



# The Design of a Baja SAE Transmission



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## Introduction

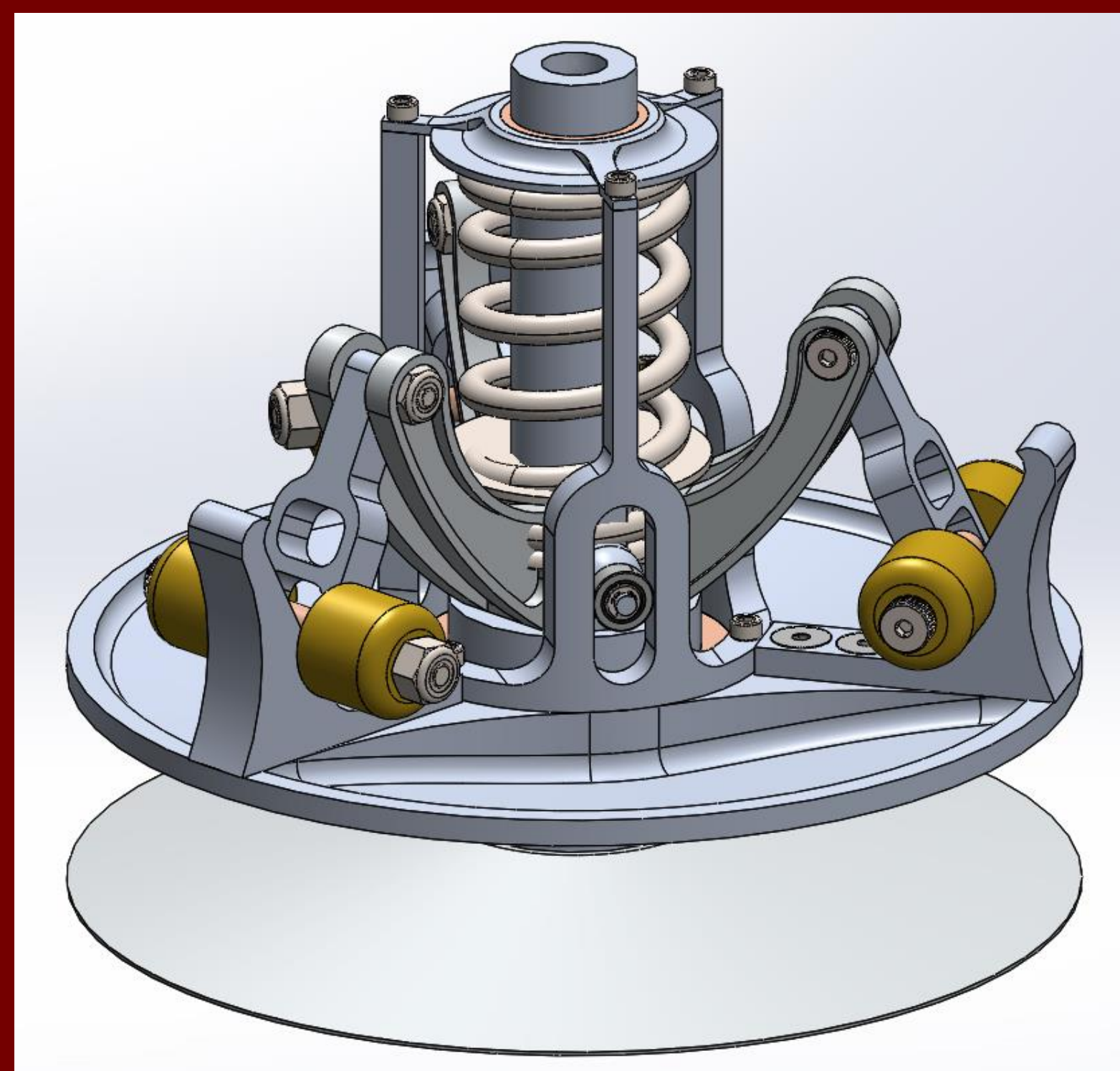
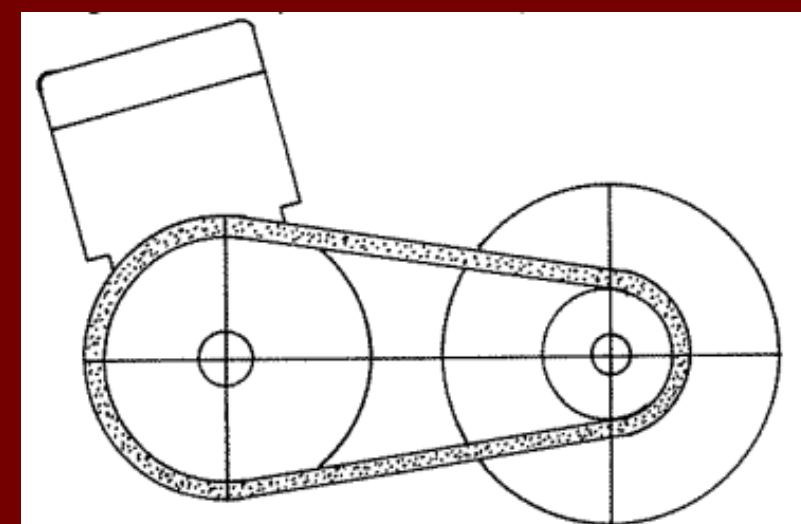
