

The **big 3Rs** of rudder repairs afloat



Can you undertake drydock-like services such as rudder removal, repair ashore, and reinstallation (the big 3Rs) whilst in water, ask *Harun Duzgoren (top), Chief Commercial Officer* and *Kevin Peters (bottom), Director, Technical Sales and Environmental Services for Subsea Global Solutions LLC.*



The cofferdam shown here next to the rudder





Rudder removals in service are not usually planned 'elective' events, and substantial knock-on delays arise. The lack of suitable drydock availability at a place of need, charges associated with preparing the vessel for drydocking and the associated costs of incurring days off-hire to charterers and cargo interests make these events costly. With the current shipping market volatility, even more services have a cost benefit to being completed as in-water solutions – provided you have the right experienced partner.

SGS has over five decades of experience pioneering underwater repair solutions. There are many ship equipment problems that do not at first appear solvable whilst the vessel remains afloat (especially when laden), requiring drydock facilities to be properly addressed. Our experience has taught us that many of the initial problems or challenges can become change points in perception when 'thinking in the water', and can be resolved in a safe and very cost-effective manner, whilst fully meeting class approval and manufacturer installation requirements.

In recent years, numerous cruise and commercial operators have employed Subsea Global Solutions (SGS) to perform 'drydock'-like services afloat, allowing their vessels to maintain their schedules and arrange the work around their port calls.

Difficult situation

At times, the backlog of vessels scheduled to discharge cargo in the ports of Los Angeles and Long Beach produces a highly congested anchorage. When a vessel loses its ability to steer, these conditions bring a difficult situation to an already challenging environment. Our client reached out to us to assist with exactly that kind of problem.

The main line container vessel had working steering gear actuators. However, their rudder was not responding. The vessel's technical department speculated that either the rudder stock had dropped off the hydraulic tapper, or the stock had broken in the neck bushing.



The rudder blade was slowly raised until it was high enough to position a transport barge underneath



On examination using a video endoscope, the mystery of why the rudder was not responding became clear – the rudder stock had totally failed, shearing off at the stock's taper. This caused the rudder to drop approximately half a metre, remaining perched on the lower pintail gudgeon and tilting aft by some 15 degrees. Drydock options were considered, but these would have involved a tow with the risk of possibly losing the rudder at sea. In addition, there was the issue of where to unload the cargo.

Removal

One of our project teams reviewed the scenarios and options and presented a credible alternative. SGS was able to reassure the vessel owners and underwriters that we had the experience necessary to plan and project-manage a cost-effective and safe operation as a permanent DNV class repair, having performed many rudder removals afloat. This particular situation combined the in-water removal, repair ashore, and rudder reinstallation (the big three Rs of rudder repair).

Our team defined specialist rigging plans, utilising rated rigging shackles on specific points of the 110-ton rudder blade so that the rudder could be swung outboard, with our divers connecting the lower rigging points.

Once in ready position, with divers clear, the rudder blade was slowly raised above the water high enough to position a transport barge underneath. Now lowered on pre-positioned dunnage, the blade was transported to our local SGS pier-side yard in Long Beach and hoisted ashore for repair.

Once the rudder was in position, the stock was installed and hydraulically-tightened pilgrim nuts and tiller arm were reinstalled



This enabled repairs to the rudder blade and its associated equipment onboard to be carried out simultaneously, so the work was able to be completed in quick succession.

Repair ashore

At the same time some of our coded welders fabricated a properly sized cofferdam onsite, tapered to fit around the rudder horn. Weighing 19 tons, the cofferdam was hoisted and tripped under the vessel's stern to mate to the hull. The cofferdam was installed and de-watered; this gave us full access to the rudder horn, allowing us to make repairs to the neck and pintle bushings.

Internally, both sets of bushings needed to be reworked along with the rudder stock. A new rudder stock was ordered from MarineShaft (see page 66), and as it was suspected the pintle had been damaged, a new pintle, along with rudder nuts, new neck and pintle bushings were also ordered. The tiller arm was removed and shipped to a workshop overseas for perfect blue fitment with the new stock in accordance with a class-approved process. The bushings were laser-aligned and line bored onsite to ensure perfect fit.

Whilst the rudder was on the dock our coded welders also attended to some minor seagoing damage, leaving the rudder itself better than we found it.

Rudder reinstallation

A crane barge was arranged to lower the rudder back into position for the final alignment with the stock and bushing. A condition of class was that the rudder's upper taper and all mechanical components must stay dry during the operation and we achieved this with a careful rigging plan and good communications between the team members.

Once the rudder was in position, the stock was installed and hydraulically-tightened pilgrim nuts and tiller arm were reinstalled. A final inspection was completed and the vessel was free to sail with no conditions of class and a happy client. ■