

MATC Internship Report



Summer 2019

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During the summer of 2019, I had the pleasure of being an intern at the Midwest Roadside Safety Facility (MwRSF). Throughout the months that I worked there, I worked on a variety of projects. These projects ranged from data mining in Excel, reviewing current events pertaining to roadside barriers, doing some research on different topics such as: “head ejection” and LS-DYNA, and contributing to technical documents.

The first project I worked on had the goal of selecting new crash test vehicles for the future. With the type, size, and weight of the vehicle changing each year, it was important to choose two vehicles that were representative of those being driven on the roads across the United States. I was given data on crashes that had taken place in Wyoming and Ohio in the past 3-5 years. Each individual vehicle crash contained many columns of data. For example, some columns included data on: the year of the vehicle, vehicle make, vehicle model, date of crash, city, color, damage, etc. I was tasked with correcting any errors in the data and classifying the cars in a “Simplified Model” and “Vehicle Group”. There were just over 1.2 million lines of data to analyze. I then used all of this data to determine what the most common vehicles were in these two states. I also did some more analysis on the data which included: lumping the cars into general categories (Light Truck, Passenger Car, Other) and determining average ages for the cars involved in the crashes. The project is still ongoing, but I am looking forward to seeing the results!

After working on the vehicle selection project for about a month, I worked closely with a graduate student on analyzing some crash data that we had obtained from Iowa. With this data, I helped classify crashes according to their vehicle type, how many

vehicles were involved, and how many injuries occurred. I was only involved in this project for a few days, but it allowed me to become more familiar with the KABCO injury scale. This scale helps engineers classify the severity of an injury that occurred in a crash.

Shortly afterwards, I was asked to do some research on current events to see if I could find articles or instances where a car went over or through a barrier and into the “zone of intrusion” (ZOI). The ZOI is above and behind the barrier. This data was acquired to help determine how far behind a roadside barrier another object would have to be, so that it didn’t come into contact with the vehicle. While I was in the habit of reviewing articles and literature, I was asked to review the MwRSF database for crash tests that had “head ejection” occur during them. This means that the surrogate occupant’s head contacted the window (which shattered) and extended outside of the passenger cabin. I was able to look through the past crashes from 2005-Present and examine the reports and videos (if possible). This allowed me to become very familiar with technical documents and gain an appreciation for them and all the work that is put into creating them. I also worked on compiling some scholarly articles in Excel to help the engineers model fluid in a tank trailer via LS-DYNA. LS-DYNA is the main computer program that MwRSF utilizes to simulate their crash tests prior to full-scale tests. The task of modeling a tank trailer in LS-DYNA was a first for MwRSF and they needed some reports to help them learn how to effectively model the fluid inside the trailer. The reports that I reviewed used a few different methods such as “Arbitrary Lagrangian-Eulerian” (ALE) and “Smooth Particle Hydrodynamics” (SPH). It was interesting to learn about this program and what it was capable of, from these papers.

Lastly, I was given the freedom to help a graduate student on a “creative project”. Unfortunately, I cannot discuss what exactly was worked on, as it is classified, but I was able to gain some experience using “Redlake MotionScope Player” and doing some high-speed video analysis. I also was able to input my own ideas for the project and created a drawing in AutoCAD of my proposal. I even helped contribute to a technical document for that project.

Throughout the months working at MwRSF, a few students and I were trained in documenting crash results. Specifically, we were told how to take pictures that would be used in the published reports, how we should describe them and what terminology to use for certain events that happened during the test, and a few other things. Also, we were trained in writing and editing reports and technical documents. An undergraduate student would be tasked with editing the document (and sometimes writing a first draft), which usually involved incorporating changes suggested by the lead engineer and many supervisors. The document itself would go through many revisions until it would finally be a final draft.

In conclusion, I am very grateful for being given the opportunity to have an internship at MwRSF. I was able to gain a lot of experience using Excel and I refreshed my memory on AutoCAD and technical documents. I was even given the freedom to come up with a design of my own. I gained a large amount of experience in the workplace and was given insight on what an engineer’s daily life could be like. Lastly, I was also able to form new relationships with engineers of all ages and develop a sense of pride to have been a MwRSF intern.