

**Keywords:** Femap, NX Nastran, Pressure Vessel Analysis, ASME Pressure Vessel, ASME Section VIII Division 2,

**Main Graphic:**



## Pressure Vessel Analysis

**Case Study Section:** ASME BPVC

**Analysis Type:** Lifting, ASME Section VIII, Division 2, Linear Static, Stress

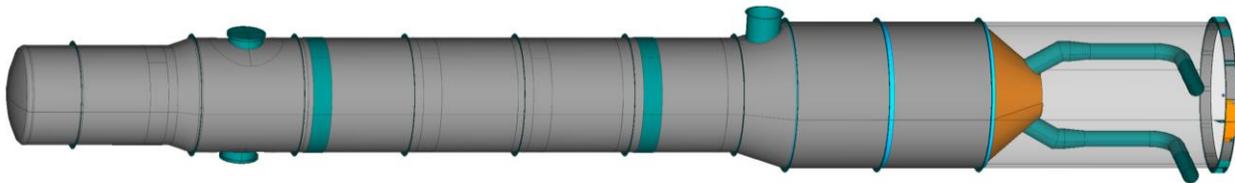
## Large Pressure Vessel Lifting Analysis

When dealing with large pressure vessels lifting and transportation can be challenging. ASME Section VIII code drives the design of the vessel but only includes details on operational loads. Lifting and transportation is a critical aspect with structures of this size. FEA analysis can help determine how the structure will behave.

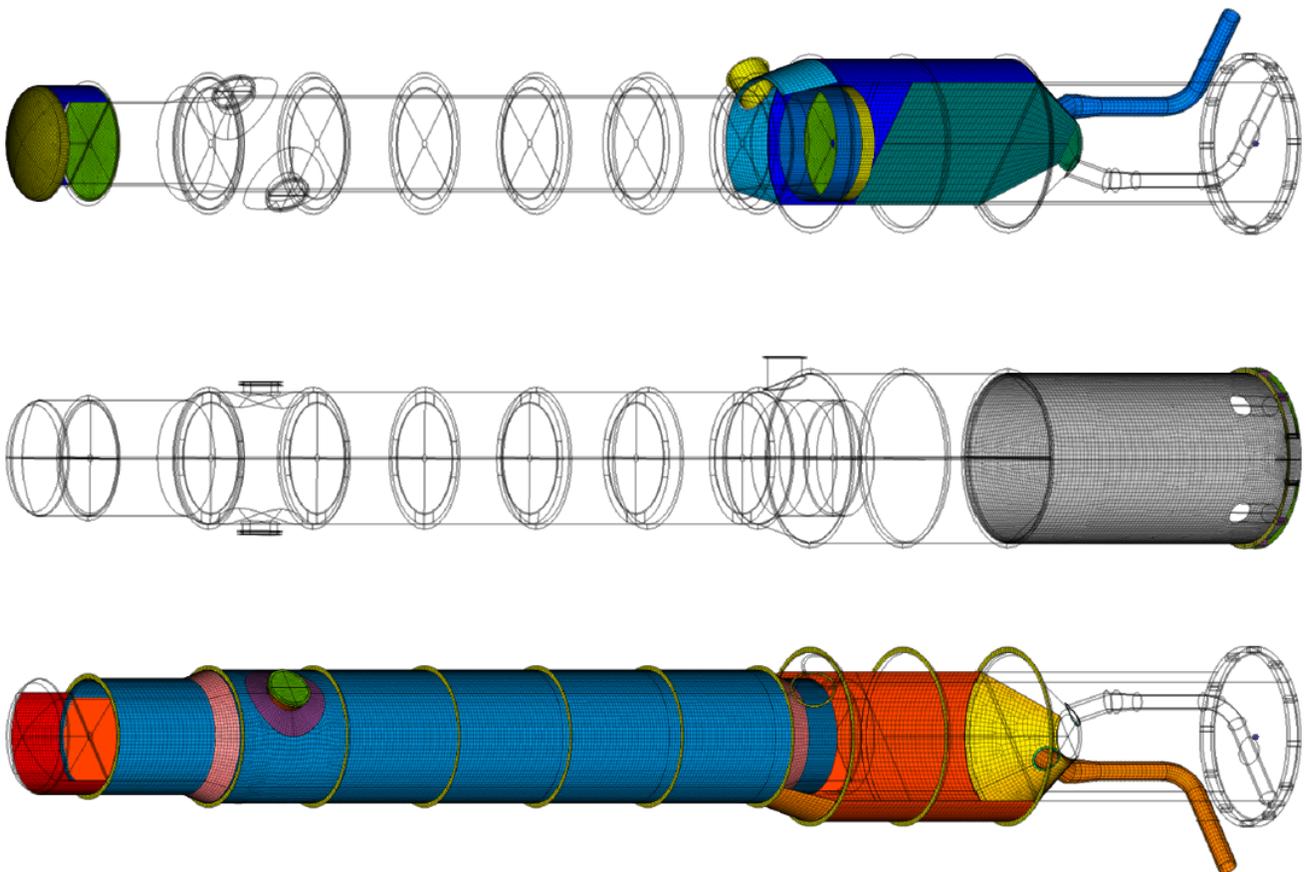
In this analysis the pressure vessel was analyzed for lifting loads at various angles as the vessel is installed. The main concern was the skirt, tailing lug and trunnions. The mass of the vessel was a critical parameter. To ensure proper mass was included the finite element model used beam elements to approximate the tube sheet. This greatly improved the efficiency of the model.

