

Design of Wind Tunnel Sting and Balance System

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Abstract:

Ohio Northern University needed a complete sting and balance type data acquisition system for its newly acquired 18" open-circuit wind tunnel. The senior design team was tasked with the goal of creating a durable and accurate yet cost effective instrumentation system for use in research and classroom instruction. Several designs were considered and after careful weighting of design criteria, a decision matrix was used to choose between them. The final design utilizes two load cells to measure axial and normal forces, two rotary encoders to measure yaw and pitch angles, and a simple four-bar linkage and turn table assembly for positioning test models within the test section. Students will interact with the wind tunnel using its on-board controls and a desktop PC with a LabVIEW user interface for logging and analysis of sensor data. While remaining fully featured, final project costs were approximately one-third that of commercially available systems.