

# Borcoat™

Innovative new Borcoat PP multi-layer foam system, vital to the success of the deepwater project

The carbon steel pipeline for oil transportation in the Thunder Horse Field, the Gulf of Mexico, required corrosion protection and thermal insulation. Standard polyolefin coating systems could not be applied as the water depths went down as far as 2,200 metres. The temperature of the produced fluids was 132°C and required specially manufactured and qualified coating solutions. New tailor made Borealis Borcoat polypropylene grades with the necessary stiffness, strength and thermal stability were used in the final thermal insulation system.

In 1999 the Thunder Horse Field was discovered in the Gulf of Mexico. BP and Exxon Mobil operate the development using one of the largest semi-submersible production and drilling platforms currently operating. The facility is designed to process 250,000 barrels of oil and 200 million cubic feet of gas per day from some of the deepest wells in the Gulf. After processing, the oil and gas is piped into an existing pipeline system.

Photograph by courtesy of BP



Thunder Horse is the world's largest semi-submersible drilling rig

## Thunder Horse pipe system

A new technical and practical solution was required to provide thermal insulation as well as corrosion protection to the carbon steel pipeline installed in water depths down to 2,200 metres. The flowline and also the Steel Catenary Riser (SCR) pipes have diameters from 219 to 329 mm and a wall thickness varying between 30 to 40 mm depending on the

specification. The design temperature for the system was 132°C and the design life was set of 20 years.

Borealis formed a project team with the pipe coating applicator, Thermotite®, a division of Bredero Shaw Norway AS, to develop and qualify a thermal insulation pipe coating system specifically for this project.

## Polypropylene for thermal insulation of steel pipes

The thermal and mechanical properties of polypropylene makes it ideal for projects such as Thunder Horse to ensure that the fluids are delivered at the required temperatures.

If the oil temperature becomes too low, the risk of hydrate or wax formation is great and a blockage of the pipe line would lead to enormous problems and costs.

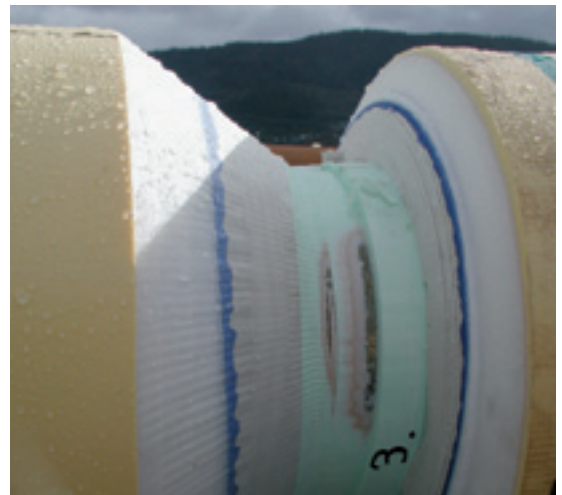
## Borcoat for deep water application

In deep water applications, standard thermal insulation solutions are not technically feasible as the increased pressures cause the insulation foam to collapse and the thermal properties are lost. Borealis was able to provide Borcoat polypropylene products for the foam with the necessary stiffness and strength and another polymer to produce a syntactic compound. Together with other materials, a new Thermotite 7-layer thermal insulation system was produced, giving a U-Value of only 5 W/m<sup>2</sup>K. Using specially designed application equipment, the insulation properties are produced in a consistent and controlled manner and, importantly, are

retained when the pipeline is laid. Depending on the specification requirements up to 103 mm of coating was applied.

The coating system can be modified to meet differing project requirements and Thermotite are planning to use this system on similar, demanding projects.

Borealis supplied a number of different Borcoat products for this application including: Borcoat BB108E-1199, Borcoat BB700E-7032, Borcoat BB127E, Borcoat BA213E and Daplen™ WB130HMS.



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