

# SAE Baja - Drivetrain

## Progress Presentation

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# Overview

- Introduction
- Recap
- CAD
- Testing
- Machining/Assembly
- Gantt Chart
- Conclusion

# Introduction

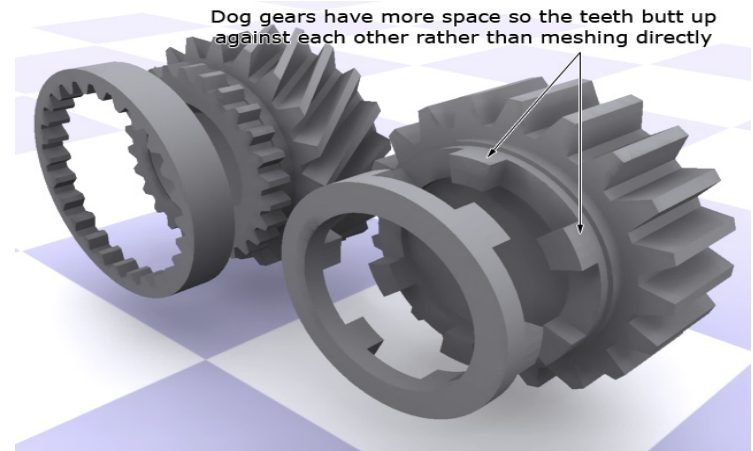
- SAE sponsored
- Design drivetrain within SAE Baja rules
- Customer requires reverse, lightweight, and safe
- Establish testing/operating environment
- Updated Gantt Chart for Spring 2015

# **Problem Definition and Project Goal**

Design and develop a drivetrain that is able to attain the desired torque and speed for the SAE Mini Baja in order to place in the top 10 in the Hill Climb and Acceleration challenges against competing universities

# Recap

- Sequential Gearbox design chosen
  - **Short shift times**
  - Little loss of power
  - Lightweight/Compact
  - Simple to operate
  - Stronger and more reliable



(Sequential Dog ring compared to Manual Dog ring)

# Specifications

## Gears

- Ratios: Crawler: **2.70 : 1** 1st: **1.24 : 1** 2nd: **1 : 1** 3rd: **0.696 : 1** Reverse: **1.20 : 1**
- Gear Material: 7075-T6 Aluminum
- Factor of Safety: **6.2**

