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Mechanical Engineer, Portfolio

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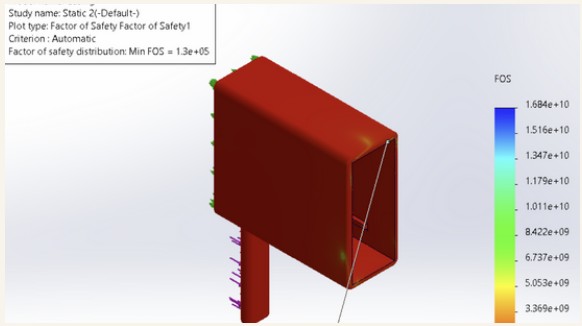
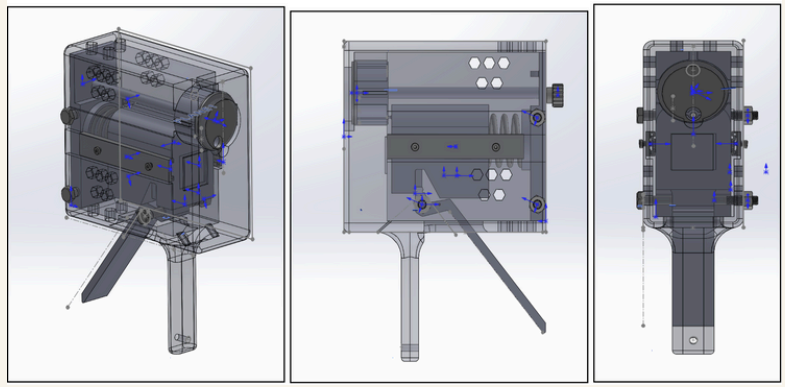
NASA Micro-g NExT Challenge - University of California





Objective

- Challenged to create a device that externally **attaches 2 pieces of multilayer insulation** underwater for **Extravehicular Activities** with **Astronaut ergonomics**.
- Finalized to create a handheld **spring-loaded** push-in rivet **deployment device.**

Action

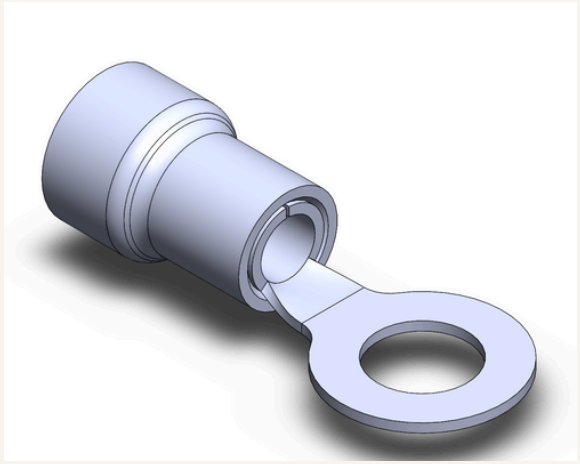
- Conceptualized final designs and modeled on **SolidWorks CAD**, and measured **factor and safety and load factors** using **SolidWorks Simulation.**
- Fabricated parts using **3D printing** and assembled with **compression and torsional springs.**

Result

- Deployed rivets into the insulation platform **in and out of water**. Applied a light tug (about **5 lbf**) onto connection point.
- Device had a **factor of safety>2**, and rivet **withstood 20 lbs of grip** force before rivet/fabric failure.

Bourns Inc. Project Intern

Thermal Cutoff Ring Connector



Objective

- Developed a device to regulate the **thermal activity** for a **Battery Management System** trailer.
- Engineered to **cutoff electric current flow** when the batteries **exceed 80F**.

