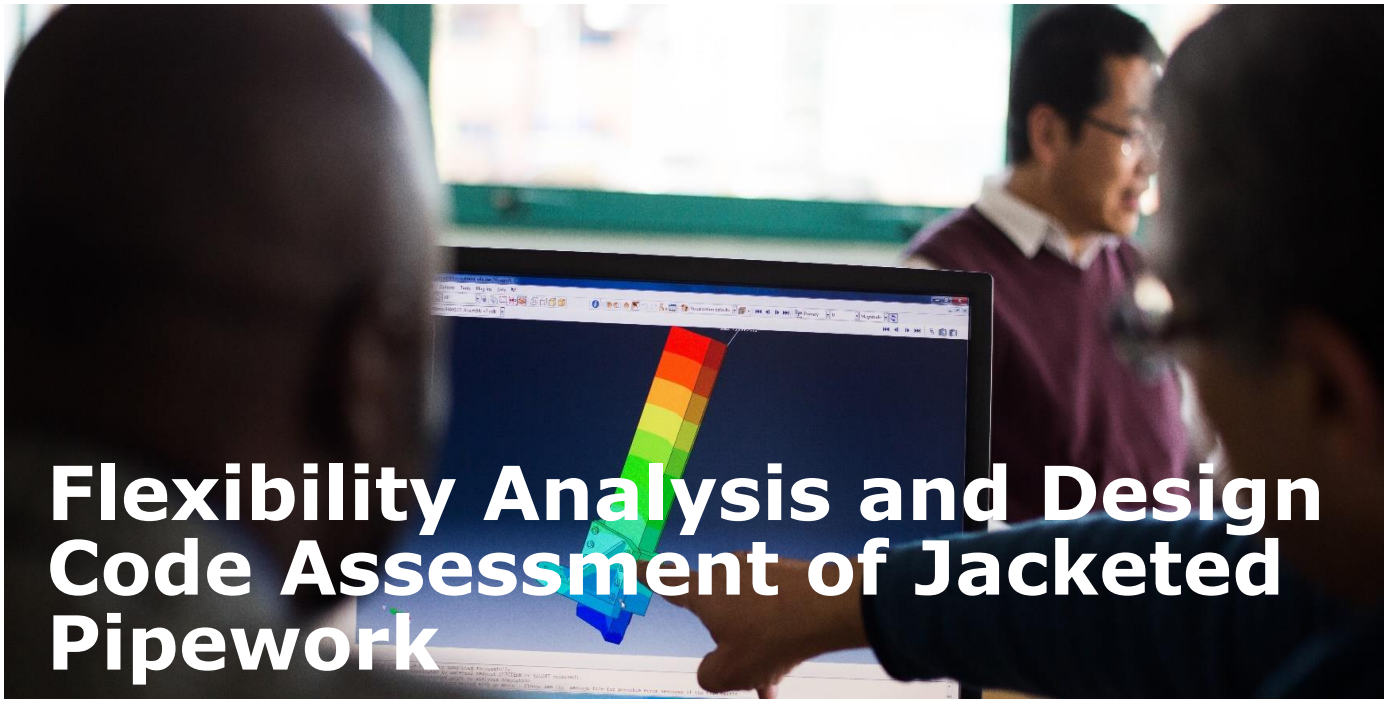

Flexibility Analysis and Design Code Assessment of Jacketed Pipework

Case study

EASL were selected to carry out flexibility analyses and design code assessments of the sludge and purge jacketed pipelines to be constructed at the Client's site. The principal aims of this work were to ensure that the design of the pipework satisfied code requirements and that thermal expansion of the system would not result in large stresses in the pipework.

The solution

The sludge and purge pipes were to be used to transfer fluids from the eductor bulge to the waste ponds.

The majority of the pipework on the sludge and purge pipes are constructed from concentric tubing. The larger pipe has a nominal diameter of 80mm while the smaller pipe has a nominal diameter of 50mm.

The tubes are held in a concentric arrangement by several "axial free guides" arranged at intervals. These "axial free guides" restrict all in-plane and out-of-plane movement but allow for axial movement of the smaller bore pipework. In addition, there are intermediate welded guides situated at either end of the first two pipe bends, and end welded guides situated at the ends of the larger pipe.

