

SECTOR:  
AEROSPACE SYSTEMS

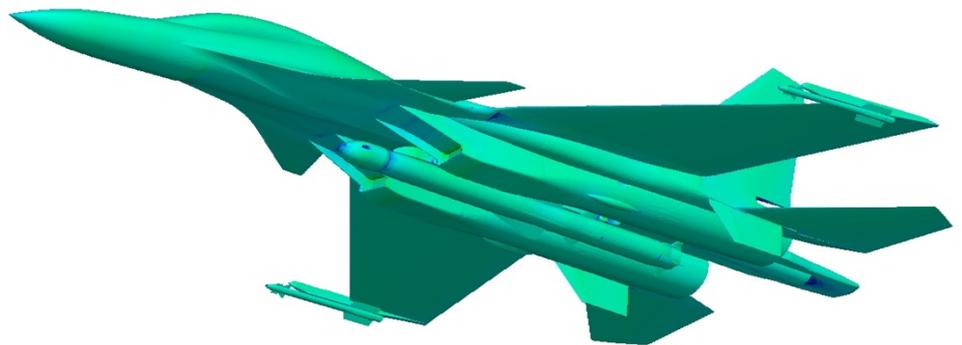
OFFERINGS:  
DESIGN APPROVAL STUDIES

TECHNOLOGY:  
FLUID DYNAMICS

## AERODYNAMIC ANALYSIS FOR WEAPONIZATION OF AIRCRAFT

Our customer is a premier Defence organization that develops state of the art supersonic missile system. They are engaged with its deployment on India's front-line fighter aircraft. For design of deployment components, a series of aerodynamics governed data on combined aircraft-missile configuration is needed. The required data, since pertaining to actual flight conditions, cannot be generated at wind tunnel and flight tests tend to be riskier at initial development stages.

Zeus Numerix relied on a series of steady and unsteady CFD simulations to generate changes to aircraft aerodynamics (in presence of missile), loads on pylon, engine fouling characteristics and separation dynamics. Proprietary hybrid mesh based implicit compressible flow CFD solver was chosen for all steady simulations, whereas separation dynamics was targeted using adaptive mesh-based simulation setup. The simulation matrix contained a total of 210 CFD runs encompassing the entire gamut of aerodynamic interactions that missile would have with aircraft.



**Figure 1: Captive loading analysis for full flight envelope**

Customer was provided with tabulated static and dynamic aerodynamics coefficients along with a detailed and thorough analysis of results including component loads and engine mass flow rates. The study also generated much needed data to instill confidence on the safety of deployment / separation process. Subsequently, customer used this aerodynamic study to obtain certification and approval for induction of aerial configuration of missile system into armed forces.