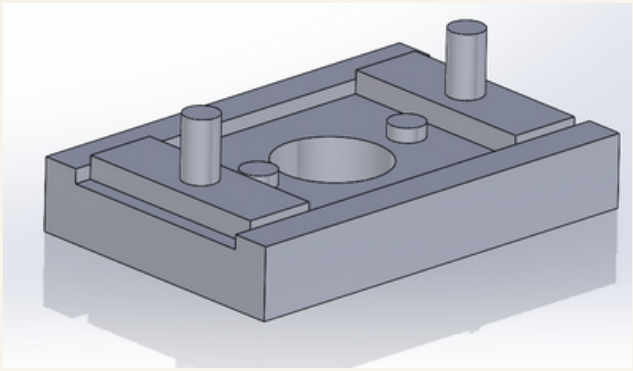
Action

- Assembled the **electric thermal cutoff device** to a **ring connector** in order to connect with battery.
- Used **SolidWorks CAD** to model a **standard ring connector.** Then **soldered** the thermal cutoff to the connector.

Result

- Applied direct heat to the ring connector with a **soldering iron** and a **digital multimeter** to track the **electric current measurement.**
- **Digital multimeter** read **0 amps** from the device after it reached **80F for 3+ trials.**

Surge Protector - Bourns Inc.



Objective

- Conceptualized a method to **mass manufacture** a **surface mounted** version of a **electronic surge protector**.
- Integrating the different components (**PCBs, wires, and surge protector**) of the product along with exterior casing.

Action

- Used **SolidWorks CAD** to design assembly **fixtures**.
- **Fabricated** fixtures using **SLA 3D printing**. Then thermally cured.
- **Soldered** all components to the PCB. Fixtures were used to thermally cure **5 models** through a **soldering oven**.

Result

- Encased in an **epoxy exterior.**
- Finished **15 models** of a **5 mm version and 10 mm** version.
- Trial products were sent off to another facility for **shock testing.**

Micro-g Liquid Rocket

- Supported **hands-on fabrication** and **assembly** of a **liquid rocket** engine, contributing to 3 spacecraft **sub-system and multiple static testing trials**

- Working along a 10+ team of students and aerospace professionals for the construction of the rocket.

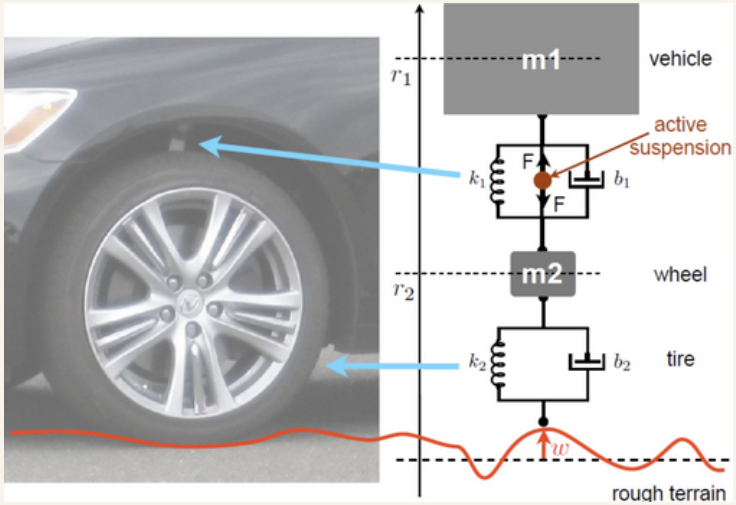
- Constructing the rocket exterior by **metal fabrication.**
- Conducted **testing** on subsystems and valve actuation (**LOX, Fuel, and MVA) .**

Certifications

CSWA SolidWorks - Sustainability

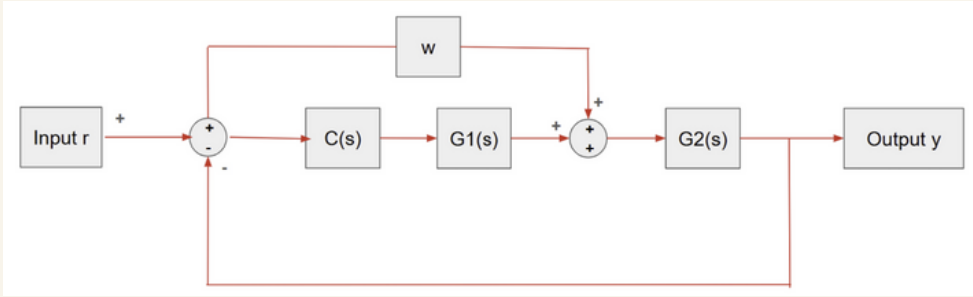
CSWA SolidWorks - Additive Manufacturing

