## SHOCK POSITION SENSORS
By Caleb Strachan

- Shock position sensors are linear potentiometer sensors that detects suspension deflection through shock absorption movement.

- Shock position sensors can measure and log the Baja vehicle's speed and position of the shock's compression. It gives an scenario on how the vehicle reacts to the track surface and change in elevation such as climbing up or rolling down on a hill.

## REAR SUSPENSION BUSHINGS
By Damien Pimont

WHY BUSHINGS VS SPHERICAL BEARINGS?
- Mostly as a result of cost, an area of competition that can always be improved. If durability and functionality can be maintained or improved and cost reduced, it increases the points scored in the cost category.

ANALYSIS OF REDESIGN:
- Stress analysis with load cases based on previous failure points and cases seen during competition.
- Fatigue analysis: in order to optimize weight and the number of A-Arms that will be produced in for 2025.
- Geometry and kinematics: Based on the 2024 car, geometries such as the pivot axes and pickup points were analyzed and retained in order to maintain performance.
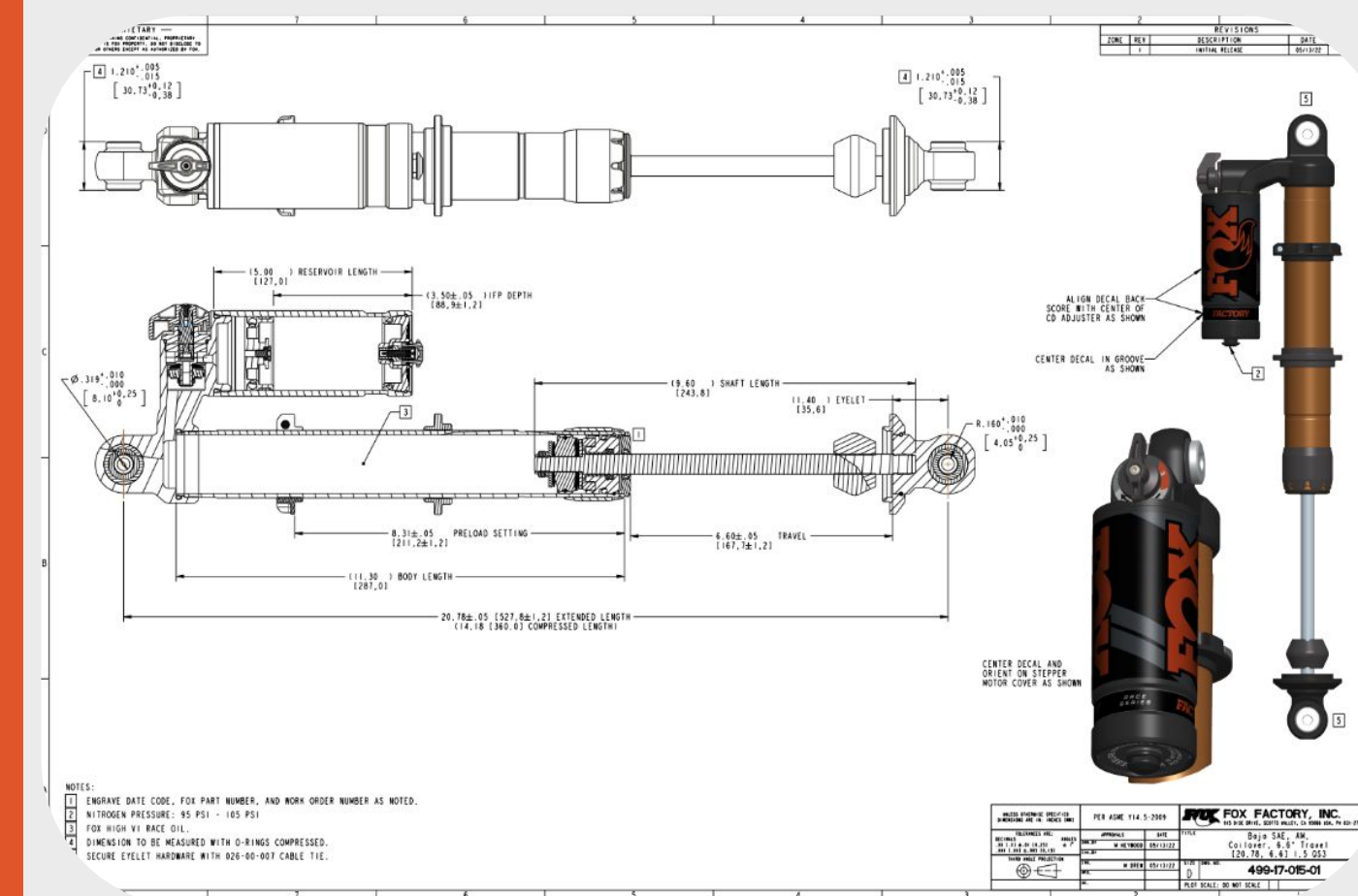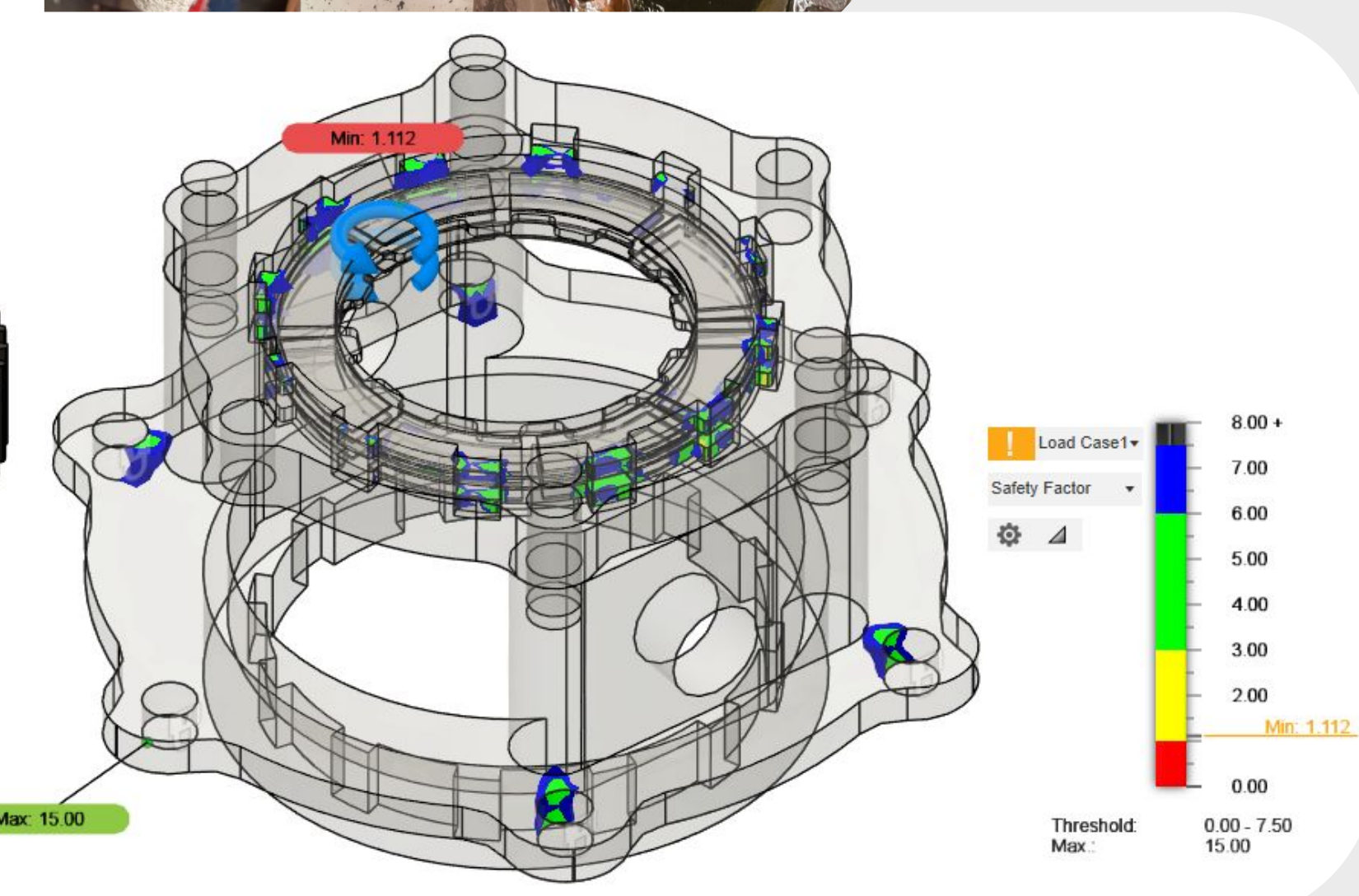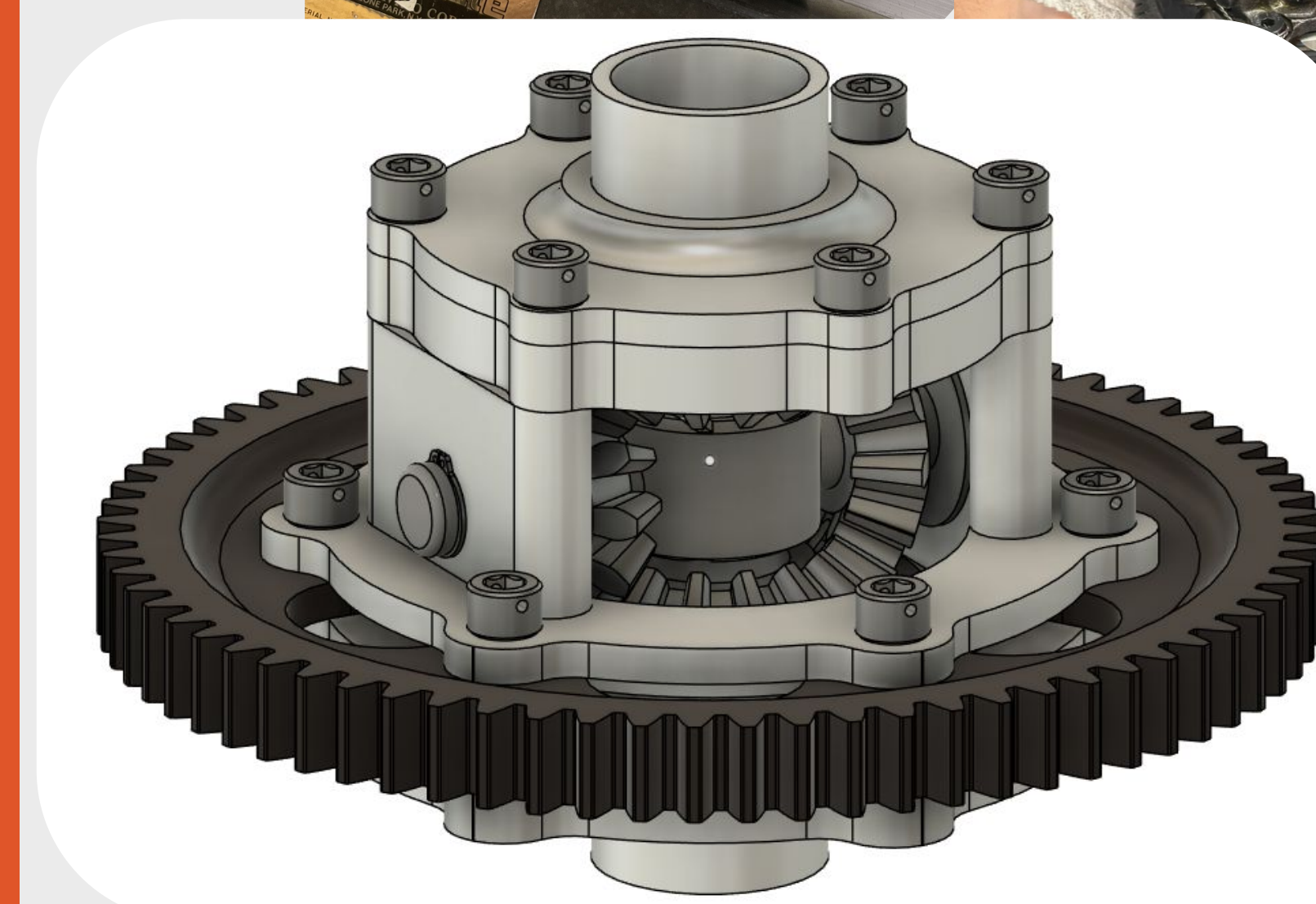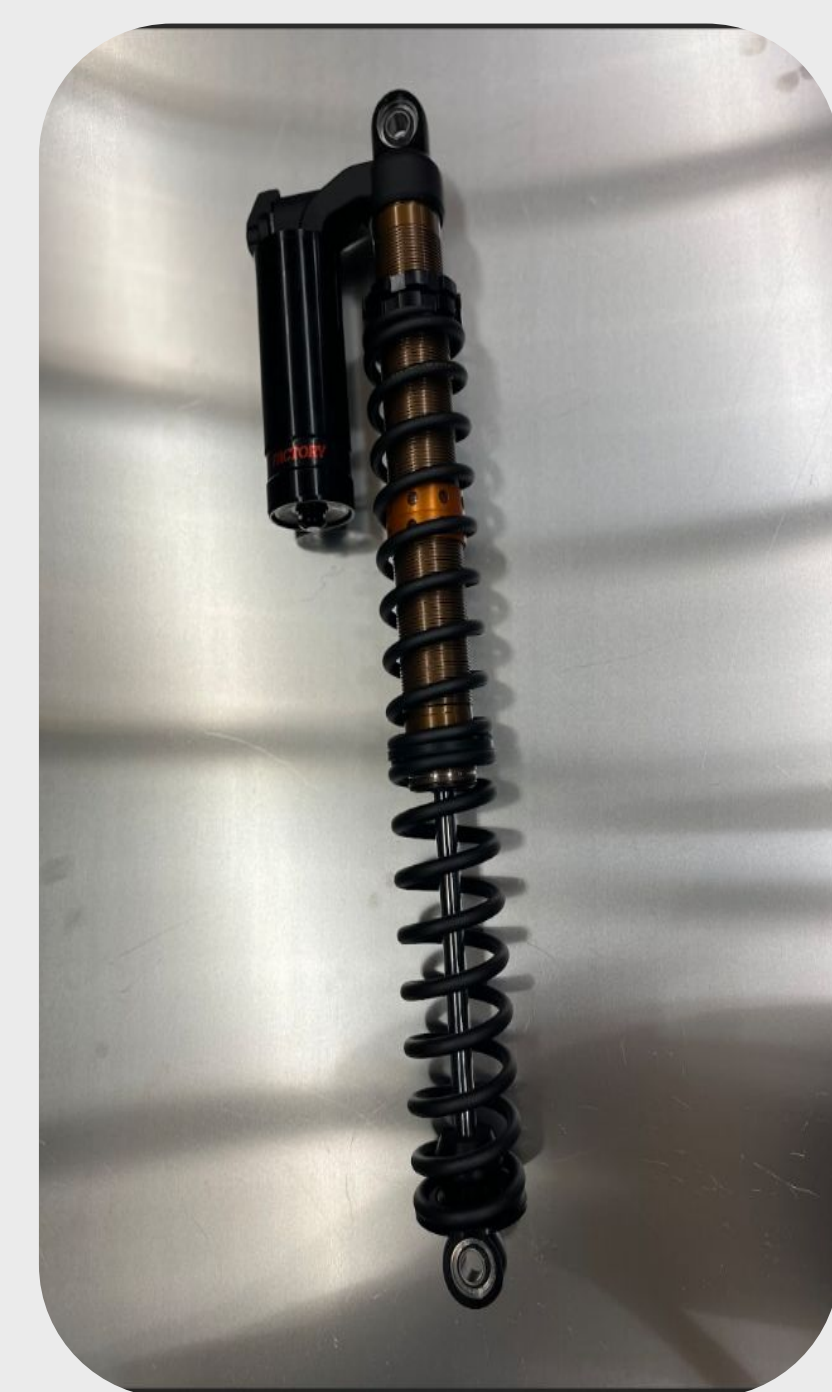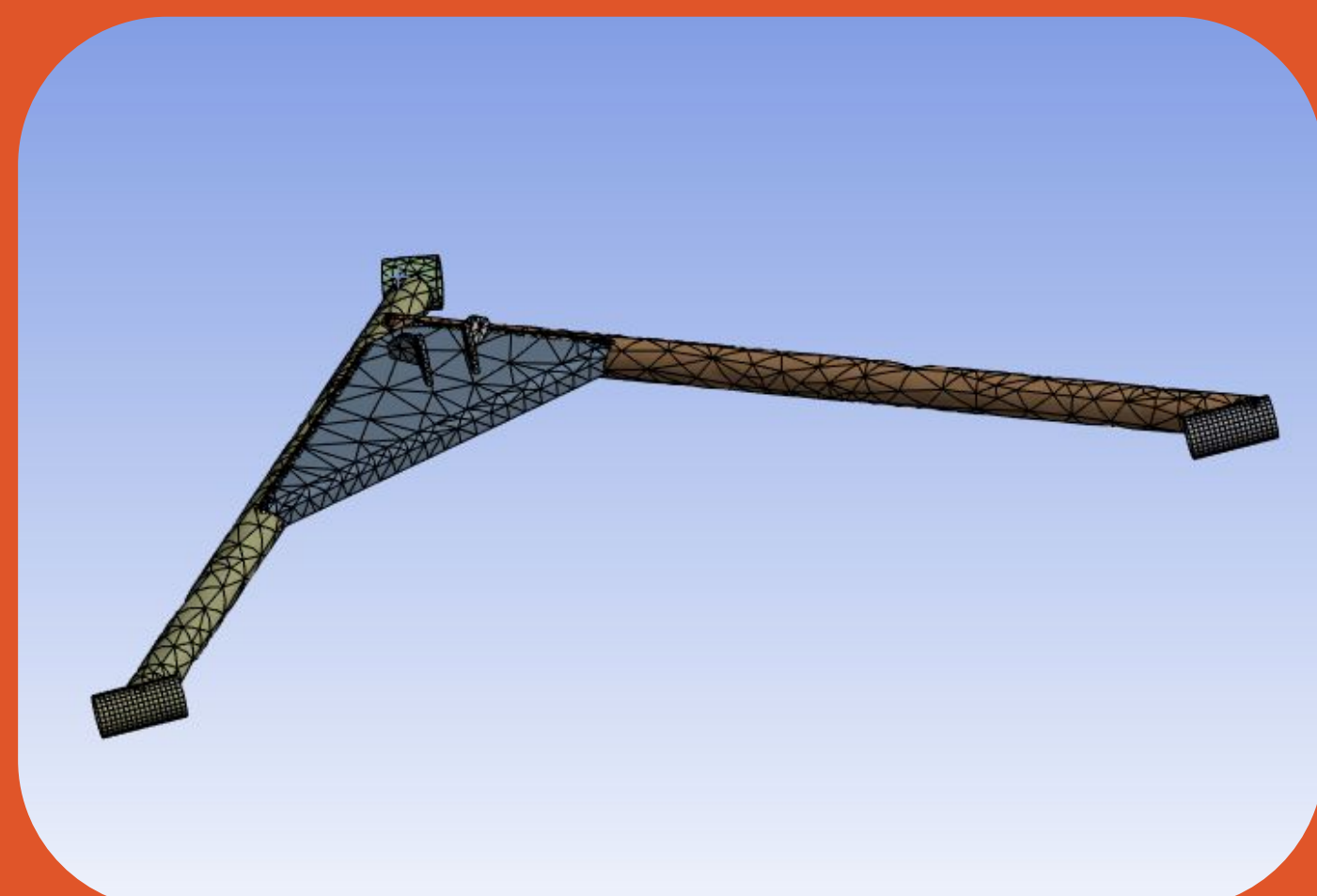


