Stationary bike generator system

(Structure System)

By

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Abstract:

Electricity is one of the most versatile forms of energy as it is easily generated by conversion from rotational energy. Individuals, while working out, mostly remain stationary, but release large amounts of energy, which must be countered by opposing energy sources, or allowed to be wasted. This energy may not find very many uses in its raw form, but conversion to other forms may allow it to do work at no cost. This paper documents the concept, objective, methods, and results of a stationary bike generator system being used to convert the energy from physical exercise to electricity, which can then be used to power household items while storing the electricity generated and thus realizing savings in energy costs. The project utilizes components, which are available to purchase from stores or fabricate using readily available materials. The assembled project consists of three subsystems: the drivetrain, which is based on a bicycle, support structure, which was mostly fabricated in the workshop, and an electric subsystem, which powers connected devices or stores the energy. One objective of this project is to hold the motor on the mount so the shaft does not move away during use. The main goal of the project is to charge electronic devices. The project demonstrates the application of mechanical engineering skills to create cost-effective and sustainable solutions. It can be improved upon for greater efficiency, lower cost, or ease of manufacturing to make it accessible to a larger number of people.

Introduction

Motivation:

The main problem that this project will convert the angular movement to electricity. By building this project, we can generate electricity by exercising on a stationary bike. The electricity generated by the stationary bike will be capable of charging multiple electric devices at the same time for no financial of money. In addition, this project will be interesting because it will raise my experience and get lots of skills.

Function statement:

This part of project is to design and construct a drive system for a stationary bike that is able to convert the angular movement to electricity. The structure will support and arrange the transfer of mechanical power from the bicycle drive to the generator

Requirements:

These requirements are important to be in the project:

- Must be able to hold the electric motor stable while operating (No deflection more than 0.1 in x, y, or z directions).
- Must be installed without changing the structure of the bike (no more than 20cm).
- Must not vibrate while operating (No more than 0.1 cm).
- Must hold the electrical panel.
- The battery must not deflect more than 0.1” under any operation.
- The cost value of this project will be not more than $300.
- Battery, its 12 V and it has about 3.2 pound.
- Be able to charge small devices (laptop, cell phone, etc.)

Scope of Effort

The scope of this project is designing and constructing a system that can hold the generator, battery, and other equipment while generating electricity.

The Success of the project

Success depends on the final performance of the system when it will be able to produce electricity at certain speed and the mount not vibrate while working on the bike, so the electrical devises can be charged.

Design and Analyses:

The stationary bike generator system will be working by generating electricity by exercising on a stationary bike by the minimum amount of effort. After that, the stationary bike to be capable of charging multiple electric devices at the same time will generate the electricity. In order to generate electricity, an electric motor will be used and a battery with convertor to AC.

Approach: Proposed solution:

1- For the stationary bike, there are two possible structure designs. The first one is that using a beam to support the mount from down duo to the heavy weights of the motor and battery. The sheave would be directly touched with the tire. The second design is using a beam placed at the bottom of the bike connected to the mount from down and a pivot for tensioning the belt to provide more friction force between the sheave and the wheel of the bike, which will be located above the mount.

2- For the power source, will be used an electric motor and battery since they are small size with high efficiency. (See figure 1).

Description (picture, sketch, rendering)

Figure 1: Electric motor

1- An electric motor, this devise will be working while pedaling to generate power to get the battery charged. The motor should provide at least 0.88 amp's current for charging the battery. It's about 8 pounds

2- Battery, its 12 V and it has about 3.2 pound. It will be connected as a parallel circuit in order to deliver a constant voltage for all the electric devices in the system.

Figure 2: (Battery)

3- Mount: The job of this mount is to support the weight of an electric motor and battery, which about 15 pounds. It will be adjustable for moving up and down. (See figure 3).

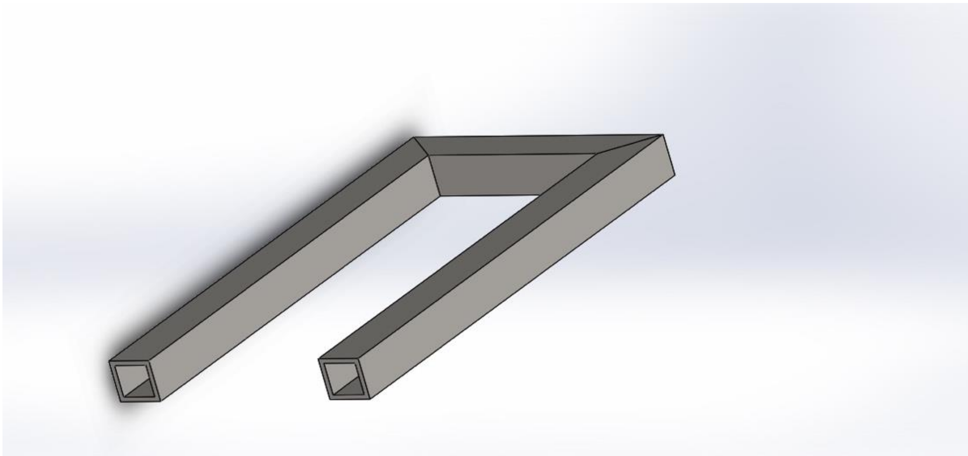


Figure 3: Mount

Benchmark:

As for comparison, there are many stationary bikes system were made around the world. This video that posted on YouTube has the same idea basically (see link below). However, the goal of this senior project is to be more organized and compact to make it looks good.

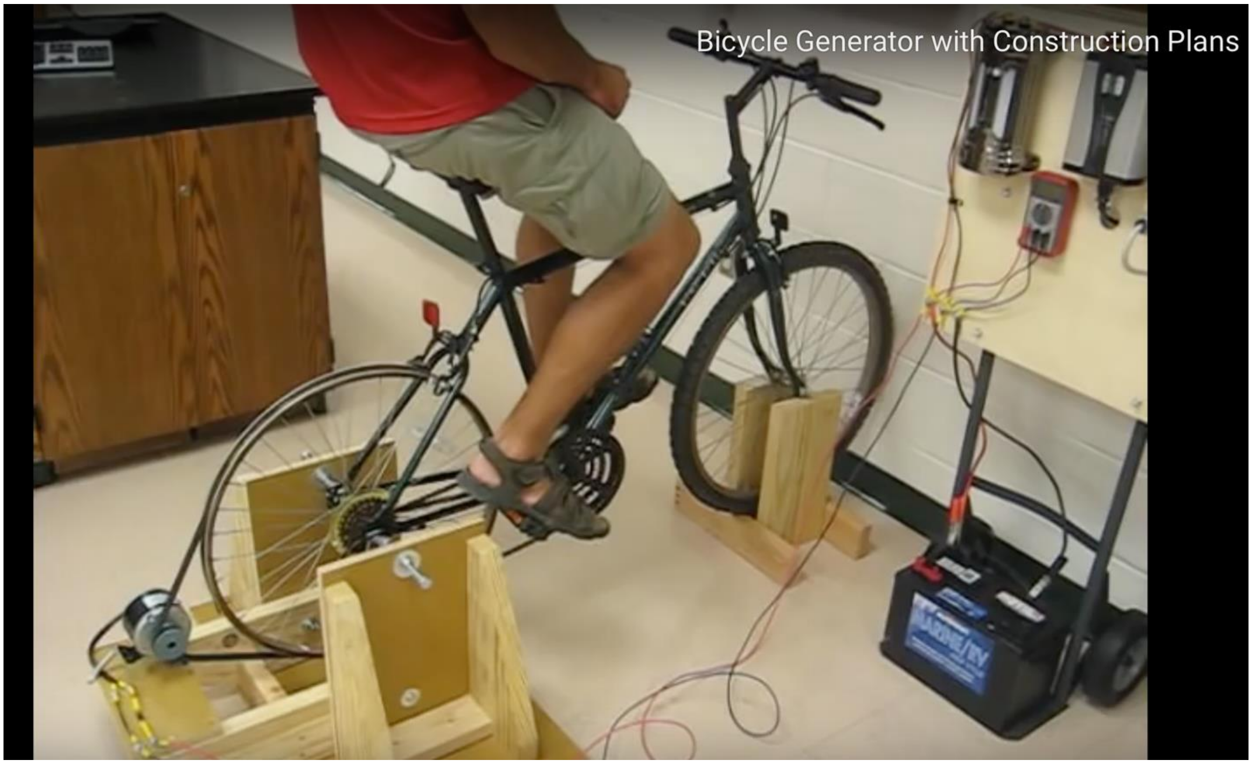


Figure 4: Similar design

Performance prediction:

By pedaling the stationary bike, the motor will generate voltage to charge the battery. The equation $v=\omega r$ where v is the tangential velocity, ω is the angular velocity expressed here in revolutions per minute (rpm), and r is the radius in inches. It will take 15 minutes to fully charged the battery. The fully charged battery will be capable of charging several cell phones and laptops for around 20 minutes.

