Rethinking the offshore wind boat landing

Andrew Wickham, Managing Director of Buoyant Works, explains how the company's FlexLanding system is rethinking offshore wind boat landings with a modular polymer design that aims to improve transfer safety, reduce maintenance and lower whole-life costs.

PES: Andrew, it's great to have you with us. Can you tell our readers a little about your background, your role at Buoyant Works and the work the company is doing in offshore wind?

Andrew Wickham: Buoyant Works is a manufacturing company based in Cornwall, operating across the offshore wind, oil and gas and marine industries. We have more than 30 years of experience in fender design and manufacturing and manufacture our products entirely in-house. Over the last five years alone, we have supplied bow fender systems to more than 230 crew transfer vessels (CTVs).

That experience has given us a strong understanding of how vessels interact with offshore structures and has led to the development of products such as Windshield and, more recently, FlexLanding. Our focus is on using high-performance polymers and our unique internal cavity technology to create impact-absorbing products with controlled and repeatable performance.

PES: Buoyant has spent a lot of time looking at what happens where vessels and offshore structures meet. What has that experience taught you about the way conventional offshore wind boat landings are designed?

AW: Our experience has shown us that the interface between a vessel and an offshore structure needs to do much more than simply provide a physical landing point. It needs to manage impact forces, provide safe and consistent access and withstand a demanding marine environment over many years.

Through Windshield, we developed a modular protection system for steel boat landings that reduces corrosion and impact damage to landing piles, lowers impact loadings and improves crew transfer safety.

What we learnt from that system has directly informed the development of FlexLanding, where we have taken the next step and reconsidered the boat landing structure itself.

PES: Steel boat landings have been the industry standard for years. Where do you think their main limitations are beginning to show, particularly as projects age and operating demands increase?

AW: Steel has served the industry well, but there are a number of areas where its limitations become increasingly important over the life of an offshore wind asset. Corrosion, impact damage and ongoing maintenance can all create significant costs and operational challenges.

A traditional steel boat landing can also be relatively heavy, while the structure and its protective systems have to deal with repeated vessel impacts and a harsh marine environment.

Our experience with Windshield has demonstrated that reducing impact loadings and protecting the underlying structure can reduce maintenance requirements, while FlexLanding goes further by replacing the conventional steel boat landing with a polymer-based modular system.

PES: With FlexLanding, you are taking that thinking a step further by rethinking the structure itself rather than simply protecting it. What led you in that direction?

AW: FlexLanding came directly from what we learnt through the development and use of Windshield. Rather than simply protecting a




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conventional steel boat landing from vessel impacts, we asked whether the structure itself could be designed to absorb those impacts and provide the access function at the same time.

That led to a polymer-based, non-metallic boat landing made from modular sections that link together to create the complete assembly. The result is an alternative to the traditional steel offshore wind turbine boat landing, with the potential for lower initial capital cost, much lower long-term maintenance costs and improved transfer performance.

PES: Moving away from a conventional steel structure is a significant change. From an engineering point of view, what can a polymer design offer that steel cannot?

AW: The key advantage is that the polymer system can be engineered around controlled energy absorption rather than simply relying on the stiffness and strength of a steel structure.

Our products use unique internal cavity patterns that generate progressive compression with controlled, predictable and repeatable performance. This allows high levels of energy absorption while maintaining low reaction forces and low face pressures. The material and design also provide significant weight savings, typically at least 30%, while offering low surface wear, low levels of marine growth and long-term dynamic performance. In addition, the polymer can be recycled at the end of its life and used in new fender products.

PES: One of the interesting aspects is the idea of bringing the ladder, impact protection and landing structure together. How does that change the way the whole interface can be designed?

AW: The major difference is that the boat landing becomes a single integrated modular system rather than a collection of separate steel components. FlexLanding uses modular sections that link together to create the complete assembly, with the ladder and boat landing tubes incorporated into a single component.

This allows the structure to provide access while also managing the vessel impact. The design can be standardised to simplify CTV accessibility, while different configurations can accommodate requirements such as ladderless access, CTV locking features and cargo-only transfers. It gives designers more flexibility in how the vessel-to-structure interface is configured.