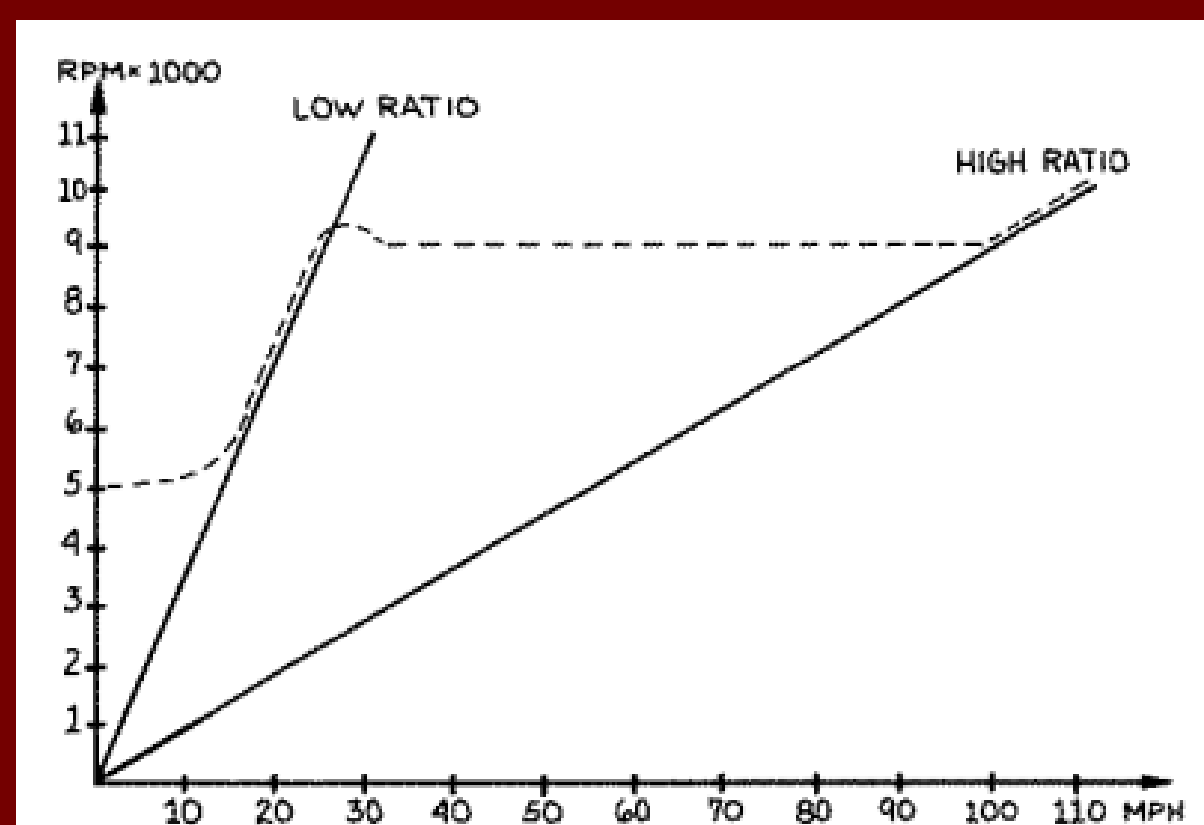
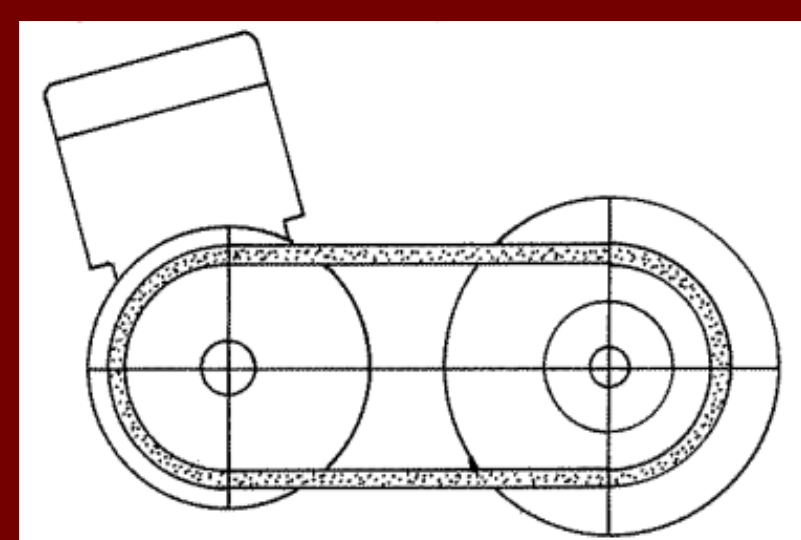
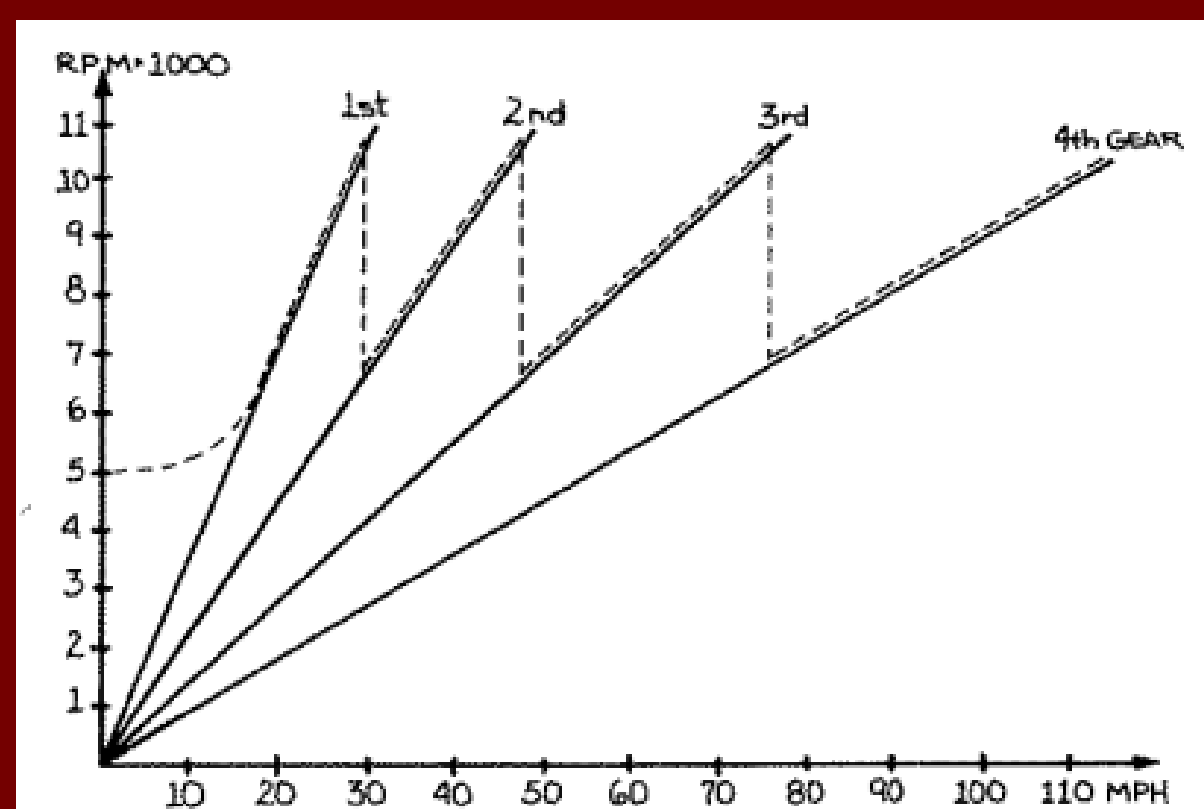
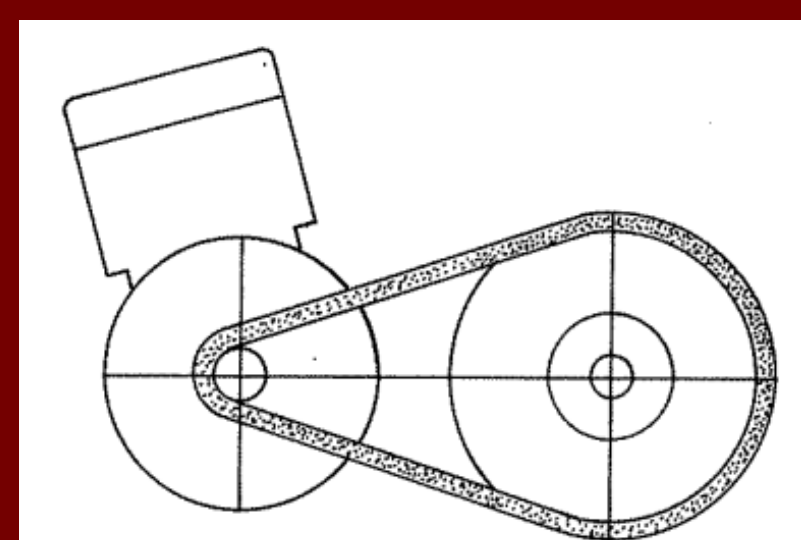
Baja SAE is a competition to design and construct the fastest offroad race car to compete against college teams across the world. The transmission is a critical part of the vehicle which dictates the transfer of power from the engine to the wheels.

