

# BP Clair Ridge The Bondstrand™ Weight Reduction Plan



## BP Clair Ridge – The Bondstrand™ Weight Reduction Plan

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During a project spanning 3 years, Fiber Glass Systems saved a total of 718 tons of weight on the Clair Ridge production platform topside modules, using Glassfiber Reinforced Epoxy (GRE) and Fiber Reinforced Polymer (FRP) composite materials and advanced engineering services.

Our composite materials provided BP with reduced future maintenance requirements, extended asset service life and enhanced safety in the harsh North Sea offshore environment near Shetland, UK, where the Clair oil-field is located.

We supported, and worked within Amec project design offices in London, directly supplying 3 kilometers of Bondstrand GRE pipe systems specified for various seawater systems, and supplied a huge portfolio of proprietary structural products in advanced fire performance phenolic FRP composite materials, all manufactured in our UK factories and shipped to the construction yard in South Korea for installation.

### Bondstrand Products:

- GRE pipe systems
- Composite pressure vessels
- MARRS™ offshore phenolic handrails
- Phenolic platforms, including stairwells and landings
- Phenolic grating

### Problem:

The Clair Ridge project faced challenges to reduce weight, and meet low maintenance requirements. They also required custom designed and manufactured pressure vessels with strict fabrication tolerances and within a tight schedule, something that others were unable to provide.



*Fiber Glass Systems advanced composite solutions installed on BP Clair Ridge.*

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## Solution:

A total of 290 Bondstrand GRE side ported pressure vessels (8" in diameter and 6.8m in length) were supplied for LOSAL Sea Water Reverse Osmosis (SWRO); 4 large diameter ASME X Bondstrand GRE pressure vessels (2x20" and 2x30" in diameter) were supplied for a Water Filtration Skid Package and 2,950m of Bondstrand 2400 series GRE pipe systems (10, 16, 20 and 24 bar) were supplied and installed for the following systems:

- Firewater
- Sewage
- Cooling Medium
- Non-Hazardous Open Drains
- Freshwater
- Hazardous Open Drains
- Seawater
- Chemical Injection

In addition to the composite pressure vessels and pipe systems installed, over 4,200 linear meters of MARRS™ offshore phenolic handrails were supplied, 8,800 sq m of I-5500 38mm phenolic FRP grating, phenolic ladders, safety gates and various FRP tertiary platforms of varying sizes and applications - All designed and manufactured by Fiber Glass Systems.

We also provided engineering support with in-house design including Finite Element Analysis (FEA) and CAESAR II analysis works. Installation support and site field service was provided at the Hyundai Heavy Industries (HHI) shipyard in South Korea.

## Results:

With the use of Bondstrand composite pipe and structures, over 700 tons of weight was saved when compared with the use of traditional metallic materials. This in turn lowered dead weight, reducing capital costs, keeping modules within crane lift capacity and allowing for more production equipment to be installed in the HHI yard, reducing hook-up time.

The use of composite materials has significantly lowered whole life costs, as it will be 40 years until the first major maintenance is required - minimizing maintenance and lifetime replacement costs.

**Contact us now to discuss your project challenges.**

Products and Total Supply	Total Weight (T) of Metallic Equivalent	Weight Saving in Tons	Weight Saving %
<b>Bondstrand Pipe Systems</b>			
2,950m of GRE pipe & fittings	338.7	254	75%
<b>Bondstrand Structures</b>			
4x Phenolic platform structures (stairwells & landings)	60	40	67%
4,200m MARRS OFFSHORE phenolic handrails	176.4	117.6	67%
8,800m <sup>2</sup> of Phenolic grating	473.4	307.1	65%
<b>Total</b>		<b>718.70</b>	

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