PES: Offshore maintenance is costly and difficult, especially on ageing wind farms. How much of that maintenance burden can realistically be reduced through better boat landing design?

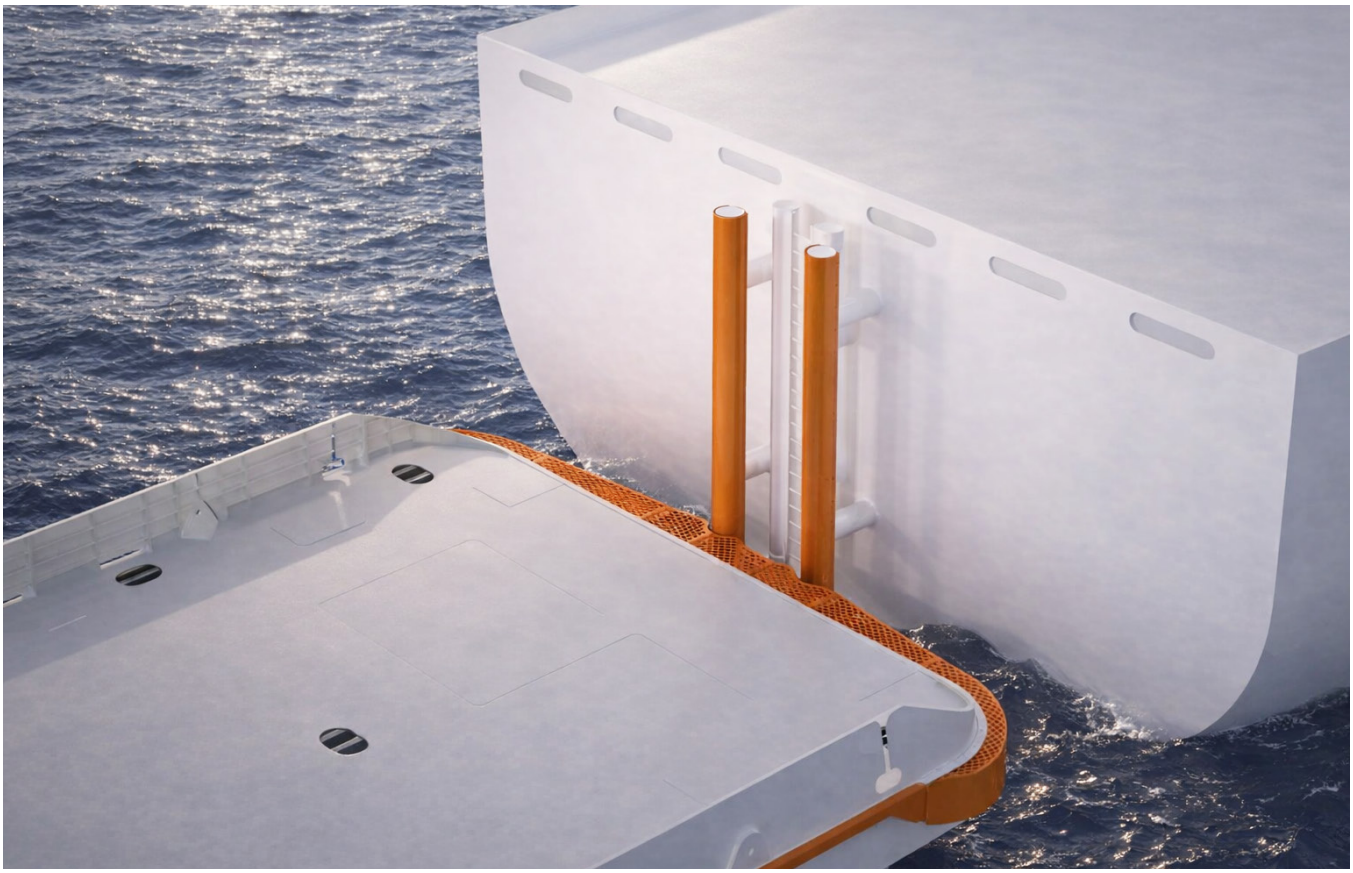
AW: Reducing maintenance is one of the major benefits we are targeting. FlexLanding has very low lifetime maintenance requirements, does not require painting throughout its lifetime and has no exposed steel components. Because the system is not dependent on painted steel surfaces in the same way as a conventional boat landing, it removes an important source of ongoing maintenance.

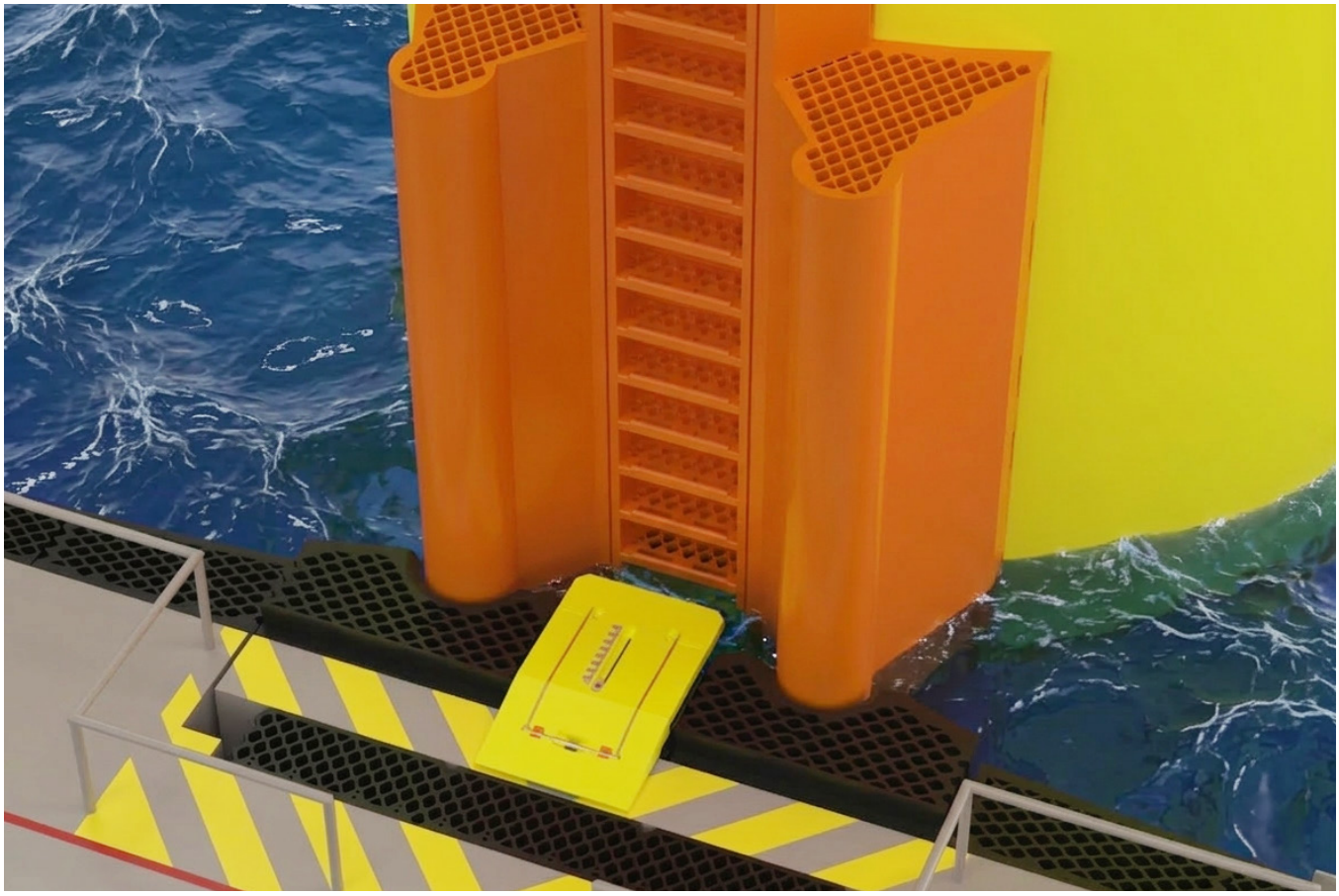
A 30-year cumulative capital expenditure (CAPEX) and operating expenditure (OPEX) comparison, assuming one replacement steel boat landing after 15 years, illustrates the potential lifecycle cost difference. The precise saving will depend on the individual project, but the design is specifically intended to deliver much lower long-term maintenance costs.

