Thermoplastic composite pipe benefits for SURF projects

Charles Tavner
Magma Global Ltd
Cost

One standard m-pipe® product is lower cost

- Stronger raw materials means thinner walls, less material and lower costs
- Better manufacturing and test data means tighter coefficient of variation, thinner wall and lower cost
- Integrated supply chain with Victrex means less wastage, volume discounts and lowest cost
Adoption

One standard m-pipe® product has delivered permanent hydrocarbon, water and gas service.
Product

One standard m-pipe® product has broad performance and operational benefits

- Spoolable
- 180°C (360°F) operation
- 20ksi pressure
Qualification

One standard m-pipe® qualified to DNVGL-RP-F119 for TCP

- Magma has achieved third party approval for individual customer projects including Statoil hydrocarbon spools

- Working with BP, Shell and Statoil to extend qualification for large diameters, high safety classes and higher temperatures

- Magma also works directly with national regulators including BSEE & HSE
Reducing riser cost

Calash research shows m-pipe® is lower cost riser solution

<table>
<thead>
<tr>
<th>System of 8 x SLORs in 3,000m Water Depth</th>
<th>Steel SLOR (US$)</th>
<th>m-pipe® SLOR (US$)</th>
<th>Steel SLOR oncost (%)</th>
<th>Steel SLOR oncost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riser, jumper and pipe materials</td>
<td>224,855,400</td>
<td>226,126,208</td>
<td>-1 %</td>
<td>-1,270,808</td>
</tr>
<tr>
<td>Equipment – buoyancy and connectors</td>
<td>67,298,000</td>
<td>36,269,501</td>
<td>86 %</td>
<td>31,028,499</td>
</tr>
<tr>
<td>Fabrication – piles, rigging and logistics</td>
<td>51,590,000</td>
<td>17,055,500</td>
<td>202 %</td>
<td>34,534,500</td>
</tr>
<tr>
<td>Engineering and Project Management</td>
<td>27,720,000</td>
<td>16,632,000</td>
<td>67 %</td>
<td>11,088,000</td>
</tr>
<tr>
<td>Offshore Construction</td>
<td>177,092,300</td>
<td>17,560,620</td>
<td>908 %</td>
<td>159,531,680</td>
</tr>
<tr>
<td>Construction all risks insurance</td>
<td>16,456,671</td>
<td>9,420,699</td>
<td>76 %</td>
<td>7,088,640</td>
</tr>
<tr>
<td><strong>Total Cost for 8 x SLOR Riser System</strong></td>
<td>565,012,371</td>
<td>323,053,144</td>
<td>75 %</td>
<td>241,959,227</td>
</tr>
<tr>
<td>Typical total project field development cost</td>
<td>2,500,000,000</td>
<td>2,258,040,773</td>
<td>11 %</td>
<td>241,959,227</td>
</tr>
</tbody>
</table>
Downline case study

Challenge
- Lower cost pumping and well intervention

Solution
- Magma IDP hydraulic pumping system

Benefits
- Faster offshore pumping operations
- High pressure and high flow rate
- 3,000m (10,000ft) of 3in m-pipe
- Low cost operation on day-rate rental

“A lot of steps have been taken with the IDP to make troubleshooting easy, to make operation easy and to make it almost foolproof. Everything works as it was designed to do. Magma has taken a lot of time and effort to put safeguards in, the automation, the shut-down systems, and the diagnostics. It’s really first class.

Chris Ruester – VP Cross Group
Reducing downline cost

Analysis shows Magma integrated downline package lowers cost

Well intervention offshore time comparison

Magma IDP

30% cost saving

Coiled Tube
Jumper case study

**Challenge**
- Simpler kicker line with faster connections

**Solution**
- Light weight, m-pipe® ‘flex-to-fit’ jumper

**Benefits**
- Simplify connection structure
- Remove all buoyancy
- Remove rock berm requirement
- Lower cost pipe and far lower cost installation

“What impressed Saipem was the ease and low load that was required when connecting up the hot stab to the PLET, with one man easily able to direct in the stab in seconds.”
Reducing jumper cost

Subsea7 research shows m-pipe® is a lower cost jumper solution