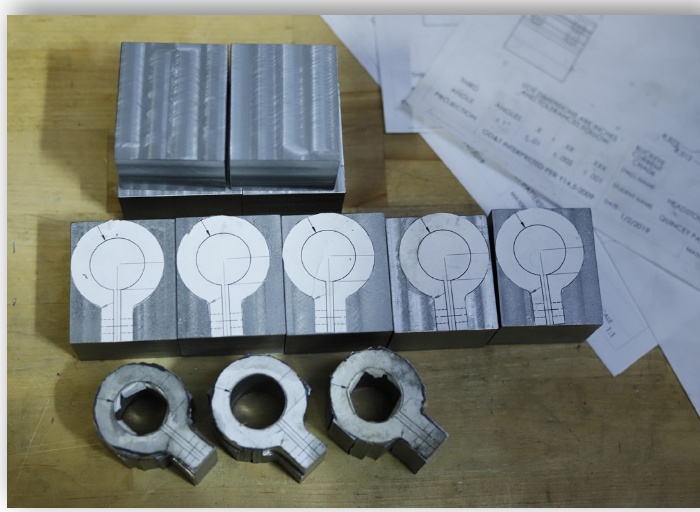
CURRENT EVENTS

In-House Chassis/Jig Manufacturing

Hello Buckeye Current friends, family, alumni, and sponsors! Over the past two months the team has been busy finalizing battery pack and frame design all while preparing for the first non-racing summer in recent years. One of the most critical operations of the upcoming month includes the assembly of our first test frame. To aid in this manufacturing process certain components are being fabricated in-house by team members. Below are a few examples of parts that team members have made and the steps they took to get to the final design.



Rear Upright Mount

Team Member Responsible: Tyler Martin

Component Function: Align and connect the swingarm to the main frame of the bike, this part is the bottom of the rear upright.

Manufacturing Process: The circular boss was faced and turned to length on a lathe followed by a standard 7/8" twist drilling to remove the central hole. A boring bar was then used to bring the larger inner diameter to the specificed diameter and depth.

Pictured: Rear upright mount and corresponding locator pin.

Headstock Interface

Team Member Responsible: Quincey Patterson

Component Function: Fixture the headstock and front suspension to the bike's main frame while allowing the headstock and front suspension to be removed for battery pack installation purposes.

Manufacturing Process: Cut stock material down to size via drop saw then clamp workable-size pieces to vice and mill to bounding box dimensions. Next the 1" diameter clamping surface for the headstock is drilled out. Using a band saw the block is then cut down closer to the outer profile and refined using the function plotter on a mill. Finally the M8 holes are drilled and tapped on the tabs followed by cutting the slot which enables the clamping capability of the part.

Pictured: Headstock interface at different stages of manufacture.

Dowel Pins and Collar

Team Member Responsible: Josh Laux

Component Function: Welding jig location control.

Manufacturing Process: The shaft collar (black) and dowel (silver, below collar) are both turned and milled to match specific heights and diameters. The collar has a pin press fit into the bottom and mates to the dowel using a slip fit. The bottom of each dowell also has a press fit pin that mates to a jig plate using a slip fit. Chassis components are then inserted into the collar as shown and aligned for welding.

Pictured: Dowell pins and shaft collar assembly securing frame member.