The cost value of this project will be not more than $300 because almost all the parts will be provided, such as electric motor, battery, convertor, and the bike itself.

The drive train and construction will take approximately 40 hours. Constructing parts which including drawings and calculations will take about 20 hours. The left 20 hours will be spending on the structure.

Description of Analyses:

The parameters of this project are the size of the sheaves. The sizes of the sheaves will be chosen by determining the needed ratios. The motor needs to reach 2256RPM to be able to charge the battery. After doing the calculations, the approximate minimum pedaling was 43.86RPM. Therefore, the sheave that is driven by the wheel should have a diameter of 3in. The sheave that is attached on the motor`s shaft should have a diameter of .995in.

Scope of Testing and Evaluation:

The scope of testing and evaluation on this project will be figuring out if the motor will be able to generate the power needed which is 14.08W to charge the battery. In addition, the 6-v dc battery should be converted to 110 v to charge the devices.

Device Assembly

The mount is made of steel, so it can support heavy weights. The length of it is 5in and width 5in. The aluminum square tubes 1"x1" are going to be placed on the bottom of the beams and mount.

Analysis:

In this project, the right ratios between the sheaves and the length of the belt are critical. The right ratio between the sheaves will provide the RPM needed from the motor to be able to charge the battery. The needed RPM is 2256RPM. 16V is needed to charge at 12V system.

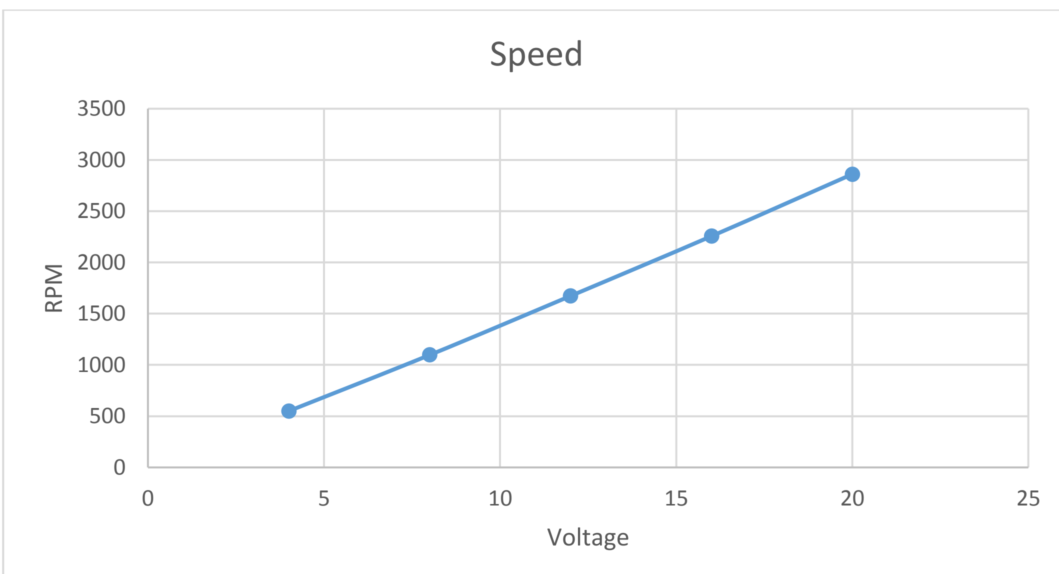


Figure 5: RPM vs Voltage chart

Methods and Construction:

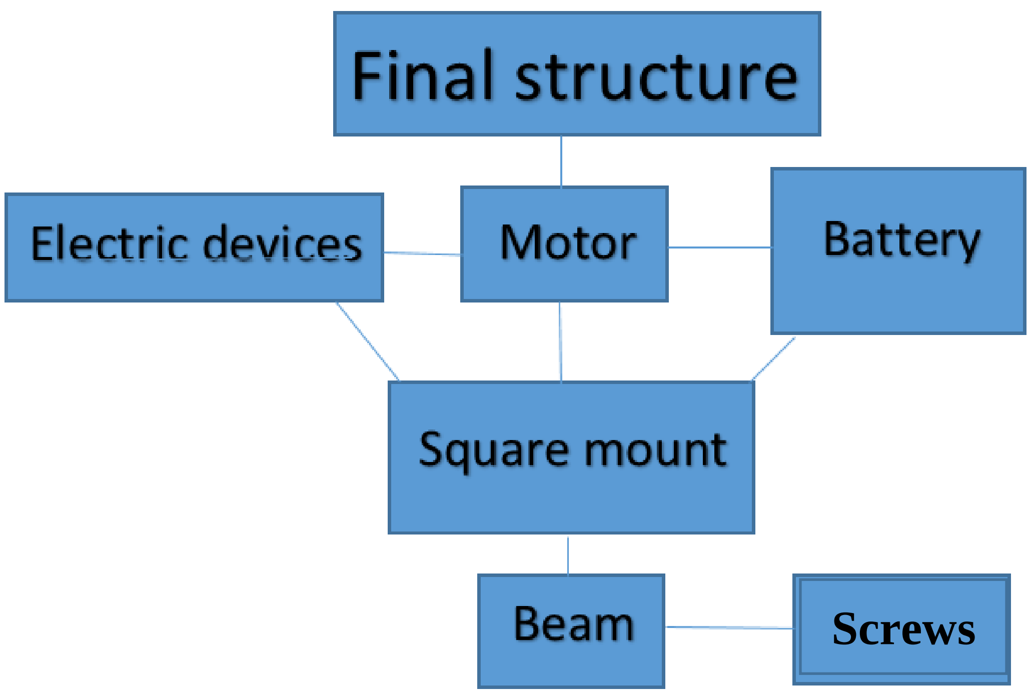
Description:

The frame of the mount will be welded in the welding lab at CWU. This mount will be welded with two beams from down to hold the shaft. There will be two slots on the two beams to hold the shaft and two springs to hold the shaft from moving duo to tension of belt.

Parts List

View the full list of parts in Appendix C.

Drawing Tree:



Discussion of Assembly

It is important for the assembly that both systems structural and drive train to be assembled within the design and the dimensions. The most critical part will be the pivot point because it will provide the tension on the belt and the friction force between the wheel and the sheave.

<u>Parts list</u>

The parts for stationary bike system are the following:

Part	Quantity	cost$	cite
Electric motor	1	114	Povided
12 v battery	1	38	Provided
convertor	1	29	Mcmaster
belt	1	15	Ace
electric outlet	1	6	Amazon
plate	1	15	from Matt
springs	2	10	ACE
washer	6	6	ACE
square tubes	1	30	From Matt
		263	

Figure7: Parts list

As shown on the part table above the total cost is $263. Some of the parts will be purchase online, and the others will be provided from CWU.

<u>Manufacturing issues:</u>
There are many ways could happen about manufacturing the mount. For example, the position of the shaft will be hard to determine. Also, finding the right dimensions for the square tube while welding it. Another issue is that vibration of the sheave while operating, so the mount should be rigid to avoid this issue. Also, placing the motor on the proper place.

Testing Method

<u>Introduction:</u>
There are two tests going to be used in my part of the project (structural part). The first test is to measure the deflection of the motor's mount where in the requirement the deflection must be less than 0.1 in. The second one is to determine the deflection of the basic mount that hold the battery and the electric panel.

<u>Method/Approach:</u>
Test 1
The first method test is to measure the deflection of the motor's mount. A dial indicator and hanging scale will be used to do this test. First, the hanging scale will be attached to the

mount surface from back as well as the dial indicator. Next, the mount will be subjected to loads, and the deflection will be recorded. The dial indicator values will also be recorded before and after each test, to insure that no permanent deformation has occurred.

Test 2

Test 2 will test the overall deflection of the battery's mount. This test will require a dial indicator, steel blocks, and a hanging scale. First, the dial indicator will be placed below the mount. Then, the mount will be subjected to 30-pound load, and the deflection will be recorded with the dial indicator values.

