The right framework for SCC management

ROSEN’s crack management framework has been developed from and is a culmination of years of industry research and development. In collaboration with pipeline operators, the company’s experienced engineering consultants – working in integrity, risk management and stress corrosion cracking – combine with technology and data evaluation experts to provide a comprehensive crack management solution founded on best practice.

The framework does not advocate throwing an expensive crack detection ILI tool into a pipeline without thought but suggests a value-adding approach to ensure that the integrity drivers for inspection are understood alongside the capabilities of the tool to detect and surmount the expected degradation. An operator should have answers to a range of questions about the problem before an inspection is considered.

Running an ILI tool

Most gas pipeline operators worldwide use EMAT and UT ILI technologies when inspecting for SCC. Although UT crack detection technology is generally considered to have better detection and sizing capabilities, it requires a liquid couplant, meaning that in gas pipelines, it is costly and operationally challenging to execute.

Acoustic-based crack detection technologies rely on the detection of planar reflectors in the pipeline, but cracking is not the only phenomenon that will generate these reflections. Sharp-edged corrosion (commonly found with certain types of SCC) and geometrical irregularities such as the weld cap profile can also generate similar signal patterns.

A common result is that an unmanageable number of features are reported from an investigation standpoint, making it difficult for the operator to make decisions on the next steps. The challenge therefore must be to improve probability of identification (POI) of ‘real cracks’. According to ROSEN, close cooperation between integrity engineers and data evaluation experts is needed at this stage and, using the results of a susceptibility analysis, engineers can target sections of the pipeline that should be focused on from an evaluation perspective.

A great advantage of running EMAT is that it provides information on coating condition and the location of different types of coating, which can be used to identify areas of poor coating where SCC is more likely to be present; this data can be used to drive the susceptibility analysis.

To complement this process, it is critical to have good in-field results, necessitating close cooperation between ILI vendor and client. Once an ILI vendor has a good understanding of what the tool is seeing and the corresponding feature is found in-field, signatures in the wider ILI data population can be benchmarked and POI further increased.

The framework allows this process to happen with its preliminary reporting of the ILI results followed by field verification and repair before the final ILI report is delivered. Choosing which features to go and dig first should be driven by a prioritisation approach considering theoretical defect criticality (i.e. a fracture mechanics-based assessment) as well as evaluation confidence in the feature.

The feature population can therefore be ‘binned’ and a range of sites sitting in each bin investigated – each refining the understanding of the threat in the line.

ROSEN’s experience is that the above phase is often skipped or substantially curtailed, leaving the integrity engineers no choice but to assess and sentence reported anomalies. This approach often originates from historical experience of running metal loss inspection technologies where both the technology itself and the associated integrity assessment activities result in binary choices. This does not hold true when faced with a cracking threat.

Putting it all together

A framework brings together experts in SCC, pipe manufacturing, fracture mechanics, inspection systems, inspection data evaluation, non-destructive examination, data analysis, fatigue, and risk and stress analysis.

It is modular, allowing clients to pick and choose the elements they can complete themselves and those they require support with.

Boasting a long-term track record working with leading pipeline operators and regulators worldwide to provide crack assessment services, ROSEN has the inspection technology and breadth of engineering expertise to deliver the entire framework.

The pipeline industry has come a long way when it comes to managing SCC. New ILI technologies and assessment methods have been developed to identify SCC and quantify the threat it poses.

More important is the understanding of that factors lead to SCC, allowing for a proactive mindset to be adopted and mitigation actions to be taken before SCC can develop into something that could cause pipeline failure.

ROSEN’s crack management framework allows operators to adopt a proactive mindset in a systematic manner, combining the best technology with subject matter experts to ensure SCC is safely and reliably managed.