Jonathyn Major

“Somewhere, something incredible is waiting to be known.”

-Carl Sagan

PORTFOLIO

Table of Contents

Jonathyn L. Major
1401 Greenbrier Rd. Apt 206
Long Beach, CA 90815
Cell: (562) 618-2610
Jonathynlee@gmail.com

SpaceX
Hawthorne, CA

To whom it may concern,

I firmly believe that no challenge is beyond my reach. I will devote all my time and effort into a project until it is completed with the utmost accuracy. The ability to learn has been an indispensable trait throughout my life, despite many hardships, and I know it would be an advantageous trait to have among the staff at SpaceX. I find my motivation in meaning; knowing my work will make a difference means everything to me. This, as well as my tenacity towards goals and my yearning to master the art of engineering, makes me a great candidate for SpaceX. I also have a furious passion for interplanetary spaceflight. My goals match those of SpaceX; I am not looking for a short career, but a life long journey.

I currently work with an online manufacturing catalog database company, Catalog Data Solutions. My job consists of many tasks including building 3-D CAD models and 2D drawings using PTC CAD Tools, project managing, programming and customer communication. Building CAD models for industrial companies requires a comprehensive understanding of drafting. This is one of the many skills I have developed while working at CDS. Parts are built based on a 2-D drawing provided by the customer. Many models require a much more immersive knowledge of the material provided; thus, research is necessary to become familiar with the component. When building gears for KHK Gears (based in Japan), it was my responsibility to learn extensive detail about gears so that they would be built with as high of accuracy as possible. It is for this reason that I have developed the ability to learn quickly and adapt to the project requirements. Above all, I will never sacrifice quality for quantity. Especially when working in an industry that will affect lives, quality and accuracy are of the highest importance. Catalog Data Solutions has offered me a full-time job, but I see my future with a company whose ambitions match those of my own, such as SpaceX.

During my free time, I enjoy inventing and building. My current and otherwise most in-depth project is an autonomous platform that will follow a user while relieving them of physical burden. As my senior design project, I took on the task of building the electrical control system for the autonomous device. Building the control system takes a comprehensive knowledge of microcontrollers, circuitry and programming in C/C++. All of which I have learned on my own with research and reading text books. This is yet another display of my ability to learn quickly and adapt to project requirements.

In my life, I have a history of overcoming obstacles. With the incarceration of my father at 12 years of age and the suicide of my mother at 13, I had a rigorous mountain to climb. These aren't events that are easily conquered, but they have taught me important life lesson. Just like my hardships, there is nothing that I can't overcome.

I believe that with the skills I have obtained from my education and my career as well as my enthusiasm for SpaceX and Engineering, I make an ideal candidate for this position. Thank you very much for your time and I truly hope I am considered for this opportunity.

Sincerely,
Jonathyn Major

Jonathyn Major

1401 N Greenbrier rd. Apt 206, Long Beach, CA 90815 | 5626182610 | Jonathynlee@gmail.com

Summary

Mechanical Engineer with two years of work experience using CAD modeling software and working within a team of specialists. Skills include advanced knowledge of Pro-Engineer, Solidworks, MATLAB/Simulink and Microsoft Office as well as adequate knowledge of ABAQUS, CATIA, NX, Eagle, AutoCAD and C/C++ Programming.

Experience

CAD DESIGN ENGINEER | CATALOG DATA SOLUTIONS **MAY 2015- CURRENT**

- Use PTC CAD tools to build fully dynamic models that can be configured using an online server. Models are all built with high expectation for low error. The models being built are used in plans all over the world.
- Use knowledge of logic and coding (within the part program/references) to give a customer the ability to make user defined changes to a model, this includes advance configurators that change specific parameters or dimensions.
- Understand and utilize built-in functions in excel to output mass amounts of data into an orderly and usable document.
- Meet project deadlines while also maintaining schoolwork. As a part time intern, being held to the standards of a full time employee, projects are expected to be done within an allotted time.
- Display ability to take initiative and communicate with CEOs and Sales Representatives of a customer company to resolve issues or clarify requests.

RESEARCH ASSISTANT | ROBOTICS LAB RESEARCH GROUP **FALL 2016- CURRENT**

- Use knowledge of circuitry, control systems and programming in C/C++ to build practical devices assist in the exploration of new boundaries in electronics.
- Understand how a sensor works, how to connect it to a microcontroller and how to determine which values to look for in a serial monitor or terminal. Use this knowledge to give purpose to the information given by a sensor.

PROFFESIONAL AFFILIATIONS

- Pi Tau Sigma (Engineering Honor Society), Industry Chair
- Ground Team in AIAA Design, Build, Fly (American Institute of Aeronautics and Astronautics), Member
- Institute of Electrical and Electronics Engineers (IEEE), Member

Education

BACHELORS OF SCIENCE IN MECHANICAL ENGINEERING | CSU, LONG BEACH **08/2013-05/2017**

GPA: 3.3

Related coursework: MATLAB, Dynamic Systems, Kinematics, Thermodynamics, Mechanics of Deformable Bodies, Fluid Mechanics, Advanced CAD/CAM

Currently Taking: Control Systems, Finite Element Analysis

Projects

- **Autonomous Following Platform– Follow Dolly (2017):** Utility cart that uses built-in tracking features to follow a user with a sensor. Uses a home built circuit board that transmits information to a center differential set of wheels.
- **Golf Ball and Club Analysis (2016):** Using Solidworks and ABAQUS, designed a materially accurate golf ball and club. The golf club was observed using a stress, impact, and fluid dynamic test; the golf ball was tested with impact and distance traveled.