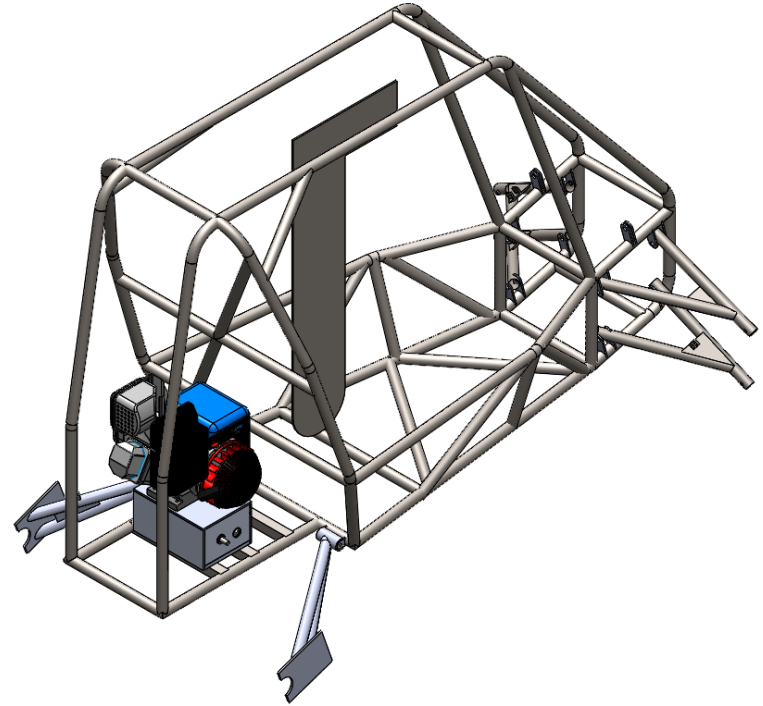
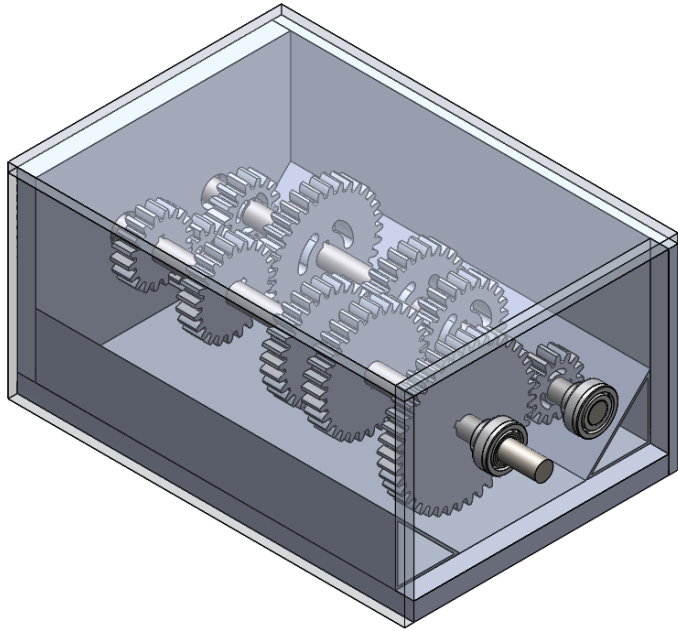
## Shafts

- Shaft Material 4340 Normalized Steel
- 0.5 inch diameter solid shaft
- Factors of Safety: Input shaft = **2.94**    Output shaft = **2.00**

## Bearings

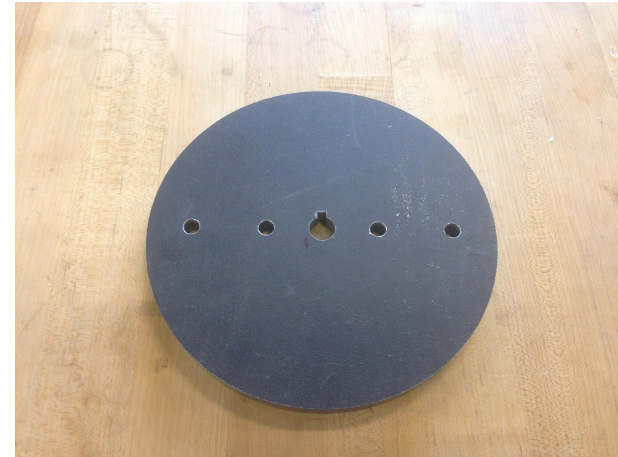
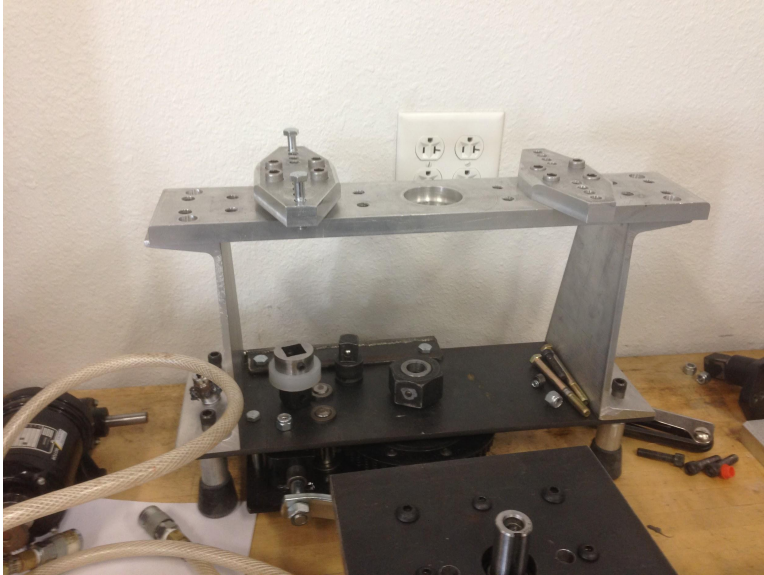
- McMaster-Carr Open Steel Ball Bearing
- Dynamic Load Capacity = 600 pounds
- Factor of Safety: **2.3**

