



# Go-Kart Drive Train 2024 Capstone

## By: Henry Bobbette, Jack Storms

### Introduction

- This years mechanical engineering capstone was a redesign of the electric go-kart. This was originally used as a project many years ago. The biggest issue was the chain falls off.



### Background

- The group was split into two groups, the drive train and the batteries.
- Upon receiving this the chain was falling off the mount when operating and the entire motor mount was moving due to the torque and other forces on the mount.

Table 1: Design Requirements

<b>Needs</b>	Stop chain from falling off	
<b>Should</b>	$A \geq 5 \text{ m/s}$	Top Speed of 30 mph
<b>Wants</b>	Aesthetic	

Table 2: Preliminary Gearing Calculations

Gear Ratios	RPM	Speed (MPH)
4.5	768	26.2
4	864	29.5
3	1152	39.4
2	1178	59.1

### Objectives

- The main objective is to design a new drive train that prevents the chain from falling off.
- To fix these problems a redesign of the motor mount, including a chain tensioner, adjusting sizes of and ordering new gears.

Table 3: Weighted objectives table for drive types

Types of Drives	Weight	Chain	Gear	Belt
Weight	4	5	6	7
Losses	3	2	4	6
Working Load	2	3	3	7
Initial Cost	7	7	4	4
Minimize Work	5	7	1	4
Maintenance	4	6	4	7
Practicality	6	7	6	4
Reliability	7	6	7	5
Top Speed	6	6	6	6
Totals		248	194	219

### Design

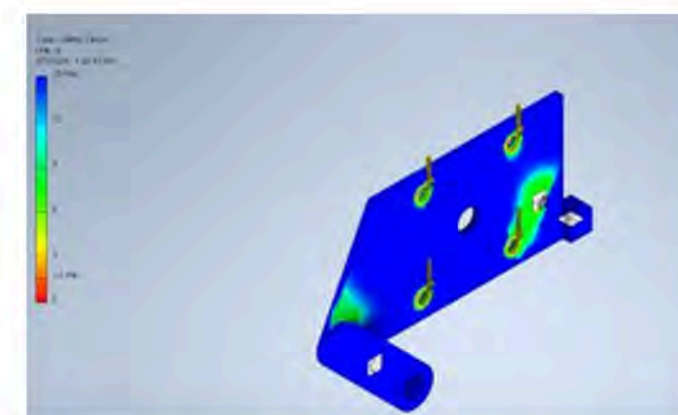
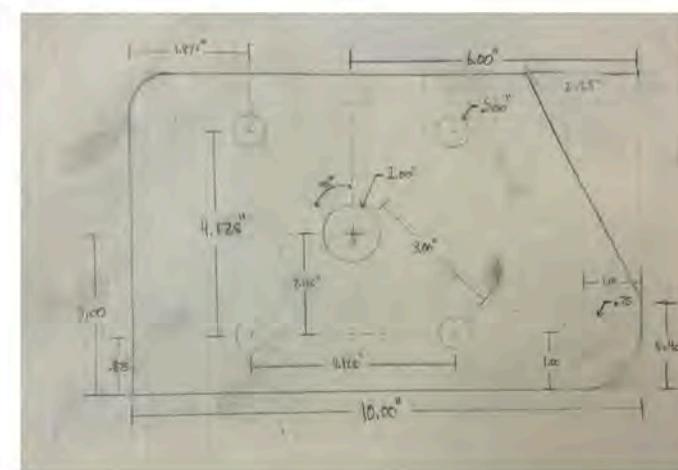


Figure 1: Frame design stress analysis



Sketch 1: Motor mount body

- This was the final design. It is thicker steel to prevent deformation and to keep the chain on tight.

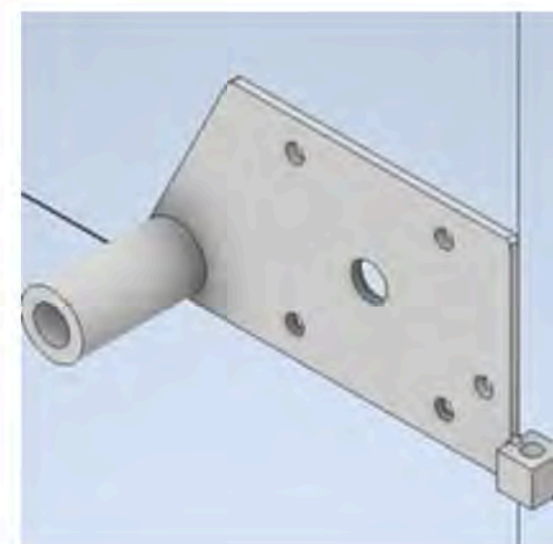


Figure 2: Frame

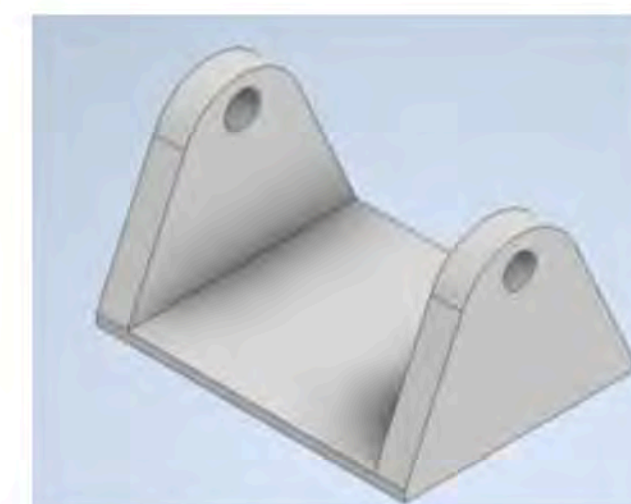
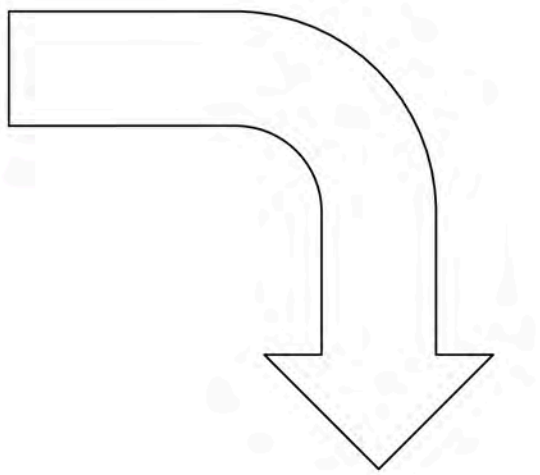


Figure 3: Mount

- This is the mounting bracket design which will secure the front of the motor mount frame.

### Process

- Talking to professors and getting ideas and requirements that need to be achieved was the first step.
- After that making drawings for parts and designs was the focus.
- Using an Inventor simulation an FEM (Finite Element Methods) test was done to see what models would collapse or stay standing and the deformation happening.
- Once all designs were made manufacturing parts became the new focus.



- These are the finished photos of our drive train.

### Results / Lessons Learned

- By following this process and around 10 different designs we were able to decide on this new mount.
- We were able to design a chain tensioner right into our motor mount to push the entire mount up away from the kart.
- For cost and time efficiency we have been using materials Mr. Haney already has laying around the shop.

