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Determination of Aerodynamic Correlation Parameters of a Vehicle

This study involves helping Manufacturing Company reduce overall production time, starting from concept through production, by finding and correlating the parameters of drag force, lift force, side force, pitching moment, yawing moment, and rolling moment of an Ahmed body, representative of a vehicle. The correlation parameters for the Ahmed body are between the computational fluid dynamics software Star-CCM+ and actual wind tunnel testing at the University of Wisconsin-Milwaukee?s (UWM) wind tunnel at a 0.3 scale prototype made from SOS rapid prototyping material. This small scale Ahmed body will be compared to the correlation parameters gathered from a full scale testing of an Ahmed body in the Wichita State wind tunnel also. The results of all three tests will be compared to see if they are in agreement with each other. The wind tunnel testing at UWM will utilize a 6-axis force/torque sensor having the capability to measure all the parameters. If the CFD results are within 5% of the actual wind tunnel testing, the project will validate the accuracy and reliability of CFD and further allow its usage to replace wind tunnel testing with confidence.

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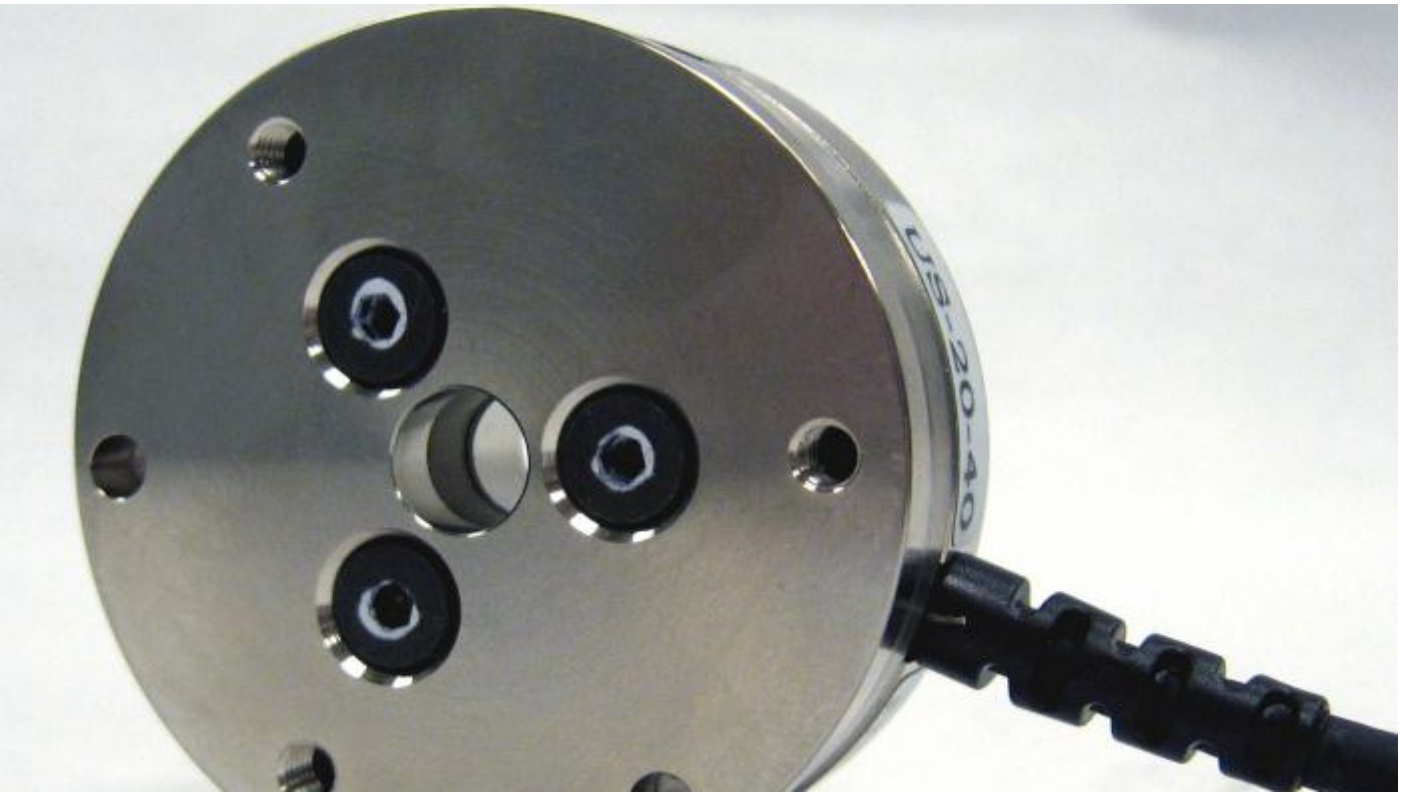

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