Individual Projects

WORK PROJECTS

Company: Catalog Data Solutions

Location: 6050 Hellyer Ave #175, San Jose, CA 95138

Website: https://www.catalogdatasolutions.com

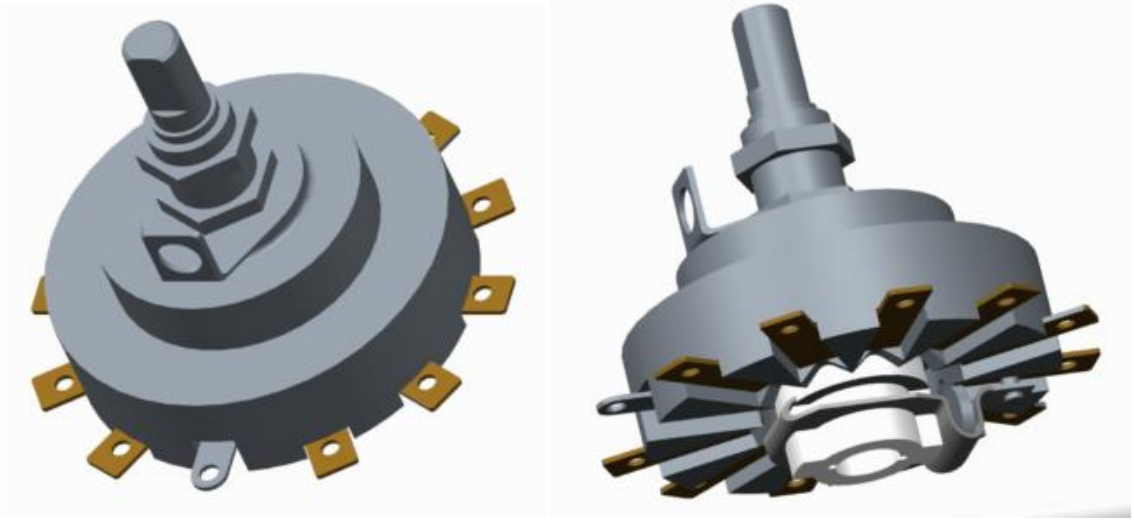
Summary: "Catalog Data Solutions (CDS) is proud to be a leading provider of web-based marketing & sales solutions. For over ten years, CDS has served Industrial Suppliers by providing them with 3D Catalog and eCommerce solutions that get their products found, designed-in, and purchased! Our professional services team provides 3D CAD, data engineering, and custom web application development for the successful deployment of all our solutions."

Note* All mentioned companies have ownership over drawing designs. No proprietary information is given in the following examples. All CAD work is contracted by CDS.

Hired In: May, 2015

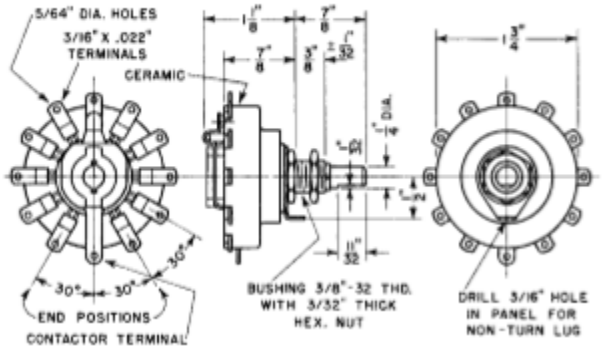
1) Power Tap Switches: Ohmite Electronics – Using Creo Parametric 2
   Summary: Power tap switches are high power rotary switches. Enabling a user to switch where power is sourced or sunk.

   MODEL 111:

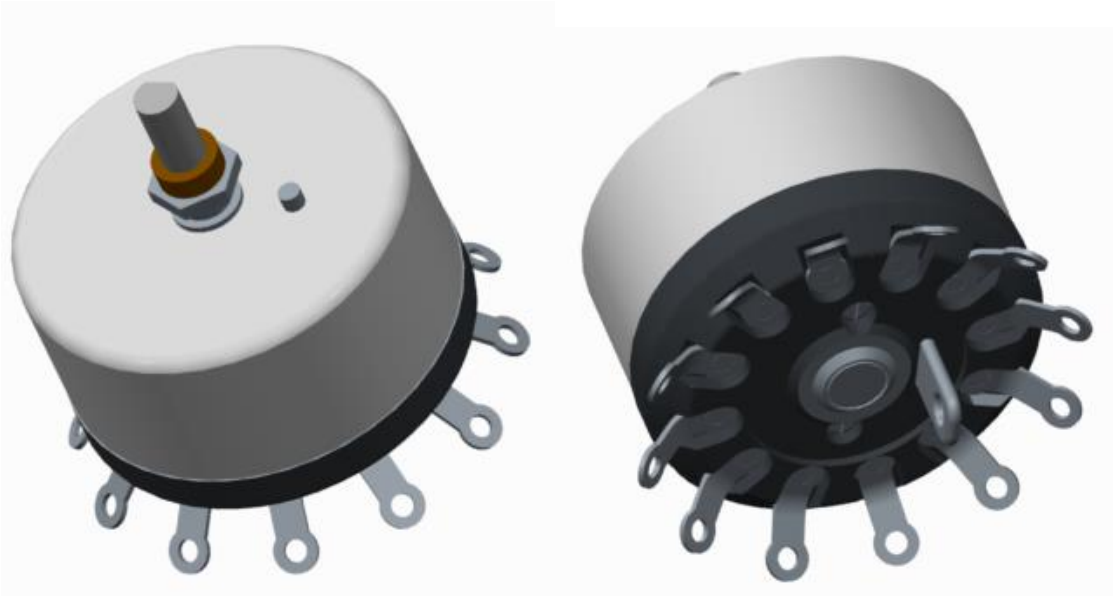


Given Design (In catalog):

