Out-of-Range Pipe Supports

Case study

A pipe support survey and audit, completed by EASL, confirmed that two adjacent pipework supports were hitting their bottom stops. This was attributed to load transfer following historic work carried out on adjacent support during a previous outage. It was recommended that all three supports be replaced during the next outage. However, the supports could not be replaced without delaying the end of the outage resulting in significant delays and costs, through lost generating capacity, to the client.

The assessment

All supports affected were constant effort type supports. As implied these supply a constant supporting force/effort to the pipework by accommodating pipe thermal movement within a pre-defined range. They are designed for use in high temperature pipework systems with large thermal movement. The supports have built in limit stops at the top and bottom of the movement range which allow some movement beyond the design thermal movement.

The assessment considered the effect of un-intended restriction to free movement, due to the bottomed supports, during normal operating and start-up conditions, has on safe life, system loads and stresses. Of particular interests are the loads and stresses at locations of high safety duty.

The assessment was carried out in two stages. First the levels of interference (the degree of restriction) were determined, then these levels of interference were simulated in a computer based pipework model.

The level of interference at the bottomed supports was taken to be the difference between the free and actual movement. To determine the level of interference the pipework displacements predicted by a computer pipework analysis were compared against the observed movements and the original design calculations.

Good agreement was seen between the design and pipework analysis movements. However, the observed support movements seen during the survey did not agree with the modelling results. Therefore, to determine the interference the historical and latest observed data were used.

The interference was then introduced into the pipework model. Bottomed supports were modelled by imposing the interference upward at each support for each operating condition.

System moments and stress ratios were extracted at the welds of interest from the base and modified computer pipework analyses for the normal operation and reactor start-up conditions. The effects of these modified loadings were compared with allowable limits given by pipework codes, fitness for purpose assessments and safe life assessments.

The results

There was a general increase in system loads and stress ratios between the base and modified pipework analyses. For the most part, the increased values were not significant. The increase in bounding equivalent bending moments between the modified computer pipework analyses and the most recent safe life reviews were small. Although the increased moments will reduce the safe life, the safe life would not be exceeded before the next outage.

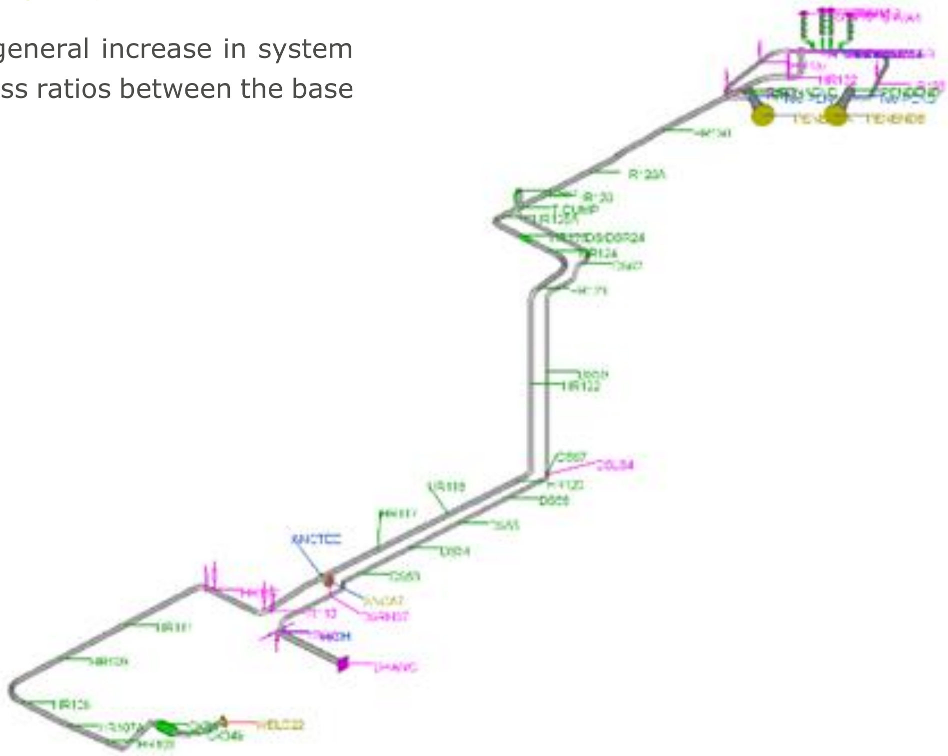
Client outcome

It was concluded that the reactor could safely return to service and the supports replaced during the next outage.

Therefore, there was no loss of generating revenue and the client could better plan the support replacements for the next outage.

EASL always work with clients to identify cost effective solutions to operational challenges.

If you would like to find out or discuss how EASL cab help your business, please get in touch.



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