CASE STUDY: SOUTHERN STAR

ADVANCING SAFETY: WORLD'S FIRST INFECTIOUS DISEASE MITIGATION NOTATION

OVERVIEW

Marine and offshore assets, similar to land-based facilities, are at risk of being exposed to outbreaks of infectious diseases. During such outbreaks, the health and wellbeing of seafarers and passengers as well as the normal operation of marine and offshore assets can be impacted. The COVID-19 pandemic is one such example, which is having significant impact on the maritime sector with companies, governments and various regulatory bodies compelled to take rapid and extraordinary measures to ensure smooth operation of the assets.

Recognizing that an asset's physical arrangement and operational procedures can act to mitigate the occurrence and transmission of infectious diseases, ABS launched the *Guide for Mitigation of Infectious Disease Transmission on Board Marine and Offshore Assets*. The ABS Guide provides guidance for the isolation and segregation of crew or passengers from shore personnel or visitors and addresses the ventilation and sanitization of interior surfaces for certain accommodation and working spaces on board. Assets that satisfy the arrangement requirements of this Guide may be given an optional notation, Infectious Disease Mitigation-Arrangements (**IDM-A**).

The existing offshore support vessel, DSV *Southern Star*, owned and operated by Tasik Subsea became the first ABS-classed vessel to be awarded the **IDM-A** notation.

In an effort to help the maritime industry in adapting to the COVID-19 pandemic and preparing for any future infectious disease outbreaks, ABS offers the *Guide for Mitigation of Infectious Disease Transmission on Board Marine and Offshore Assets.*

Download at www.eagle.org

CHALLENGES

The *Southern Star* is a diving support vessel with capacity to carry up to 120 people plus up to 15 Divers in Saturation. Apart from carrying a large number of specialized personnel, the vessel carries a myriad of equipment onboard to support subsea offshore operations including Saturation & Air Diving, ROV and Survey. The ABS Guide requires a specific minimum number of single-occupancy cabins to facilitate isolation and segregation of potentially infected persons onboard. Additionally, there is a requirement for an anteroom to provide caregivers a place to change Personal Protective Equipment (PPE). Given the nature of infectious diseases, the vessel owner or the operator should consider grouping isolation cabins and associated anterooms together, separate from the other accommodation space.

Due to the *Southern Star's* existing design, constraint of spaces and the owner's operational considerations, designating such isolation cabins and anterooms was a challenge for this vessel. The challenge was further compounded by the limited ability to modify the vessel to provide these isolation cabins and anterooms. The ABS Guide allows the use of portable accommodation modules (PAM) on open decks. The vessel has a PAM during the COVID-19 pandemic but it was not included in this **IDM-A** notation exercise as it is not permanent.

To help mitigate the risk of contaminating ventilation systems, the ABS Guide has specific requirements for the ventilation system of the isolation cabins and associated anterooms. One example is the requirement for the anterooms to be under negative pressure (at least -2.5 Pa) with respect to the accommodation area corridor, and isolation cabins and the associated shared sanitary space to be under a negative pressure (at least -2.5 Pa) with respect to the anteroom. For the *Southern Star*, tracing leakages in unexpected locations in the vessel and fixing them to achieve the required negative pressure turned out to be one of the key challenges during onboard survey by the ABS Surveyors.

While new construction vessels would offer a relatively higher level of flexibility to modify design at an early stage, an existing vessel posed unique challenges and required an out-of-box thinking approach to minimize any significant modifications to the existing arrangements while providing an equivalent level of safety.

SOLUTION

The review process to assign the **IDM-A** notation to the vessel required close communication with the designer, vessel owner and operator to understand the constraints and find practical solutions to compliance-related matters. ABS worked with the client to identify the minimum required number of cabins to be designated as isolation cabins in the event of an outbreak. Part of one accommodation deck (fourth deck) was designated as the isolation deck, with an air-tight door fitted in the alleyway. The newly installed air-tight door would be kept closed at all times during a disease outbreak, thus segregating the isolation areas from the rest of the accommodation deck. As no available separate cabin could be assigned as an anteroom, the corridor space adjoining the isolation cabins was designated to serve the purpose of the anteroom. Such solution avoided onerous modifications to the vessel.

Next came the requirements associated with ventilation systems. Patients with infectious diseases should ideally be treated in negative pressure isolation rooms. The most viable option of converting a normal cabin to a negative pressure cabin was to utilize the concept of displacement ventilation (either mechanical or natural ventilation), where the air intakes are at a low level and exhausts are at a high level. The modification not only involved separating the exhaust lines for these rooms from the rest of the deck but also separating the exhaust lines from each other to avoid cross-contamination. To do so, an isolation valve was placed on each branch of the exhaust line together with a non-return damper. The isolation valve would be effective when there was a disease outbreak onboard and make the exhaust line independent. The non-return dampers (NRD) on each branch would further isolate the exhausts from each other, thus minimizing cross-contamination.

Finally, the exhaust outlet needed to be routed to an open deck space in such a manner that it is no less than eight meters away from all air intakes, natural ventilation points, doors and open-type windows. To satisfy this requirement, the exhaust outlet would have to be placed near the navigation bridge which was about 5.6m above the fourth deck. This would have impacted the negative pressure on the isolation cabins. To solve this issue, a high energy particulate air (HEPA) filter was used. HEPA filters are known for their high efficiency in filtering air and are permitted by the ABS Guide. The final arrangement used a HEPA filter at the end of the exhaust outlet which was placed at the same deck level.

Even with all the above arrangements in place, unexpected leaks were observed onboard and achieving a negative pressure of 2.5Pa in the isolation cabins was a challenge. However, with the experience and in-depth knowledge of the ABS personnel onboard, the leaks were properly identified, fixed, and the required negative pressure was achieved.

RESULTS

After completion of all plan reviews and surveys onboard, the *Southern Star* was awarded the **IDM-A** notation, becoming the first in the world to receive this notation. Ultimately, the vessel's modified arrangement and operational procedures onboard will help mitigate occurrence and transmission of infectious diseases, thereby, providing a safer work environment to the seafarers and other personnel working onboard.

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