Test procedure:

Motor's mount test

Time: 2 hour

Place: Thermodynamics Lab

Procedure

1. Place the electric motor on the mount and tight it to make it fixed on place.
2. Put the belt on the sheave of the motor and tension it.
3. Start pedaling the bike at variable speeds (110rpm).
4. Start looking for any vibrations or misalignment.
5. Attach the hanging scale from inside the mount, so it can be ready to pull.
6. Attach the dial indicator on the mount and set the dial to zero.
7. Pull and Apply up to 50 pounds.

8. Record this value, release the tension and repeat two more times to find an average.

   The main safety concern here is breaking the mount while applying pounds of force, and if the belt tensioned so hard to be cut.

Battery and electronics' panel mount Test

Time: 1 hour

Place: Thermodynamics Lab

1. Below the mount, place the dial indicator pointing straight up
2. Adjust the dial indicator, and set the dial to zero.
3. Apply up to 30 pounds of force on the mount
4. Measure the deflection on the dial indicator.
5. Remove the force and record the final value of the dial indicator, to ensure that no permanent deformation has occurred.
6. Repeat this process two more times and find an average value.

Deliverables
Test 1
The design requirements states that the deflection must be less than 0.1 in.
Experimental Data:

Force(lb)	Deflection(in)
2	0.01
3	0.02
4	0.02
5	0.023
7	0.028

Test 2
Experimental Data:

Force(lb)	Deflection(in)
8	0.01
15	0.03
20	0.05
25	0.06
30	0.12

Once the test is being made and everything works as planned, the final subproject will be putting together, and it will be ready to work. In other cases of failure, a solution should be planed a head to correct whatever needs to be corrected by changing the size of mount or corrected the measurements of the beams.

Budget and Schedule

Proposed Budget:

The schedule for this project is constrained by the MET 495 course, and it is shown in Appendix C. Most of the parts that are required to build this project well be provided duo to the previous versions of this project. The rest of those parts are available on line on Amazon and Mc master car, and ACE. In addition, some parts will be made in CWU labs. Other equipment that needs to be purchased for the fabrication includes the tools necessary for this part.

Part suppliers and costs:

University recreation supplied the spinning bike. (See appendix C 1)

Part	Quantity	cost$	cite
Electric motor	1	114	Povided
12 v battery	1	38	Provided
convertor	1	29	Mcmaster
belt	1	15	Ace
electric outlet	1	6	Amazon
plate	1	15	from Matt
springs	2	10	ACE
washer	6	6	ACE
square tubes	1	30	From Matt
		263	

Figure 8: Budget

Estimate total project cost:

The estimated cost for this project will need is around $263. This price does not include some parts that supplied from CWU.

Funding Sources:

Funding for this project will come from personal expenses and Saudi Arabia Culture Mission.

Schedule

Time plays a great role to success any project. This schedule is detailed in Appendix E, and it is subjected to change to help organizing this project and ensure that it will be completed on time. It points out the main tasks. The estimated time to complete the structure portion of this project is 56 hours.

Project Management:

Human Resource:

This project would not be completed without helping from the project partner Abdullah Alsuhaim. He helped in brain storming and planning the project. In addition, Dr. Johnson, prof. Pringle, and prof. Beardsley were a big help with answering questions regarding the proposal.

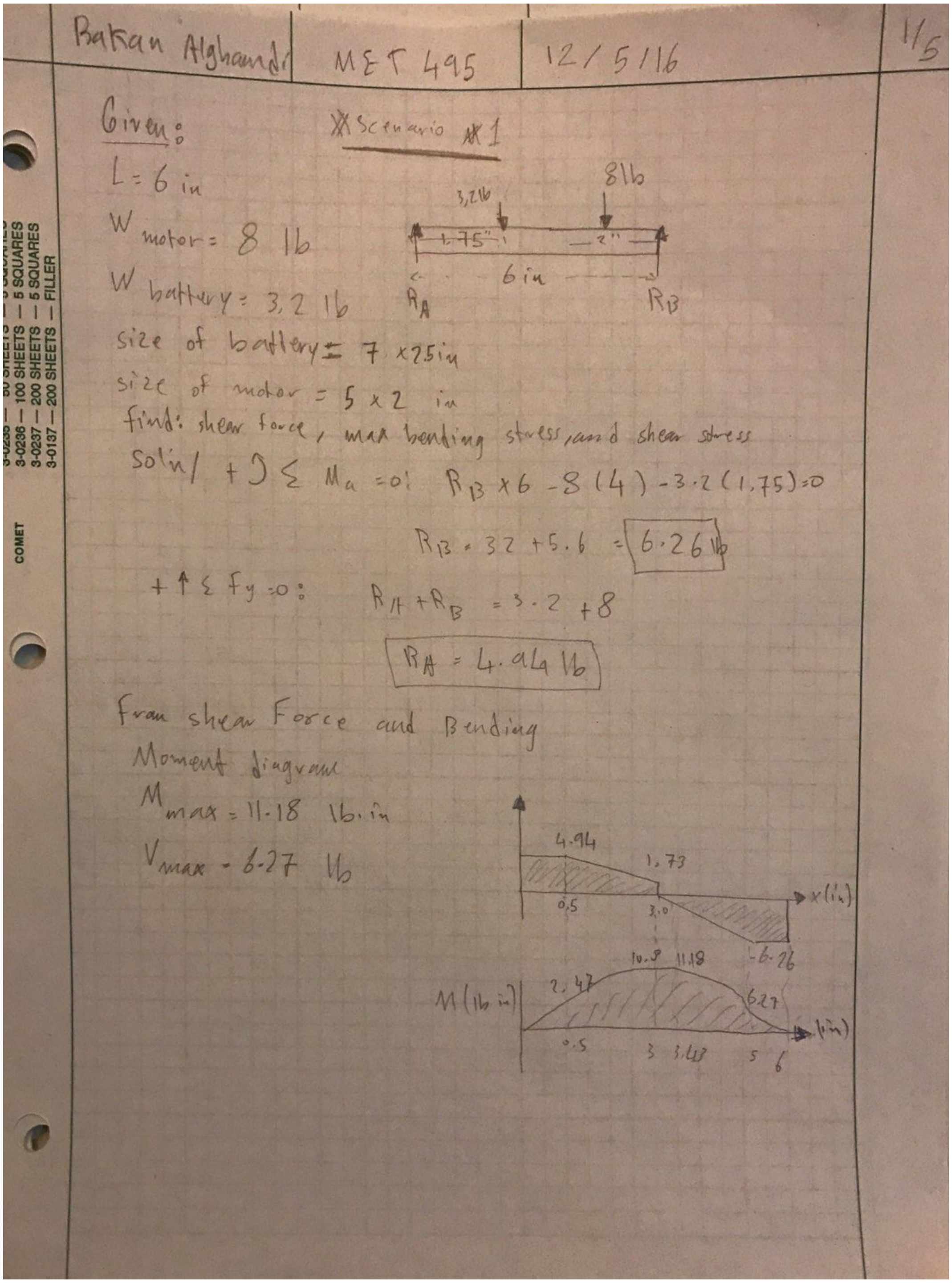
Conclusion

The purpose of this project is to generate electricity by exercising on a stationary bike. The electricity generated by the stationary bike will be capable of charging multiple electric devices at the same time. For example, laptops and phones. This project is divided into three major subprojects, which are structure the square mount, drive train, and charge electric devices. The mount is going to be supported by a beam to hold the battery and motor, and this mount will be in front of the bike's tire, therefore this mount must be rigid while exercising. The drive train will be designed by using a belt system. There will be a sheave that is driven by the wheel and connected by using a belt with another sheave to be driven the shaft of the motor. After assembling both parts structural and drive train, the whole system should be functional, so by exercising on the bike the motor will rotate at certain speed so the battery will be charged. The MET department here at CWU offers classes such as machining, welding, design, and statics. These classes teach the necessary skills required to design and construct this project.

Acknowledgements

Acknowledgements of appreciation go out to CWU for funding this project by providing the basic parts such as the bike, electric motor, and electric devices. In addition, a special thanks to Professors Roger Beardsley, Craig Johnson, and Charles Pringle for all their time giving feedback and helping with technical and mechanical expertise to success this project.
Finally, thanks to my partner Abdullah Alsuhaim for his assistance and support to improve this project.

