Quick Check Alignment Device

Overview
Trucking companies spend hundreds of thousands of dollars a year on tires due to trucks being misaligned, and costs even more money to take trucks off the road to check the alignment. A device that checks alignment in the field quickly will allow for trucks to stay on the road and make sure alignment is correct. The device was to use lasers to take measurements that would obtain key measurements.

Objectives
Develop a concept and provide a working prototype to demonstrate that key measurements (centreline distance and toe angle) can be taken. The procedure should be done in two minutes or less.

Approach
- Site visit was made to the International Marketing Incorporated headquarters in Chambersburg, Pa.
- The sponsor laid out the design constraints and expectations.
- Several designs were discussed and worked through.
- Calculations were done to determine which design had the least amount of tolerance interference.
- Designs were discarded once the analysis of tolerances were considered.
- SolidWorks models were done on to model the mounting and Finite Element Analysis were done to show loading force and bending stresses.
- Materials were ordered to construct a prototype made from acrylic, aluminium, distance measuring lasers and microcontrollers.
- Testing was done in the lab with the distance measuring lasers and the microcontrollers could communicate to a handheld device.
- A field test was done to ensure mounting worked properly.
- The model was validated by proving the lasers and code provided a correct reading.

Outcomes
- The device can take the correct measurements needed and determine whether alignment is correct.
- This is a can be placed on a truck and measurements taken in a very short time.
- The product will save trucking companies money on tire costs and unneeded maintenance costs.