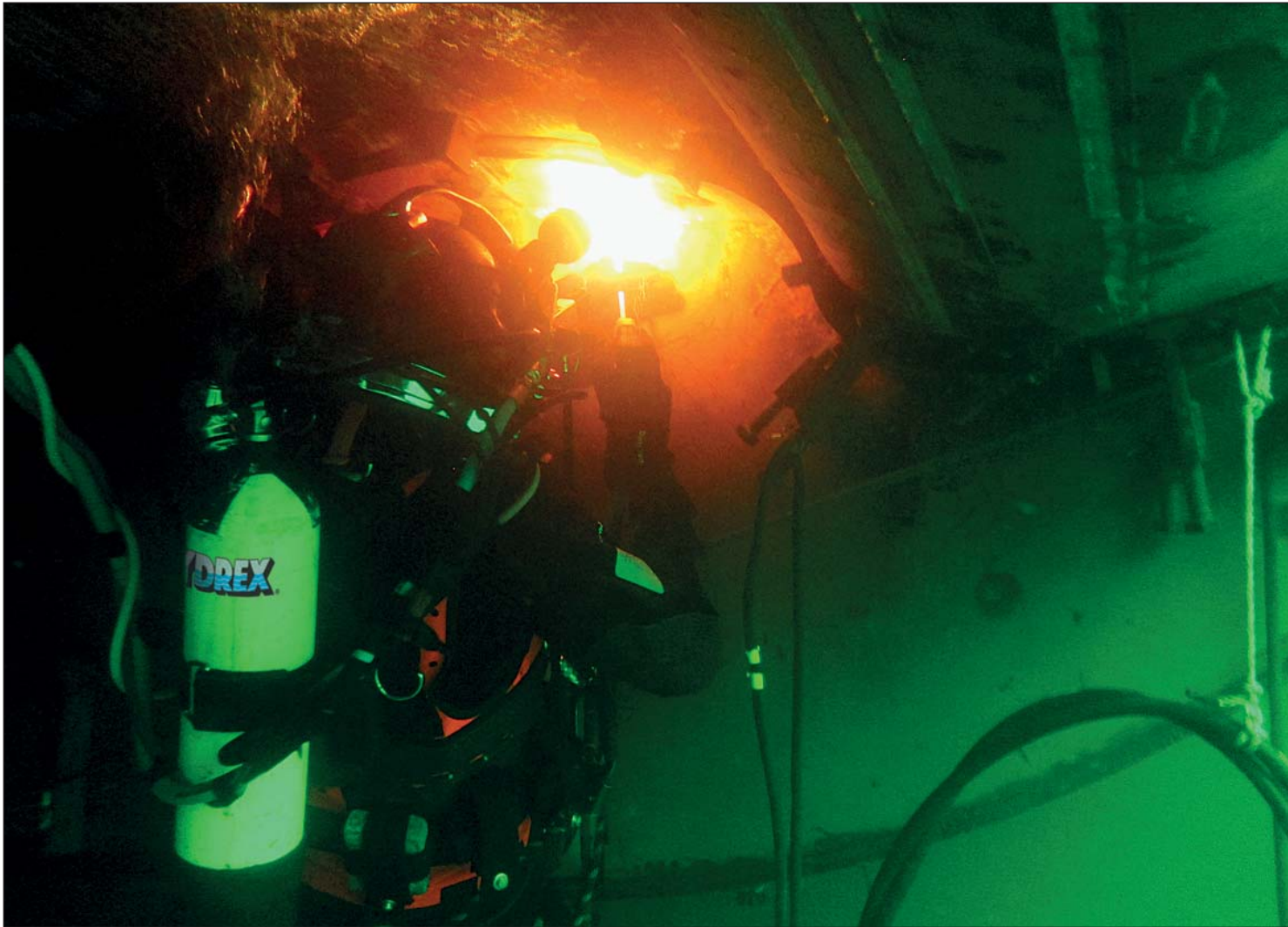
No. 1. The frame was fabricated and used for measurement and then the plate itself was cut, preshaped and attached.

