

Flexibility analysis of vacuum jacketed super insulation Liquid Nitrogen (LN2) transfer line and Gaseous Nitrogen (GN2) lines for Centralized distribution system

Abstract

A centralized distribution of liquid nitrogen (LN2) and gaseous nitrogen (GN2) is being under the phase of design and development for different users of New R& Lab at IPR. The lab space and associated required infrastructure (water, electrical power and building etc.) are already available for up-gradation of existing facility and setting up of experimental set ups. However, all above sub-projects envisages the use of large quantity of GN2 (~ 100g/s) and LN2 (~1500l/h) for their experiments.

Based on the layout constraint and available preliminary isometric of the distribution network, the project work involves the followings

- 1) Re-fine the isometric of the network (~ 190 m length)
- 2) Identification of the load cases (Dead weight, seismic and thermo-structural loads)
- 3) Optimal utilization of flexible components
- 4) Piping stress analysis and verification of the structural integrity of the network for identified load cases and
- 5) Optimization of allowable stress with respect to use of flexible components

Piping stress analysis is to ensure safety against failure that could result from loading conditions both external and internal – that are expected to occur in the lifespan of a piping system. Verifying the structural integrity against various load conditions in consideration of economic aspects and other several factors that impact different types of piping systems – making the stress analysis more complex

This project also includes the literature survey, understanding and utilization of standard software's for flexibility analysis, ASME code, analytical calculation, iterations in calculation and report preparation.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 2

2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 12 Weeks

(b) Student's presence at IPR for academic project work: 3 Full working Days per week

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