Appendix A:



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Given: Scenario #1

$L = 6$ in

$W_{motor} = 8$ lb

$W_{battery} = 3.2$ lb

size of battery = 7 x 2.5 in

size of motor = 5 x 2 in

find: shear force, max bending stress, and shear stress

3.2lb
8lb
1.75"
2"
6 in
R_A
R_B

sol'n/ $+\circlearrowright \sum M_a = 0$: $R_B \times 6 - 8(4) - 3.2(1.75) = 0$

$R_B = 32 + 5.6 = 6.26$ lb

$+\uparrow \sum F_y = 0$: $R_A + R_B = 3.2 + 8$

$R_A = 4.94$ lb

From shear Force and Bending Moment diagram

$M_{max} = 11.18$ lb·in

$V_{max} = 6.27$ lb

4.94
1.73
x(in)
0.5
3.0
-6.26
10.8
11.18
2.47
6.27
M(lb·in)
0.5
3
3.43
5
6
x(in)

Continious

$I = \frac{1}{12} bh^3 = \frac{1}{12}(6)(1) = \frac{1}{2}\ in^3$

$A = b \times h = 1 \times 6 = 6\ in^2$

So, the max bending stress is

$\sigma_{max} = \frac{M \cdot c}{I} = \frac{11.18 \times \frac{1}{2}}{\frac{1}{2}} = 11.18\ psi$

$c = h/2$

So maximum shear stress in case of rectangular section

$\tau_{max} = 1.5 \frac{V}{A} = 1.5\left(\frac{6.26}{6}\right) = 1.565\ psi$

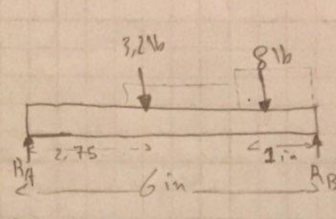
Scenario #2: Now we change the load position and check the bending and shear stress.

* We consider weight of motor and battery as distributed load.

$I = 1/12 \times 6 \times (1)^3 = 0.5 \ in^3$

$A = b \times h = 6 \times 1 = 6 \ in^2$

* Calculate the support reactions



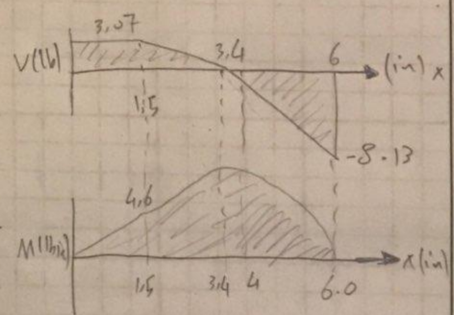
$+\circlearrowleft \sum M_B = 0: -(R_A \times 6) + (8 \times 1) + (3.2 \times 3.25) = 0$

$R_A = 3.07 \ lb$

$+\uparrow \sum F_y = 0: R_A + R_B - 3.2 - 8 = 0$

$R_B = 8.13 \ lb$

x (in)	V (lb)	M (lb.in)
0.0	3.07	0.0
1.5	3.07	4.6
3.9	0.0	8.27
4.0	-0.13	8.27
6.0	-8.13	0.0



$M_{max} = \boxed{8.27 \ lb.in}$, $V_{max} = \boxed{8.13 \ lb}$

Bending stress in beam

→ distance from N.A

$\sigma_{max} = \frac{M_{max} \cdot c}{I} = \frac{8.27 \times 0.5}{0.5} = \boxed{8.27 \ psi}$

Max shear stress in rectangular Beam

$\tau_{max} = 1.5 \ \tau_{avg} = 1.5 \ \frac{V}{A} = 1.5 \left(\frac{8.13}{6}\right) = \boxed{2.0325 \ psi}$

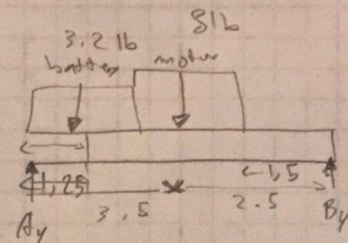
Scenario #3

$+\uparrow \Sigma F_y = 0: A_y + B_y = 8 + 3.2 \rightarrow ①$

$+\circlearrowleft \Sigma M_A = 0: (B_y \times 6) - (8 \times 3.5) - 3.2(1.5) = 0$

$B_y = 5.33$ lb

$A_y = 5.87$



$+\uparrow \Sigma F_y = 0: A_y + B_y = 8 + 3.2 \rightarrow ①$

$+\circlearrowleft \Sigma M_A = 0: (B_y \times 6) - (8 \times 3.5) - 3.2(1.5) = 0$

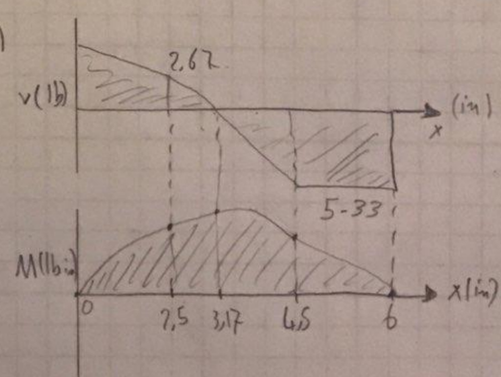
$B_y = 5.33$ lb

$A_y = 5.87$ lb

$I = \frac{1}{12} b h^3 = \frac{1}{12}(6)(1) = 0.5 \ in^3$

$A = b \times h = 6 \times 1 = 6 \ in^2$

x (in)	V (lb)	M (lb in)
0	5.87	0.0
2.5	2.67	10.67
3.17	-0.01	11.56
4.5	-5.33	8
6.0	-5.33	0



$M_{max} = 11.56$ lb·in

$V_{max} = 5.87$ lb

Continous

$$\sigma_{max} = \frac{MC}{I} = \frac{11.56 \times 0.5}{0.5} = 11.56 \text{ psi}$$

$$\tau_{max} = 1.5 \frac{V}{A} = 1.5 \left(\frac{5.87}{6}\right) = 1.4675 \text{ psi}$$

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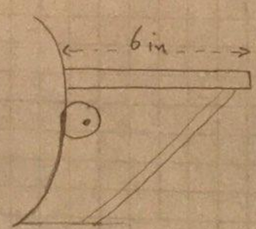
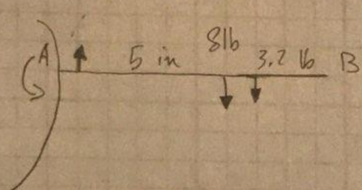
Find: A_y

Given: weight of motor = 8 lb
weight of battery = 3.2 lb
Length of bar = 6 in



Solution/



$$\circlearrowright + M_B = 0: \; -3.2\text{ lb}(.5\text{ in}) - 8\text{ lb}(1\text{ in}) + A_y(6\text{ in}) = 0$$

$$A_y = \frac{1.6\text{ lb.in} + 8\text{ lb.in}}{6\text{ in}}$$

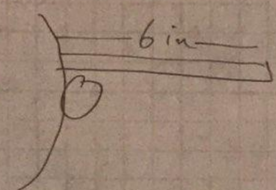
$$\boxed{\uparrow A_y = 1.6 \text{ lb}}$$

Find: B_y

Given: motor = 8 lb

battery = 3.2 lb

length of bar = 6 in



Sol'n/ $F_y = A_y - 8\ lb - 3.2 + B_y$

$B_y = -1.6 + 8 + 3.2$

$\boxed{B_y = 9.6\ lb \uparrow}$

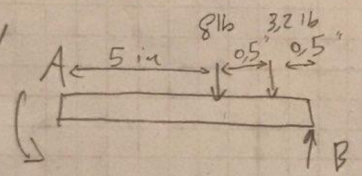
Find: Moment on A

Given: L = 6 in

motor = 8 lb

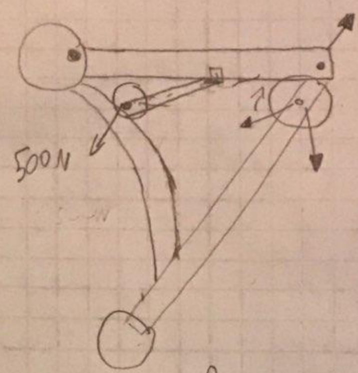
battery = 3.2 lb

sol'n /



$$M_A = 8\text{ lb}(5\text{ in}) + 3.2\text{ lb}(5.5) - (9.6)(6\text{ in})$$

$$\boxed{= 0}$$



Find: Friction Force

Given:

$f = 0,3$

$w = 142$ RPM

rod $= 20$ cm

$Pwr = 450$ W

Sol'n/

$$F_f = f F_N$$

$$F_N = \frac{F_F}{f} = \left(\frac{Pwr}{VEL}\right)\frac{1}{f}$$

$$= \frac{(450\,w)\left(\frac{1\,N\cdot m/sec}{1\,w}\right)}{(.20\,m)\left\{(142\,rev/min)\left(\frac{2\pi\,rad}{1\,rev}\right)\left(\frac{1\,min}{600\,sec}\right)\right\}(0,30)}$$

$$= \boxed{504\ N}$$

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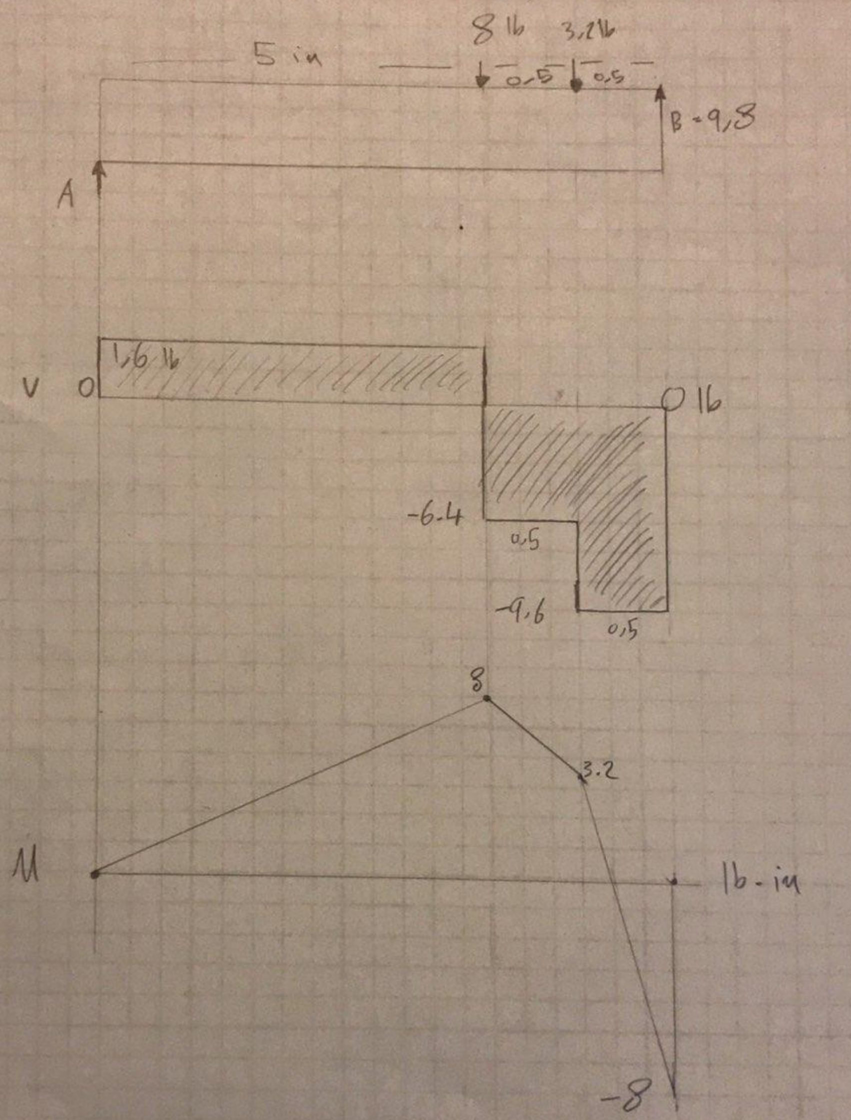
Shear Moment Diagram , Moment Diagram



speed of the bike:

4 V = 550 RPM → 0,70 A

8 V = 1097 RPM → 0,77 A

12 V = 1673 RPM → 0,83 A

16 V = 2256 RPM → 0,88 A

20 V = 2861 → 0,96 A

* Rev per one pedal = 3.25

Radius = 20 cm

Length of the stand = 8 cm

shaft = 0,393"

Diameter of the motor = 4"

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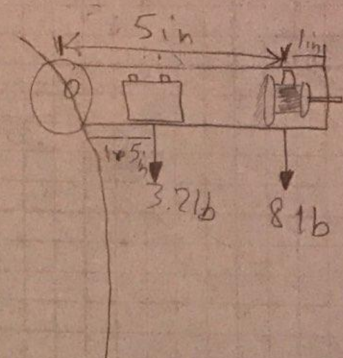
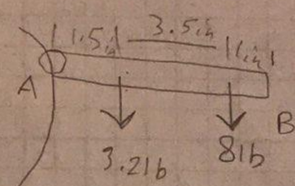
3-0235 — 50 SHEETS — 5 SQUARES
3-0236 — 100 SHEETS — 5 SQUARES
3-0237 — 200 SHEETS — 5 SQUARES
3-0137 — 200 SHEETS — FILLER

COMET





$+\circlearrowleft M_B = 0: \; M_B = (4.5in)(3.2lb) + (1in)(8lb)$

$$\boxed{M_B = 22.445 \text{ in}\cdot\text{lb}}$$

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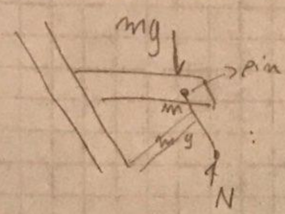
find: Normal force + friction force

