Developing a Farm Tractor Simulator

Overview
The overall goal of the project is to understand why tractor overturns occur and implement ways of preventing future accidents. This was accomplished by creating a tractor simulator by interfacing a full-size tractor cab from John Deere to a 6DOF MOOG motion base.

Objectives
1) Assess motion base capabilities
2) Interface tractor cab
4) Collaborate with simulation team (software developers)

Approach
- Project was introduced and customer needs were gathered in first 3 weeks of semester.
- An outside search of patents and documents related to project was performed by all team members to help develop concept idea.
- After considering customer needs and assessing MOOG motion base capabilities, three concepts were generated.
- The final concept (central pivot) was chosen using a concept scoring matrix.
- Design and construction of final interface was initiated and hit several delays along the way.
- A CAD model was developed and can be seen in the lower right corner of this document as well as in the final report.
- Meeting were help with the sponsor every Monday at 7:00 PM with Dr. LaJambe and Dr. Brennan to ensure progress was being made every week and that the design was reasonable.
- The final construction of the interface was done at the Engineering Services building, Learning Factory, and Research Building B. All welding was performed at the LTI test track.
- FEA analysis was done on the top plate of the interface (weakest member) to ensure that an excessive amount of deflection would not occur.
- Testing was performed on the top plate which consisted of bolting the top plate to the MOOG base, bolting the tractor to the plate and running the simulator and monitoring deflection with the help of Alex Brown.

Outcomes
Below are the outcomes of the project:
- Assessment of Motion Base capabilities
- Interfaced John Deere tractor cab
- Extra ~15° of tilt.
- CAD Documentation
- Simulation team was informed of software and hardware limits of simulator
- The sponsor will be able to conduct research after controls are interfaced.