Road and Pavement Tester

Mechanical Engineering Capstone 2021-2022

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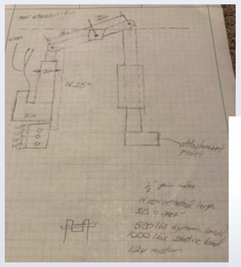
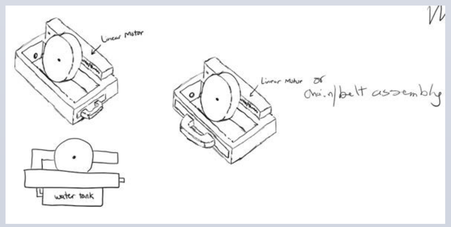
INTRODUCTION

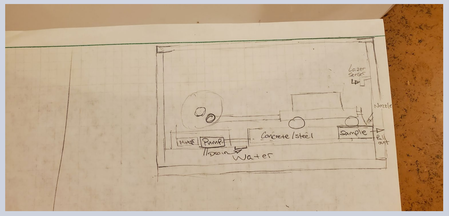
As the world grows and becomes more connected, the need to construct more roads and assess their effectiveness grows as well. There are existing testing machines that evaluate current roads; however, they do not accurately emulate all the real-world conditions that actual roads are subjected to.

OBJECTIVES

Design a testing machine that will test how well different road samples perform under different driving and plowing operations. This machine also needs to be able to withstand and apply different environmental conditions.







Different Ideas from Concept Generation

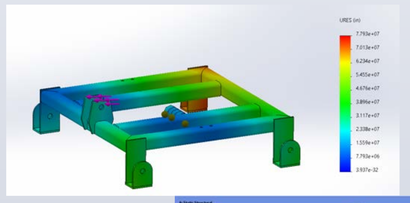
METHOD

After gathering and evaluating the customer needs and project specifications, there were numerous rounds of concept generation. All the concepts were evaluated to choose the design that most precisely fit the customer specifications. This is the culmination of that process.

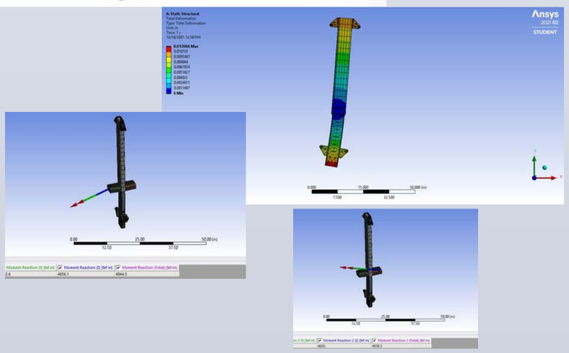
Final Concept

A few requirements were added on by the team, which are:

- Self-contained unit
- All electrical
- Limited Detachable Parts



FEA Analyses of Different Parts



Solidworks and ANSYS were used to conduct Finite Element Analysis (FEA).These analyses were used to assure the team members and oversight faculty that:

- the design and components would perform as expected
- the design would be safe for the end user to operate.

RESULTS

Final Product with Wheel Attached.

Plowing operations using a snowplow apparatus can also be tested.

Mechanism to apply downward and horizontal forces

Different Angles of Final Testing Device

STANDARDS

- ANSI
- SAE