SAE Supermileage Vehicle

Summary Report

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After two semesters, we have produced two functioning supermileage vehicles. The one from first semester was used as a learning curve to fine tune fabrication and testing procedures. Second semester, using the results gained from the first semester testing and analysis, we built the car that we will take to the competition. The following is a break down of what was done to the components.

The frame was fabricated over Christmas using a design that was created during the first semester. The frame was lighter than the original frame, and was created from aluminum tubing welded together. After applying loads to the frame, modifications were needed and several supports were added. ANSYS analysis was done to determine the stresses and deflections in the frame due to the loading. Strain gage testing was also done in order to verify the ANSYS analysis. The strain gage testing resulted in smaller values of stress than what was generated by ANSYS. Some repairs had to be made to the frame due to wrecks during testing, however all these repairs were done in such a way so as the joints are now stronger than what was originally calculated for.

We had three engines at the beginning of this project. We decided to leave one unmodified as a back up. To modify the first engine, the head was taken off and milled to create a smaller combustion chamber and therefore more compression. A smaller carburetor was also attached to reduce the amount of fuel flow into the engine. The second modified engine was also milled, but the head was replaced with a new head that had an overhead cam system and an angled spark plug, to generate a more complete combustion in the combustion chamber. A different and fully adjustable carburetor was also used. All three of these engines were tested on a dynamometer, however the dynamometer was broken during testing, and testing remains incomplete.

The drive train has been developed as planned from last semester using a torque converter and a series of sprockets leading back to the drive tire. As slipping was one of our main concerns, a tensioner was added to eliminate this problem. Calculations were done to optimize the drive train for the most efficient torque to rpm ratio. The torque converter gives us an idling speed and also allows us to smoothly transition from a stop to drive. High quality wheels were used and modified to give the necessary resistance for the drive tire, and least amount of resistance for the steering tires. Rack and pinion steering was used to create an ease of steering. Brake and throttle pedals were installed to make the vehicle drive like a regular car. Kill switches and brake lights will be added prior to the competition.

The composite body was created of fiberglass to allow for lightweight yet formable material. This was a lengthy process involving the fabrication of a plug, sanding and shaping, and then the actual fiberglass laying process. After the fiberglass had cured, much sanding and smoothing where necessary to get a good finish. Then a primer coat was applied, and the body was painted. The body will be attached to the frame in two parts, one removable engine cover in the rear, and one fixed section to cover the cockpit. The driver will exit through a removable windshield. Due to the risk involved in testing, the body will not be mounted until all testing is complete. The analysis of the body was done in Gambit and Fluent, and resulted in a negligible resistance due to airflow over the body.

All goals for this semester have been met pending testing. Due to several accidents, the time frame of our testing has been pushed back. Testing will be completed

prior to the submission of the final report. A summary of these results will be included in the final report.