Sol'n/

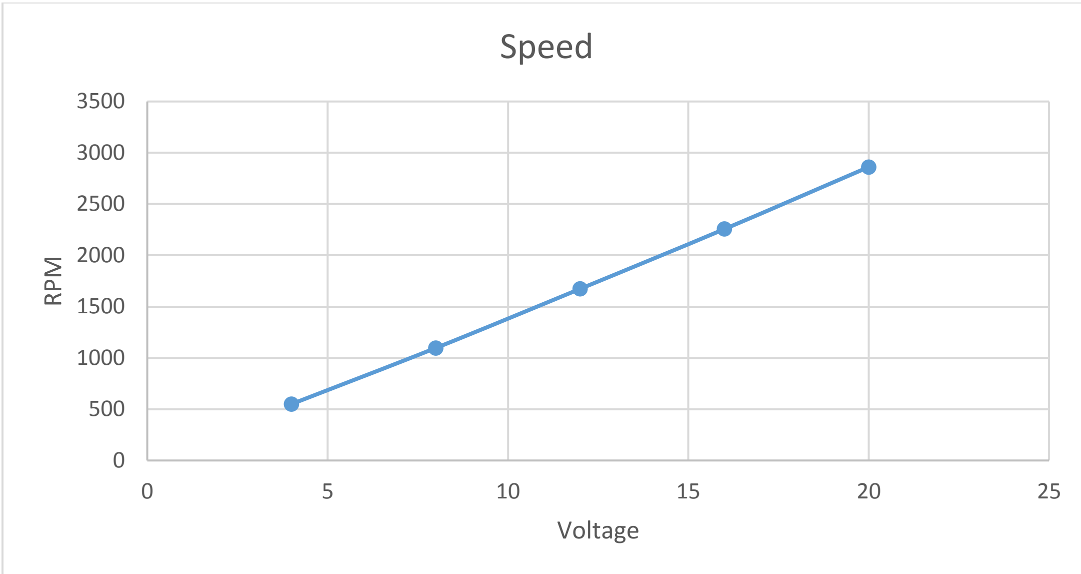


$f = 0.3$

$$F_N = \frac{14.08}{0.3 \times 0.628}$$

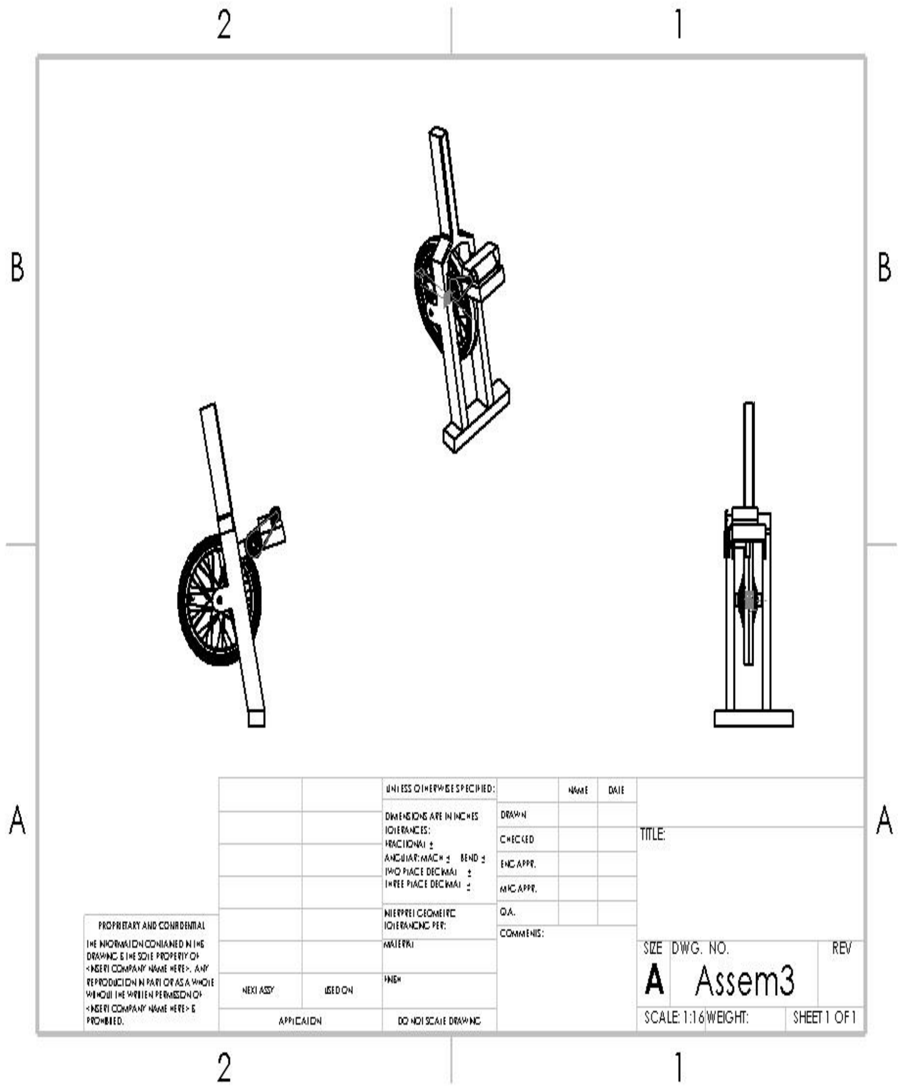
$$\boxed{F_N = 74.697\ N}$$

$$F_f = \mu F_N$$
$$= (0.3)(74.697)$$
$$= \boxed{22.41\ N}$$



RPM vs Voltage chart

Appendix B: Drawings



Assembly drawing

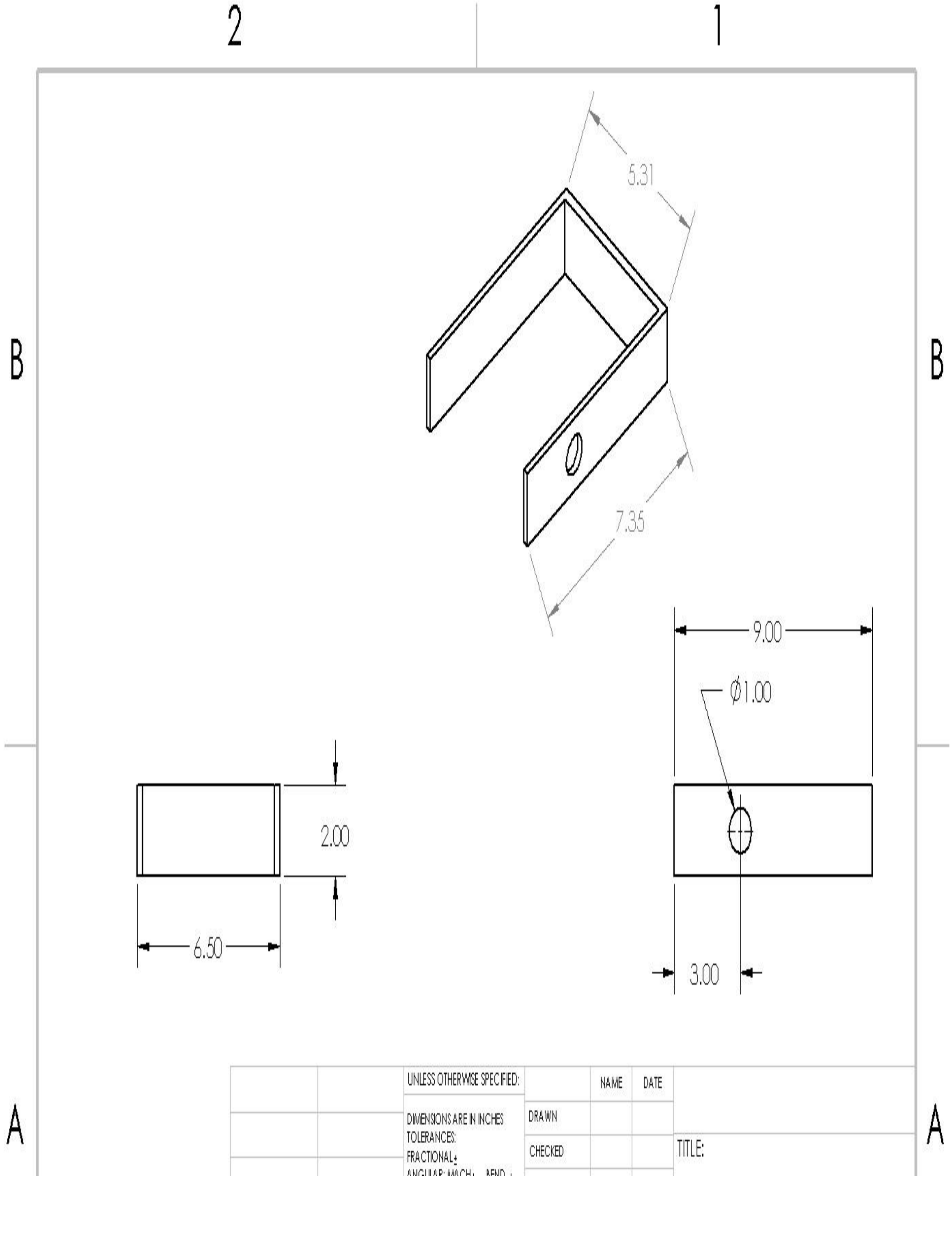


Figure: Mount

