

Abstract

Load cells are a powerful tool in the world of experimental aerodynamics. They allow for the full measurement of forces and moments experienced by a body in a wind tunnel. While there are many different types of load cells, the ones used in this study operate using strain gauges and measure forces and moments in all 3 axes (6DOF). As a force/moment is applied to the load cell, the electrical resistance of the strain gauge changes proportionally. However, like most measurement instruments, load cells are prone to error. The main types of error a load cell could experience are hysteresis, creep, and temperature. Hysteresis encompasses any error associated with the difference between loading and unloading the load cell. Creep includes any change in the load cell over time while the applied force remains constant. Finally, temperature, which changes when the load cell is experiences fluid flow in a wind tunnel, affects the resistance of the strain gauges and thus the forces recorded. Additionally, this study hopes to also investigate any errors associated with changing the orientation of the load cell while all else remains the same. A rig to apply a constant force/moment to the load cell has already been designed and fabricated. Quantifying the error in this manner would ultimately allow for more accurate results in other experiments using this load cell.