

SURGE ANALYSIS OF HIGH PRESSURE PIPES IN DESALINATION PLANT

VERTICAL:
**CONSTRUCTION &
INFRASTRUCTURE**

SERVICE:
**CUSTOMIZED CAE
SOFTWARE**

TECHNOLOGY:
**CFD / STRUCTURAL
ANALYSIS**

Our customer is a leader in water and waste water management solutions to the industry. They are engaged in design and construction of 100 MLD desalination plant. One of the focus areas is finalizing the high pressure pipe layout and gaining confidence on the associated support structure. Such pipe layout and associated skid are under constant threat of damage due to water hammer i.e. surge load that arises from sudden pump failure or valve closure. Since the length of high pressure pipes in plant were unusually long, the surge load was expected to be severe. It estimation was not possible using any thumb rule or empirical relationship

Zeus Numerix performed surge analysis for obtaining surge pressure loads followed by structural analysis of skid for ensuring its survival during such event. Surge analysis was performed using 1D fluid mechanics formulations. The physics involved transient movement of pressure waves in pipe during sudden changes in operating conditions. Various scenarios such as sudden pump closure and valve closure were studied for the surge analysis. Static and dynamic structural analysis of the skid was carried out against the loads obtained from the surge study.

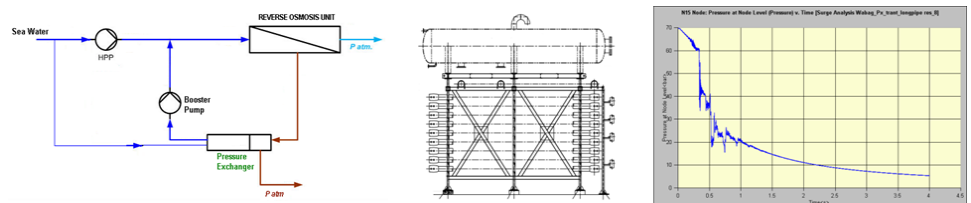


Figure 53: (a) Schematic of plant (b) RO skid design (c) Pressure surge

Customer was provided with magnitude of surge pressures in pipes and the von-Mises stress distribution for the skid. Through this study, our customer was assured that the structural design of pipe supports & RO skid were strong enough to withstand the impact of surge during power failure or sudden valve closure. This study is turned out to be crucial considering its importance towards reliable operation of large capacity desalination plant.