

SECTOR:  
NAVAL SYSTEMS

OFFERINGS:  
ENGINEERING SIMULATION  
SERVICES

TECHNOLOGY:  
STRUCTURES

## SHOCK, VIBRATION AND MOTION ANALYSIS OF SHIP STRUCTURE DURING MISSILE LAUNCH

Our customer is a one of the premier defense establishment in the country. They were involved in a national programme of creating capability to launch advanced missiles of higher class from a naval platform. During the launch of missile, the platform is expected to experience significant transient loads. These events can introduce high temporary stresses & vibration in the support structure, as well as overall ship pitching / roll motion. The customer wanted to quantify these effects to ensure the safety of the platform during missile launch.

Zeus Numerix approached the problem by identifying three critical analysis requirements, required to quantify the effects. These were (a) plume shock on the ship structure, (b) vibrations onto nearby panels and (c) ship motion analysis. It required developing a detailed finite element model of ship structure spanning tens of frames & multiple bulkheads. The plume shock analysis was done to estimate the development of transient stresses during a missile launch event. The stresses were way below allowable limits. The vibrational analysis proved that there were no panels that resonate due to missile plume induced vibrations. The ship motion analysis established that rolling motion of the ship had no safety implication to the safe launch of the missile.



Figure 1: Missile being Launched from a Naval Platform

The customer was delivered with a comprehensive report with the analysis of all the three simulations. The simulations quantified all the requirements of the customer and proved appropriateness of the structural integrity of the naval platform. The study helped establish more confidence on the capability of launching large missiles from ship.