RT-Bolt

Simple • Accurate • Robust

Bolt Load Measurement

Coke Drum Bottom Deheading Valve Joint Assembly and Monitoring


120 RT-Bolts, with hardened washers and machined nuts, all specially coated, ready for installation on site

The Problem:

Coke Drums operate at high temperature and see extreme cycles of operation every 24 hours. Most sites using delayed cokers have had leakage problems with the joint between the bottom deheading valve and the coke drum or coke drum transition spool.

The Consequence:

Joint leakage can escalate to the point where ignition is possible, requiring the unit to be taken offline to repair the joint. This leads to several days of lost production from the unit. In addition, there is cost associated with the periodic tightening of the joints and the potential for over-tightening of the bolts, leading to damage to the valve body at the studded bolt hole.

Previous Fixes:

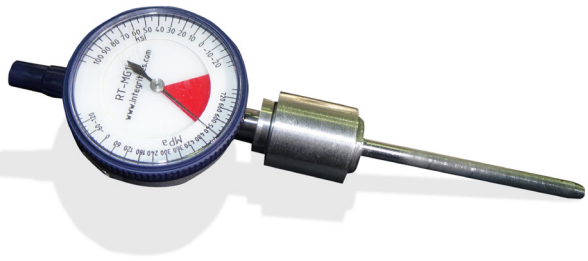
Many sites operate a time-based approach for tightening of the bolts on the joints, with regular intervention required after the first few cycles and then on a six monthly basis. Other bolt elongation methods have been used, but generally found inadequate for the harsh environment on the coker.

The RT-Bolt Solution:

RT-Bolts have been employed across several coker units to ensure accurate joint assembly, to monitor the bolt load during operation, to set the required torque for online tightening and to continue to monitor the bolt load after re-tightening. To overcome common problems with bolts galling, the RT-Bolts for this application are supplied with a special coating, hardened machined and coated washers, and machined and coated nuts.

The Outcome:

The use of RT-Bolts has shown that a significant part of the problem with the previous leakage has been due to insufficient bolt load achieved during the initial assembly. RT-Bolt has enabled the joints to be maintained at a significantly higher (> 30% higher) residual bolt load than previous and this has, in turn, reduced the frequency of re-tightening the joint.



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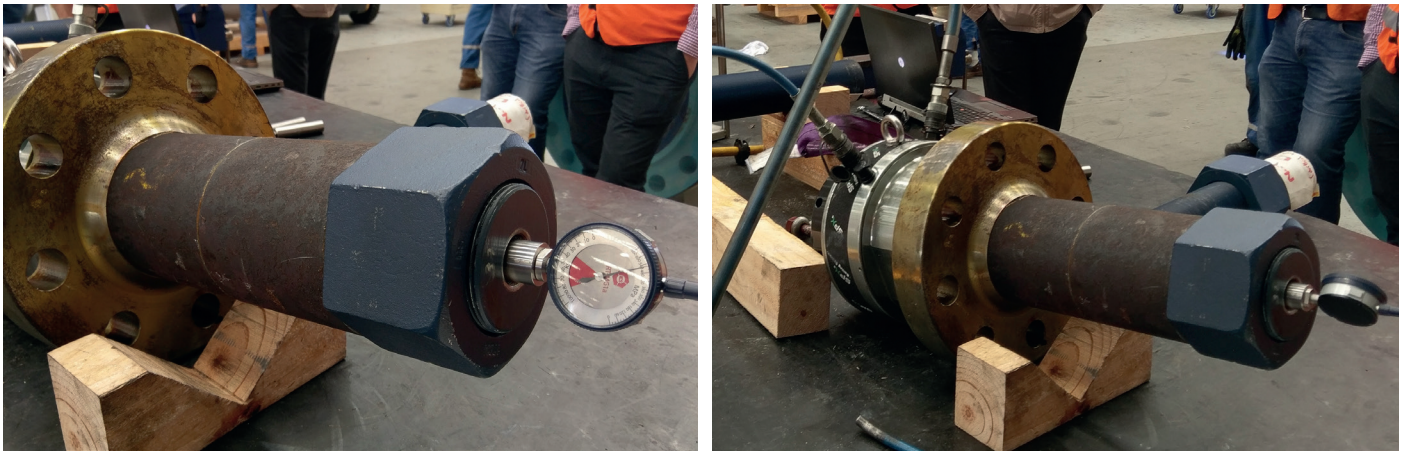
Integrity Assurance for Offshore Platform Compact Flange Conversion



RT-Bolt acceptance testing underway, witnessed by client representatives

The Problem:

Compact flanges were used on a NPS 40 gas line on an offshore platform. The compact flange joints proved very difficult to seal during assembly and commissioning. They are also likely to be difficult to maintain, as small imperfections can cause leakage of the seal ring. A back-up plan was formulated that involved using a kamprofile gasket in place of the compact seal ring. This required very accurate joint assembly, in order to ensure that an adequate buffer against leakage could be established with the kamprofile gasket.

The Consequence:

Leakage of these joints would not only shut the platform down, but (if ignited) it would have the potential to severely damage the platform infrastructure. In addition, envisaged maintenance issues with the current design are expected to likely extend future turn-arounds, having the potential to cost in excess of $5million per day in lost production and turn-around costs.

Previous Fixes:

The use of such large diameter compact joints is relatively new in industry, so the associated problems and fixes are only now emerging.

The RT-Bolt Solution:

RT-Bolts were machined into a set of 3-1/4 inch diameter x 30 inch long A320-L7 bolts, in order to facilitate accurate assembly of the joint, should the kamprofile gasket option be employed.

The Outcome:

The RT-Bolts passed the end-user inspection, verification and testing with flying colours and are now in storage, for use should they be required. The accuracy and repeatability of the bolts was confirmed by the multinational end-user client's engineers via comprehensive site acceptance testing.

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Assembly and Monitoring of High Temperature Heat Exchanger Joints

RT-Bolt load measurement underway during assembly of an exchanger channel cover with ¾" diameter bolts

The Problem:

A refinery had continuous nuisance leakage from a bank of high temperature heat exchangers with 3/4" bolts. Assessment of the joint integrity revealed that an extremely high assembly bolt load (90% of yield) was required in order to ensure good joint integrity.

The Consequence:

Leakage of these joints was problematic for the refinery, requiring shutdown to retighten the joints and, on occasion, shutdown to replace the gaskets. The cost associated with these activities, and the risk to personnel were substantial.

Previous Fixes:

Other load indicating bolts had been used in the past, but due to the small diameter of the bolts and the larger bore of the device, these devices prevented tightening to as high an assembly bolt load as desired. They were also found to be poorly installed on occasion, with the nut being too many threads away from the end of the bolt, greatly reducing accuracy.

The RT-Bolt Solution:

RT-Bolts were machined into a set of 3/4 inch diameter A193-B16 bolts, in order to facilitate accurate assembly of the joint to 90% of yield and allow ongoing monitoring of the residual bolt load using the ceramic high temperature RT-Bolt gauges.

The Outcome:

The RT-Bolts worked well for assembly and the joints were brought online with no leakage issues. Online measurement of the bolt load indicated that some bolt relaxation or bolt yielding may have occurred, which will be investigated further once the joints are taken out of service.