Innovative OSV Mothership for UK Round 3 Far Shore O&M

Innovative Design & Technology Innovation

The stylized exterior form has a structural glass roof feature, which acts as a collector panel for a light tunnel system, which distributes natural light within the areas of the ship devoid of natural views. Inspired by structural and superarchitectural forms the exterior form was developed around the visual metaphor of a hand clasping a petal. The hull is perceived as a visual form of strength that exudes itself around the petal form of the accommodation module. The flowing sculptural form of the exterior, shown in Figure 1, seamlessly integrates the bridge level with the rest of the hull. The exterior design process began in side-profile, were the dynamic stance of the visual form was developed. The visual mass of the exterior was moved forward to help create the dynamic silence make the vessel look as if it was moving when stationary. Refined through the use of line analysis to reduce drag, and to increase airflow around the vessel. The use of continuous horizontal windows in the fore section of the bridge allowed to see into the forecast area which therefore clean the otherwise closed forms. The horizontal windows alter the profile and make the bridge gives it an imposing sense of scale from large architectural forms. The beam of the vessel has been increased to accommodate both the SMTS XSS WFSVs and a crane launch system. In the final version the bulwark is horizontal towards the transom as the visual mass of the WFSVs balances the bow petal form.

Exterior Design and Technology Innovation

The technology innovation in this design proposal is the use of common platform technology. We refer to this as a vessel design is generic OSV vessel with a modular platform capable of being fitted with frames and cranes for the launch/recovery of WFSVs. There are two distinct launch/recovery systems under development. The first involves lifting a lifting frame onto both hulls of the WFSV as shown in Figure 2. Here the principle of operation involves driving the WFSV onto a bollard at the transom of the mother ship under threat, to partially constrain the axis of motion of the WFSV, enabling it to operate under 1.5 cm conditions. A robotic arm system then assists in hoisting the lifting frame onto the sides of the lifting frame. This has a flexible cable based mechanism to allow for the motion of the vessel in the 2.5 Hz sea state. The cable system raises the WFSV above the water and the crane retracts to the dock. At which point the cable lowers the WFSV onto a trolley and track based system, which allows the vessel to be moved forwards on an electrically powered bogie to make room for the second WFSV to be recovered from the water.

Interior Design

The second proposal in development uses the same starting point of driving the WFSV onto a bollard, in this case the use of a lifting cage which is submersed just below the rear of the transom is raised to the underside of the WFSV in partially constrained condition. It is then lifted from clear of the water on a cable system and the crane retracted to transfer to the deck of the mother ship. The challenge in this proposal is transfer of the vessel from the lifting cage to allow the second vessel to be recovered. This will involve a mobile track and bogie system to allow the WFSV to be driven forward from the lifting cage and the second WFSV to be moved into the lift area case when recovered.

Environmental Psychology

Environmental psychology is an interdisciplinary field of research that addressed the relationship between humans and their surroundings. The term environment includes: natural and physical, socio-cultural, interactive, and informational environments. The discipline is both value oriented and problem oriented, with the objective of solving live environment issues. Conceptualizing human environment is the basis of Environmental Psychology. The application of new methods relies on interaction with other disciplines in the design field such as: architecture, interior design, urban planning, industrial design, and landscape architecture.

Heerwagen [3] refers to the biological foundations of well-being, which distinguishes between “survival needs” and “well-being needs”. Survival needs deal with aspects of the environment that “keep us alive” whereas well-being needs deal with our existence, pathologies or trauma, and opportunity for rest and sleep. Well-being needs affect overall health through human behavior.

Noise levels not much above or below that in nature

Meaningful and pleasant surroundings

- A relaxing and positive environment

The technical basis for the forms consists of a number of the other theoretical perspectives that may be relevant to well-being and personal well-being. The working environment, the experience of the environment, and the environment as a whole, are all subject to such factors as privacy, security, and order.


Research has indicated that current wind farm support vessels will not be appropriate for accessing the UK Round 3 far shore wind farms of the North Sea. In order to improve the productivity of WFSVs, access arrangements would therefore be required. Extending the European Wind Energy Association’s (EWEA) growth projections for the period up to 2020 in employment, operation and maintenance, of offshore wind farms, it will be necessary to recruit land based support vessels. Therefore, most shipbuilding nations will need to address the user needs and aspirations of a new generation of technologists, who may not have been exposed to typical marine environments. Therefore, in order to satisfy the proposed, that challenges perceptions of the working and living environment on the current offshore support vessels to the new generation of technologists. The interaction between innovation in design meaning and technology innovation can result in the creation of new market sectors. An analysis of the offshore wind market identified the challenges of vessel financing compared to the shipping industry. A fundamental question was to what extent it is possible to create a truly sustainable system, that will be cost efficient without creating excessive costs to a market sector, and as a result also create new market sectors. The concept presented has an innovative WFSV launch/recovery system enabling a conventional OSV design to create a novel design. The concept is based on the notion of making a high-tech technology into a marketable technology. Resulting in a more cost effective solution in terms of design and construction that the benchmarked specialist vessels.

References


Conclusion

Future changes in the PAX regulation of CTVs and the current transfer to turbine technology could radically modify O&M strategy business models. This requires the mothership to be a highly adaptable platform that can be readily and cost effectively reconfigured for the range of CTV types and deployment solutions. The two CTV launch/recovery solutions proposed will be evaluated in the further work of the authors in this context to quantify potential benefit and ROI. The recent exterior design development leading companies in the commercial vessel sector indicates that they are developing an appreciation of the overall marketing value of exterior form as part of the brand value and perception. Given the significant knowledge work nature of the technologists in the O&M activities in the offshore wind sector, Environmental Psychology offers a significant opportunity for Transfer of Innovation from the built environment to the commercial marine sector.

Figure 4: Seating area with biophilic, lighting features and textures

The second concept has a strong biophilic and luxury influence inspired by an airport business class lounge. The seating area with biophilic lighting features are shown in Figure 4. The use of plants and natural stone effect combined with the use of edge lit glass of the ceiling gives the natural stonework a sense of atmosphere. The free reference as a structural motif within the lighting features at the centre of the layout, seating and the organic forms is an emphasis in biophilic design. The use of hard wood flooring complements the natural stone effect.

Figure 5: Views of interior apartment

The technician room concept, shown in Figure 5; uses a small wall to simulate views of nature as well as interactive media content. The minimalist design and the use of light and lighting make it appear spacious. The use of a Murphy bed in the corner of the room enhances the design meaning making it feel like a small apartment luxury lounge, shown in Figure 6, by enhancing the sense of space when the bed is stored.