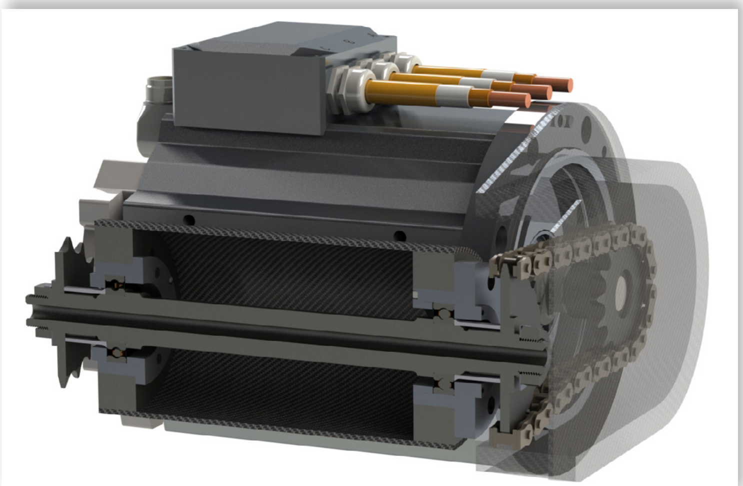
Technical Highlight: Drivetrain

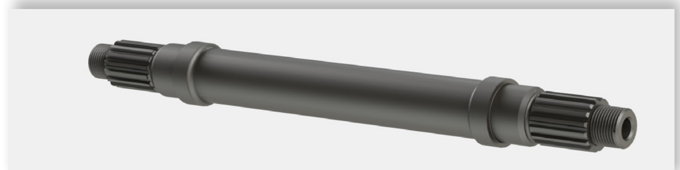
In previous years the team used a direct drive from the motor output to the rear wheel. However, with the new motor the team is using this approach wasn't ideal. There were two main reasons for the new drivetrain design. First was sprocket size. Last year for Pikes Peak, a 62 tooth sprocket was required on the rear wheel to achieve appropriate torque and acceleration for the race. This was the largest size the previous bike was designed for without swingarm interference occurring. The new motor has lower torque but higher speed than the Emrax used by the team in the past, so the new drivetrain allows the team to choose from a wider range of gear reductions and get the appropriate wheel torque without chain interference issues.

The second reason for the new design is aimed at improving vehicle dynamics. To reduce the roll inertia, the team wanted to position the motor in the center of the bike to minimize the negative gyroscopic effects of the rotor. This year's motor is also significantly longer in the axial direction than motors the team has used previously and positioning the motor so the output aligned with the rear wheel sprocket would be detrimental to vehicle geometry and performance. With the driveshaft (pictured top right), we're able to appropriately position the motor, improving our vehicle dynamics while increasing the modularity of our gear ratios.

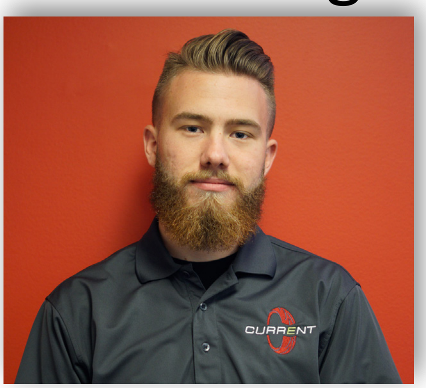
With this new design came certain difficulties in determining the appropriate manufacturing process. One of the most difficult aspects of the drivetrain design was determining the required hardness, surface roughness, and tolerance for the bearing seats and splined sections. The team worked with Schaeffler to determine the requirements for the bearings and Advanced CNC for the splined portions of the shaft.

The drivetrain design is complete and the team is currently in the midst of manufacturing. The bearing housings and various other components were fabricated in-house by team members and the driveshaft is being machined by Advanced CNC. Once the frame design is complete, mounting features will be designed and the drivetrain assembly will be installed on the bike for testing.





Chase Gough



Hometown: Mansfield, Ohio

Year: Senior

Major: Mechanical Engineering

Hobbies: Riding Motorcycles & Skiing

Projects: “In the past I have helped design suspension spacers, helped with various manufacturing tasks, and was part of the pit crew during our 2017 and 2018 race seasons. Currently I am working on the drivetrain design and helping build the dyno cart.”

Favorite Team Memory: “My favorite experience from my time with the team was racing at Pikes Peak these past two years, specifically winning the electric class during the 2017 season."

Favorite Part of OSU: " My favorite part of OSU is the Center for Automotive Research. It has opened up many opportunities to me over the years and I've met many people who share the same passions as I do."