Life Extension of Ageing Platform Well Conductors

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Ageing Conductor Integrity Challenges

- Multiple ageing wells, requiring life extension of 20-30 years
- Limited records of construction and maintenance
- Heavily corroded (~60% wall loss)
Agenda

- Introduction
- Analytical Integrity Assessment
- Measuring Axial Load
- Remedial Measures
- Conclusions
Platform Conductor Assessment

- Sources of conductor loading:
  - Well construction loads
  - Drilling equipment
  - Production thermal loads
  - Environmental loads – waves and currents

- Typical analysis:
  - Strength and stability
  - Fatigue

- Uncertainty in loads requires conservative assumptions
Case Study

- 13m water depth
- Wells have been in service for 30 years with life extension for a further 25 years
- 30in conductor, 13-3/8in surface casing
- Severe corrosion found in many conductors
Loading Uncertainties

- Typically assume all well tubulars supported at surface
- Casing bottom support often evident
- Robustness of conductor foundation uncertain
- Leads to variability in load sharing
Figure 2: Conductor preliminary corrosion assessment – Stress Comparison

- No Corrosion

- Measured Corrosion

- Minimum Preload

- Maximum Preload

- Percentage Wall Thickness Loss

0% (uncorroded)

26%

28%

31%

46%

41%

62%

60%

60%

Top Clamp

Platform

Jacket Support

Mean Sea Level

Elevation above Mudline (m)

Utilisation Of Strength Design Limit
How Much Corrosion is Allowed?

ALLOWABLE CONDUCTOR WALL THICKNESS

Utilisation Of Strength Design Limit

Corrosion Level (% of Wall Thickness)

- Von Mises / Yield = 1.0
- Von Mises / Yield = 0.8
- Von Mises / Yield = 0.6

No Corrosion
Intermediate Corrosion
High Corrosion

Minimum Preload
Maximum Preload
Axial Load Measurement

- ASTM hole drilling method
- Apply strain gauges
- Drill hole to half wall thickness
- Measure change in strain during drilling
- Measurements interpreted into axial stress through wall thickness
Offshore Implementation of Load Measurement
Typical Axial Stress Results

Mid-wall stress represents average across thickness
Averaged between 2 diametrically opposite tests to remove bending effects
Example Results

- Expected axial compression loads up to 1300kips
- Measured axial loads on 5 conductors of 300 to 1300kips
- Indication of bottom support for casings
- Preloads lower than expected
- Increased corrosion acceptable, delaying need for remedial measures
Conductor Sleeve

- Two half shells secured around conductor
- Can be bolted or welded
- Restores structural integrity
Grouting

- Limits corrosion
- Provides load sharing between conductor and surface casing
Conclusions

- Significant need for conductor life extension worldwide
- Lack of information leads to conservative assumptions
- Conservative assumptions can result in unacceptable strength and fatigue performance
- Measurement of corrosion levels and axial loads are important inputs to integrity management plan
- Implement remediation where and when necessary
Questions?
Thank you

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