## Activities:

Led a team of two other students to research solutions to design the most efficient transmission possible. My major role was to design the new design using CAD (SOLIDWORKS).

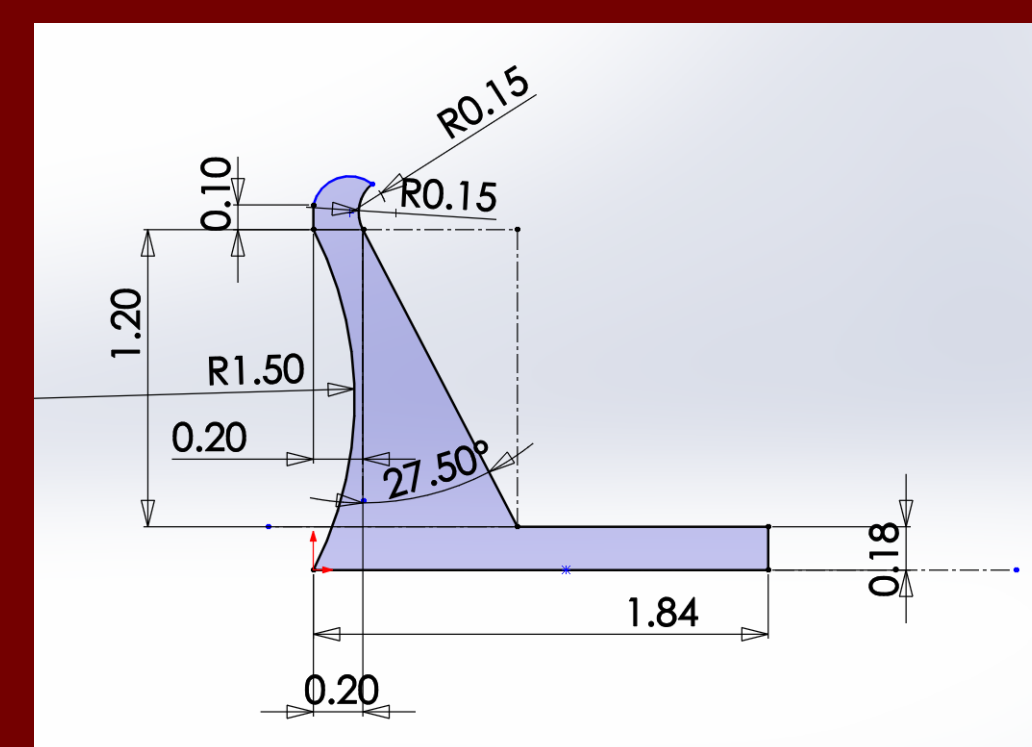
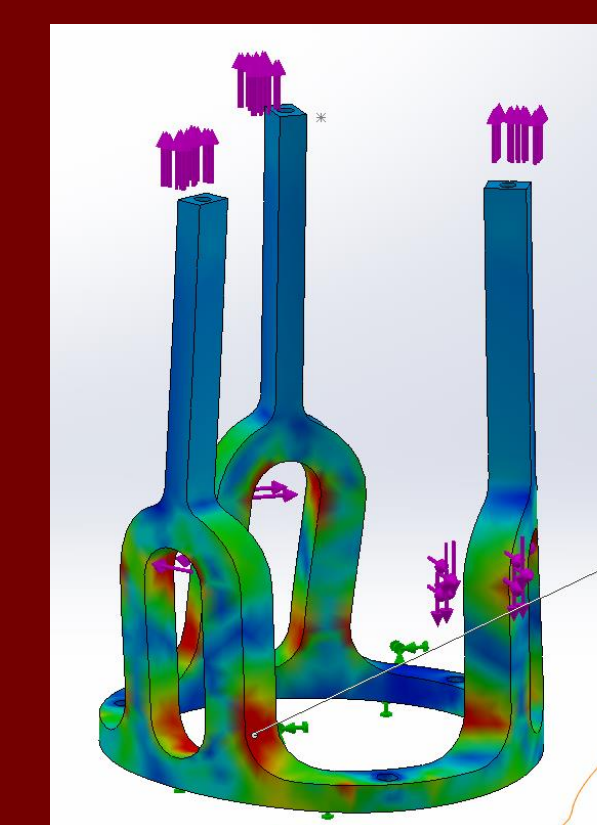
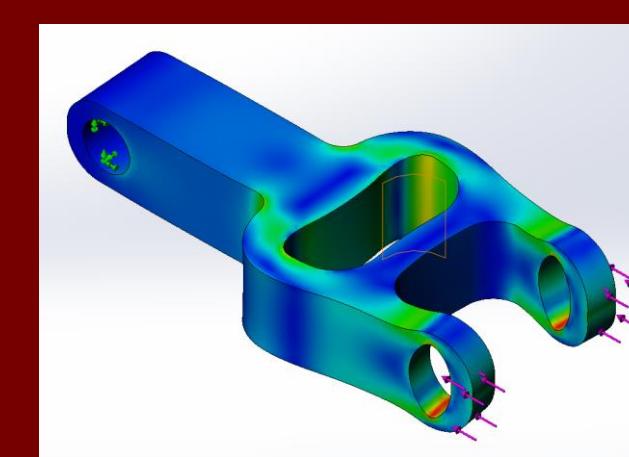
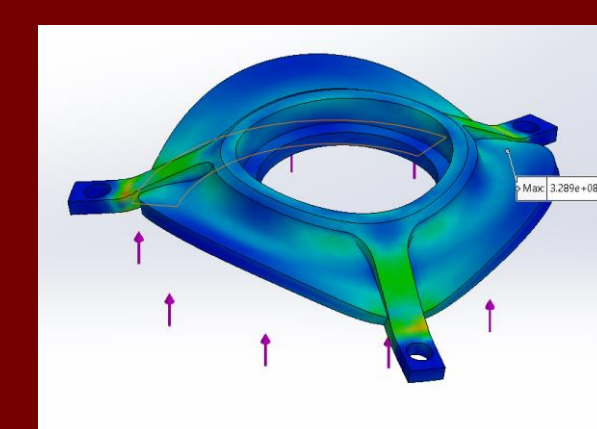
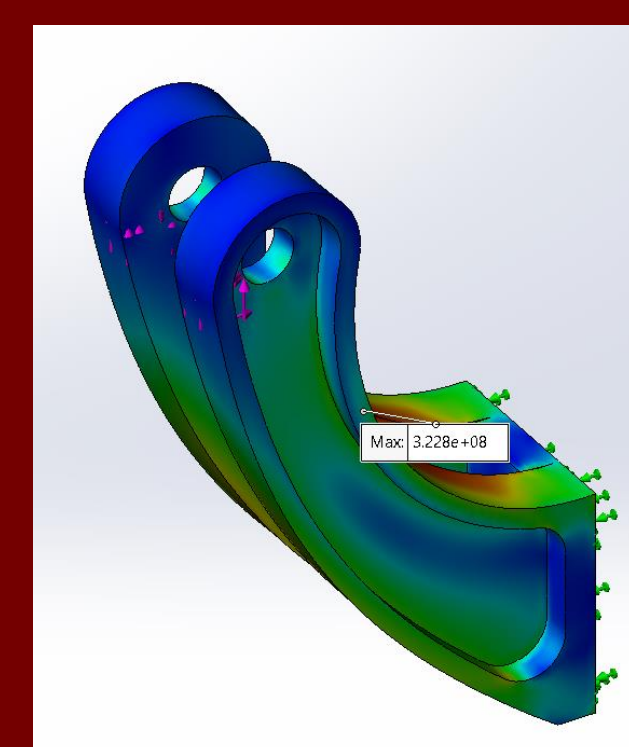
## What is a CVT?