Supplied with only CAD drawings the sheet surface of the midplanes was built as shown in Figure 1. Once the geometry was modeled, 4-node plate elements were used to build the finite element model.

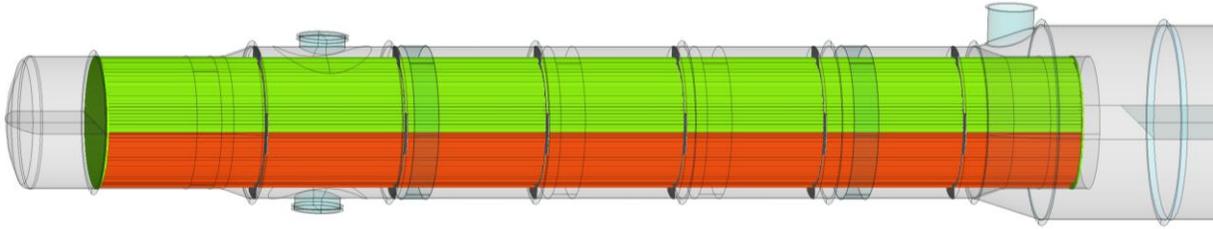
Initially, the tailing lug was not adequate but after a couple design suggestions a final design was found. This analysis helped the client better understand how the vessels act during installation. Not only did they have confidence in this particular design, but they also gained valuable knowledge for future designs.



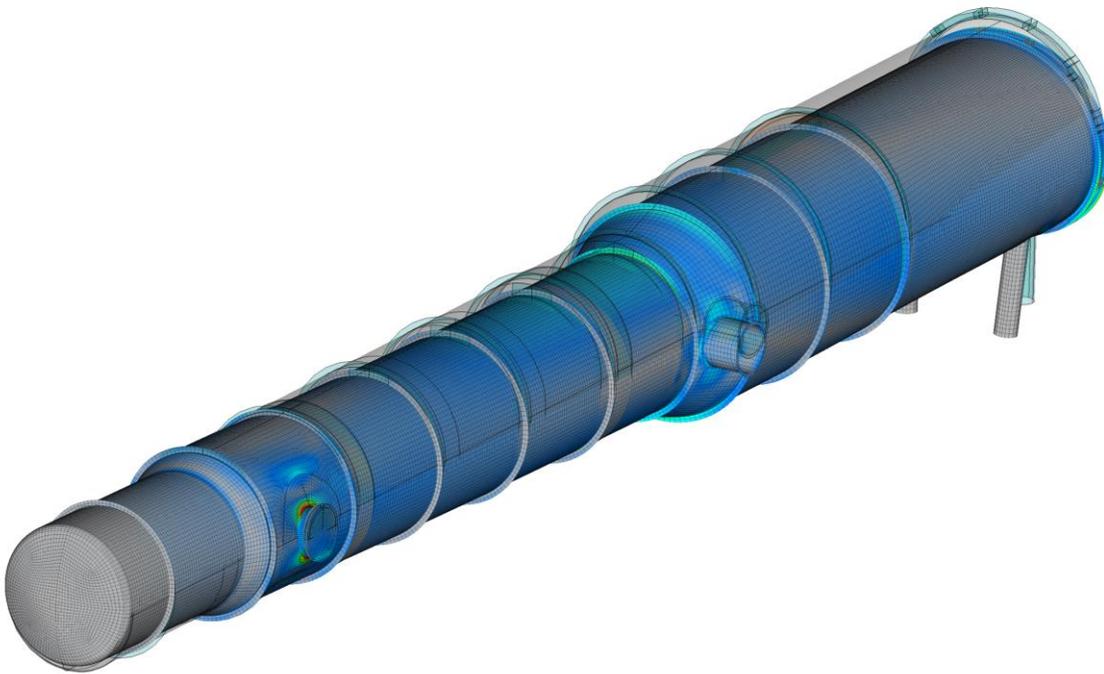
**Figure 1: The sheet surface geometry built from CAD drawings.**



**Figure 2: Plate element mesh.**



**Figure 3: Beam elements for tube sheet**



**Figure 4: Stress contour plot**