

## Double layer tensegrity grid offshore platform for sea accessibility

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### Abstract

Tensegrity structures, which emerged in the mid-20th century in the form of sculptures, are a class of reticulated space structures composed of compressed bars maintained in equilibrium by a network of tensioned cables. Their stiffness depends both on the mechanical properties of the elements and their internal stress introduced during assembly, which is called self-stress state. They have been increasingly studied during the last few decades for civil engineering applications.

Taking advantage of their promising structural properties, we respond to the challenge of accessibility to the sea with modular lightweight and transparent platforms. Variable configurations are developed to fit ecologically into the marine environment thanks to double layer tensegrity structures. Moreover, allowing easy assembly / disassembly we respect also the coastal law in France.



Figure 1: An overview of prototypes of the platform

This study, both numerical and experimental, sheds light on the different structural and conceptual aspects of this solution, thus validating its mechanical capabilities as well as its feasibility, particularly through the aspects of modularity, folding / deployment and setup. After the structural and design optimization of elements constrained by weight and stiffness, we detail the design of the nodes, which are the key components to ensure the geometry and foldability of the structure but also the interaction with the supports on the seabed and the deck.

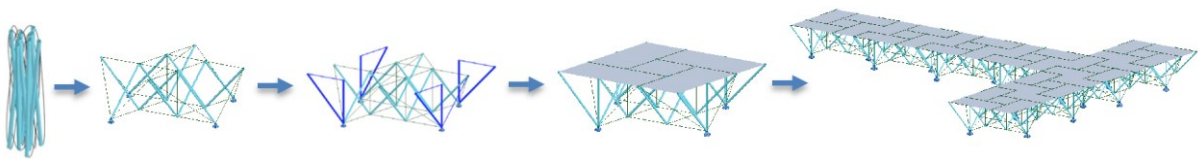


Figure 2: Illustration of the unfolding process, from a compact bundle to a wide variable platform

### References

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