**Introduction**

The Basic Utility Vehicle: Firetruck seeks to provide modern firefighting equipment to a mission in Kenya and eventually other poor rural areas.

We aim to provide an affordable means to increase safety in the communities.

We are working on a Basic Utility Vehicle (BUV) insert which would add firefighting and additional functionality to existing, in-country BUVs, without the need to buy a new BUV.

A basic utility vehicle is a 3-wheeled truck with minimal safety and comfort features. Most of the recognizable truck components have been removed to reduce cost, but the engine, bed, drive system, and frame remain.

*A Basic Utility Vehicle, courtesy of Drivebuv.org*

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**Design**

We implemented and tested an electric clutch on the pump which allows the pump to be constantly connected to the engine while running.

The pump can be engaged or disengaged, without regard to engine speed.

*Pump with Clutch*

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**Analysis**

We ran a SolidWorks Stress Analysis on the BUV frame.

The frame was made of one inch steel tubing and was intended to hold three, 55-gallon plastic barrels.

The total load on the frame would be roughly 1,420 pounds and would be distributed over its upper and lower members.

The simulation revealed that the static stress would be about half of the allowable yield stress for the material.

This was too small a margin, when considering impact loading (a bump in the road) and the effects of water sloshing, the stresses would become greater than the safely allowable limit.

*Results of the SolidWorks Stress Analysis*

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**Conclusions**

Based on concerns raised by the analysis and research regarding the sloshing and impact loading, we are working to redesign the frame to minimize the overall height.

By minimizing the height, both the structural and tipping problems, due to water movement and normal operation, will be reduced.

We plan to connect the three drums containing the water next to each other so that they may lie flat in the bed of the BUV, giving us an advantage of a lower center of gravity.

*Propsed Frame Design*

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**More Information**

Our project charter can be found on the Collab Internal Webpage, accessible from Messiah.edu

More information regarding our client can be found at www.drivebuv.org

For specific questions, contact student project manager John Keeports at jk1458@messiah.edu

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**Clients**

The Institute for Affordable Transportation

Will Austen - IAT Executive Director

www.drivebuv.org

“"The Institute for Affordable Transportation seeks to improve the lives of the world's poor by providing simple, low-cost vehicles to facilitate community transformation. BUVs open up possibilities for faster water delivery to remote villages, for quickened access to medical care, and for the safe transportation of goods and people through rugged terrain.”

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