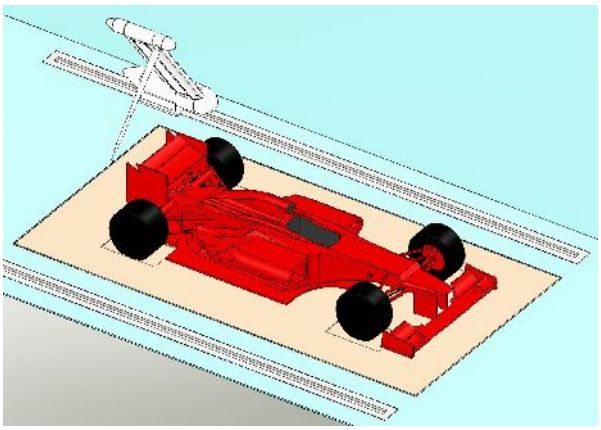
Case Study

F1 Wind Tunnel Rotary Probe Traverse System

Description

A high accuracy traversing probe system for F1 wind tunnels. A typical requirement is to position a probe (usually a 3, 4 or 5 hole cobra probe) around various parts of a 50% scale F1 car, in a 50 m/s wind tunnel working section. The probe traverse system is constructed from high modulus CFRP, optimised to minimise deflection, aerodynamic loading and flutter/vibration.

Floor Mounted Probe Traverse



Floor Mounted F1 Probe Traverse System Design

A typical positional accuracy of better than 2.5 mm is achieved as standard, or improved using a high accuracy calibration and laser deflection measurement system. High ratio, low backlash, low weight harmonic drives are used with encoder feedback and bespoke designed opto-electronic switches for accurate positioning. An optional integrated capacitative sensor system can also be used for collision avoidance. Finally, the traverse system is also provided with an independent, PC based, 19” rack-mounted control system.

Disciplines Used

- Conceptual, mechanical & electro-mechanical design
- Electronics & PCB design
- Composite design & analysis
- Fluid mechanics analysis
- Stress & vibration analysis
- Project management
- Manufacture & assembly
- Test & commissioning

Specification Summary

- 50 m/s wind speed
- Typical 1000 mm x 750 mm traverse area
- 3% - 5% blockage
- +/- 2.5 mm positional accuracy
- High modulus carbon composite structure
- High ratio, low backlash, low mass harmonic drives
- Optional integral slip rings
- Optional real-time laser measurement system
- Optional capacitative collision avoidance system
- 2 axis PC based 19” rack mounted control system