

SECTOR:  
AEROSPACE SYSTEMS

OFFERINGS:  
DESIGN APPROVAL STUDIES

TECHNOLOGY:  
FLUID DYNAMICS

## ASSESSMENT OF STORE SEPARATION UNDER WIND GUST CONDITIONS

Our customer is an agency whose primary function is certification of military aircraft and airborne systems. While giving clearances for integrating a new store to an aircraft, it seeks proof that the system is safe under most critical conditions. Wind gust at high altitudes poses risk to airborne system due to uncertain store movement. Store separating from aircraft encountering vertical gust may hit back the aircraft. Numerical studies were needed to simulate this scenario.

Zeus Numerix developed a unique CFD analysis approach for predicting impact of gust on separation trajectory. Simulation was unsteady and utilized multistage dual time stepping technique over LUSGS implicit compressible solver. Event was such that vertical gust hits the store as it starts to disengage from aircraft, creating the most critical scenario. Gust parameters were selected based on probability of occurrence in practical cases as per MIL-STD-1797A. It was a discrete gust of 1-cos profile with length equal to half of store length and amplitude of 22 m/s.

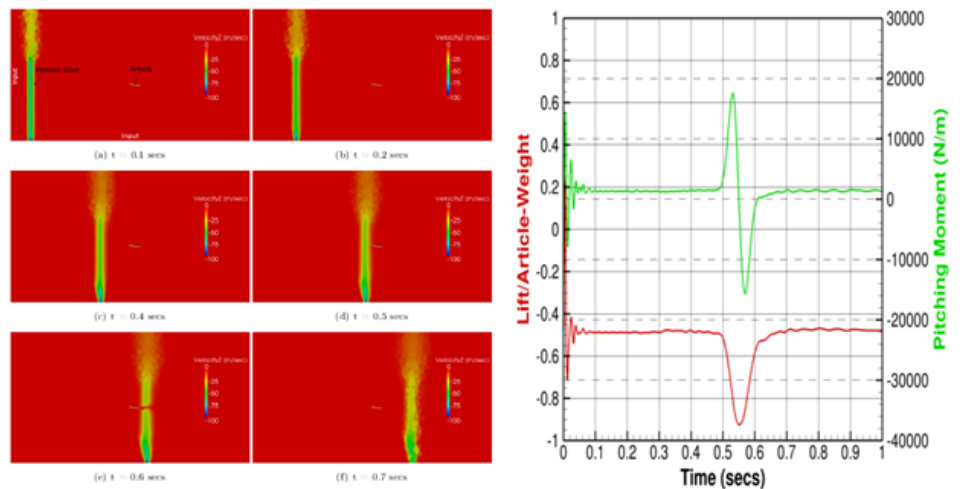
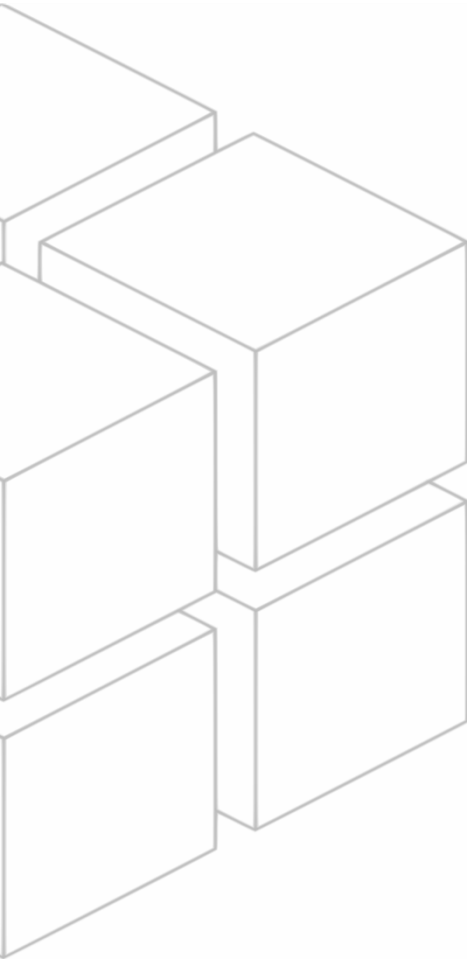


Figure 7: Movement of gust and effect on lift and pitching moment

Zeus Numerix simulated four flight conditions and presented results to multi agency review committee. Owing to the weight of the article and the fact that gust strength diminishes after coming in touch with aircraft, it was found that gust had minimal effect of separation trajectory. Study contributed towards the clearance of store for flight trials.