In addition to the repair of the two main areas of damage, there were many smaller holes and cracks

which had to be repaired so that the vessel could sail. These holes and cracks were being repaired while the work of designing and fabricating the section and large doubler plate was going forward.

The final step for the salvor and the diving team

was a full inspection of the underwater hull on CCTV in order to gain the approval of the classification society for the vessel to sail. The *Sagittarius* passed the inspection on October 13<sup>th</sup> and resumed passage under its own steam to its destination, China.

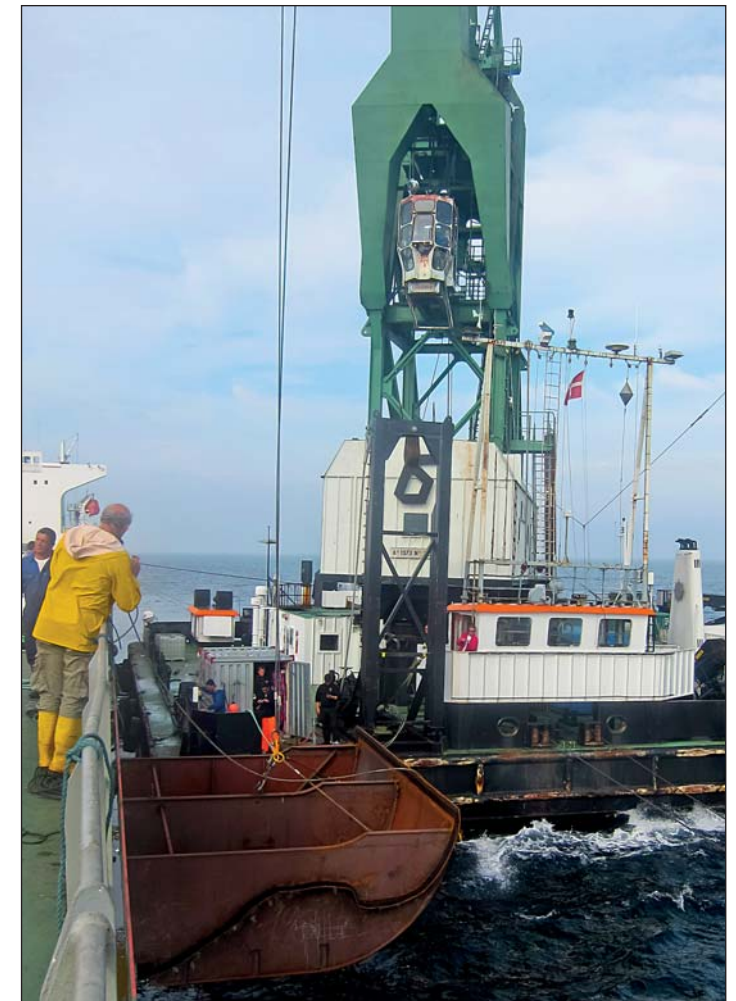


*Repairs to smaller areas of damage where the hull was holed or cracked.*

## **Conclusion**

The successful manning of a 24-man team, mobilization, equipment, and execution of the work on a project of this size can only be undertaken by a large, well trained and experienced company. Hydrex was also running a large similar operation in Fujairah along with several smaller projects overlapping the *Navios Sagittarius* salvage operation and amounting in total to an additional 24 diver/technicians performing operations around the world.

As a note, speed was of the essence in this job as the ship was on a long-term charter and each day it was out of service was costing tens of thousands of dollars. It was a testimony to the skill and conscientiousness of the divers and salvage team that after ten weeks and hundreds of meters of wet welding, the work was inspected and found to be excellent. ■



*The finished section being lowered into the water and inserted into the cut-out in the hull using chain blocks.*