# BEAVER BAJA RACING TEAM

**Ethan Darnell, Damien Pimont, Christian Aguayo, Caleb Strachan, Cole Fenner, Grant Ortiz**

**The Oregon State Racing Team designs, fabricates, and races an off-road car at SAE Baja competitions. OSU has been ranked among the top 5 universities in the past 10 years.**



## LIMITED SLIP DIFFERENTIAL
By Cole Fenner & Grant Ortiz

- As the commercial model is no longer sold, development for a student manufactured case, clutch pads, and modified front differential bevel gear parts.

- Work onto measuring and quantifying old parts through friction and spring measurement experiments.

- Manufacturing qualifications in order to manufacture all components.

- Simulations and precise engineering drawings to substantiate design success.
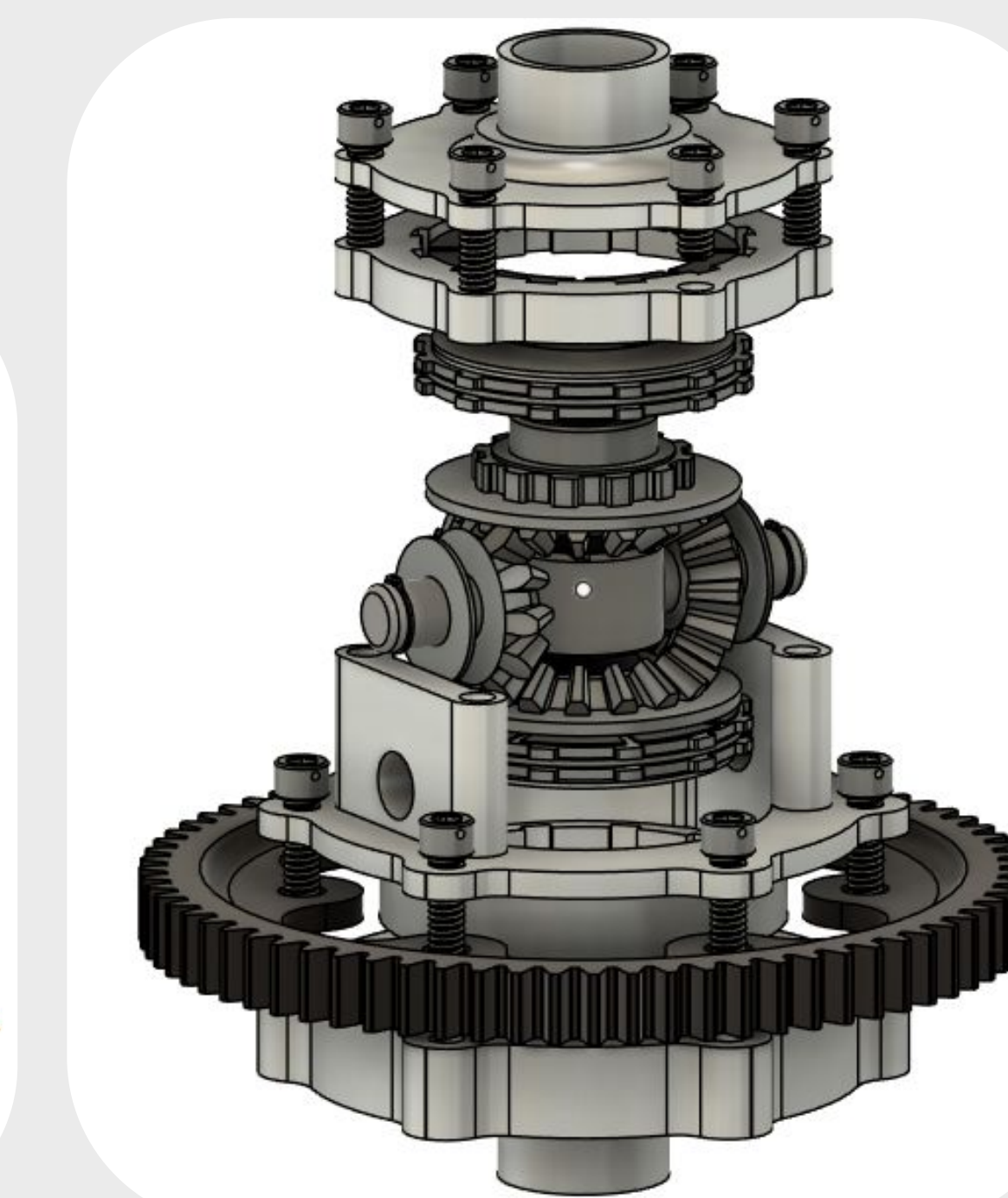


