

About Me

Team Wheelders & The Engineering Design Process in ENGI 120



Mechanical Engineering Major

Hello,

My name is Luke Van Leeuwen, and I'm an undergraduate engineering student at Rice University. On campus, I contribute to advanced materials science research, lead the structures subteam for Rice Electric Vehicle's solar car initiative, serve as an Ambassador for the Doerr Institute for New Leaders, and I am lucky enough to be an O-week advisor for 12 amazing new students.

Outside the classroom, I'm passionate about the outdoors. As an Eagle Scout and Master Scuba Diver, I spend my breaks hiking, diving, and adventuring with friends.

My career interests lie in applying hands-on design, research, and leadership skills to projects in aerospace, automotive, and defense engineering. I'm driven by challenges where creativity, teamwork, and technical rigor combine to build solutions that advance technology and society.

Skills

- Advanced experience with CAD and fabrication tools including Fusion 360, 3D printing (PLA & TPU), and power tools from OEDK
- Team leadership and technical mentorship in delegating tasks and teaching fabrication techniques to team members
- Iterative design and testing protocols from concept sketching through physical prototyping and traction validation

Working in Teams

During the prototyping phase, I collaborated closely with my team by taking a lead role and delegating tasks throughout the prototyping phase. We worked closely together on the documentation, discussing what was working well and what we needed to do next. Given my prior experience with many tools in the OEDK such as 3D printing, hand and power tools, and CAD I led most of the construction of our prototypes and helped guide my group mates in learning those tools to enable us to produce our more refined prototypes faster.

Overcoming Challenges

A challenge we faced was designing tests for our prototypes. In particular how to test traction. After a brainstorming session with my team and our faculty mentor we were able to come up with an effective test for traction. Another challenge we faced was with 3D printing in TPU. As a team we researched together how to get TPU printing to work and used our connections to find someone to teach us the nozzle speed and extruder temperature we needed for a successful print.

Engineering Design Skills

The prototyping phase pushed me to apply engineering design skills more systematically. I used iterative sketching both on paper and digitally, low-fidelity mockups, and quick simulations to narrow down concepts and manufacturing methods with my team. This process made me much more disciplined in documentation and defining requirements. I became better at justifying my design choices and making sure I wasn't wasting time solving problems that hadn't shown themselves yet.

Key Improvements

I now have more planning skills as well as I had never been experienced to an engineering project process before and now I understand more what goes into producing a good prototype or final product.

Technical Skills

Throughout this project, I relied on several technical skills that were essential to producing our prototypes:

CAD Design (Fusion360) 3D Printing (PLA & TPU) Power Tools Material Selection Test Development

CAD Design (Fusion360): I modeled our different wheel designs as well as created digital drawings of them to guide our fabrication and to use in 3D printing.

3D Printing: I printed our wheel designs in both PLA and TPU filament.

Power Tools: Used to retread and attach spikes to the outside of our rubber wheels.

Material Selection: Compared physical properties, ease of manufacturability, and cost to select the best materials for usage in our prototypes.

Test Development: Developed procedures to collect data and analyze points to refine our prototypes. Used both quantitative measurements and qualitative observations to guide design changes.