Case study

Solving ‘trapped water’ within a marine riser assembly

Client
Pride Drilling Inc

Project location
Houston, Texas USA

Product
DRBM High Performance Composite Syntactic Buoyancy

Time period
2009 – 2014

BACKGROUND

In 2009 Matrix was approached by Pride Drilling to solve a problem associated with a phenomena referred to as ‘trapped water’ which is experienced during riser recovery operations on floating drill rigs. Riser Buoyancy is typically manufactured from a composite shell with an internal core of low density syntactic foam. The modules are designed to lower the in-water weight of the steel riser assembly in water.

The riser assembly consists of a primary riser tube surrounded by a bundle of ancillary pipes. Discrete riser sections or ‘joints’ are flanged together to make up a riser assembly which can be up 3km long.

PROBLEM

The trapped water effect refers to a sudden increase in derrick loads that are sometimes observed during riser recovery operations. A contributor to these load conditions is assumed to be the drag forces that result from the turbulent flow of water between the internal geometry of the buoyancy and the OD of the riser assembly.

Consequently, the trapped water effect can result in increased hook loads on the rig which can, in specific circumstances exceed the safe operational load of the derrick.

METHOD

In order to reduce the effect of turbulent water flow a reduction in the free space between the Marine Riser and buoyancy was necessary. Essentially a buoyant void filler or ‘insert’ was required that could meet the operational and deployment requirements of the riser. Ideally the insert should be manufactured from a material similar in material properties to the riser buoyancy and contribute to the uplift of the riser assembly.

Riser buoyancy modules are manufactured in discrete depth breaks, in this case 2000’, 4000’, 6000’, 8000’ and 10,000’. The inserts where designed to match the depth breaks of the modules and fitted between the auxiliary lines and the riser tube.

Due to the sheer number of inserts, over 2000 per string, they had to be completely interchangeable and had to be precision moulded using machined tooling.

OUTCOME

Over a five year period Matrix delivered eight strings for Pride (later Ensco Drilling) comprising of 8,000 ultralight weight buoyancy modules and 24,000 inserts.

These products have been successfully used without any reported performance issues to deepwater wells in in the Gulf of Mexico, Brazil, Offshore West Africa and South East Asia.

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02/08/18