

Glen Lyon FPSO

Stainless steel linings for Enhanced Oil Recovery (EOR) & chemical tanks

Area	1250 sq m
Material	Stainless Steel
Owner	BP



Summary

SPS linings for EOR tanks provide:

- Safe, clean, stainless steel containment system with low risk of contamination
- Thermal insulation from adjacent tanks to maintain a stable storage temperature
- Minimal impact on tank capacity due to compact thickness of SPS structure
- Efficient low-weight solution using integrated structural design
- Economic and non-disruptive installation in carbon steel tanks
- Zero through-life maintenance

Background

SPS was selected by BP as a high performance lining for the EOR fluid tanks for the Glen Lyon FPSO. The principal design requirements were for a stainless steel lining to protect the specialised EOR fluid from contamination and thermal insulation from adjacent fuel oil tanks to prevent excessive heat damaging the sensitive EOR fluid. A compact design was also required to minimise structural weight and maximise the storage capacity of the tanks.

Alternative solutions such as conventional steel cofferdams involve constructing void spaces adjacent to the fuel oil tanks. But these are not structurally efficient and may create additional maintenance costs and operational risks from possible build-up of explosive gases.

SPS meets all of the design requirements, minimises operational risks and should require no maintenance during the life time of the vessel.





The combination of stainless top plate and fully bonded PU core creates an integrated composite structure for the tank boundary. The strength of the resulting sandwich plating allows full structural advantage to be taken of the stainless steel lining, with minimal impact on weight or tank capacity. The SPS specification uses 8mm stainless steel top plates, with a 50mm PU core. All of the fabrication work was completed inside the tank under the supervision of class (LR), with minimal disruption to the vessel's construction programme.

The fabrication technique employed in this project offers the ability to construct stainless steel linings inside carbon steel tanks. The welding procedures adopted to join the two steel types use standard industry practice and were fully approved and qualified prior to construction.

General cost savings:

The application of SPS using contrasting steel types is very flexible in its use. The construction technique can be applied at the new-build stage or as part of a conversion or upgrade to existing vessels. The methodology is also suitable for products and chemical tankers, providing cost savings over the use of pure stainless steel tanks or the use of explosion bonded stainless steel.

Details

A technically advanced EOR fluid is stored on board the Glen Lyon for injection into the well to increase oil recovery. However, the fluid is sensitive to both contamination and temperature. For this reason the internal tank surfaces must be stainless steel and the EOR fluid maintained within a limited temperature range.

On the Glen Lyon the EOR tanks are adjacent to the fuel oil tanks which are frequently operated at around 60 degrees C. Although the EOR fluid is circulated within the tank to avoid hot spots, an additional layer of insulation is also necessary to maintain a stable temperature.

The SPS solution selected for this application allows the use of stainless steel, even though the original structure of the tank is standard carbon steel. In addition the thermal conductivity of SPS (R-value 0.2819 m²C°/W), is sufficiently low that the required level of insulation is adequately provided by the polyurethane (PU) core.



SPS is a structural composite material comprising two metal plates bonded with a polyurethane core to form a light, stiff sandwich material with excellent strength and energy absorption characteristics. In using SPS, structures can be tailored to take advantage of the enhanced impact protection, greater resistance to blast and ballistics, built-in fire protection and improved performance against fatigue and corrosion compared to traditional steel structures.