After a long month of finals, our team began working through the holiday vacation, our goal being to finalize subsystem designs and get as much manufactured as possible by the time school started up again for the spring semester. We draw closer to a running car everyday and have overcome many challenges since the last newsletter.

Breaking driveshafts is a common problem with FSAE vehicles. Three years ago the team thought we had solved the problem on our car by putting our tubular steel driveshafts through a heat treating process. They performed well until recently when the 2003 car broke a driveshaft, leading us to reconsider our present powertrain design.

Since reliability remains our primary objective for this year, we have decided to redesign the powertrain from the differential outwards. This will involve very time consuming machining since all the components are made out of steel and require a high level of accuracy. We will go with a new drivetrain if time permits. Otherwise, in order to get enough testing time in, the old design will be sufficient.

The hubs that failed on the 2003 car have also been redesigned. Examining the broken hub, the team determined that fatigue caused the failure, and that the size and shape of the previous hubs were inadequate for the lateral loads that they see. After considering two ideas- beefing up the previous aluminum hubs or machining them out of steel- the team decided to use a new aluminum design, to save both weight and machining time.

The new hub design, shown below, was developed using FEA. When compared to the 2003 hub (far right), three things become apparent; the new hub has more material resisting lateral loads that caused the failure, larger bearing seats to accept different bearings (to prevent the frequent bearing failure experienced by previous cars), and a six hole bolt pattern on one face instead of three.
We designed this hole-pattern to accommodate different brake rotors than the previous aluminum Wilwood rotors. As a result of packaging constraints on the front suspension due to the swept forward A-arms, the Wilwoods can no longer fit. The new floating steel rotor, which originally comes from a Yamaha dirt bike, are smaller and a lot lighter than the previous year’s. The new rotors will also slightly alter the design of our aluminum rear differential housing, which the rear rotor attaches to. Aside from different brake pads and adjustable pedals, the other braking components will remain the same.

As for construction, the suspension tab jigs have been completed and were used to position the pickup points on the car. After welding the tabs in their proper positions, we began using the A-arm jig to make the A-arms, which are still under construction.

Machining has begun on the rear uprights, but has unfortunately been postponed until a new powertrain design is finalized. In the mean time, we have plenty of other components to complete. Hubs, front uprights, bellcranks, the intake manifold, and the 20mm intake restrictor are on the list of projects.

We’ve received the 3.6 mm camera that we plan to mount on the car for in-car video. We have come up with a way to input the video into a standard video camera (seen duct taped to the nose of the car), but haven’t yet set up the microphone to record sound. The video will be in the media section of the website as soon as final editing has been completed.

The web site has been updated with better page layouts and some new material, most notably this newsletter and the video which will be posted come March. Let us know what you think about the video, and we’ll be getting more and more up as the season rolls on.

The test engine is now mounted on the engine dyno, shown here in our dynamometer room. So far, we’ve run the engine a few times with our 2003 intake to see if it is in proper working order. Upon completion of the 2004 intake manifold this weekend, we will be able to tune the engine and load the data into the car’s ECU. Some of the various intake components are shown on the next page, including the fuel rail, injectors and injector seats, runners, and the mock plenum made of cardboard; the finished plenum will be welded aluminum sheet metal.
Unfortunately we haven’t been able to get barbeque donated for our get together, but we decided we might have enough money to fund it out of pocket. However, the barbeque will have to wait until the car done in order to see if we have enough money left to hold the event. We will be sending e-mails in mid-April to all of our sponsors in effort to decide on a good time to hold this get-together. We plan on getting some good food and some driving in, in addition to demonstrating our preparation for the upcoming competition. Please RSVP as soon as possible so we can know who is to be expected.

Thanks again!

Longhorn Racing