Hardware Review

SAE Baja – 19F08

ME-486C

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Front End

The Front End sub team obtained material and is currently fabricating the upper and lower control arms of the Baja SAE vehicle. The tubing has been bent to design specifications and inserts for the heim joints for frame mounting have been manufactured. Figures 1 and 2 represent the control arm tubing and inserts, respectively.

Figure 1. Control arm tubing

Figure 2. Control arm inserts

Once the Uniball joints and insert cups arrive within the following week, they will be welded onto the control arms to complete the fabrication process and subsequently mounted to the steering knuckle.

Brake rotor prototypes have been 3D printed for fitment validation on the brake calipers as well as the rear end of the vehicle. This will be further improved with the arrival of the front hub,

where the rotor mounting pattern must be determined. Figure 3 displays the 3D printed rotor design.

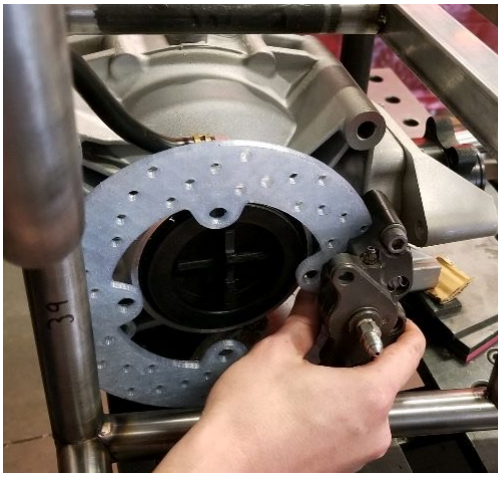

Figure 3. 3-D Printed brake rotor

The brake pedal to be used in car #31 is readily available along with one of the two required master cylinders. The required pedal mount is in the process of being fabricated.

Rear End

The rear end team has obtained material for and completed fabrication of a full trailing arm used for testing up to this point. Figures 4 through 7 review hardware fabricated by the rear-end team.

Figure 4. Press fit bearing in aluminum sleeve for trailing arm

Figure 5. Plugs for end of trailing arm tubing to connect rear lateral links

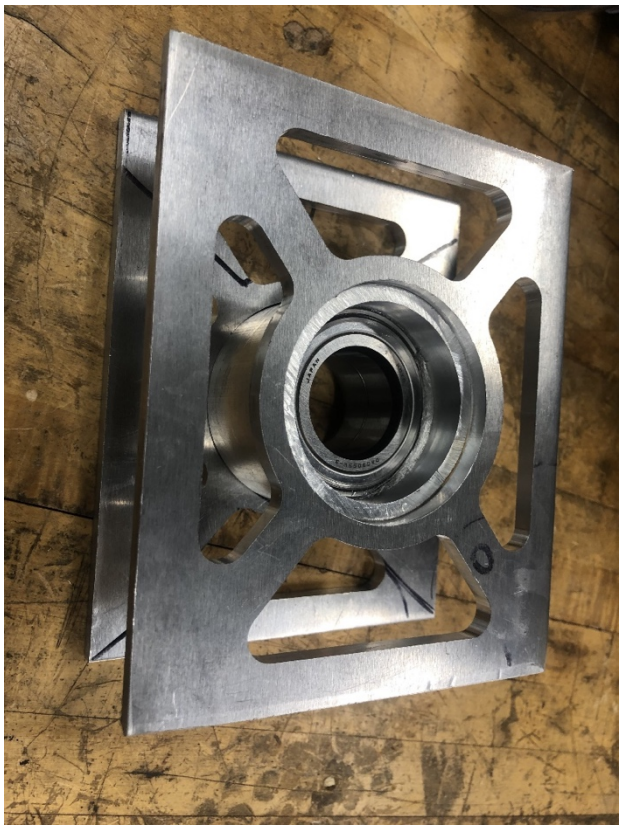

Figure 6. CV axle bearing pressed in sleeve and faceplates for trailing arms

Figure 7. Completed trailing arm for prototype testing

The rear-end team will start construction of the two trailing arms that will be used for our final product in addition to two extra trailing arms to be used as replacements during competition or by the SAE club on campus in future years if the initial two arms ever failed. The last of the rear-end's needed materials have been ordered and should arrive within the next week. Fabrication of these trailing arms is anticipated to be finished within the next two weeks. After completion, the rear-end team will aid other sub teams with fabrication and help write competition documents.

Drivetrain

The Drivetrain has focused on acquiring hardware and materials for the ECVT and Gearbox respectively, as well as designing mounting brackets for the differentials and ECVT. The ECVT has completed the first stage of its build and is progressing through the second phase of final mechanical construction and electrical integration. Figures 8 and 9 show the completed bracket setup connected to the engine, and some of the parts required for integration.

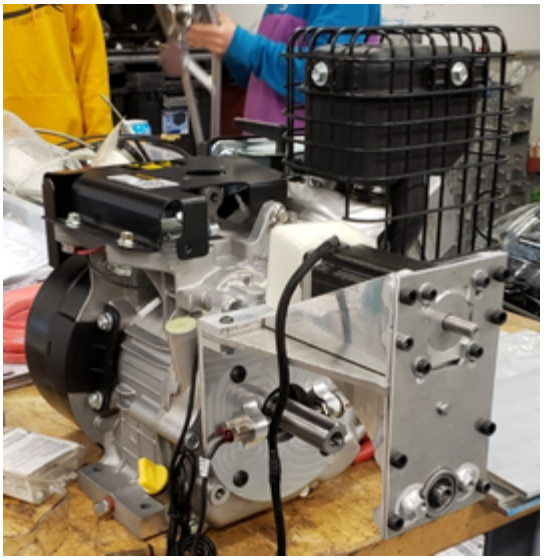

Figure 8. ECVT Bracket Construction

Figure 9. ECVT Parts

The Gearbox has received the necessary material to move forward with outsourced fabrication. The team's original fabricator failed to accommodate our needs in the time allotted, which therefore requires locating a new vendor. Figure 10 shows the materials for the gears and input/output shafts.

