Outside Trailer-Tow Mirror Force vs. Displacement Tester

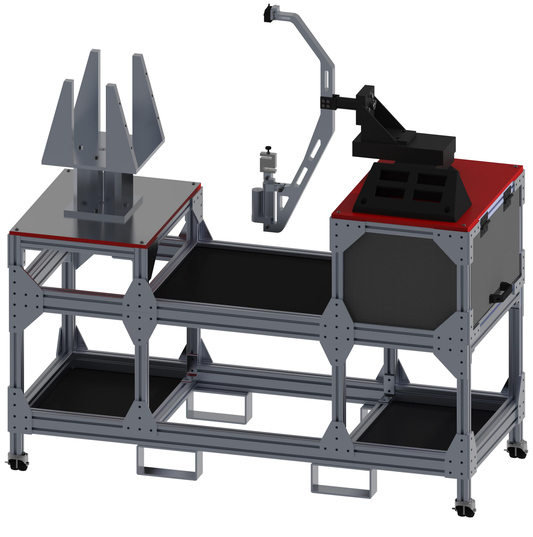
TEAM 13

The Problem to Solve

The current testing process suffers from downtime and inconsistency. Multiple configurations are required for both left-hand and right-hand mirrors in their retracted and extended positions. Setting up each configuration takes upwards of 15 minutes, even for experienced personnel. In addition, the lack of fixed positions introduces human error and variation in test results.

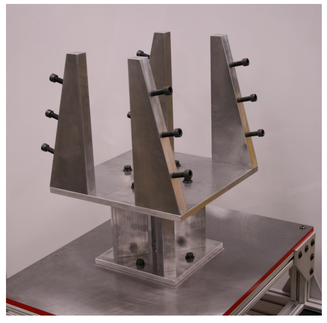
Project Accomplishments

- Repeatability verified using a Gage R&R value less than 10%
- Ability to measure at a precision of 20 microns
- Single configuration setup time reduced by at least 67%



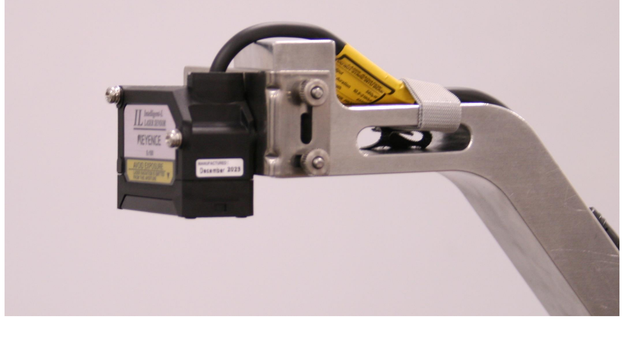
Project Objective

The objective of this project is to develop a more reliable, precise, and user-friendly tester for measuring the force and displacement relationships on Magna's trailer-tow mirrors. The principal challenge is to develop a universal test system that can accommodate all of Magna's mirror variations, each of which has a unique mounting base and position. This necessitates the development of a system that permits expedient and uniform configuration alterations while maintaining the capacity to accommodate disparate mirror designs.



How the Machine Works

There are two arms that comprise the metrology of the machine, the force arm and the measurement arm. The force arm contains a linear actuator and load cell that press onto the body of the mirror. The measurement arm has a triangulation laser distance sensor that records the amount of movement due to the applied force. The mirrors are mounted on a structure that allows for multiple mirror designs and orientations to be tested.



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Acknowledgments

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