Car Suspension Simulation Project - Feedback Control

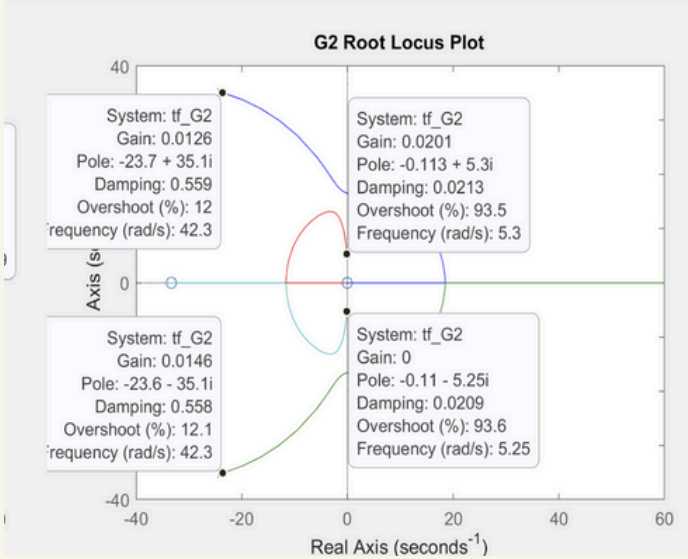


- Analyzing the forces applied to a car and wheel in this active suspension scheme.
- The concepts of feedback control are used to analyze this linear system using MATLAB.

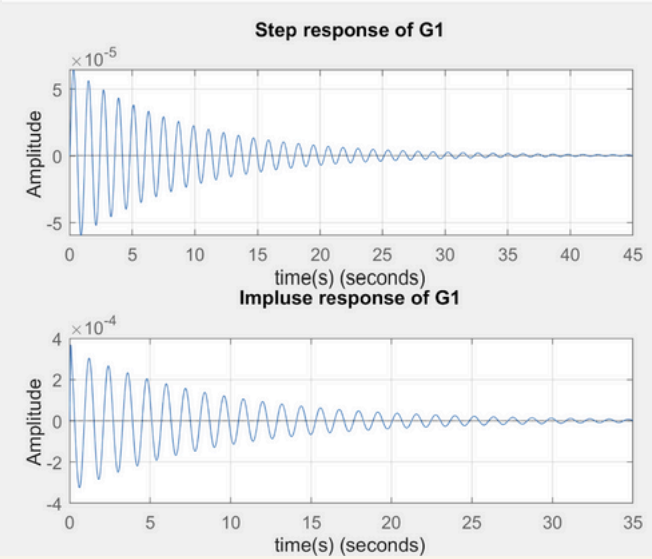
- vehicle mass = G1(s) and wheel mass = G2(s)



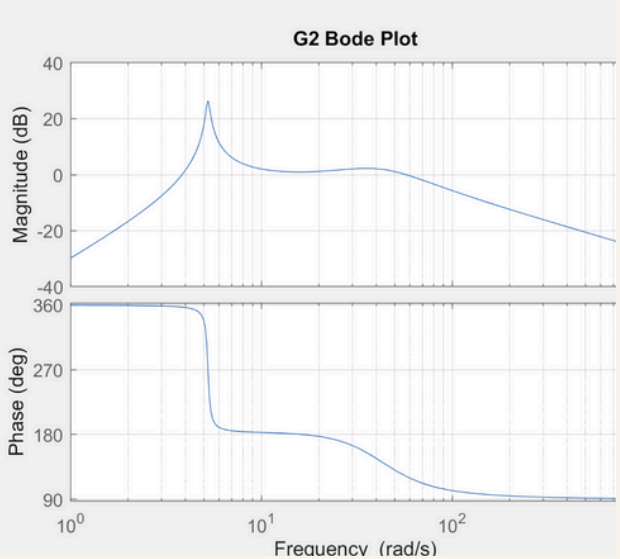
Control Block Diagram



Root Locus Plot



Step and Impulse Response



Bode Plot