



Wind Tunnel Model Support FEA & CFD Analysis

Description

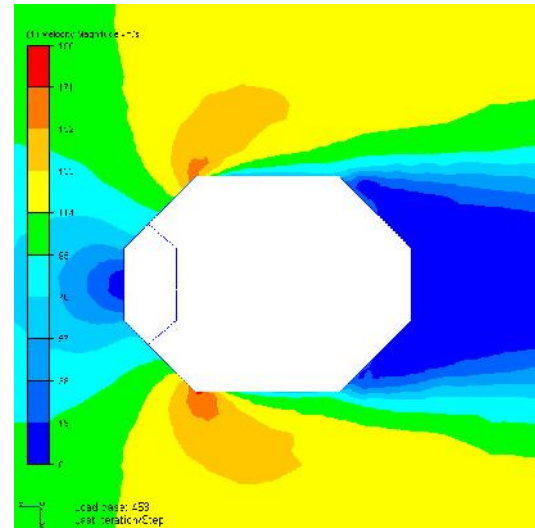
Mechanical engineering design, structural and aerodynamic design/analysis was utilised to assist in the upgrade of an existing wind tunnel that required a new sting support system for testing aerospace models. The system was designed in collaboration with the client, with Quadratic acting as their technology partner, and being responsible for the structural design and analysis, modal frequency analysis and computational fluid dynamics analysis of the sting support system in various pitch and yaw combinations.

A number of design configurations were investigated and produced in 3D SolidWorks. These were then analysed using "COSMOS DesignStar" to calculate modal frequencies and ensure acceptable stress and deflection results. Once this was completed, "CFDesign" Computational Fluid Dynamics software was used to analyse the flow distribution in the tunnel, to ensure minimum flow disturbance to the model under test.

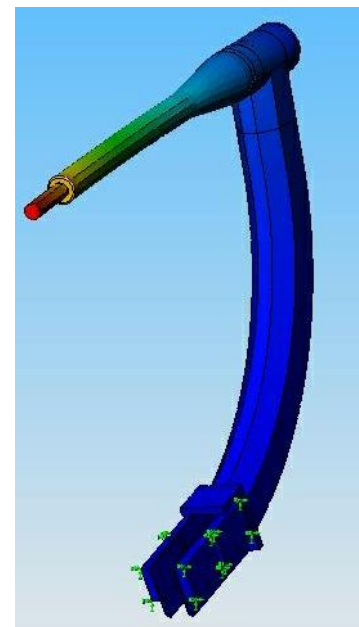
Three basic models were analysed using an empty wind tunnel, a wind tunnel at zero pitch and yaw and, with the sting at maximum pitch and yaw. The flow characteristics of dynamic pressure, static pressure and flow angles were then investigated around the area of interest for the aerodynamic test model and compared. The results were then used to optimise the design of the sting and ensure flow distribution was within acceptable limits.

Disciplines Used

- Mechanical design, fluid mechanics analysis, computational fluid dynamics, stress & vibration finite element analysis



Strut Section CFD Results



Model Strut & Sting Finite Element Analysis