

Go Kart or Go Home: 24 Hours of Lemons Race

24 Hours of Lemons Race Background

24 hours of Lemons is a 24-hour endurance race to see which car will be the last one standing. The car that completes the most laps is ultimately the winner. Each team will need to purchase a vehicle for \$500 or less, including any performance modifications added to the vehicle. The team must also complete their project following the extensive list of 24 Hours of Lemons technical rules. We will be working on a 2008 Ford Fusion to complete our project. This will be a year long project and all tasks and requirements will be assigned weekly. If we were to compete in the 24 Hours of Lemons race, our car would need to pass a technical inspection. If everything looks good in our vehicle and follows the rules and regulations of the race then we would be able to participate. If anything were missing from the technical inspection list it would prevent us from racing.

Project Goal

The main objective of our project is to get our vehicle race-ready in hopes to compete in a race at the end of the school year. We will do this by following the rules and regulations set by the 24 hours of Lemons website.

Roll Cage Design

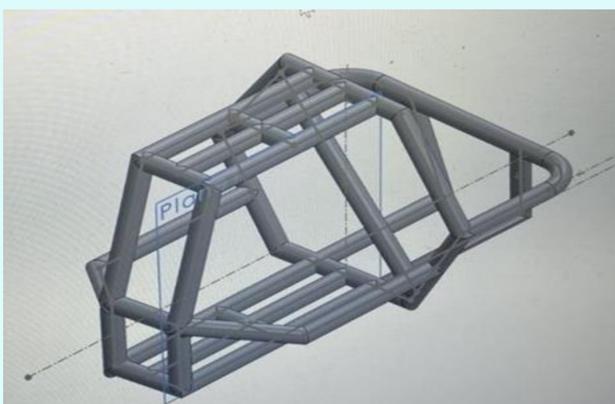
Our roll cage was designed on Solidworks in the Fall 2021 semester and it was constructed and installed in the Spring 2022 semester. According to the 24 hours of Lemons rulebook, the roll cage for our vehicle must be professionally made and installed by a manufacturer. A roll cage that is poorly built, or mounted improperly would disqualify us from competing in the race.

The roll cage must include:

- a full front and rear hoop, appropriately braced to each other along the roofline
- two driver-side door bars, appropriate main-hoop backstays with no bends, located as close to 45 degrees from horizontal as practical
- one main-hoop diagonal
- appropriate spreader plates and gussets
- complete 360-degree welds at all joints, including all car-to-cage joints.

Other specifications are as follows:

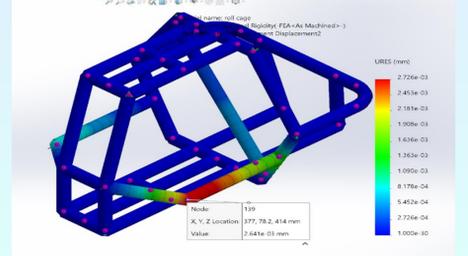
- each major load bearing member must be formed from a single continuous tube
- all sides of all of the drivers' helmeted heads must be at least two inches inside the area enclosed by the cage
- a minimum tubing size of 1.75" x .120" properly bent, racecar-grade, and quality tubing; no stretched or crushed bends allowed; DOM mild steel is very strongly recommended over ERW (seamed) tubing
- all spreader plates must be mild steel, at least 24 square inches wide, and at least .125" thick
- for roll bar padding, all roll cage tubing must be padded with high-density roll bar padding wherever a driver may come in contact with the tube – head, knees, elbows, etc.



Roll Cage Simulation

The roll cage was designed by one of our team members to test how the roll cage could withstand possible impacts that may occur during a race. We ran a simulation on Solidworks that showed the torque, stress and tension applied.

According to the figure on the right, the roll cage would be able to handle the impacts that we tested on it. Now that our roll cage has been manufactured and installed in our vehicle, we will be able to mildly test it before the event of a race.



Car Interior

When we purchased our vehicle the interior of the car was dirty and had a funky smell. We had a checklist of things that had to be removed, so we completed the following removals:

- floor carpeting
- ceiling carpeting
- all seats
- windows that did not roll down



We ran into a problem when trying to remove the dashboard, due to the airbags. If we removed the airbags incorrectly, they could have harmed one of us, so we had to do research on how to safely remove them, which caused us to lose some time.

After finally taking out the dashboard of our vehicle, we worked on the following:

- took the dimensions for our roll cage and sent them off to the manufacturer
- after having the roll cage installed, we double-checked it to make sure it was made and installed properly, according to the 24 Hours of Lemons rules
- purchased the driver's seat, harness, roll cage padding, and kill switch
- changed our tires by ourselves
- changed the oil so that we would not run into any issues during a race

We received the driver's seat and mounted it first, along with the harness, while our team lead, Bailey, sat in the seat to make sure that it was mounted to her exact size as she was chosen to be our driver to make things easier..



From there, we installed:

- the kill switch, which is a very necessary component of our project as it allows the engine to be completely turned off instantly during the race in case of an emergency
- the fire compression system in case of a fire during the race

After installing all of these necessary items, we finally finished our project and triple-checked that we were ready for an inspection test. Since we are unable to attend the 24 Hours of Lemons competition due to financial issues, we ended up getting a professional to help us out and perform an inspection.

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