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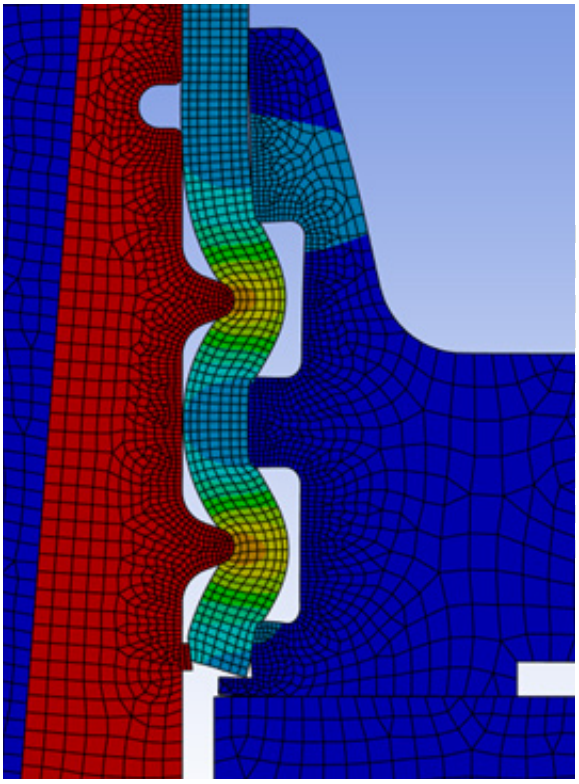
Quickflange™

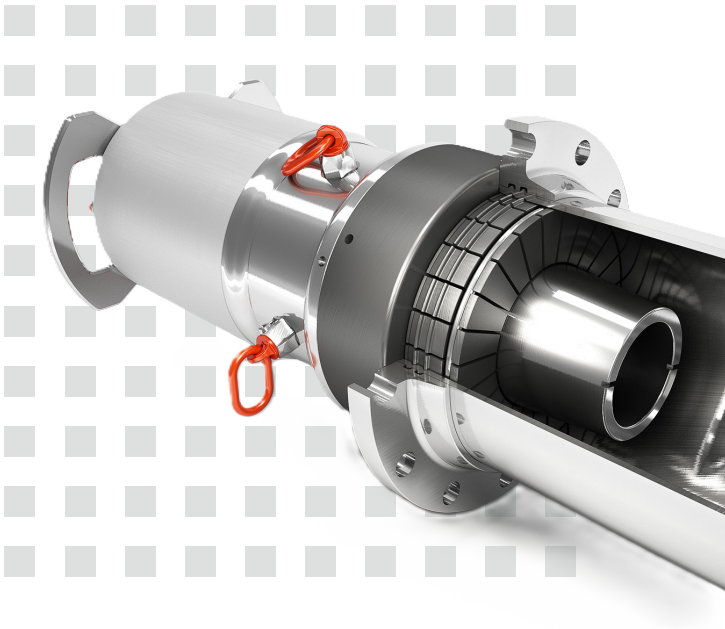
Design-by-Analysis for Out-of-Specification Piping

Quickflange™ is engineered for use on both new installations and existing piping systems. While the connector design and tolerances for the mating pipe typically satisfy most application requirements, there are cases where conditions fall outside the qualified range and additional consideration must be given.



To assess the suitability of Quickflange™ connectors in these scenarios, our engineering team can utilise 2D Axisymmetric Finite Element Analysis (FEA) to verify the joint integrity.

This method simplifies the 3D Quickflange™ assembly into a 2D cross-sectional model, assuming symmetry around the pipe's longitudinal axis and adopting an orthotropic elasticity model to account for reduced stiffness in the bolt annulus region.



Under these modelling parameters, the mechanical performance of the Quickflange™ joint can be accurately simulated during both activation and anticipated operating conditions.

Expected Outcomes of Finite Element Analysis

Reliable Sealing Prediction

Accurate simulation of the sealing performance of Quickflange™ technology under non-standard conditions.

Activation Pressure Confirmation

Validation that the joint activation pressure is sufficient for cases involving reduced wall thickness.

Engineering Justification

Numerical analysis provides a robust technical basis to support the approval of Quickflange™ installations on out-of-specification pipe geometries.

Key Consideration for Out-of-Specification Piping

When evaluating a Quickflange™ installation outside of standard specifications, our analysis focuses on several critical aspects to ensure the integrity and performance of the joint:

- **Contact Pressure:** Verification of sufficient contact pressure at the pipe–flange interface to ensure a robust, metal-to-metal seal and leak-free performance.
- **Mechanical Load Capacity:** Assessment of axial load capability, which may be reduced due to decreased wall thickness.
- **Equivalent Plastic Strain:** Evaluation of plastic deformation levels in the pipe during the swaging process, which may increase with thinner walls.
- **Equivalent Stress:** Analysis of stress amplification caused by the swaging process, particularly in areas where wall thickness is reduced.
- **Deformation Behaviour:** Examination of overall deformation to ensure it does not compromise contact pressure or joint integrity.
- **Activation Pressure Requirements:** Confirmation that the standard activation pressure remains sufficient to achieve the necessary deformation in the thinner-walled pipe.

Benefits

2D axisymmetric analysis provides our engineers with an insight into the impact of geometrical variations and allows all critical aspects of an out-of-tolerance pipe to be evaluated, facilitating the assessment of both structural and seal integrity.

Using Quickflange™ where a reduction in wall thickness is common can reduce downtime, and help avoid costly alternatives.