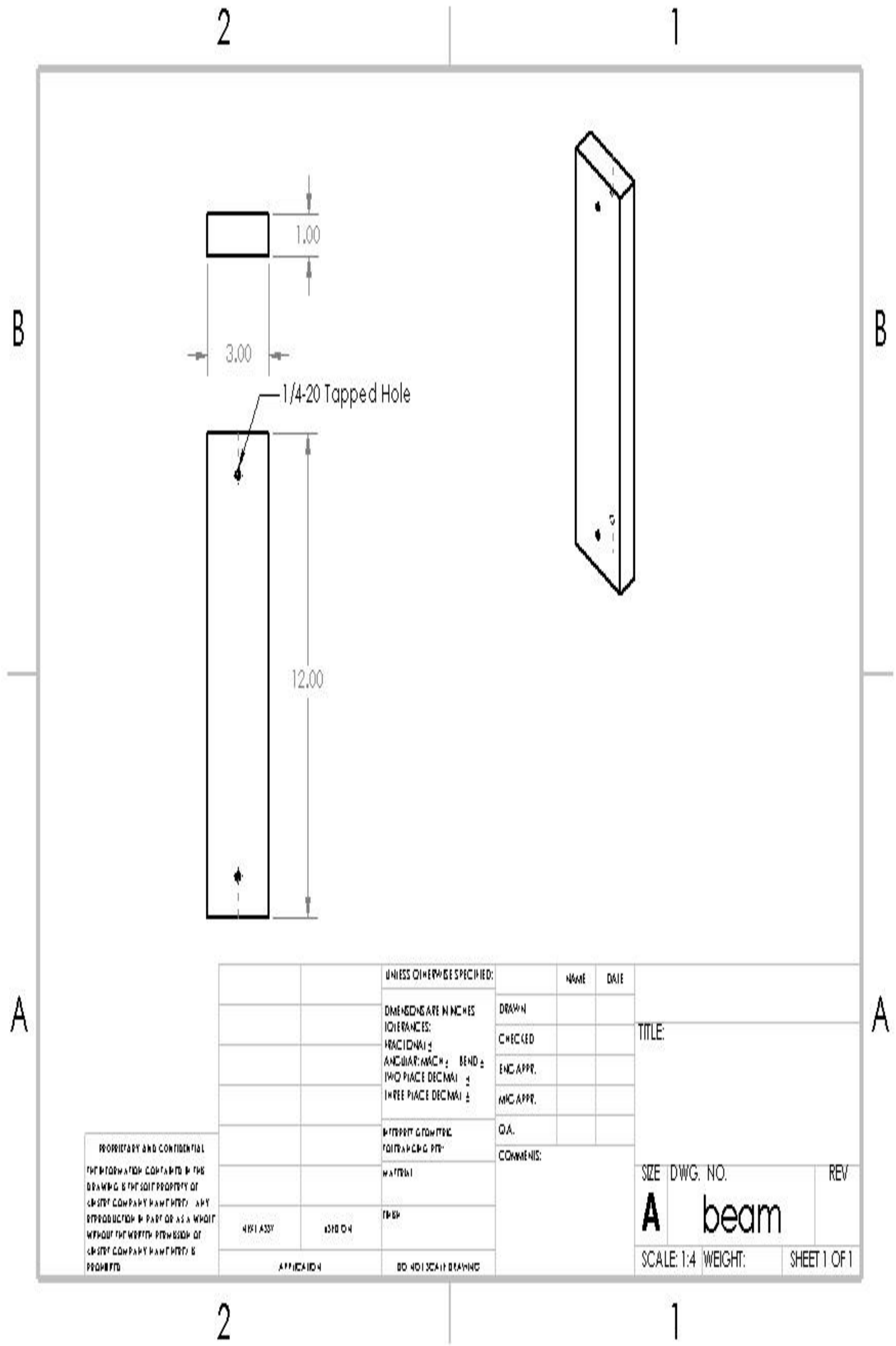
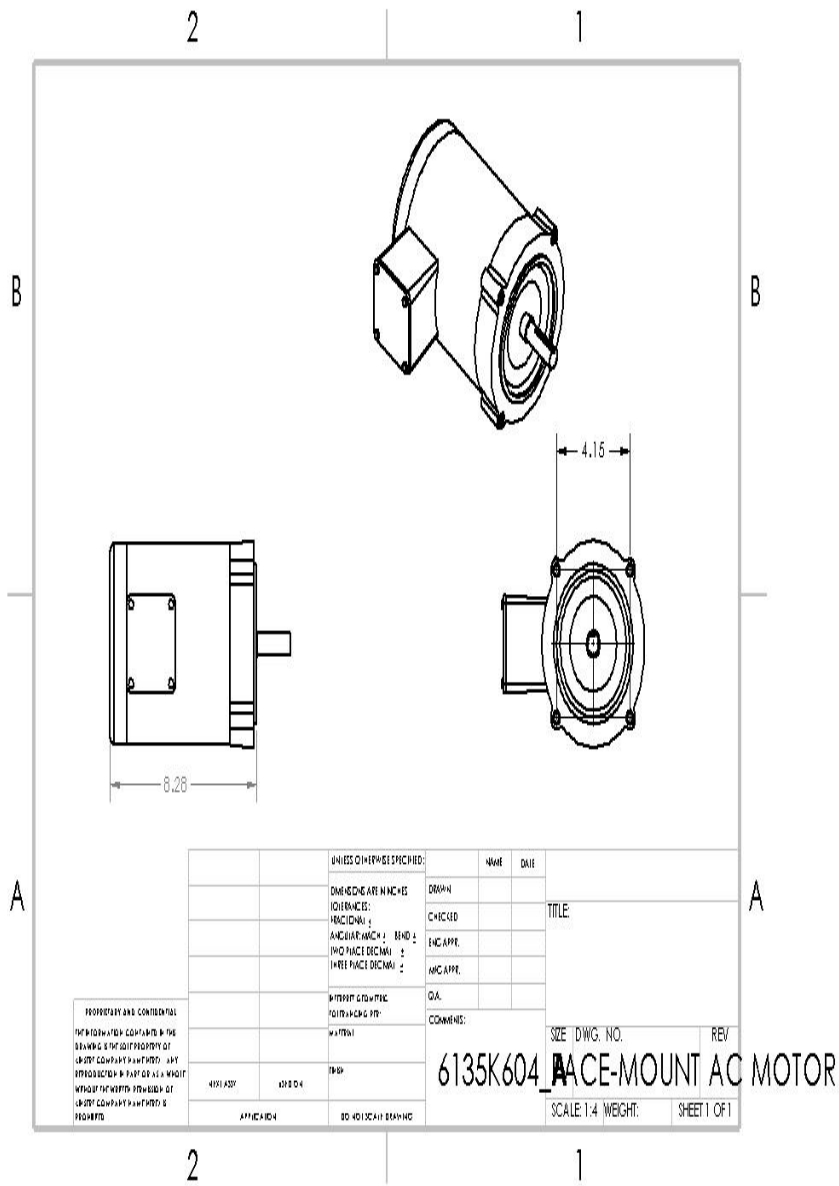
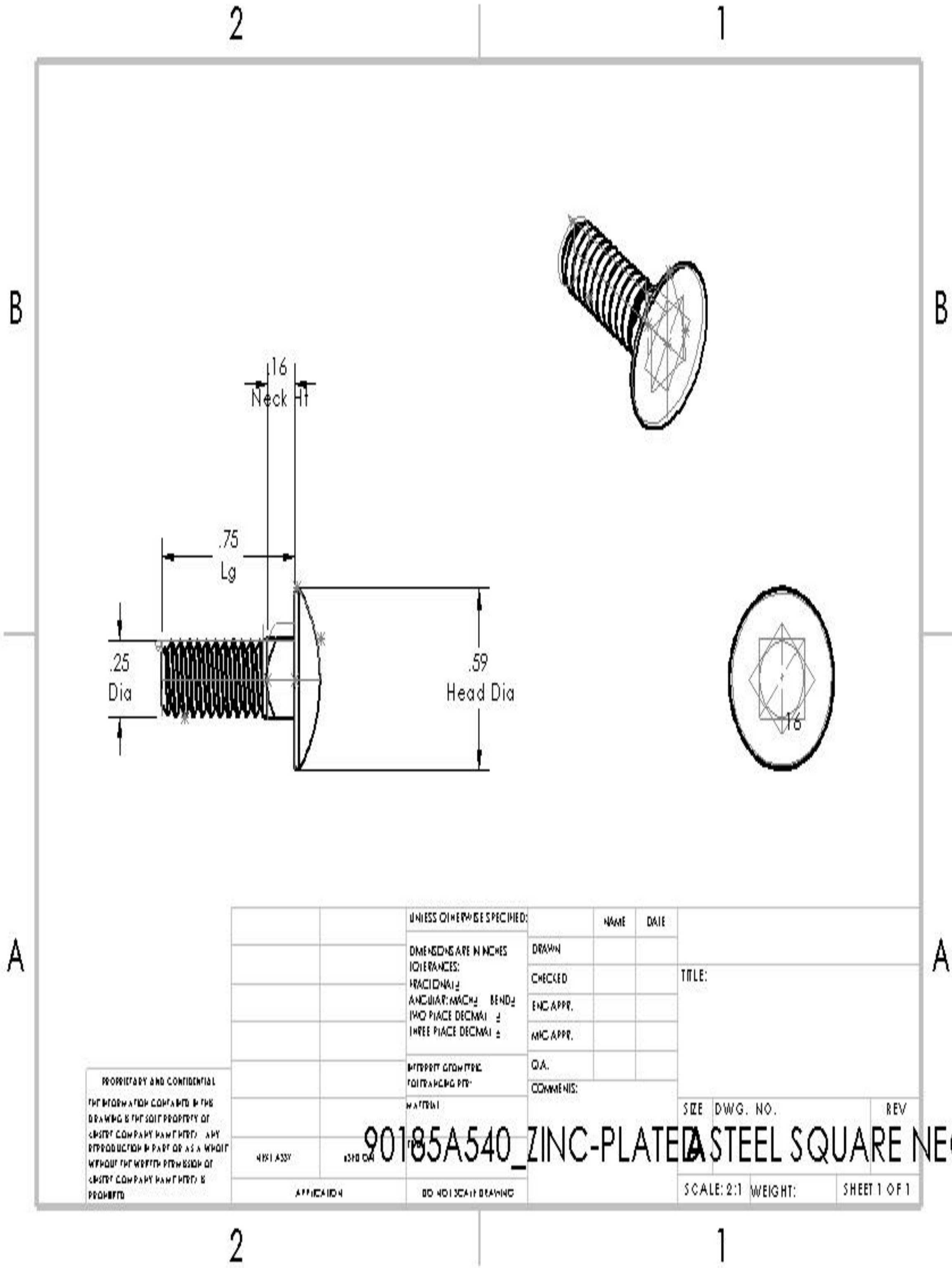

1.00
3.00
1/4-20 Tapped Hole
12.00
UNLESS OTHERWISE SPECIFIED:
NAME
DATE
DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
TITLE:
SIZE
DWG. NO.
REV
A
beam
SCALE: 1:4
WEIGHT:
SHEET 1 OF 1
APPLICATION
DO NOT SCALE DRAWING

