

The Problem

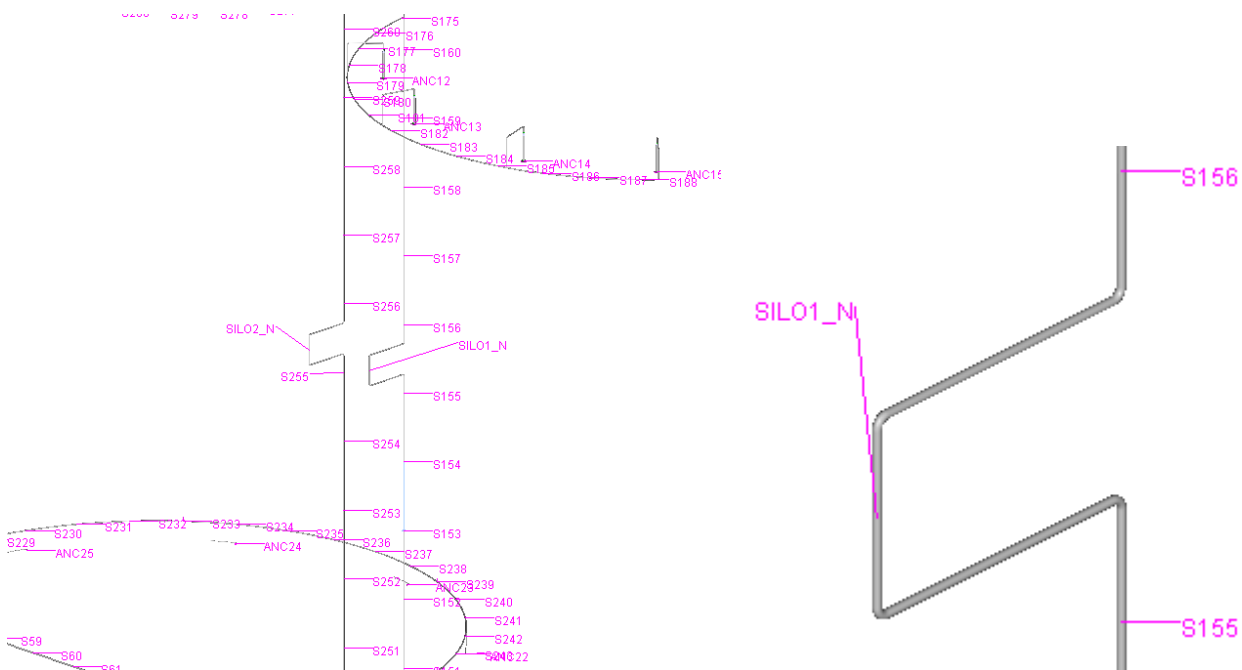
Our client was appointed for the design and supply of a nitrogen fire suppression system for four biomass silos. Having previously worked with the client on similar projects, MMI were appointed to undertake the pipe stress analysis of the outside battery limits (OSBL) pipework.

Our Approach

The methodology employed to analyse the nitrogen suppression system included reviewing all pipework support drawings in order to accurately capture the support conditions. The pipework was then assessed against the requirements of ASME B 31.3 using a PSA5 model of the pipework system. PSA5 analysis results were used to extract pipework support and anchor reactions. The pipework supports were subsequently checked for the applied loads using guidance from BS5950.

Outcome

The results for the original pipework design indicated unacceptable high stresses within the vertical pipework between the lower and upper silos. In order to reduce these stresses, MMI recommend that an expansion loop should be installed within this section of pipework. Additional analyses were carried out to demonstrate that if the expansion loop was installed as recommended, then all stress ratios would remain below 1.0, and the supports would be capable of withstanding the imposed loads.



Proposed expansion loop in vertical pipework on Silos 1, 2, 3 and 4