

AIMS VIV SUPPRESSION HISTORY

During the 1980s, AIMS International became known for its capabilities in the structural fiberglass industry in the Gulf of Mexico. Around 1987, the very first deepwater project in the GoM took shape—the Placid Green Canyon Project. This was the first floater in the Gulf, and it was an 84” diameter combined drilling and production riser system supplied by Cameron Offshore Engineering. Due to AIMS’ reputation in the fiberglass world, the COE approached AIMS about supplying the vortex strakes for the riser. To our knowledge, AIMS supplied the first vortex strakes ever in the Gulf of Mexico.

The Placid strakes were a 4-start helix with a fin period of $5 \times D$, where D is the 84” diameter riser, and the fin height was $0.15 \times D$. These strakes were manufactured using the hand-lay-up fiberglass process (HLU) and consisted of the fin, which was perpendicular to the 84” OD buoyancy riser, but also possessing a flange at the base—essentially a T-shaped cross section. Using 1” diameter fiberglass bolts, the flanges of the T-shaped strake were bolted to the riser buoyancy. As a secondary attachment means, the strakes were strapped to the buoyancy modules.

During the 1990s, AIMS experimented in the VIV suppression industry, having been awarded only a few projects through the entire decade, and these projects were quite small in revenue. AIMS had no hydrodynamic test data to support its product offering, and as the deepwater projects became more prevalent in the 1990s, it became clear to us that we were going to have to obtain our hydrodynamic test data, or we would never become a player in the VIV suppression industry.

That being said, in the early 2000s and through the remaining decade, AIMS’ VIV suppression products (strakes and fairings) have been subjected to more hydrodynamic testing than any in the industry. AIMS embarked on a rigorous testing regimen that verified the drag coefficients, C_d , and the VIV suppression efficiency as a function of amplitude of its product offering, which consists of both vortex strakes and fairings.

AIMS’ fairing is known as the AIMS Dual-finned Flow Splitter or ADFS. It is not the conventional, tear-dropped fairing, but rather a U-shaped fairing. Because of its shape, it is the most stable fairing on the market, it possesses the lowest drag coefficient, and its VIV suppression efficiency is in the 98% range.

The patented ADFS has been tested rigorously by several operators, and AIMS’ intellectual property covers the following ranges of designs as a function of aspect ratio and taper. As stated previously, the ADFS is essentially a U-shaped fairing; however, we can taper the fins to achieve a lower drag coefficient. A 50% taper means that the fins are tapered such that if the diameter of the fairing at the body is D , the fins are tapered such that the gap between the fins at the end is $0.5D$. A 100% taper would represent a tear-dropped fairing, and a 0% taper would represent a U.

Aspect Ratio x Taper
2.0D x (0% - 50%)
1.75D x (0% - 50%)
1.625D x (0% - 50%)
1.50D x (0% - 50%)

We have tested at tapers in excess of 50%, but have found that instability sets in. We have tested at aspect ratios of less than 1.5, but have found that drag increases.

AIMS’ vortex strakes are a 3-start helix, and we have hydrodynamic test data to support the supply of the following vortex strakes:

Fin Period x Fin Height
5D x 0.15D
15D x 0.25D
15D x 0.20D
15D x 0.175D
15D x 15D

Further, in relation to our vortex strake product line, AIMS developed and patented a compliant banding system. When deploying strakes around flowlines that are coated with an insulation material, such as a GSPU when the Inconel bands are installed on the deck of the pipelay barge, the bands are tight; however, when the flowlines are at depth, the hydrostatic pressure can cause the diameter of the insulation material to compress, thus reducing the diameter of the overall system. The bands are now loose. AIMS’ Compliant Banding System allows the diametric reduction of the flowline’s insulation; however, the bands remain tight.

All of our products can be coated with an anti-fouling coating if deployment is going to be above the 600 foot water depth range. We have also developed ROV installable fairings and strakes, which have been in use since 2006 for strakes and 2010 for fairings. AIMS supplied its first ROV-friendly vortex strakes on the BP Mardi Gras Pipeline System beginning in 2004.