Overview

• Application of composite repairs
• International Standards
• Key factors for pipework and pipelines
• Case studies
Composite repairs are not just a “bandage” or temporary repair; they can be engineered to give a lifetime of up to 20 years.
Why Choose a Composite Repair?

• Reinstate integrity (pipework, pipeline, structures, decks)
• Long design life (up to 20 years)
• No hot work required
• No shutdown required
  • Can be applied to live pipework
• Significant cost saving over shutdown and replacement
• Applied by fully trained technicians
Applicable Standards

- Guidance on testing, design and installation
- Both standards are similar, but there are a few differences:
  - External loadings not considered in ASME ($P_{eq}$)
  - Temperature factor the same for both through wall and thin wall defects
  - Design life not clearly defined
- Result is the ISO standard gives a slightly more conservative value, given the same inputs
Compliance Testing

• Prescribed by both ISO and ASME standards
• Includes;
  • Mechanical Testing (modulus, poisson, shear, thermal expansion, Tg and lap shears)
  • Performance data (Impact test, long term strength, burst tests and Energy release rate)
• Adhesion is measured with the Energy Release Rate (ERR, J/m2)
• Calculated using data points as per relevant standard
• Repair performance is controlled through the adhesion of the repair to the substrate

• Various factors affect the level of adhesion achieved:
  • Surface preparation (cleanliness and profile)
  • Substrate material
  • Repair system used
## Surface Preparation Techniques

<table>
<thead>
<tr>
<th>Surface Preparation Standard</th>
<th>Technique</th>
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<tbody>
<tr>
<td>Sa2.5 Cleanliness with a surface finish of 65µm or greater profile</td>
<td>Grit Blasting</td>
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<tr>
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<td>Slurry Blasting</td>
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<tr>
<td>ST3 Cleanliness with a surface finish of 40µm or greater profile</td>
<td>Bristle Blaster</td>
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<tr>
<td>ST2 Cleanliness with a surface finish less than 40µm</td>
<td>Emery Paper</td>
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<td>File</td>
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<td>Needle gun</td>
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Additional Testing

- Small diameter pipework
- 0.5”
- 0.5mm steel remaining
- 200 bar design pressure
- Failed at 1400 bar
Live Leak Sealing – Leak Diversion Plate
14” Gas line

Overview

• 14” gas vent line suffering severe external corrosion
• Up to 40 meters of pipework affected
• Design conditions, pressure 28 bar, temperature 30°C

Why a composite solution?

• Tailored repair for the pipework
• 4 layers required over most of the pipework but where extensive corrosion was present 14 layers were applied
• Applied live – no downtime, zero impact on production
• Integrity maintained through an engineered repair solution with a life of field guarantee
Technowrap SRS Stair Tower Repair

- Platform was suffering heavy corrosion on Structural members
- Using our LT Resin and SRS cloth a repair was applied which considered the axial loading and applied bending moments
Summary

- Repair performance is controlled through the adhesion of the repair to the substrate.
- Adhesion is a function of the repair material, surface preparation and substrate material.
- Demonstration of long term integrity through long term qualification data.
- Repairs must be applied by trained installers.