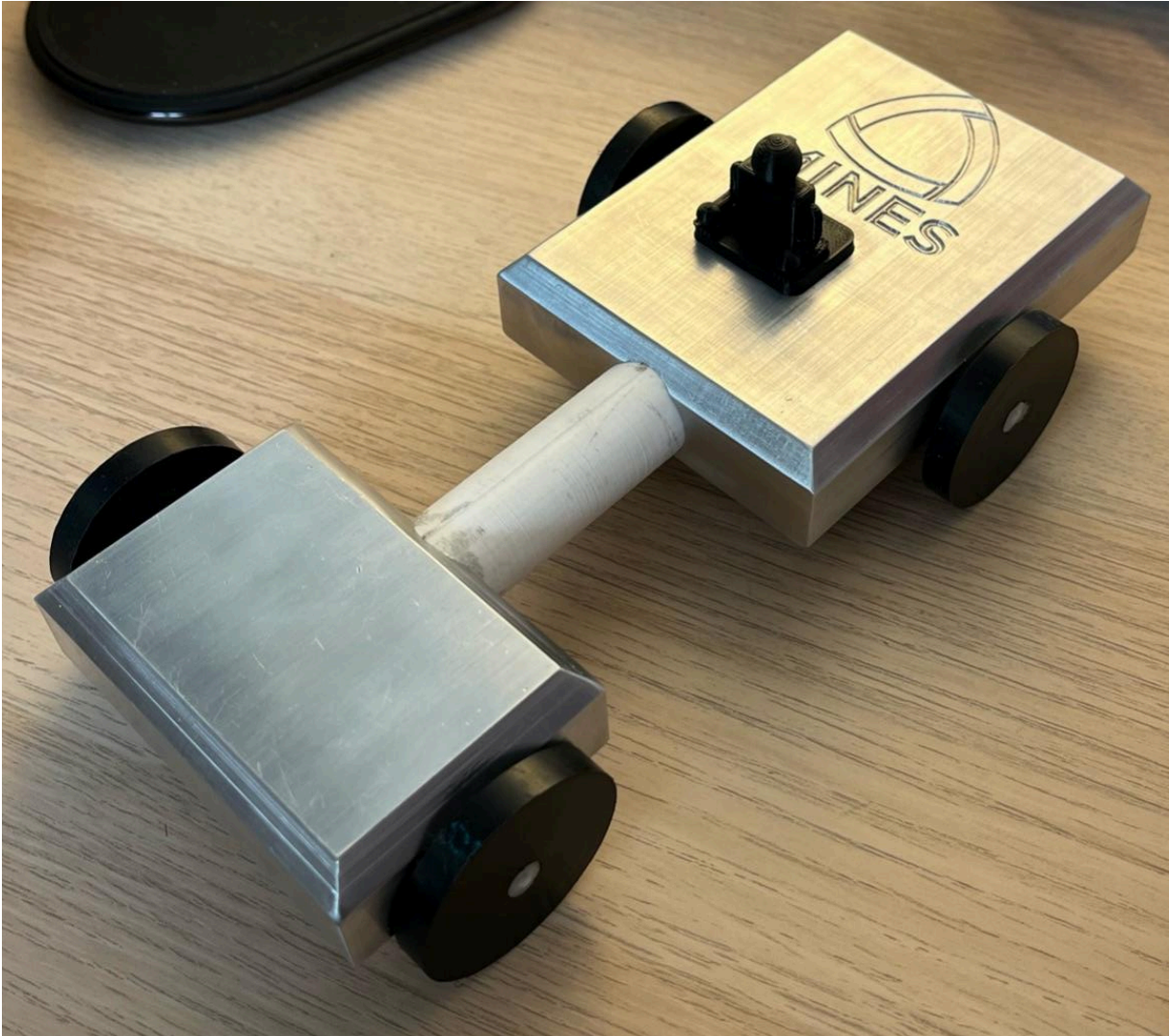


Mines Derby Car Final Report

By: Jack Davis, Chris Stone, and Jake Doyle



*Figure 1 (Team 51 Derby Car)
Ricky Bobby pictured above*

Our initial design was very similar to our final design. When asked to brainstorm a design in class we took inspiration from a Formula One car. The first idea was to make a pizza shaped car. Then after further brainstorming and research we discovered that the more back heavy the car was the more potential energy it would have therefore, the further and faster it would go. This was when we decided to cut our chassis into two. This would allow us to load the back with weight, connect the back piece to the front piece with a 3D printed rod to ensure the majority of

the weight was loaded in the back. Once we decided we wanted to connect the two pieces with a 3D printed rod, the design was more or less finalized. We only changed small things like the angle of the sides of the wheels and we decided to go with chamfers instead of fillets.

When designing the wheels and axles we wanted a press fit between the two. We designed the part of the axle that connects to the wheel to be 0.25 inches. Then when drilling the hole into the delrin for the wheels we used a 0.246 drill bit. This ensured that the wheel would press fit onto the axle and not come off of the axle during the race. The final wheel and axle is within spec to our original drawings. We set the spec on the hole pattern on the chassis to be 0.005in. We scored the bottom plate and cut it on the vertical bandsaw. Once we had the two bottom plates we used the mill to find the correct positions for the holes and drilled them there, the holes aligned perfectly. Everything we manufactured was in spec.

Our group has no big regrets about our derby car design. We knew it would be a challenge when we decided to stick with the two separate chassis. During the machining process, all of the TAs and shop workers questioned our design and referred to us as “that group with the funky design” whenever we came into the shop. This was only motivation to prove to them that the funky design was the best design. Our design preformed very well. We placed 2nd in the speed race, and 3rd in the distance and last man standing race. If we could redo this project we would take more time on the axles and slot for the axle. But, we would keep the general design. Through this project, our group learned many things. One of the biggest things that we learned is that things aren’t always as easy as they seem. For instance, whenever creating the axle we assumed it would be a quick 10-15 minute process. Two and a half hours later we learned that was not the case. We also got a ton of experience with all the other machines in the shop (mill, laith, vertical bandsaw, taps, and the buffer wheel) and got to know how each machine works

individually. We decided to go with 3-D printing for friction fit purposes. The driver was extremely secure and the center axle held up nicely for all races. CNC'ing was a cool process to see how a machine can accurately mill a part. Overall, this project was extremely beneficial to my engineering career; we are now confident that we can design and machine just about anything we can imagine.