Archiving Surface Integrity Research for the Development of New Applications and Economy of Design

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Mitigation of Sulfide Stress Cracking

Failure Prevention in Downhole Environments

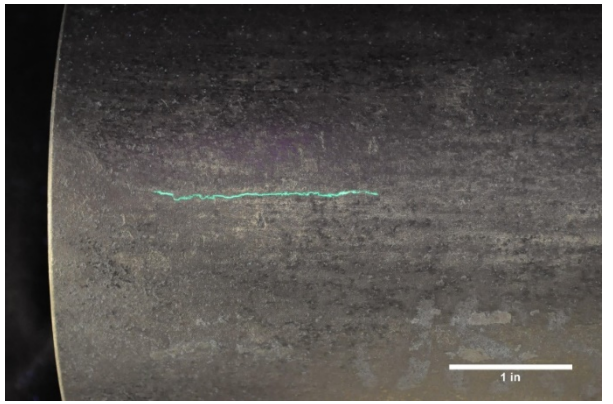
Supported by:

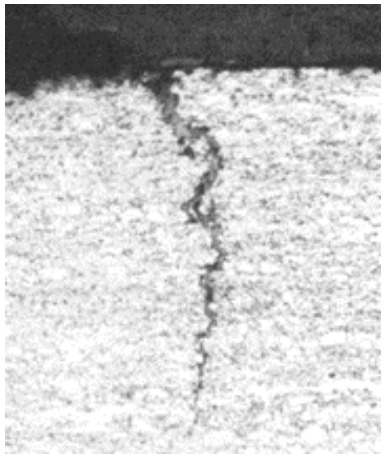
LAMBDA Technologies Group

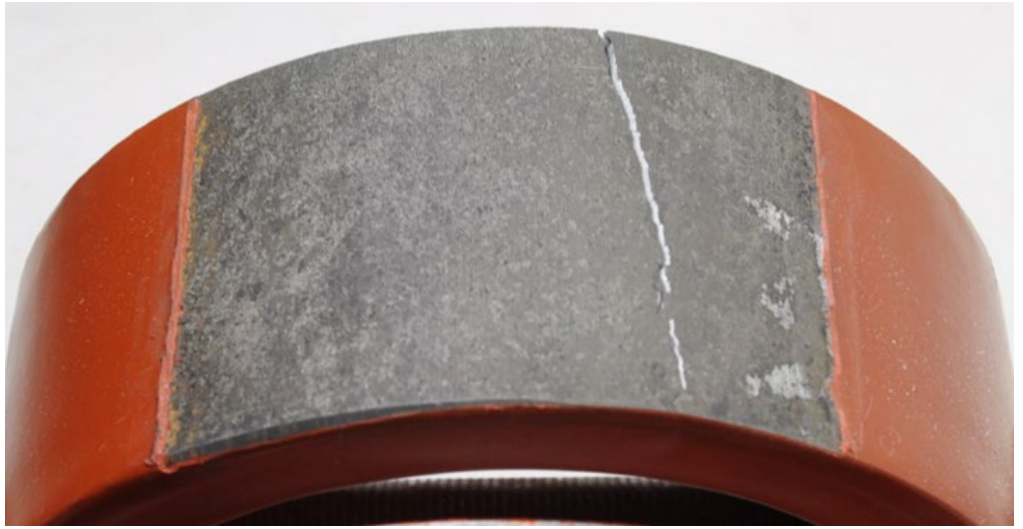
Detrimental Effects of Sulfide Stress Cracking

- **Caused by combined effects of sour gas (H_2S) and tensile stress**
- **Commonly found in steel downhole tubular components**
- **Threshold stress levels are typically very low**
- **Leads to unanticipated catastrophic failures**

SSC in UNTREATED TUBE







Consequences

- **Potential catastrophic failure**
- **Frequent Inspection**
- **Frequent replacement of parts**

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Common Treatments

- Minimize exposure of sour gas (H_2S) medium to SSC-prone components in design or operations – changing design or operations could be cost-prohibitive
- Frequent inspection for corrosion and cracking damage – very difficult for components with low damage tolerance; limitations on frequency of inspection; components may not be easy to inspect once they're in place
- Use of corrosion protection coatings – most coatings are not environmentally friendly and local breakdown of coatings would exacerbate the problem
- Replace parts frequently – Increases total ownership costs

These treatment methods aim to minimize effects of sulfide cracking, with varying degrees of success.