## SHOCK TUNING - BASE VALVE
By Christian Aguayo

- The base valve on the shock absorbers significantly improves shock performance by preventing cavitation.

- Different shim stack configurations on the base valve can affect shock performance. A series of experiments were conducted to further research the shim stack.

- Shock testing involves disassembling the shock, installing new shims onto the base valve, and running tests on the shock dyno. The data is then analyzed in MATLAB.
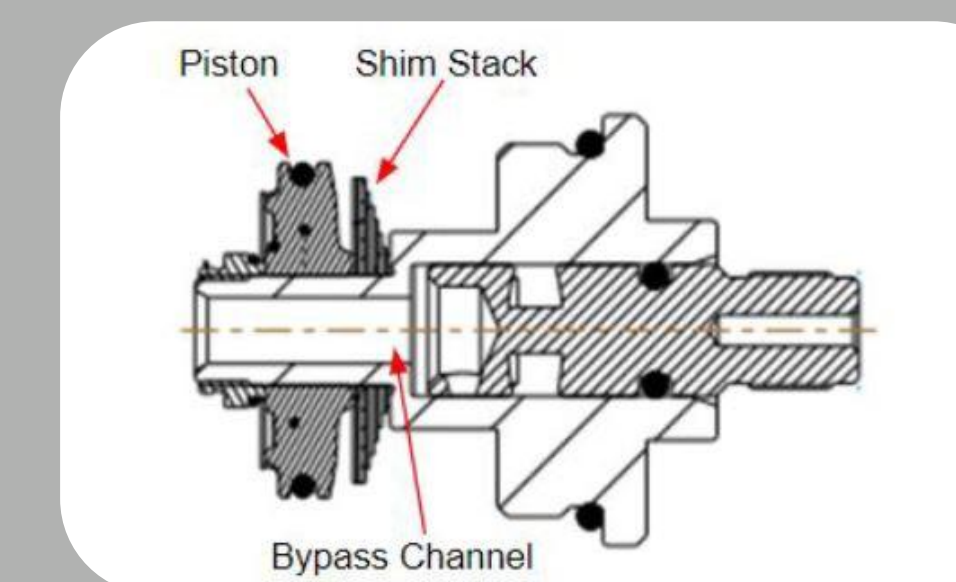


## SHOCK TUNING - MAIN PISTON
By Ethan Darnell

- The main piston in the shocks has two shim stacks that allow for more precise tuning of rebound and damping forces.

- A fractional factorial DOE was used to test how varying shim thicknesses on the rebound stack affect the shock's rebound force.

- The data that was gathered from the shock dynamometer was then analyzed in MATLAB to create predictive equations for each shim