NIOSH Tractor Cab Simulator

Overview
The problem assigned was to modify a design of a tractor cab simulator base to remove unwanted oscillations after initial motion to replicate real world scenarios. The tractor cab was heavy enough that it applied a large moment about the actuators causing on wanted oscillations. We were faced with the challenge of running tests and analysing the data that was collected to determine the proper shock characteristics. The second obstacle was to install the correct shock with travel length in mind as well as safety and location of the shock in order to reduce risk for the operator.

Objectives
- Purchase a shock with the correct damping ratio and travel length while also being adjustable.
- Design a concept for mounting the shocks while keeping it out of the way.
- Construct our final design and run tests to determine if the shocks meet expectations.

Approach
- We first talked to our sponsor and determined what their needs were.
- We researched several patents that were related to our project.
- We researched different companies and selected FOX shocks to use for our project.
- We ran tests on the tractor cab to determine the oscillation pattern.
- After analysing the data, the damping ratio was determined.
- We created SolidWorks drawings to model our concept.
- We fabricated our design.
- We ran tests with a new cab with and without the shocks to compare the data.
- We compared the damping ratios of the simulator with and without the shocks.

Outcomes
- Increased the damping ratio by 100%.
- Without shocks damping ratio=.2456
- With shocks damping ratio=.5376