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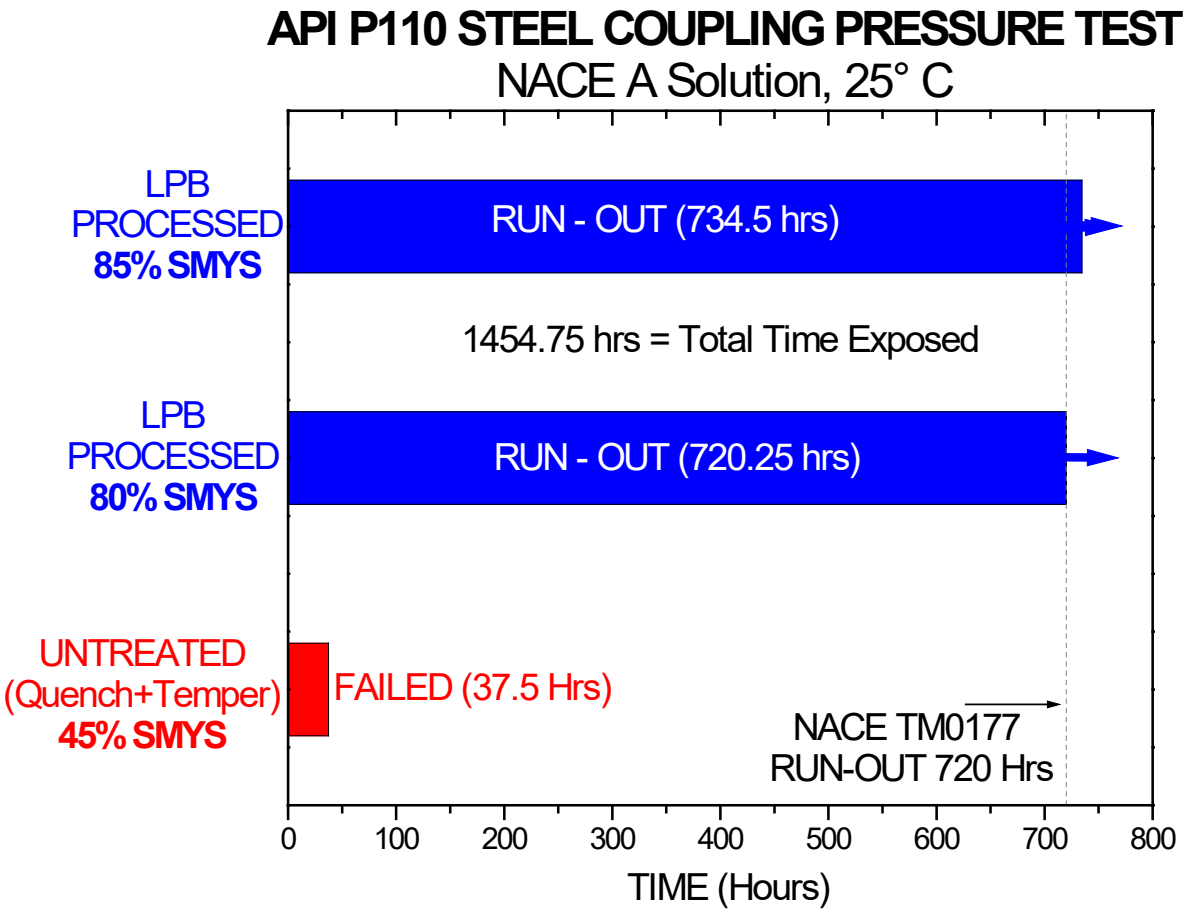
Designed Compression



Benefits

- Extend Component Life
- No Material Replacement
- No Redesign
- Improve Damage Tolerance
- Reduce Risk of Failure
- Improve Cost Savings

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Improve Damage Tolerance with Designed Compression
A Cost-Effective Solution to Mitigate the Effects of SSC