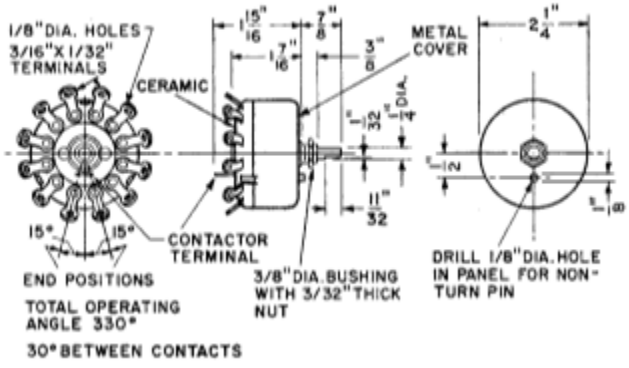
Model 111



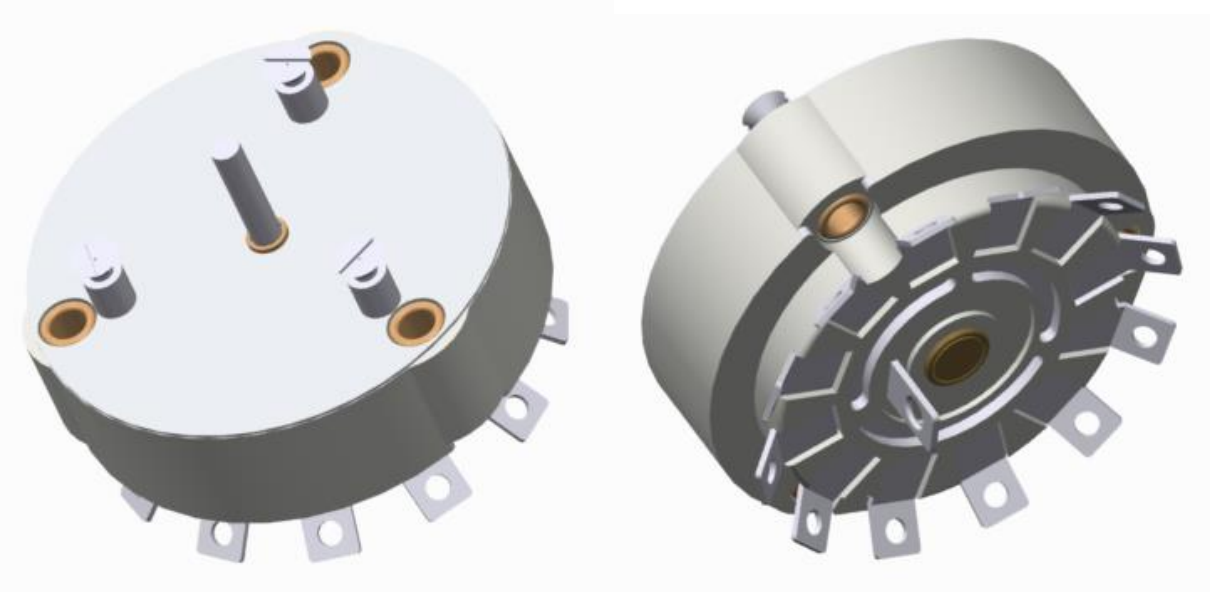
MODEL 212:



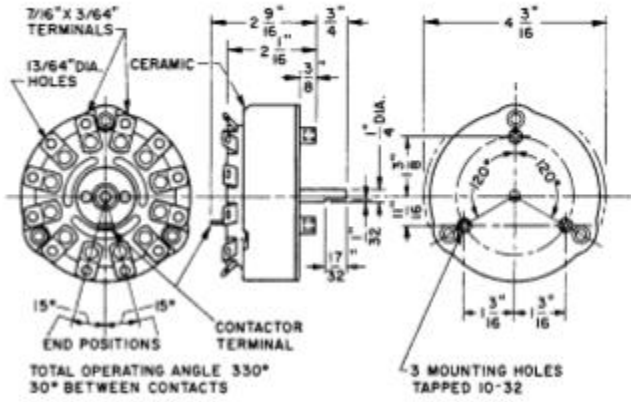
Model 212



MODEL 412



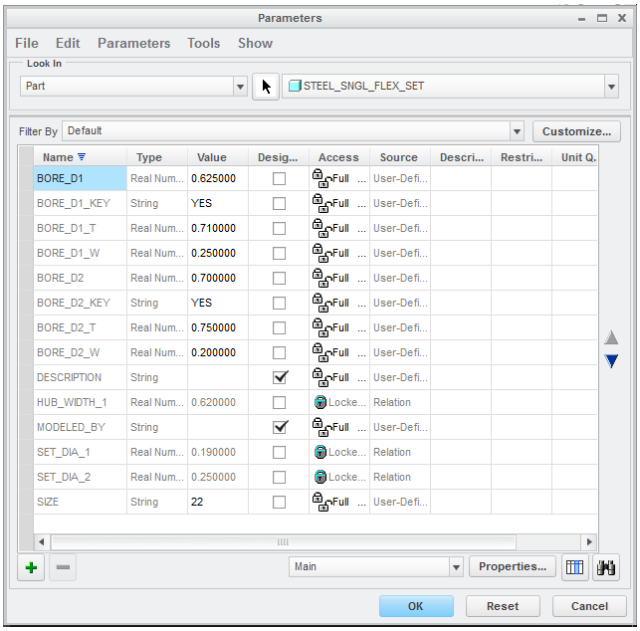
Model 412



2) Composite Disc Flex Couplings: Zero-Max Inc. – Using Creo Parametric 2

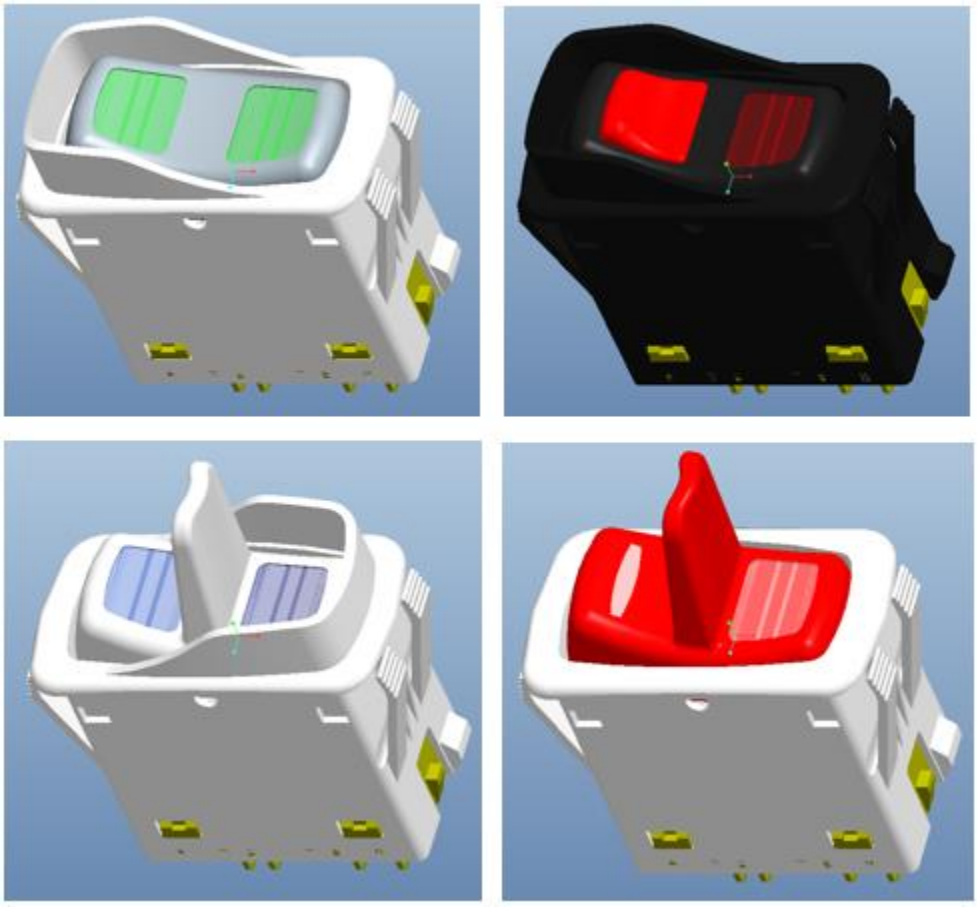
Below is a parameter table that drives the model. By change the values, the model changes with the corresponding information. These values are programmed into the model using an integrated notepad environment that uses native C based language commands. (i.e. If statements, rounding functions, logical value tests)

Composite disk couplings allow for efficient mechanical energy transfer in shafts. Below is just a single disc coupling where there are many different types. I have just used this one as an example of my work.



3) L-Switch Configurator: Carling Industries – Using ProE WildFire 5

The switches below were designed for a configurator, the user can change any of the parameters based on the catalog and the switch would react accordingly.

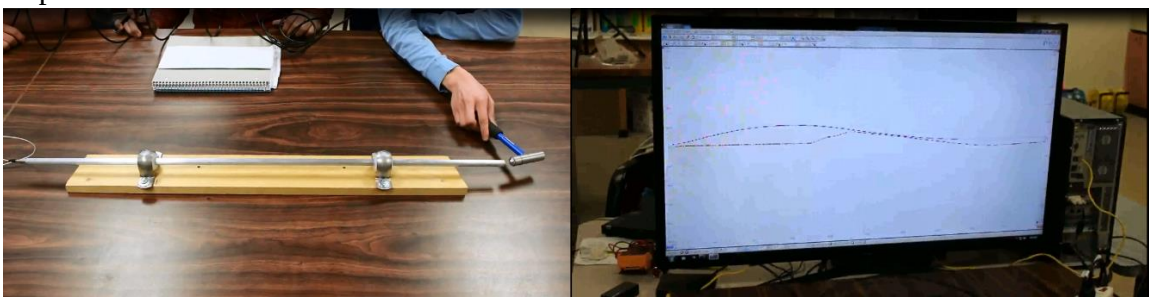


ACADEMIC PROJECTS

1) Finite Element Analysis Lab: Measuring a Force Pulse to Determine the Speed of Sound Using ABAQUS.

   Intro: This lab contained many step, this is a quick summary of what was covered. Using a stainless steel hammer, a meter long rod was stuck at one to record the force pulse within the bar. The hammer contained a force pulse sensor that shows the instantaneous force when the bar is struck, on the far side of the bar is an accelerometer. This measures the amount the bar accelerates.