(Continuously Variable Transmission)



## Design of a custom CVT

### FEA:



The design was modeled using SOLIDWORKS. To the left, you can see a sketch of one component. To the top right, you can see results from FEA (finite element analysis), a numerical simulation which calculates forces across a part.

Images courtesy *Aaen's Clutch Tuning Handbook*

## Design Review:

The old design we have used for many years weighed **6.67lb.** Our new design has a final weight of **2.37lb.**, meaning we were able to shave off **4.28lb.** These improvements will drastically approve our vehicle's acceleration and top speed, as the mass of the CVT is inertial, and is spun at roughly 3600RPM by the engine. Our team plans to finish the fabrication of this design at the beginning of the fall semester and use it in competition in 2023.



## Fabrication:

The previously made and future parts will be manufactured in-house on the University's CNC Lathe and CNC Mill. These two machines use precisely controlled tools to cut away material from the aluminum stock to create the desired shape.

### Site Information:

Terps Racing, JMP Hall

4356 Stadium Drive

Scott Schmidt, Terps Racing Baja Faculty Advisor

### Future Work:

Many of the designed components are currently being manufactured. A significant factor of properly engineering a continuously variable transmission is in its tuning. After fabrication, the transmission will need to be heavily tested, fine tuning the components to ensure speed and power of the engine is maximized.

### Acknowledgments:

- Dr. Holtz and Dr. Merck for organizing and instructing the SGC program
- Scott Schmidt for overseeing my work and advising the Terps Racing Baja Team



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