Thermowell Safety Alert for Step Change

Incident date

10th July 2011

Summary

During a routine inspection of the online Janice gas compression packages hydrocarbons was found to be seeping from a thermowell (picture 1) on the 2nd stage discharge dampener on train B. The compressor was shut down and the thermowell removed for investigation.

Incident consequence

Compressor shutdown

Cause of accident or incident

Failure of integrity of thermowell allowing minor gas release

Location

Janice A

Activity

Production

Description:

On the 10th July 2011 during a routine inspection of the Janice gas plant, oil was seen to be seeping from the threaded area of a thermowell on the 2nd stage discharge dampener of gas compression train B. The compressor was shut down in a controlled manner and the thermowell removed for investigation and analysis.

The thermowell was found to have small through-wall cracks through which the hydrocarbons leaked. Further and more detailed testing indicated the presence of relatively large shrinkage cavities in the body of the fitting, (pictures 2 and 3). The presence of these cavities, along with vibration in the plant from the gas compressors, caused the cracking. These cavities should not be present and were caused as a result of faulty manufacturing process.

Shrinkage voids in cast ingots is not an uncommon event. It was identified that one other thermowell had been supplied to Janice from the same batch as the failed item. This was therefore sent to a material specialist to be tested for defects. However, it was found to have no material defects.

Supplier details: Carrs Special Steels, UK. Cast no. CD16249, manufacture date: 22/6/2006. Material spec is: ASTM A182 F 316L.

Specific equipment

Thermowell

Lessons learned

Defect was not identified during visual inspections
Thermowell passed pressure and service tests
Small cracks developed from the shrinkage cavities to the metal surface as a result of vibration.
More reliable NDE techniques are required to identify sub-surface material defects.
Operator vigilance is very important and prevented this becoming a significant gas release.

Task description

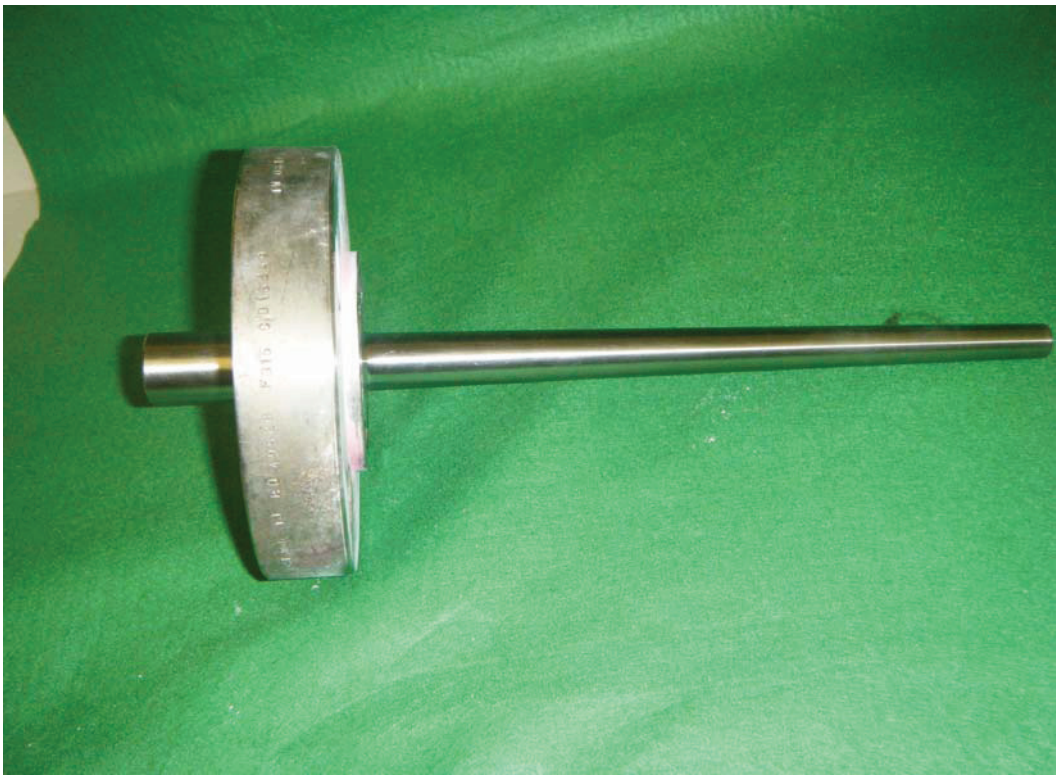
Temperature measurements in compressor

Recommendations:

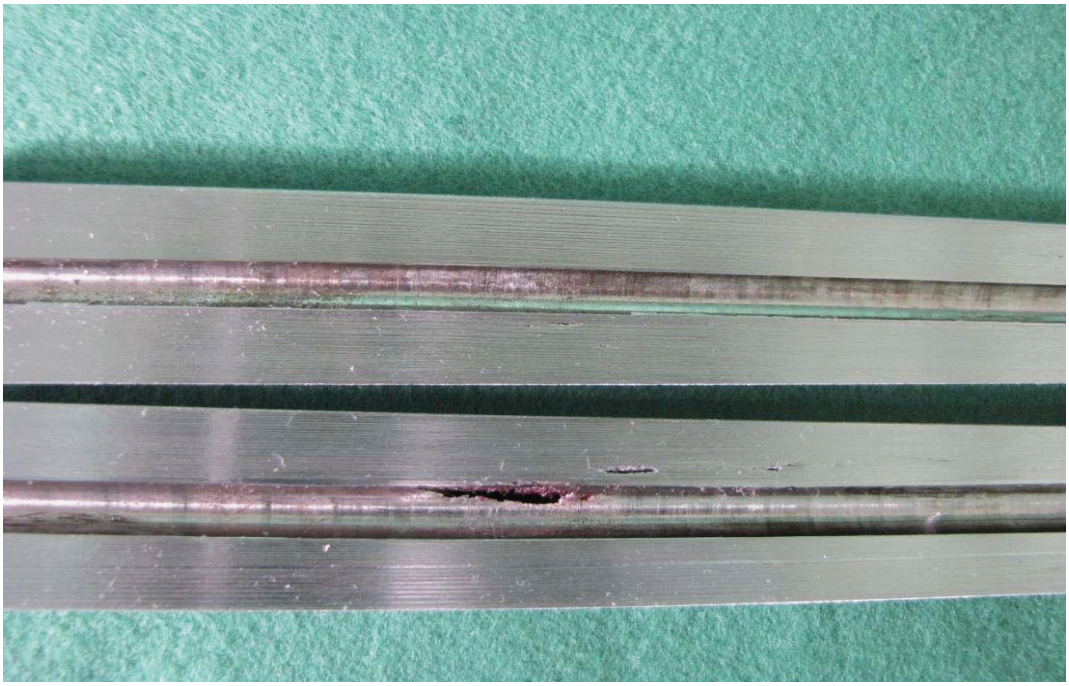
1. Operators may wish to check the certification on thermowells they may have purchased to establish if any of them come from this same batch number. If any do, they may wish to plan to change them out.

2. The manufacturer did carry out all the tests identified on the order, but none of these would have found this defect type. Therefore, Operators may wish to consider specifying additional inspections at the supply stage for thermowells on high pressure hydrocarbon service to check for sub-surface defects.

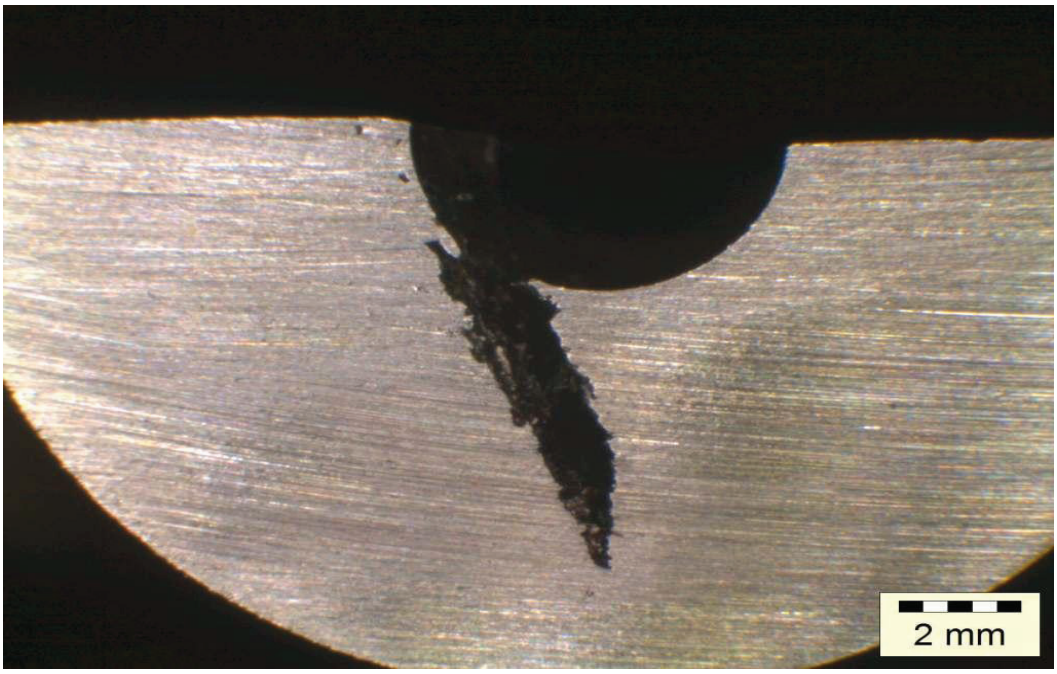
Picture 1



Picture 2



Picture 3



Picture 4