Figure 10. Gearbox Material

Moving forward, the drivetrain team will finish building brackets for the differentials and driveshaft. The gears for the gearbox will need to be outsourced to a new vendor in order to progress the construction of the full gearbox. Finally, the sub-team will complete fitment of the gearbox, driveshaft, differentials, and CV axles to complete the drivetrain subsystem.

Frame

The frame team is in the manufacturing and assembling phase of the project. 42 individual frame members were professionally fabricated by VR3 Engineering a company specializing in precision tube bending and fabrication. Most of these frame members have been welded together as seen in Figure 11.

Figure 11. Current state of frame

Some additional members have yet to be welded, as can be seen in Figure 12**.** These members haven't been introduced to the current assembly as they could potentially interfere with later adjustments.

Figure 12. Unwelded frame members

The frame team designed and fabricated the engine mount for the vehicle, shown in Figure 13. The engine mount consists of 3 connecting members which are welded on to the main structural frame, and a rectangular engine mounting platform. Mounting holes and sleeves still need to be added to the engine mount.

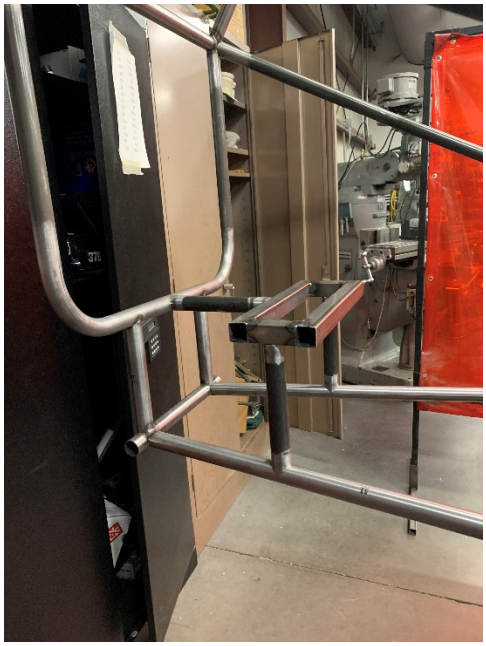

Figure 13. Engine mount

Before the semester began the team fabricated some miscellaneous brackets that will later be welded to the frame. These brackets can be seen in Figure 14**.**

Figure 14. Miscellaneous brackets

The team has been in contact with Nova Kinetics to work with them for the carbon fiber body panels. Since we already had leftover stock from last year, we were able to cut out a good amount of our panels already, as seen in Figure 15. The only panels we still need are the top and front of the nose along with the floor pan. We have decided to make the floor out of sheet metal however since it will likely be seeing some impacts and will bend rather than crack and splinter.

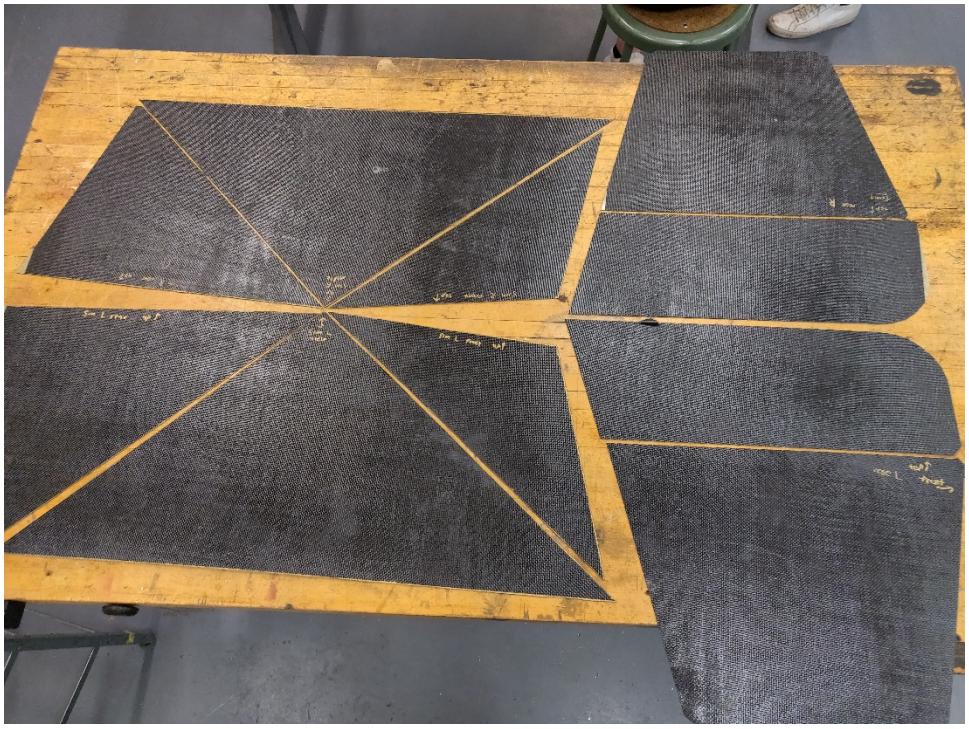

Figure 15. Cut Body Panels