



Learning Event



OPERATING PROCESS EQUIPMENT

HAZARD

Chemical
(Explosive)

**Loss of
Containment**

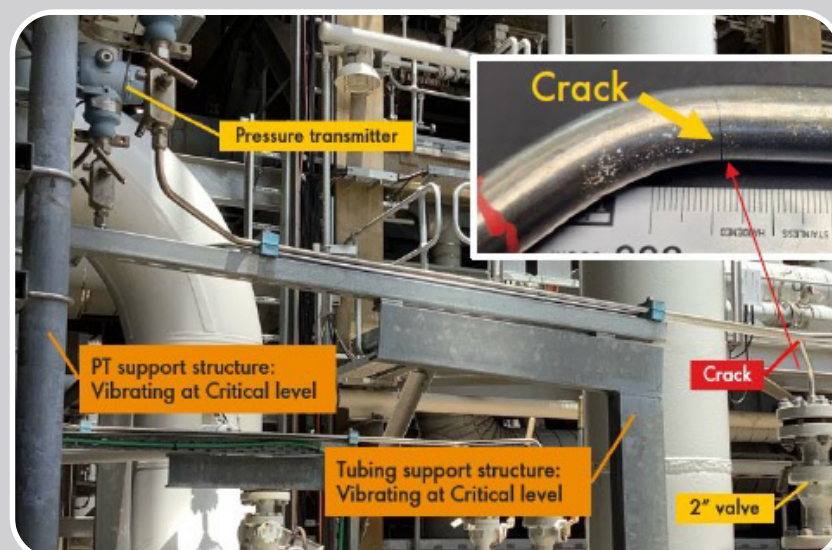
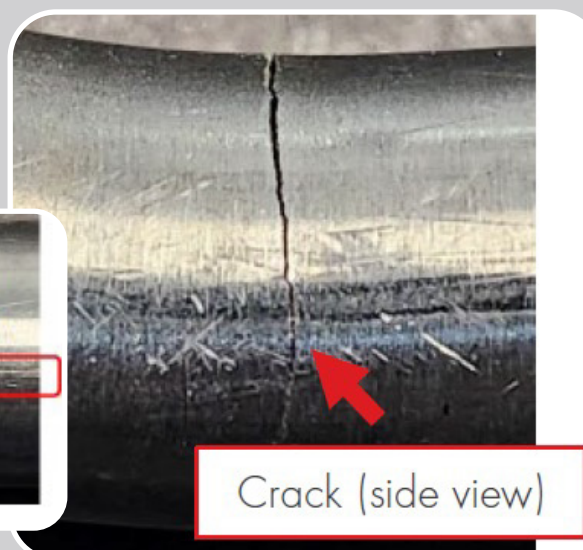
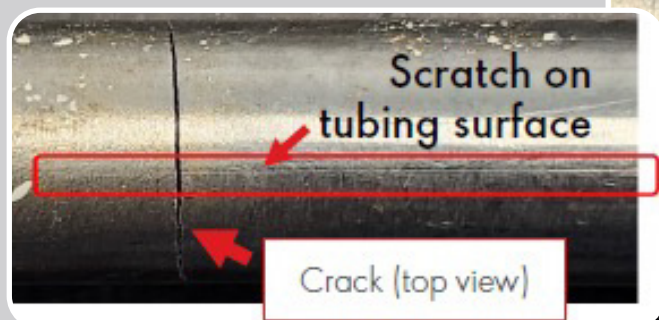
CONSEQUENCES

Actual: No harm to persons
Potential: This could have
caused multiple fatalities

WHAT ARE YOU DOING TO MINIMISE THE RISK OF GAS LEAKS FROM FATIGUE CRACKING IN SMALL BORE TUBING?

What Happened?

A Tier 2 methane leak (52 barg) occurred from cracked pressure transmitter tubing at an onshore gas processing facility.



Why did it Happen?

The crack in the small bore tubing was caused by:

- Exposure to vibrations at a critical level.
- Damage to the tubing (scratch on surface) from mechanical handling, likely during commissioning. The scratch acted as a local stress concentrator which eventually induced a fatigue crack.

IOGP Process Safety Fundamentals

- ✓ We improve our understanding of process safety hazards at our location and our roles in controlling them.
- ✓ We are vigilant about the potential impacts of uncontrolled process safety hazards.
- ✓ We proactively look for indicators or signals that suggest future problems.
- ✓ We speak up about potential issues even if we are not sure they are important.



What did they Learn?

Even a small scratch on instrument tubing can lead to a major Loss of Containment and safety hazard when tubing is in vibrating service.

- Fatigue cracking is a mechanical form of degradation that occurs when a component is exposed to cyclical stresses for an extended period (e.g. dynamic loads, unstable fluid flow, water hammer).
- Vibrations are a form of dynamic loads often seen near compressors, turbulent process flow. They cause cyclic stresses that can lead to fatigue cracking. Even low stresses can lead to failure after a high number of cycles.
- Surface defects and/or geometry introduce stress concentration factors that may result in higher cyclic stresses locally.
- Small-bore tubing is especially prone to fatigue cracking because of its small wall thickness.

Small bore tubing should be free from scratches and deformity before installation. This includes any damage caused by tube bending and handling. Any scratch / deformity, and any type of corrosion on the outer surface of small bore tubing can act as a stress concentration factor. If tubing is vibrating, that stress concentration factor can lead to fatigue cracks.

Ask yourself or your Crew:

Do you have instrument tubing in vibrating service at your site? Are you aware that any scratch or deformity in the tubing might cause a leak due to fatigue cracking? How confident are you that the tubing you have in place is free from scratches? How do you know?

What checks on surface condition do you make when you're installing tubing? What surface condition would you consider unacceptable?

Further Information:



SCAN ME

Safer Together - Maintain It video
(Process Safety Awareness)



SCAN ME

Safer Together - Contain It
(Major Accident Event Awareness Training)



SCAN ME

Energy Institute - Guideline for the
design, installation and management of
small bore tubing assemblies

Click here to send us your feedback

or scan the code

