

# UNDER PRESSURE

## DESIGNING A SPECIALIST REEL FOR A SPECIALIST HOSE

**A downline flexible pipe destined for the Uruguá~Mexilhão-1 gas flow system situated in the Uruguá oil and gas field, Santos basin, offshore Brazil, will have travelled many thousands of kilometres before it reaches its final destination. It also requires a purpose-built Aquatic reel to operate properly.**

The 3-in. flexible pipe will be utilised during pre-commissioning of the Uruguá~Mexilhão pipeline, which Saipem is installing and commissioning for the Brazilian state oil company Petrobras. The 174-km long, 18-in. gas pipeline will link the *Cidade de Santos* floating production, storage and offloading vessel, which is anchored in Uruguá field in 1372 m of water, to the Mexilhão-1 gas platform (172 m water depth).

Aquatic equipment and personnel will provide assistance in pre-commissioning the gas pipeline, which involves cleaning, dewatering and drying the pipeline by pumping pressurised gas through it via the downline flexible pipe.

Saipem contracted DeepFlex in Houston, Texas, USA, to manufacture the flexible pipe, and, because of the unique environment and product specifications, asked Aquatic to design and fabricate an installation and storage reel, and to provide a reel drive system and tensioner for installing and recovering the flexible pipe on location; the pre-commissioning will be carried out from on board the Saipem fleet installation vessel, the multipurpose support vessel *Normand Cutter*.

The flexible pipe began life at the DeepFlex manufacturing facility in Manitowoc, Wisconsin, from where it was shipped, via Canada, across the Atlantic to Peterhead, UK. Once the flexible pipe arrived in Peterhead,

Aquatic took receipt and transpooled it from its transportation reel onto the newly fabricated installation and storage reel with DeepFlex personnel as witnesses.

“One of the areas we pay particular attention to when designing a reel of this type is the potential forces that are going to be exerted on it. This 6.8-m diameter reel will need to withstand the environmental conditions of the journey, such as the forces acting on it through the vessel’s motion, and the compressive forces when installing and recovering the flexible pipe from the seabed,” explains Adrian Chubb, project manager at Aquatic.

“The hose will be deployed onto the seabed from the host vessel so that it can be used to pump pressurised gas through for the initial dewatering operation, but it will still have a residual length spooled on the reel. This acts as a contingency and also assists in providing back-tension for hose control during deployment and recovery. You have to design such reels with the structural strength to survive that kind of constriction,” says Chubb.

The flexible pipe has been developed to withstand the high pressures in the deep water Brazilian field and the product that is being pumped through it. “The flexible pipe is manufactured from a lightweight composite material, which has advantages over traditional flexible and rigid steel products,” says Brian Osterloth, project coordinator at DeepFlex. “The steel product is heavier and results in a greater top tension, whereas the composite product can be deployed from a smaller installation or service vessel. It can also be retracted and used in multiple applications.”

After the flexible pipe was transpooled, Aquatic pressure-tested it, also with DeepFlex personnel as witnesses, to make sure that it had not been damaged in transit or had its integrity compromised. Chubb says, “We also carried out a tensile pull test on a sample of the flexible pipe before the equipment was mobilised to ensure that its friction capability was sufficient for it to function with the tensioner. This test mimics the stresses the flexible pipe could be subjected to when it is deployed from the installation vessel during installation and recovery.”

Finally, the reel with the downline flexible pipe and the reel drive system and tensioner were shipped from Aquatic’s yard in Peterhead to Saipem’s Boscongo yard in Pointe-Noire, Republic of the Congo, before deployment to Uruguá field. At Pointe-Noire, the equipment was mobilised onto the *Normand Cutter* before crossing the Atlantic to commence the pipeline pre-commissioning.

