**Task Description**

The brake rotor team will design and fabricate front and rear brake rotors.

The front brake rotors should be compatible with the Wilwood PS1 brake caliper and the RCV Performance FSAE front hub. The disc should have a maximum diameter of 10 inches.

The rear hub selection and rear upright design are not finalized. Currently we intend to use RCV performance intergrated hub and tripod housing and a Brembo P2.34 caliper. Again, the brake disc should have a maximum diameter of 10 inches.

Given that the rear hub and caliper selection are not finalized, I suggest you investigate the feasibility of designing, testing, and manufacturing the brake rotors. Search for FSAE brake rotor designs. Perhaps you will find papers that outline other teams’ work. Solidworks also has great tutorials on testing brake rotors.

Design for a car brake rotor:

<https://www.youtube.com/watch?v=3Fk1bCMJchw>

Thermal simulations for FSAE rotors:

<https://www.youtube.com/watch?v=tf_WWrHYkSw>

<https://www.youtube.com/watch?v=YT1svFOzriI>

Other Solidworks Videos for FSAE

<https://www.youtube.com/playlist?list=PL38088C14E31FAF31>

Rijan, our new grad affiliate, worked with an FSAE team as an undergraduate. His team designed their own brake rotors. Attached is inforamtion from them.

**Responsible Parties**

Tilman is the project lead. He is responsible for meeting deadlines, delegating responsiblities, and communicating with the chief engineer and project manager. Laila will assist in research and design.

**Deliverables**

This project has three main phases: research, design, and fabrication. At the end of each phase you are required to submit a document that summarizes the findings or achievements of the previous step and indicates a path forward. For example, after the research phase, you will create a brief report of your findings and answer questions like “What sort of material will we make the rotor out of? Do we have the fabrication techniques to make the rotor? What will the total cost fo the project be? Do we need to revise our schedule because it will take longer than expected” etc.

Please indicate completion dates for each phase of the project in the timeline section of the work package. Additionally, add other important milestones or deliverables like “finalize the design”, “analyze design with solidworks simulation”, “start fabrication”, “finish fabrication”, and “deliver finished brake rotors”.

For more information regarding the design process, look at the Design Flow Chart in /Trunk/Administration/Conventions/

**Budget**

(Fill this out after research phase is complete)

**Resources (human and machine)**

(please fill this out after the research phase is complete)

**Time to complete**

(Please fill this out now. I imagine that it could take 1-2 weeks to research, 1-2 weeks to design, and 1 week to fabricate).

**Measures of Success**

(Please fill this out now)

**Required Inputs**

(Please fill this out. It will include things like final caliper and rear hub selection)

Info from Rijan:

As for rotors.  If you are designing the parts that the rotors bolt up to, then yes.  Actually it’s a yes regardless!!!  Not many racing companies make rotors for FSAE or FSAE-E.  And those that do aren’t the cheapest ones on the planet.  I remember when I used to cut them on the HAAS they would take a few hours a piece, but they came out ready to bolt onto the car, no questions.  We have been water jet cutting them now, as it cuts down on time, and they come out just as good.  Less burrs.  Also frees the HAAS up to work on other projects.  Plus, the kids had to choose the size of wheels they were going to use, and had to make rotors to “custom” fit their wheel packages, if you catch my drift.  While there were only a few select sizes to choose from, it still didn’t leave a lot of competition for aftermarket companies.  Plus it was a good thing for them to design the rotors, so they got the idea of why they were either slotted or drilled out for cooling purposes.

We used Chro-Moly steel, the same stuff used in the pipes that made their chassis.  4140 or 4130 steel.  Either one of them.  Both are a little tougher than 1018 machine steel to cut up, but its nothing the machine can’t handle.  What I suggest you do is have the machine drill out a pattern in a line just shy of the finish contour (if you can get your CAM or program to do it).  That way, the cutter doesn’t spend hours hogging away at billet material, when it can just do a few finish contour passes, and you pull a finished part off the machine, aside from deburring, of course.  Also choose a drilling pattern for your cooling holes that is NOT in a straight line from the inner diameter out to the larger diameter.  If you remember back to the cars here, each “line” of holes is in a swept pattern.  So offset each ring of holes at least the radius of the one inside of it.  Unless you plan on slotting, then same thing, no straight lines.  Sweep them slightly.