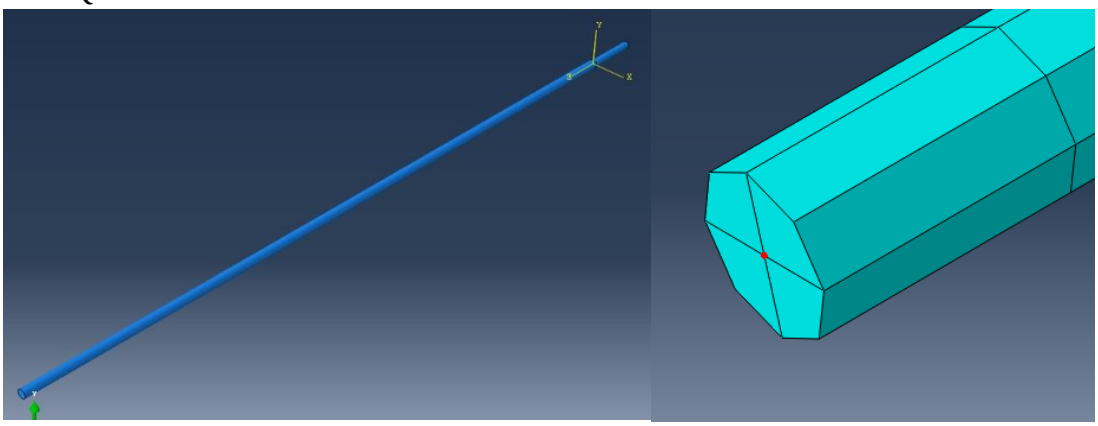
   Experiment:



   Once the experiment is completed. The data is recorded on a scaled plot vs. time. The time increment is at .001s.

   Next, the experiment was conducted in ABAQUS and the results were compared using MATLAB to scale the graphs together.

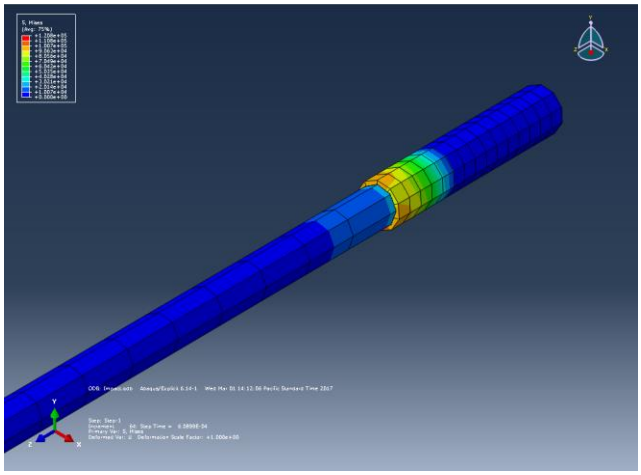
   ABAQUS DESIGN:

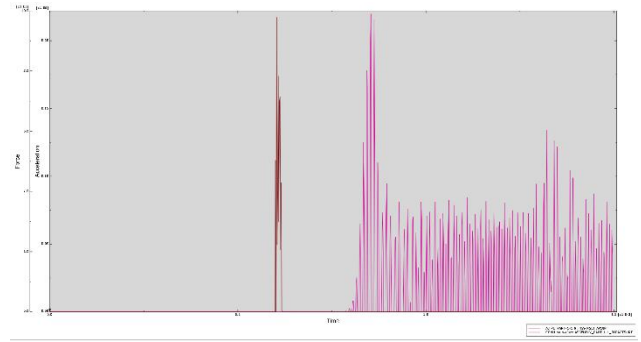


ABAQUS Results:

In the graph to the right, it can be seen that the there is a distinct time between the force pulse and the reaction of the accelerometer. (Where the **Dark Red** is the force pulse and the Acceleration is the **Pink**). Using this time difference, the length of the rod(1m) is divided by this step in time.

The material used in this case is Aluminum.

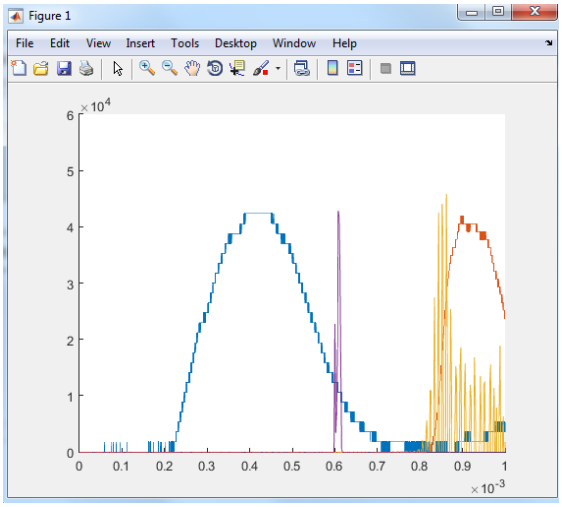




Final Results:

Using ABAQUS results, the speed of sound is found to be about 4000 m/s.

