

## **A Deepwater Dry-Tree GoM Solution: The FourStar TLP**

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### **ABSTRACT**

SBM Atlantia have developed a Dry-Tree FourStar TLP with full drilling capability for GoM applications. This presentation focuses on the unique features of the Dry-Tree FourStar by considering a typical design example.

Dry-Tree FourStar TLP considered is a 100,000 ton displacement structure with a payload of approximately 40,000 tons, designed for 4300 ft water depth. Like its wet-tree predecessor, the hull geometry follows the battered column form, which leads to increased stability for quayside integration, wet tow of the integrated system, and self-supported installation. Furthermore, the large keel footprint of the hull maximizes the efficiency of the tendon system.

In order to enable quayside integration of the 22,000 ton topsides onto the FourStar hull, the deck is designed as three separate interconnecting modules. The Dry-Tree FourStar hull is structurally optimized for effective load transfer through the outer-shell of the structure, resulting in significantly lower hull steel densities when compared to industry standards.

The design was confirmed through a comprehensive wave basin model test campaign performed at the Offshore Technology Research Center at Texas A&M University. The model tests were performed at 1:50 scale, and utilized the latest GoM MetOcean criteria. The top-tensioned risers were included in the physical model in order to provide more realistic estimates of the hydrodynamic behavior of the TLP. The model tests confirmed the performance of the GoM Dry-Tree FourStar as a stable drilling and production platform.

This paper presents the development of this TLP with emphasis on the hydrodynamic and structural aspects that are unique to the concept. It discusses the observations from the wave basin model tests, including the results of a comparison with a theoretical global performance analysis.

### **INTRODUCTION**

SBM Atlantia's new battered four-column TLP is developed to create a more economical solution for deeper waters and larger payloads, where SeaStar is no longer an optimal solution.

The FourStar TLP's unique characteristic is its battered columns. The four columns of the FourStar are battered towards the center of the

platform; thus, for a given topsides geometry, the base footprint and the water plane area are larger than a conventional vertical column TLP. Therefore, it can be designed to provide adequate stability to enable quayside integration of the topsides onto the hull, wet-tow of the integrated system, and self-supported tendon lock-off. This eliminates any offshore heavy lift(s), which can often be a significant expense compared to the total cost of the TLP/Tendon system.

Moreover, the larger base footprint results in the tendon porches being further away from the center of the platform, compared to a conventional vertical column TLP. This feature maximizes the effective arm of the tendons, thus resulting in a smaller tendon system; which is one of the most expensive components of the TLP.



**Fig 1: Artist's rendering of SBM Atlantia's Dry-Tree FourStar TLP.**

The battered columns result in an 'open' structure at the waterline, leading to less wave disturbance and overall better motion characteristics, when compared to a vertical column structure. This feature has also been observed during the wave basin model tests performed on two different configurations of the FourStar TLP (the