PES: Modularity is another important part of the concept. If damage does occur, how would repair or replacement work offshore and what could that mean for downtime and vessel intervention?

AW: Modularity is important because it means the entire boat landing does not necessarily have to be treated as one structure if damage occurs. FlexLanding is manufactured as modular sections that can be transported and assembled, and the design allows individual sections to be replaced. In the event of severe damage, sections can be replaced offshore.

This has the potential to simplify repair activities and reduce downtime compared with replacing a much larger conventional structure. The modular approach also supports manufacturing, transportation and final assembly on a monopile or transition piece.





PES: Offshore access is changing too, with CTVs, daughter craft and CSOV operations all placing different demands on the interface. How do you see boat landing design evolving to accommodate that wider mix of vessels and operations?

AW: The design has been developed with a much wider range of offshore access requirements in mind. FlexLanding can be used with CTVs, service operation vessels (SOVs) and installation vessels, as well as on traditional transition pieces, monopile foundations, jacket structures, floating wind structures and substations.

We have also developed options for CSOV access, CTV locking features for ladderless access systems and cargo-only transfers where a ladder is not required. Standardising the design can simplify CTV accessibility, while the modular approach allows configurations to be adapted to different operational requirements.

PES: Any move away from an established steel solution will naturally raise questions for developers and operators. What evidence, testing and assurance will they need before alternative materials and designs are accepted more widely?

AW: For any alternative to an established steel solution, developers and operators will naturally want confidence that the product will perform consistently throughout its service life.

The technology behind FlexLanding is based on internal cavity patterns designed to provide controlled, predictable and repeatable compression, with high energy absorption, low reaction forces and consistent long-term dynamic performance. We have also developed and manufactured a full-size cross-section prototype as part of the development process.

Ultimately, wider adoption will depend on demonstrating that the system meets the relevant engineering, safety and operational requirements for each application, but the underlying design philosophy is based on predictable performance rather than simply replacing one material with another.

PES: Do you see the strongest opportunity in retrofit, or is the bigger shift likely to come when access, impact protection and maintenance are considered much earlier in the design of new offshore wind projects?

AW: There is an opportunity in both areas, but FlexLanding is particularly interesting because it can be considered as part of the overall access philosophy from the beginning of a new project.

The modular design also allows the system to be manufactured and transported in sections for final assembly. For existing structures, the range of configurations offers potential for adapting the technology to different access and operational requirements.

The key opportunity is therefore to think about access, vessel interaction, impact absorption and lifecycle cost together rather than treating the boat landing as a standalone steel fabrication.

PES: Finally, looking five or ten years ahead, how do you expect offshore wind access to change, and do you think the traditional steel boat landing will still be the industry standard?

AW: I think offshore access will become increasingly focused on safety, efficiency, flexibility and whole-life cost rather than simply reproducing the traditional steel boat landing design. We are already seeing a wider range of vessel and access requirements, including CTVs, SOVs, CSOVs, installation vessels, floating wind and ladderless access systems.

Operators are also looking for ways to reduce maintenance, extend operational windows and reduce the environmental impact of offshore operations. FlexLanding is designed around those requirements, offering a lighter modular structure, lower impact loadings, very low lifetime maintenance and potential fuel savings of 20 to 30% during transfers.

It is too early to say that steel will disappear entirely, but we believe there is a strong case for alternative materials and integrated designs to become much more common in offshore wind access.

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