Figure: Beam

Electric motor




.16
Neck Ht
.75
Lg
.25
Dia
.59
Head Dia
.16
UNLESS OTHERWISE SPECIFIED:
NAME
DATE
DIMENSIONS ARE IN INCHES
DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:
TITLE:
PROPRIETARY AND CONFIDENTIAL
APPLICATION
DO NOT SCALE DRAWING
SIZE DWG. NO.
REV
90185A540_ZINC-PLATED STEEL SQUARE NE
SCALE: 2:1
WEIGHT:
SHEET 1 OF 1

Bolt

Appendix C

Part	Quantity	cost$	cite
Electric motor	1	114	Povided
12 v battery	1	38	Provided
convertor	1	29	Mcmaster
belt	1	15	Ace
electric outlet	1	6	Amazon
plate	1	15	from Matt
springs	2	10	ACE
washer	6	6	ACE
square tubes	1	30	From Matt
		263	

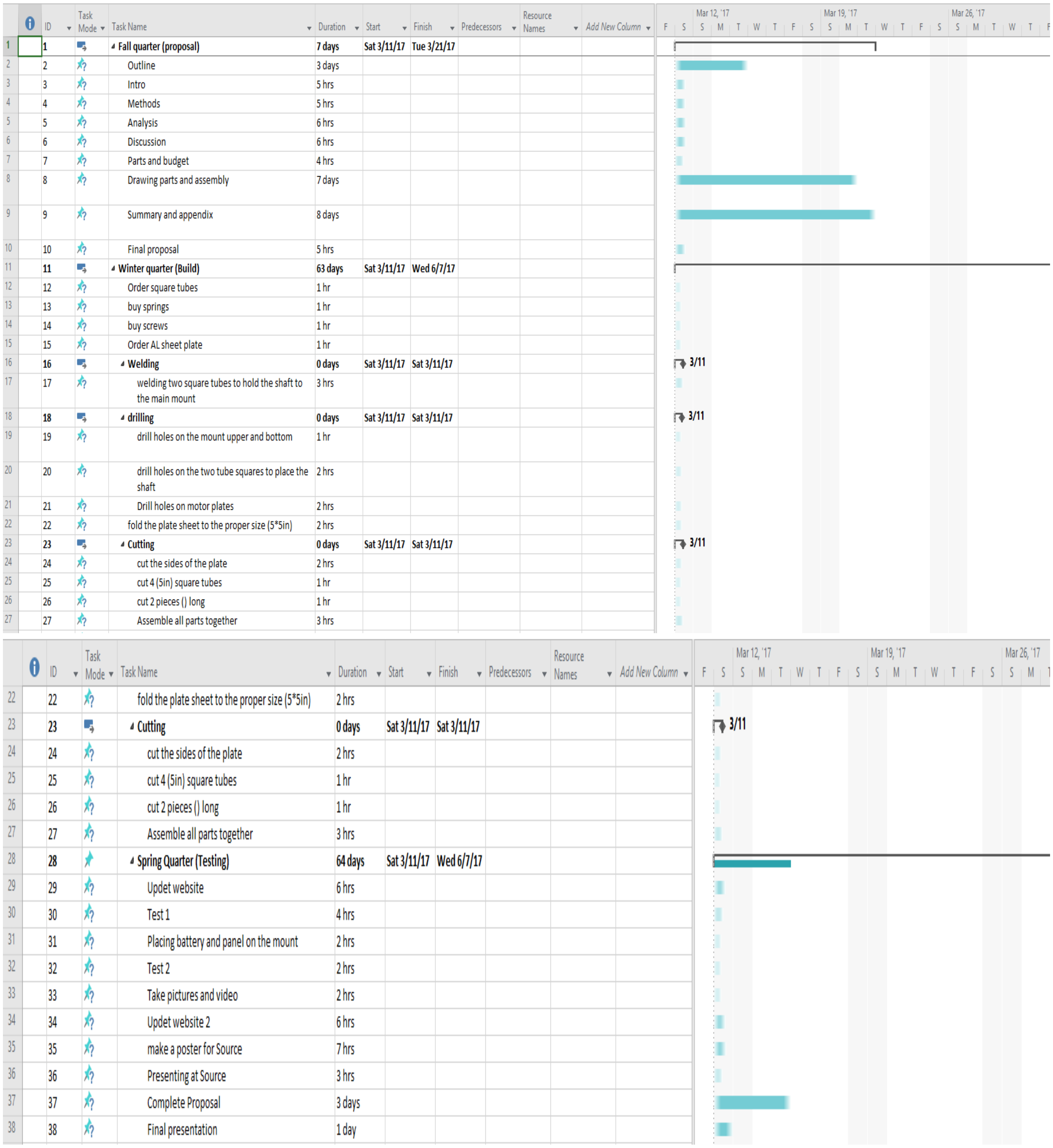
Parts list

Appendix D:

Part	Quantity	cost$	cite
Electric motor	1	114	Povided
12 v battery	1	38	Provided
convertor	1	29	Mcmaster
belt	1	15	Ace
electric outlet	1	6	Amazon
plate	1	15	from Matt
springs	2	10	ACE
washer	6	6	ACE
square tubes	1	30	From Matt
		263	

Budget

Appendix E:



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Add New Column
1		Fall quarter (proposal)	7 days	Sat 3/11/17	Tue 3/21/17			
2		Outline	3 days					
3		Intro	5 hrs					
4		Methods	5 hrs					
5		Analysis	6 hrs					
6		Discussion	6 hrs					
7		Parts and budget	4 hrs					
8		Drawing parts and assembly	7 days					
9		Summary and appendix	8 days					
10		Final proposal	5 hrs					
11		Winter quarter (Build)	63 days	Sat 3/11/17	Wed 6/7/17			
12		Order square tubes	1 hr					
13		buy springs	1 hr					
14		buy screws	1 hr					
15		Order AL sheet plate	1 hr					
16		Welding	0 days	Sat 3/11/17	Sat 3/11/17			
17		welding two square tubes to hold the shaft to the main mount	3 hrs					
18		drilling	0 days	Sat 3/11/17	Sat 3/11/17			
19		drill holes on the mount upper and bottom	1 hr					
20		drill holes on the two tube squares to place the shaft	2 hrs					
21		Drill holes on motor plates	2 hrs					
22		fold the plate sheet to the proper size (5*5in)	2 hrs					
23		Cutting	0 days	Sat 3/11/17	Sat 3/11/17			
24		cut the sides of the plate	2 hrs					
25		cut 4 (5in) square tubes	1 hr					
26		cut 2 pieces () long	1 hr					
27		Assemble all parts together	3 hrs					

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Add New Column
22		fold the plate sheet to the proper size (5*5in)	2 hrs					
23		Cutting	0 days	Sat 3/11/17	Sat 3/11/17			
24		cut the sides of the plate	2 hrs					
25		cut 4 (5in) square tubes	1 hr					
26		cut 2 pieces () long	1 hr					
27		Assemble all parts together	3 hrs					
28		Spring Quarter (Testing)	64 days	Sat 3/11/17	Wed 6/7/17			
29		Updet website	6 hrs					
30		Test 1	4 hrs					
31		Placing battery and panel on the mount	2 hrs					
32		Test 2	2 hrs					
33		Take pictures and video	2 hrs					
34		Updet website 2	6 hrs					
35		make a poster for Source	7 hrs					
36		Presenting at Source	3 hrs					
37		Complete Proposal	3 days					
38		Final presentation	1 day					

Figure: Gantt chart

Appendix J – Resume

RAKAN ALGHAMDI

alghamdir@cwu.edu
1902 N Walnut St #6b, Ellensburg, WA 98926
(425) 772-9109
https://rakanahmed4.wixsite.com/mysite

Objective:

A dedicated and highly motivated person aims to get a job that allows me to improve my Engineering skills.

Education:

2013 *Jubail Industrial College

Associate degree in Mechanical Engineering Technology from Saudi Arabia.

2017 *Central Washington University

Bachelor in Mechanical Engineering Technology

***English Language Program**

1- Edmonds Community College 2014

2-Ielts certification

Experience:

Internship at Schlumberger Company for four months in Saudi Arabia.

Presented at Source 2017 in CWU

Skills:

*Machining.

*Solidwork program.

* Advanced in Microsoft Excel, Word, and PowerPoint.

* Time management.

* Good teamwork.

References:

Available Upon Request.