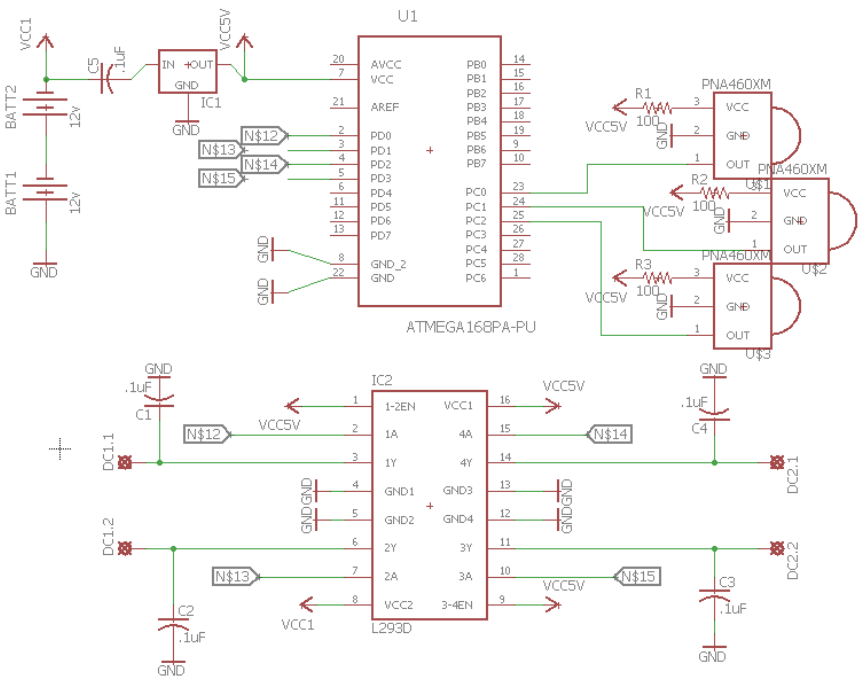
This Graph shows the comparison of the ABAQUS result to the real test results.



The Matlab Code is as follows. (The Data from ABAQUS is exported as a .rpt file)

```
clear
clc
filename = 'AluminumData.xlsx';
filenamerpt = 'Aluminum.rpt';
rangetime = 'D1:D250004';
rangea = 'E1:E250004';
rangeb = 'F1:F250004';
time = (1/3)*xlsread(filename,rangetime);
channela=1000*xlsread(filename,rangea);
channelb=800*xlsread(filename,rangeb);
A = fopen(filenamerpt,'rt');
b=importdata(filenamerpt);
ColumnA = b.data(:,1)
Column2 = .22*b.data(:,2)
Column3 = 4.5*b.data(:,3)
hold all
plot(time,channela)
plot(time,channelb)
plot(ColumnA,Column2)
plot(ColumnA,Column3)
xlim([0,.001])
ylim([0,60000])
      hold off
```

2) Senior Design – IR Sensor Schematic Design for L293D Driver - Using EAGLE



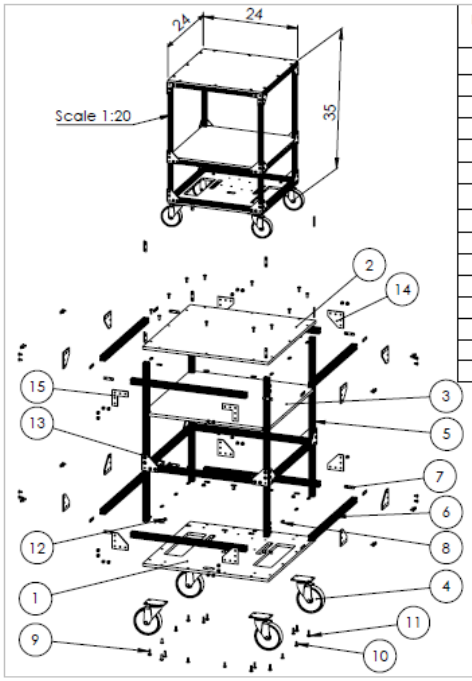
Is the schematic design, there are a few things to take note of. First, the controller being used is an Atmega168a Microcontroller. Second, the exports for the drivers go to empty slots to which the motors can be soldiered. Lastly, ends with common names are linked (i.e. GND).

Group Projects

1) Senior Design CAD and Manufacturing – Using Solidworks

Summary:
The Follow Dolly is a platform that autonomously follows a user using IR sensors and two HC-06 Bluetooth Modules. This allows the user to relieve themselves of physical burden and will allow them to keep track of all their tools.

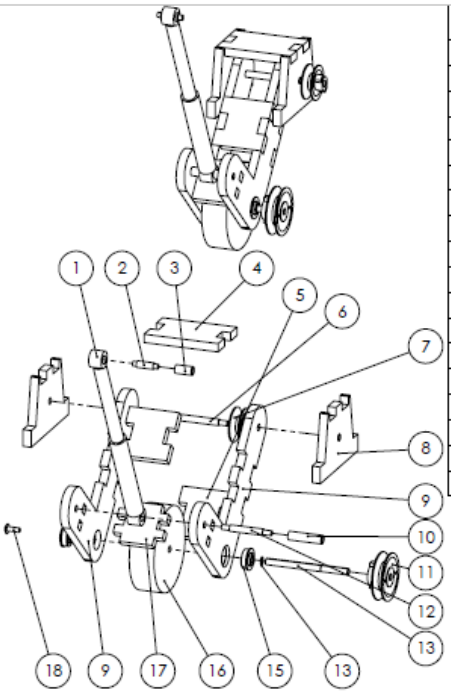
Frame Design:
The simple design is made up of a metal T-Slot frame, plasma cut 3/16 general steel, thin wooden platforms and four basic casters (Pre-Assembled).



ITEM NO.	PART NAME	PART #	SUPPLIER	QTY.
1	Plate bottom	A1		1
2	Table top	A2		1
3	Shelf	A3		1
4	Caster	2835T13	McMaster-Carr	4
5	T-Slot 1'x3.5'	47065T101	McMaster-Carr	4
6	T-Slot 1'x22"	47065T101	McMaster-Carr	12
7	Dual fastner	47065T147	McMaster-Carr	48
8	Sigle fastner	47065T142	McMaster-Carr	28
9	Screw 1"	91355A083	McMaster-Carr	12
10	Screw 3/4"	91355A082	McMaster-Carr	20
11	Washer	92141A029	McMaster-Carr	16
12	Lock nut	99904A101	McMaster-Carr	4
13	Piston bracket	47065T239	McMaster-Carr	4
14	Bracket	A4		22
15	Bracket cut	A5		2

Frame	Assem No.	Group C	MAE 472
Scale 1:15	A	2/17/2017	Unit: IPS
Tolerance ±0.05	Material: Various		

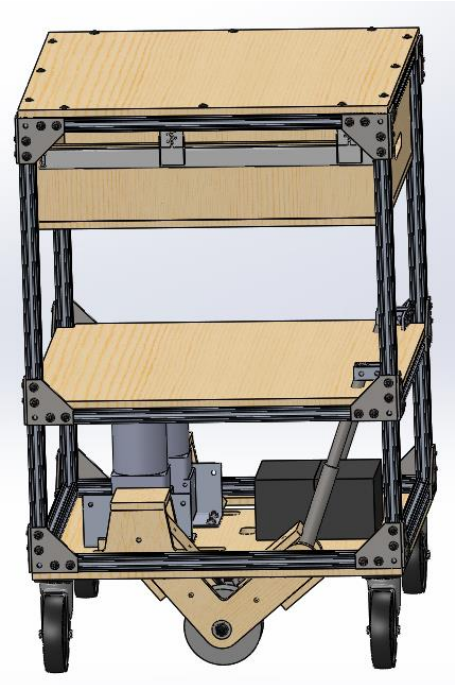
Driver Arm Design (Simple – Non Proprietary):
This spring loaded design allows for the driving wheels to be pressed against the ground at all times so that there is never a time where they will not have traction.



ITEM NO.	PART NAME	PART #	Supplier	QTY.
1	Shock	13840	Northern Tool	1
2	Shaft	B1		1
3	Spacer	B2		1
4	Plate_bracket_top	B3		1
5	Arm_support_B4	B4		2
6	Shaft arm top	B5		1
7	6245K651	6245K651		1
8	Plate bracket	B6		2
9	Arm_side	B7		2
10	Spacer	B8		1
11	Pulley 2.75"	6245K651	McMaster-Carr	1
12	Shaft	B9		1
13	Keyed shaft	B10		1
13	Snap ring	97633A170	McMaster-Carr	1
15	Bearing	6383K232	McMaster-Carr	2
16	Wheel			1
17	Arm_top	B11		1
18	Holding screw	91355A082	McMaster-Carr	1

Arm	Assem No.	Group C	MAE 472
Scale 1:5	B	2/17/2017	Unit: IPS
Tolerance ±0.05	Material: Various		

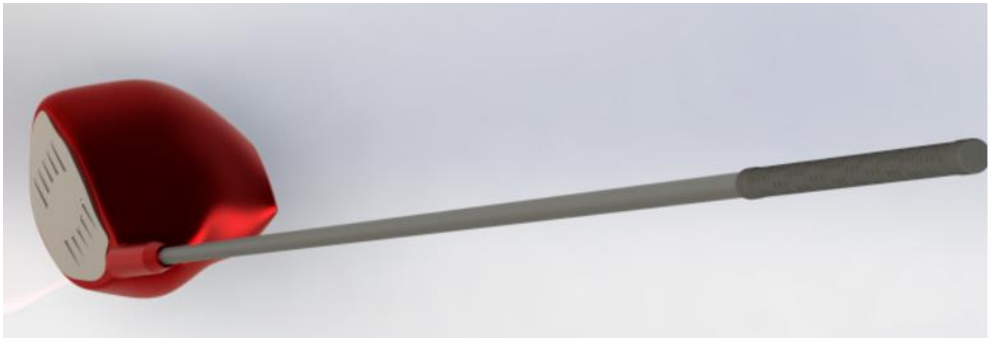
Overall Design: The follow dolly uses 2 Brushless motors that are controlled by a complex controller (Included), the inputs come from a microcontroller (ATMEGA168a) that is programed using C. The motors run on 24 volts at about 1/15 HP. The weight capacity is up to 250lbs (theoretically).



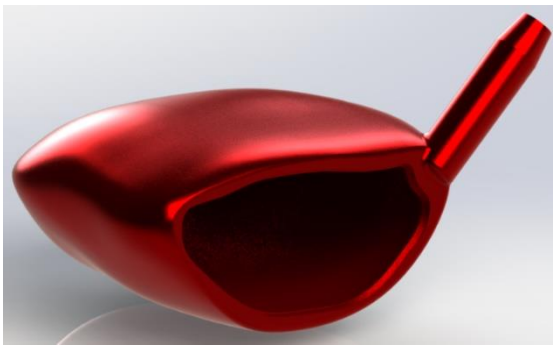
2) Golf Club and Golf Ball Design and Analysis – Using Solidworks and SW Simulation.

Summary:
The purpose of this project was to design a golf club and golf ball so that the Aerodynamics, Stress, deformation and distance travels could be analyzed.

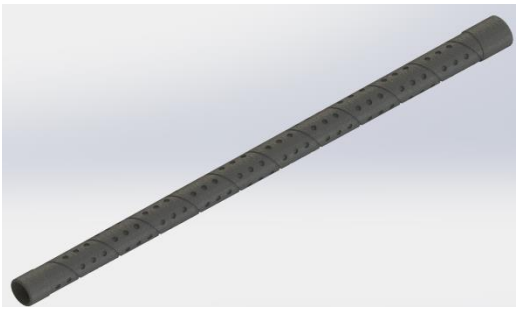
First, the golf club was designed in Solidworks with a reference club in mind. The main goal was to make it aerodynamic. The material of the head is aluminum, of the shaft is Carbon Steel and of the handle is Rubber.



The Head and Face:
The head is hollow and is made entirely of aluminum for a light weight swing. The face is also made of aluminum and provides an appropriate surface for efficient impact.

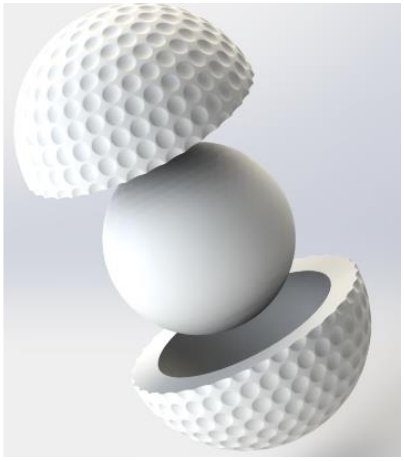


The Handle:
The handle is primarily designed for ergonomics. This allows for the air flow within the palm. There is no relation to the analysis but is used only for design.



Golf Ball:

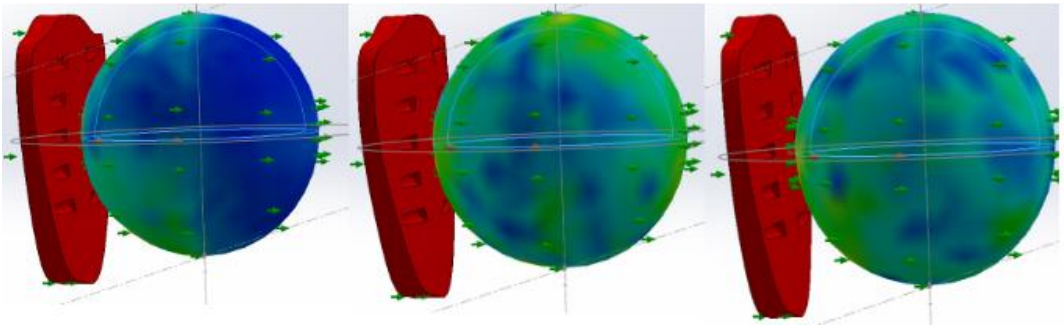
The golf ball is just as important as the club when it comes to the material, the material in the core of the golf ball can change the behavior of the ball vastly. For each of two tests, a different internal material is used. For the first test, the ball is of a polybutadiene for the outer shell and a natural rubber inner core. For the second, the core is made of Phenol Formaldehyde



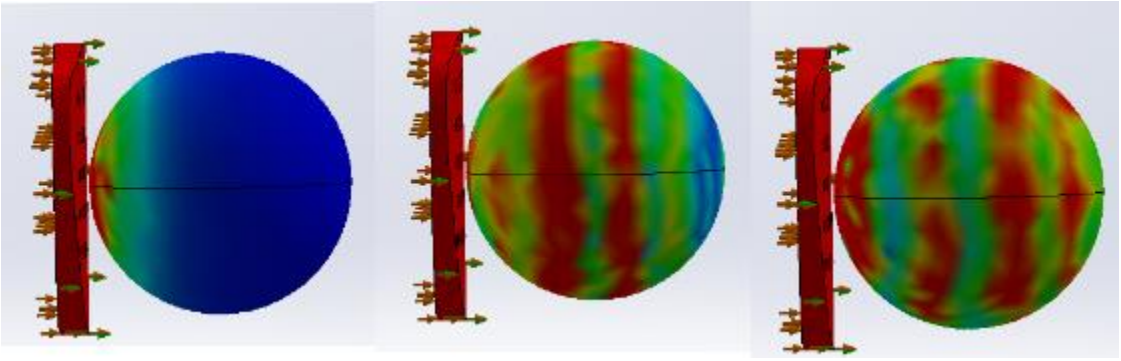
RESULTS:

Impact Test on the Ball:

For Natural Rubber the stress taken by the ball is relatively smooth and is dispersed evenly.

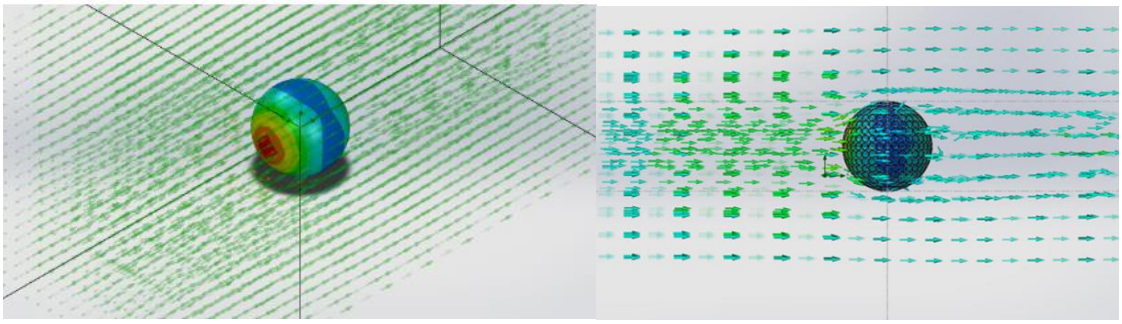


For the Phenol Formaldehyde, the stress is harsh and travels through the ball is wave. This means that the Rubber is better at handling stress.



Fluid Test on a Smooth Ball vs. a Indented Ball

In the images below, it can be seen that the Indented ball diffuses the wind much more. This creates turbulence while in the air and allows the ball to travel further.



Motion Study of Impact:

The point of the motion study is to recreate the event of hitting the ball. The model uses a device so that the club can rotate around a certain axis, this replicates the actual swing of a golf at about 100 MPH (average for a pro). The simulation actually tracks the distance the ball travels and can then be plotted.