

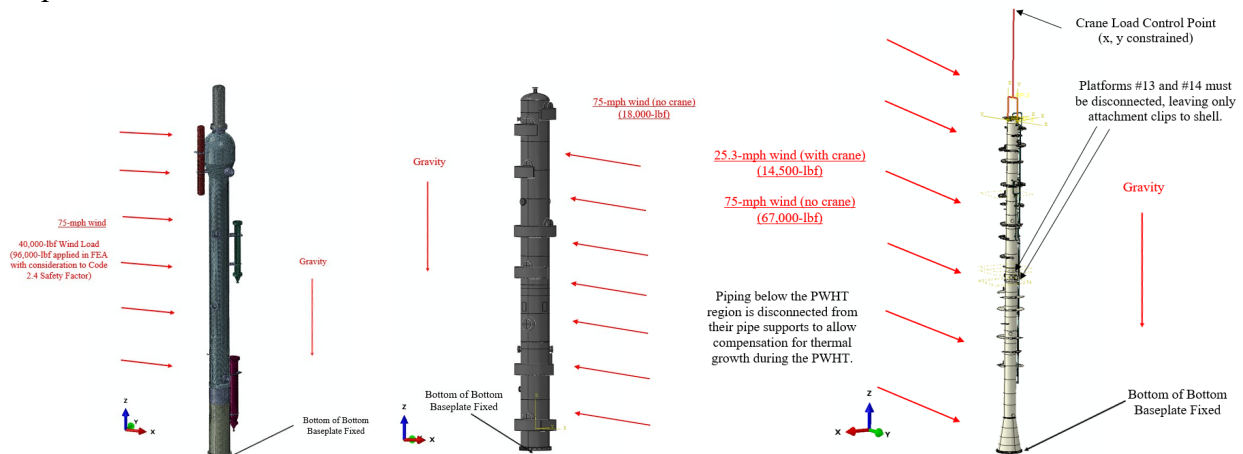
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Field PWHT FEA Stability and Local Strain Analysis (Finite Element Analysis, Vibration Analysis, ASME Section VIII Div. 2 Elastic-Plastic Analysis)

Project Description: Routinely associated with equipment repairs of towers and other vessels is the need for field PWHT. This stress relieve can be either locals or full/partial circumferential band heating. Of utmost importance when these field PWHT are performed for these types of equipment is the stability due to dead-weight loading and high wind loads. Next, often these repairs are associated with environmental cracking (hydrogen, amine, caustic, etc.) where adjacent discontinuities, often fillet weld for nozzles or structural items, are suspect to new crack initiation or crack growth due to those items being placed in a thermal gradient zone where high enough strains are generated. Finally, often engineering calculations are needed for the repair itself, such as when a substantially large cutout is required from the main shell or skirt. In these cases, ASME Section VIII Div. 2 Elastic-Plastic analysis is used to establish whether the tower is stable or not under an established maximum wind load, whether the thermal gradients are low enough for adjacent attachment welds or other items, and if openings are strong enough or require additional temporary support. When the vessel is shown to not be stable, crane support can be considered and/or establishment of temporarily lowering the PWHT soak temperature to a point where the material has suitable strength.

FEA Model: Below are a mixture of images of various towers, or other equipment, where PWHT FEA was performed.



FEA Results: Some various images of results for different PWHT FEA studies are shown as follows:

