Mechanical Engineering Portfolio

Jadrian Png (B. Sci Mechanical Engineering)

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Beverage Mug Modeling

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Pokémon

Welcome, and thank you for taking the time to view my portfolio. The Goal of this portfolio is to give you a deeper insight into my experiences and skills I have gained over my recent history as an engineer.

It is my hope that this will allow you to better assess how my skills can be applied to your company.

I would be happy to talk in more detail and can be reached using the contact information at the bottom of this page.

About Me

Very passionate about designing, proficient in CAD modelling with 2 quarters of modeling experience working on various engineering projects related to school, proficient with 3D printing. Demonstrated ability to work as a team in deadline bound projects. I am driven by the desire for more knowledge and work hard to achieve my goals. Available for relocation.

Objective: Seeking for the position as a Mechanical Engineering Intern within an organization that will provide me with the opportunity to enhance my skills and update my knowledge

EDUCATION

Seattle University. Seattle WA. *Sep 2019 - Jun 2023*
Bachelor of Science Degree, Mechanical Engineering

PROJECT WORK

Integrated Design 2, Engineering Class *Spring 2021*
Yakima Box Loader

- Prototyped a device to lift a 200-pound Yakima box to a height of six feet powered by one person.
- Tasked to design a rail subsystem to support payload system to be able to handle a 200-pound payload
- Performed finite element analysis in SolidWorks on rail system to identify points that may fail under 200-pound point load along the rail channel.
- Consulted teammates in redesigning the device to include a leg support beams on the rail systems structure in order to avoid material failure due to stress from 200-pound load.

Integrated Design 1, Engineering Class *Spring 2020*
DIY Coronavirus Mask Maker

- Researched mask making technologies and methods of creating masks to reach specific qualifications and categories.
- Coordinated with team to CAD design a prototype model of final mask making system for DIY users.
- Tasked with designing the “cotton candy” thread making system with teammates to achieve a specific thread thickness to create mesh mask comparable to a N95 grade surgical mask.

Engineering Design *Class* *Winter 2019*
Automated Steel Door

- Coordinated with teammates to design and model a 6-foot watertight steel door.
- Modeled a gear locking system to allow the door to be water sealed.

COURSE WORK

- Engineering Design
- Machine shop
- Engineering Economics
- Integrated Design I and II
- Statics and Dynamics
- Engineering Methods
- Mechanics of Materials
- Thermo Dynamics 1
- Materials Science
- Machine Design I *(Winter 2021)*
- Fluid Mechanics *(Winter 2021)*
- Heat Transfer *(Spring 2022)*
- Instrument and Data Acquisition I & II *(Winter 2021 & Spring 2022)*
- Integrated Design III *(Spring 2022)*

WORK EXPERIENCE

Spiration Olympus. Redmond, WA. *Sep 2017 – Jan 2018*
Engineering Intern

- Coordinated with team members to create a prototype holder for surgical bronchoscopes to be used during operations. The prototyped holder was created to act as a harness for the bronchoscope to mount onto using Velcro, nylon straps, and plastic clips.
- Designed the individual holder that hooks onto the Bronchoscope before attaching the device to the frame
- Responsible for designing straps and holds for prototype surgical bronchoscope holders
- Designed and tolerance the separate attachable clip to attach the bronchoscope which was a separate piece that would clip to the bronchoscope and be attachable to the holder itself.

ShareTea. Seattle, WA. *Oct 2019 – Mar 2020*
ShareTea. Redmond, WA. *May 2019 – Sep 2019*
Barista

- Provided service as a cashier with excellent communication skills through taking order and serving customers
- Worked as cook in backend kitchen to prep tapioca bubble, teas, and toppings to support front end operation
- Worked as frontend operator to fulfill customer orders

TSA (Technological Student Association) Nationals *Jan 2018 - Jun 2018*
Participant

- Participated in the national level competition as a team of four. Received fourth in the Biotechnology Category.
- Given the high content of mercury in fish these days, the team designed a portable mercury measuring testing device to test mercury levels in fish and determine if the mercury level is safe for consumption.
- Device was designed to have a small probe with a sample collector tip that would be inserted into a desired fish to collect a sample for analysis. The probe would then be reinserted into the device where a chemical solution would change to a specific color to determine the level of mercury in the sample fish.
- Prototyped the mockup design using 3D printed materials and balsa wood for exterior body.

CSRSEF (Central Sound Regional Science and Engineering Fair) *Sep 2017 – Mar 2018*
Participant

- Researched the properties of chitin within crustacean shells to determine if it is the sole cause for causing limpet teeth to be the strongest biological material possible. The goal of the research was to determine if chitin is the sole reason that limpet teeth is the strongest biological material that occurs naturally.
- Performed tensile testing using three-point bend test on crustacean shell samples and correlated data to chitin percentage levels within different crustacean shells and limpet teeth.
- Received honorable mention within material science subgroup

Uniqlo. Bellevue, WA. *Jun 2021 – Sept 2021*
Sales Associate

- Worked with teammates to provide high quality customer service in a fast-working environment.
- Managed and interacted with customers in fitting rooms to provide a welcoming environment for customers to try potential items.
- Manned cash registers and presided over customer transactions of selected items for purchase
- Worked as a greeter for frontend operations of the store to be the face of the store greeting customers that enter and exit the store.

Seattle Badminton Club. Kirkland, WA. *Jun 2021 – Aug 2021*
Assistant Coach

- Coached and managed students from ages 7 – 13 years old in groups of 8 to 15 students.
- Drilled students in training and technical exercises for badminton summer camp.

EXTRA CURRICULARS

- **Mechanical Engineering Club**
  Vice President
  Coordinated club events for members and promoted the club to non-members. Provided support to club officers.
  Coordinated and lead club events and chaired club virtual meetings online.

COMPUTER SKILLS

- Fluent user of MS Office Suites.
- 3D CAD software (Solidworks)
- Adobe Illustrator

CAD Modeling

Project Title:

3D Model a Beverage Mug

Project Objective:

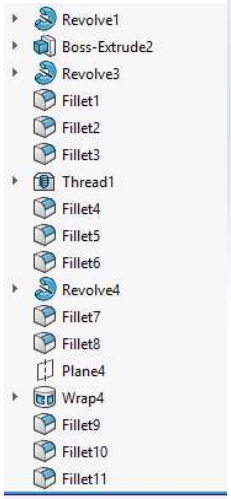
To 3D model a beverage mug in SolidWorks. Additional requirements were that the mug had to be a single part not as an assembly, hallowed out for thermal insulation, the handle had to allow for four fingers, can accept a lid, and there could be no sharp corners for user safety.

Approach:

- First the dimensions of the mug had to be determined (height, width, container size) which gave parameters of how to model the mug
- The modeling in the project was carried out in SolidWorks
- Designing for each objective was carried out after size constraints were established

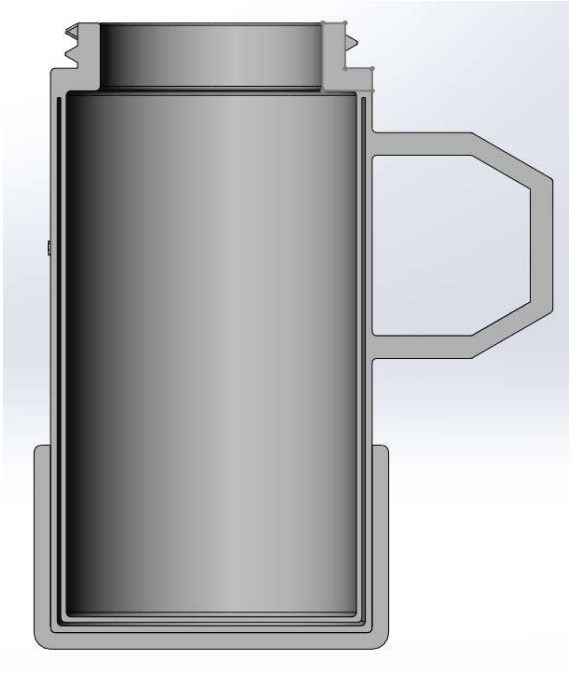
Steps to model mug:

- First the overall shape of the mug is drawn along with a portion that meets the requirement for thermal insulation
- A revolve extrusion is done to attain the 3-dimensional body of the mug
- A boss-extrude is done to create the handle
- Fillets are done throughout the model to avoid sharp corners, especially along the handle and rims of the mug
- The threads were created using SolidWork's thread software using an inch die at 4.0000-4 size as an extrusion
- Text extrusion was then added along the surface of the mug after establishing a plane that the text could then be wrapped from
- Final fillets were made to the overall design to make sure that no sharp corners were seen in the model



Results:

The complete design with all the specifications for the mug were determined. A complete working model was developed in SolidWorks CAD software with its dimensions. No material loads or load specifications were calculated as this wasn't part of the requirements.



FINITE ELEMENT ANALYSIS

Project Title:

Yakima Box Loader

Project Objective:

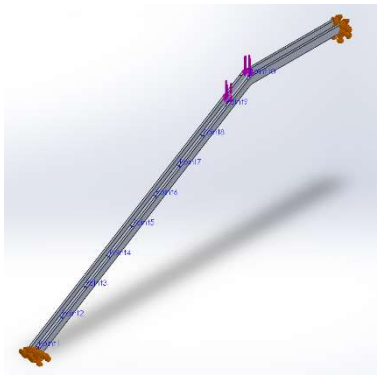
The goal of this project was to design a device or system that would allow a single, average person to lift a 200lbs Yakima box a height of 6 feet from ground level on top of a car roof. The device must be human driven and cannot be assisted by any outside motors or assisted lifting mechanisms driven by electricity. We opted to create a crank driven loader that would drag a load up a rail.

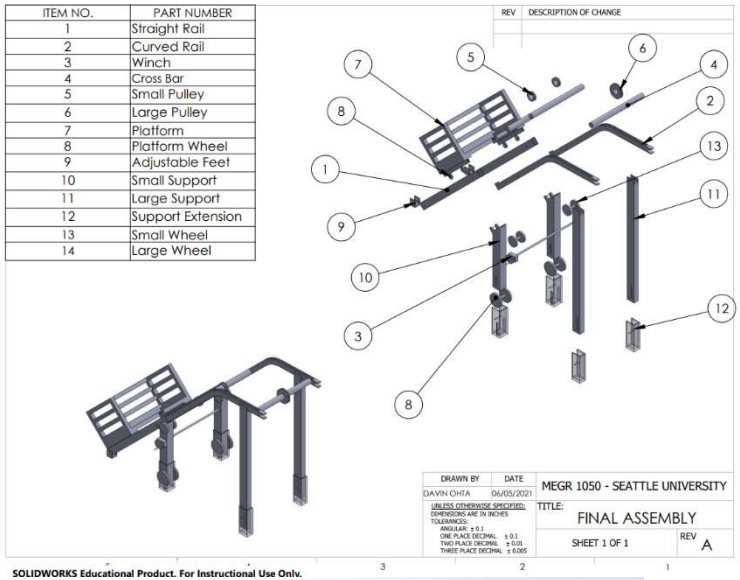
FEA Objective:

To test in SolidWorks and analyze whether the rail system we had in place would be able to handle a 200lb load and check for significant stress locations that may happen on the material (6061 Al) for the rail.

Approach:

- All the dimensions for the rails are recorded from the model
- Isolate for a point force and look for the greatest shear stress along the rail
- This was calculated for 1 rail
- From the simulation analyze the data that is given.



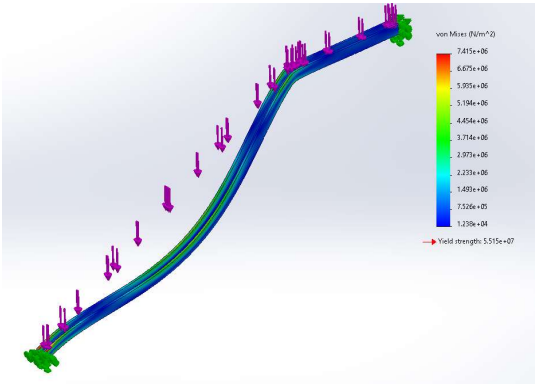


ITEM NO.	PART NUMBER
1	Straight Rail
2	Curved Rail
3	Winch
4	Cross Bar
5	Small Pulley
6	Large Pulley
7	Platform
8	Platform Wheel
9	Adjustable Feet
10	Small Support
11	Large Support
12	Support Extension
13	Small Wheel
14	Large Wheel

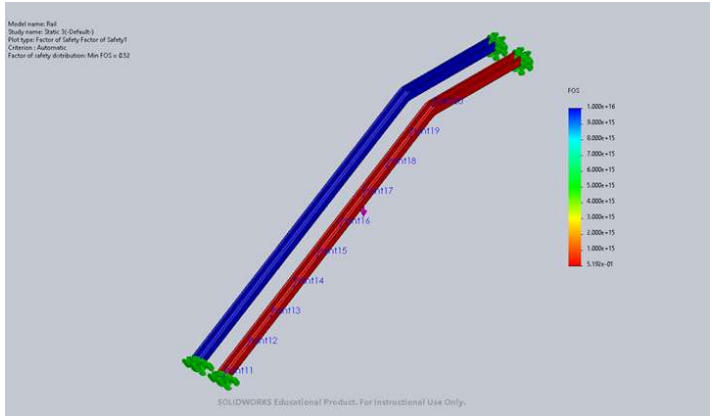
Above is the orthographic view of the final product

Analysis:

- By inputting the material into the simulator and by varying the location where the load will be acting on, the shear stresses and significant material displacement could be identified
- The shear values and displacements were then graphed
- The location with the greatest shear stress and displacement was also labeled on the graphs



The figure above shows the points of interest that the force was applied to



Results:

The large shear stresses and material displacement from the load prompted for the introduction of structural supports to the design to make the rail still be able to handle the large load as it traveled. The graphics were some of the results and what was specifically tested from them. These tests that I performed were able to provide my project group valuable information about the safety of our device.

3D PRINTING

Project Title:

Pokémon 3D Printing

Project Objective:

Take existing 3D models and experiment and learn the intricacies of 3D printing and operating a 3D printer.

Experience:

Most recently I started 3D printing. The existing models that I chose to experiment and learn about 3D printing were Pokémon models. These included a Bulbasaur, a Charmander, and Pikachu. Of these 3 models that I printed, only the Bulbasaur was a successful print with no flaws. Charmander had a slight defect due to no supports being added in the mouth as the PLA plastic deformed under the extruders heat. The Pikachu that was printed had a malfunction which resulted in a cancel of the print as it shifted from its position on the print bed due to the filament getting caught on a section. This caused the print to deviate of the already printed portions of the model.