Aerodynamic Analysis towards Weaponization of Aircraft

VERTICAL:
AEROSPACE & DEFENCE

SERVICE:
ENGINEERING SERVICES

TECHNOLOGY:
CFD

Our customer is a premier defense organization that develops state of the art supersonic missile system. They are engaged with its deployment on India's frontline 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 & unsteady CFD simulations to generate changes to aircraft aerodynamics (in presence of missile), loads on pylon, engine fouling characteristics & 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.

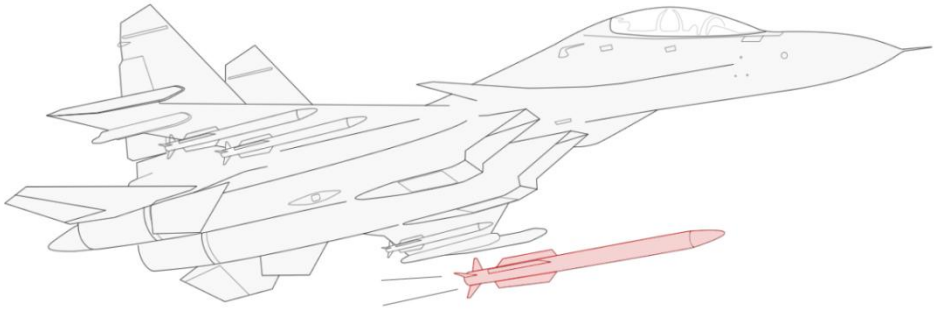

Figure 1: Captive loading analysis for full flight envelope

Customer was provided with tabulated static & dynamic aero-dynamics coefficients along with a detailed & thorough analysis of results including component loads & 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 & approval for induction of aerial configuration of missile system into armed forces.

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