THE PROBLEM

- Many bolted joints are operating beyond their design life
- Carbon Steel bolts are heavily corroded
- True strength of bolts are unknown
- Bolts categorized by visual inspection
- Shut down and replacement is a substantial task and results in a major loss of production
- Budgeting for traditional bolt replacement is almost impossible
FLANGE INTEGRITY SYSTEM
**XTEGRITY OVERVIEW**

- System bolt identical specification to flange bolt
- Lightweight
- High-strength forged components
- Low profile geometry
SYSTEM INTERFACE

- Greater contact area between the flange and the system leg than flange bolts
  - Lower contact pressure than the original flange bolts

- To minimise flange bending stress the load region is positioned over the pitch-centre-diameter of the Flange Bolts
SYSTEM APPLICATIONS
3 AREAS OF APPLICATION

1. INTEGRITY
2. MAINTENANCE HOT-BOLTING
3. INTERVENTION
1. INTEGRITY

Leave the corroded flange bolts in place and apply the Flange Integrity System to prevent joint failure.

- In the event of flange stud failure, the load will transfer to the Xtegrity system maintaining joint integrity.
- A “temporary repair” maintaining flange joint integrity until corroded bolts can be replaced.
2. MAINTENANCE HOT-BOLTING

Temporary application to enable the corroded flange bolts to be replaced via hot bolting

- flange bolts are removed, and replaced one by one in accordance with the hot bolting procedure
- Xtegrity geometry maximises access to the flange bolt for maintenance tools.
3. INTERVENTION

Apply the Xtegrity System following a loss of joint integrity

- The Flange Integrity System is available at short-notice for emergency call-out

- The system may be applied to facilitate increased gasket load as a temporary measure without the risks associated with tightening corroded bolts
ASSEMBLY & INSTALLATION
ASSEMBLY

The modular system is designed to be easily applied

- Kit-form enabling pre-assembly prior to application
- Hinged over a flange joint on site
- A single connection system leg is then installed to captivate the system on the joint

In scenarios with limited clearance the system can also be built up over the flange to ease assembly
CATEGORISATION

Flange Joints can be categorised as follows–

- **HIGH RISK**
  Xtegrity system installed and left in place, flange bolts untouched

- **MEDIUM RISK**
  Xtegrity system installed, hot-bolting of flange studs replicating current loads using ultrasonic monitoring

- **LOW RISK**
  Xtegrity system installed, hot-bolting of flange studs, using standard bolting torque settings
FLANGE JOINT LIFECYCLE

- Joint Life
- System Install
- System Loaded
- Flange Bolt Failure
- Extended Joint Life

Seal Compression
Flange Bolt Load
Clamp Bolt Load
HOT BOLTING
XTEGRITY HOT BOLTING

- Precision hot bolting
- Utilises ultrasonics and the Xtegrity system to gauge load
- Replicates individual bolt loads
- Restores original gasket compression in the joint
- Allows for a thorough assessment of the joint
ULTRASONIC MONITORING

- Ultrasonic probe is used to accurately measure the System Stud length
- Changes in length correspond to changes in loading
- By monitoring the system studs throughout the hot-bolting process the flange stud loading can be accurately replicated
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