Clock Spring® Contour

Increasing integrity
Reducing cost

- Proven solution controlled by standards (ISO TS 24817 and ASME PCC-2 Articles 4.1 and 4.2)
- Long term performance (20 years)
- Repairs can be made immediately, no waiting for construction of spools
- Repairs can be installed whilst system is online, no need for shutdown
- Only need to repair affected portions of the pipe – allowing rehabilitation rather than replacement
- No hot work
- Light weight, easy to install
- Apply even in areas where access is restricted
- Accommodate unexpected geometrical details when on site
**Clock Spring® Contour**

**Typical Applications**

- Replace strength lost due to
  - External corrosion
  - Internal corrosion
- Leaking pipes
- Long lengths (e.g. >50m) and local repairs
- Straights, tees, elbows, reducers and other components
- Pressure and structural loads
  - Piping and pipelines, caissons, risers, flares, vents, drains, vessels, tanks etc.
- Corrosion under insulation
- Mechanical damage such as dents
- Corrosion at supports
- Air to ground interfaces
- Welds
- Applications to date onshore, offshore, pipelines, chemical plants and refineries
- Carbon steel and alloys
Internal Corrosion

- 6” and 16” gas vent lines suffering internal corrosion repaired to prevent gas leaks. 3.5barg (50psi), 93°C (200°F) design temperature for the repairs.

Over 50m total length repaired. Large cost savings as no shutdown required.
External Corrosion

- Oil export header, general external corrosion. 40°C/104°F operating temperature, 49.6barg (720psi) pressure. Up to 80% wall thinning locally.

Production not interrupted
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Elbows and Tees

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- Extensive external corrosion with pitting and localised leaks. 20 local repairs completed on the line
- Low pressure (1.1barg/16psi) gas vent line.
- Temporary repair, two year life

Combination of Snap Wrap and Contour
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Small Bore Fittings

- External corrosion on fitting adjacent to weldolet fitting
- Wall thickness reduced to <1mm
- 20 bar (300psi) design pressure brine line

- Repair applied to strengthen fitting and extended onto main line to provide additional support to thinned area on offtake
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Mechanical Damage

- 16” diameter, 1.5D bend hydrocarbon line damaged by backhoe, gouge equivalent to 57% wall loss, 32 bar (465psi) operating pressure
- Dressed to remove any damage before repair applied

Remote location with difficult access.
Light weight materials simplified installation of the repair.
Gas Pipeline Repairs

• Internal erosion on three, gas transmission pipeline elbows
• 35 bar (500psi), 6” line
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Fuel Lines

- Localised external corrosion on long pipe run
- Most joints welded making replacement very difficult
- Five closely spaced lines affected, with restricted access
- Lines in daily use repair method avoid interruption
- 16 bar (235psi) operating pressure

43 locations repaired

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Caisson Repair

- Vertical pipe subject to large axial forces due to wave loading
- Extensive corrosion and large holes (up to 500mm – 1.5’)
- 26” diameter, low pressure 2 bar (29psi)
- Access very difficult and installed by rope access

- Design for 20 year service
- Repair carries all loads
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Caisson Repair

- Internal corrosion on 36” diameter line with 16” branch. 50°C (122F) design temperature 2 bar (29psi) pressure.
- Large holes present in line. Caisson shutdown for 24 hours to enable repair using adhesive bonded technique.
- Contour repair applied over the top to provide 20 year solution

Application by rope access

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High Temperature Lines

- Nickel based alloy suffering internal erosion/corrosion and expected to leak. A number of 1” and 6” fittings were present in the pipe run, complicating the geometry
- 20” diameter line, 3 bar (45psi), 135°C (270F) design conditions
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Stainless Steel Lines

- 4” lines, 2.1bar (30psi), <40°C (104°F) 304 Stainless Steel H₂ cooler supply
- Localised pitting leading to leaks at welds on elbows and straights
- Centring repairs around the welds only enabled cost effective rehabilitation of the entire line
Partial Customer List

- Shell Expro
- Shell Distribution
- ConocoPhillips
- ExxonMobil
- CNR International
- SABIC Europe
- SIGEMI
- Chevron
- Western Refining
- Dow Refining
- Invista
- Calpine
- Sunoco
- St Lawrence Gas
- Hovensa
- ADMA
- ADCO
- Qatar Gas
- Occidental Petroleum of Qatar
- Gasco
- Oman LNG
- Oman Gas Company
- KNPC
- Prezioso, Angola
- Dubai Petroleum Company
- Lietuvos Dujos