Both intermediate and end welded guides connect the two concentric pipes together restricting movement in all translational and rotational directions.

Before conducting flexibility analysis and design code assessments, a review and comparison of the sludge and purge pipes was undertaken. Based on the review, bounding pipework requiring flexibility analysis and design code assessment was identified.

A pipework model of the bounding pipework was created using the pipework analysis program PSA5, making use of the interactive data entry system (IDES). A design code assessment to ASME B31.3 was then carried out.

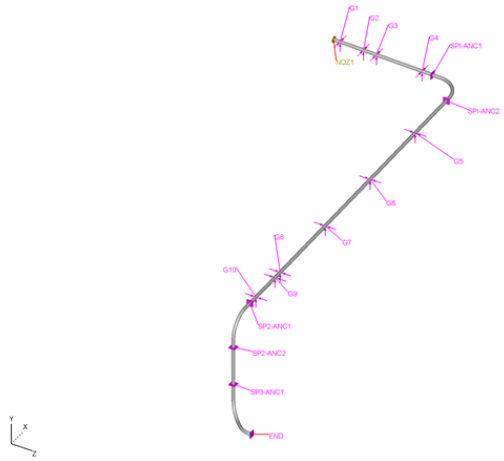

Figure 1 Sludge pipe stress model

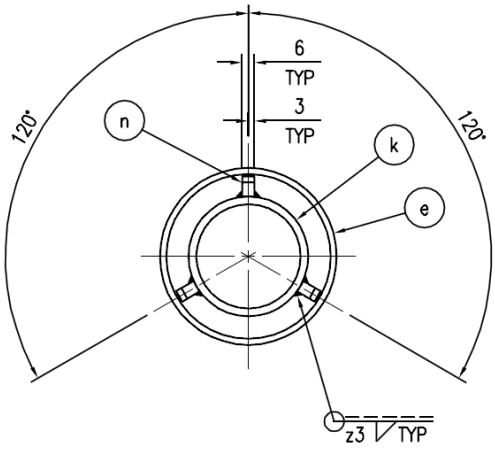

Figure 2 Axial free guide

Sustained, displacement stress range and operational load cases were considered in the design assessment. The operational case did not require assessment to B31.3 but was included to enable an evaluation of operational support and system loads.

The outcome

EASL were able to successfully show that, the pipework satisfied the flexibility and design code requirements of ASME B31.3. Analysis was used to confirm the adequacy of the welded end and intermediate guides.

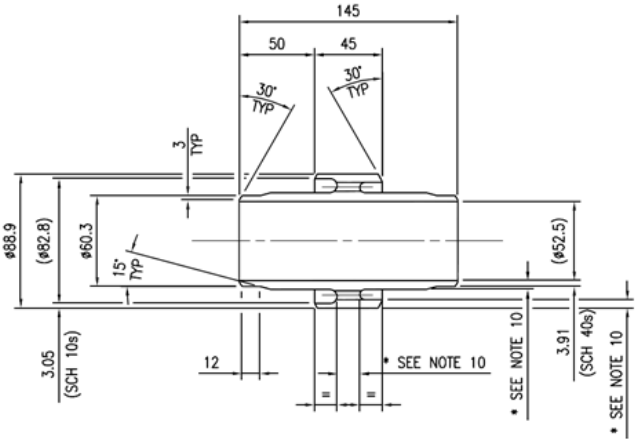

Figure 3 Intermediate welded guide

Value delivered

The initial review of the pipework by EASL helped significantly reduce the analysis requirements. EASL was therefore able to provide a cost effective solution meeting its client's needs.

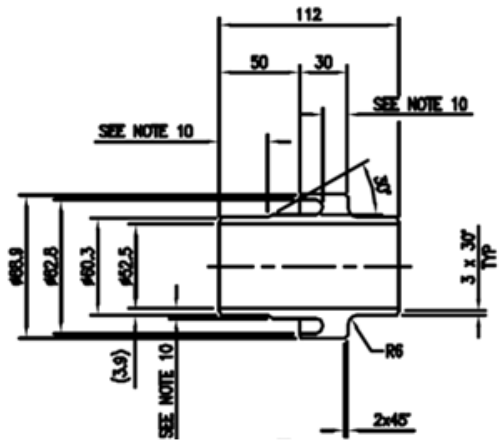

Figure 4 End welded guide

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