# CAD



# Testing

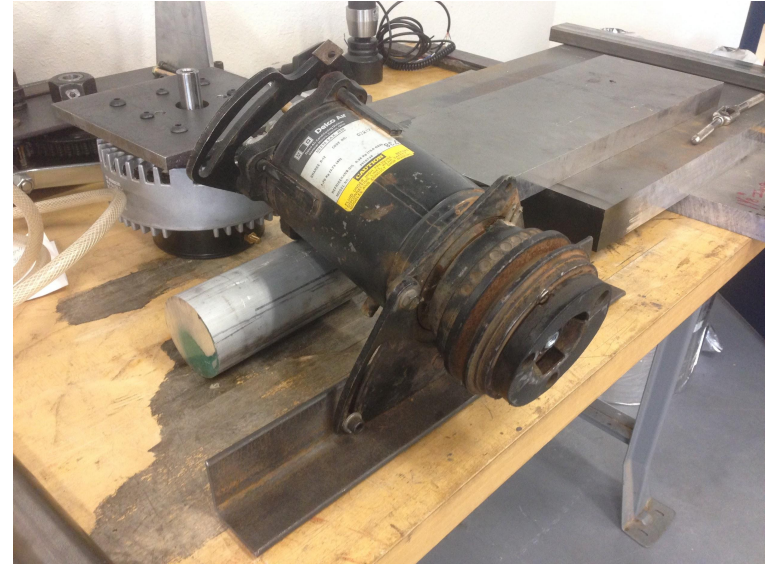
- Shear Testing for Gears





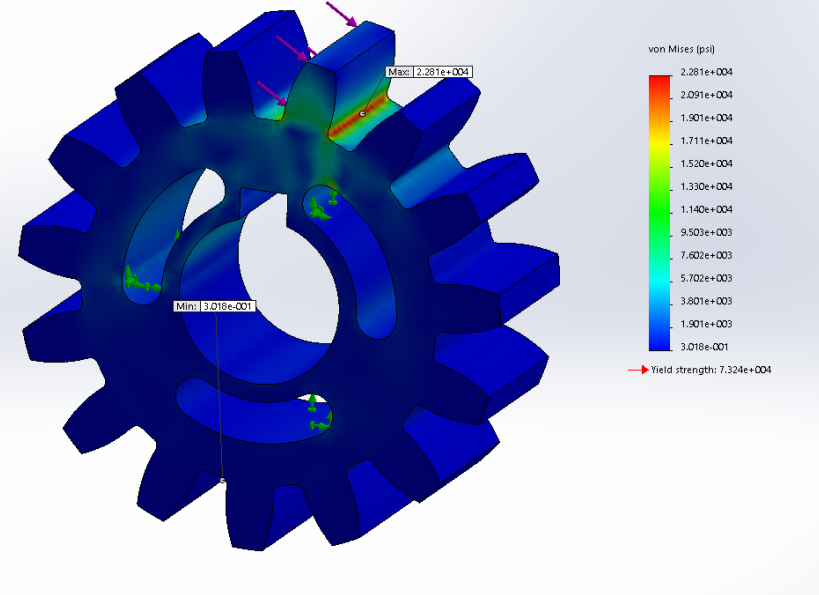
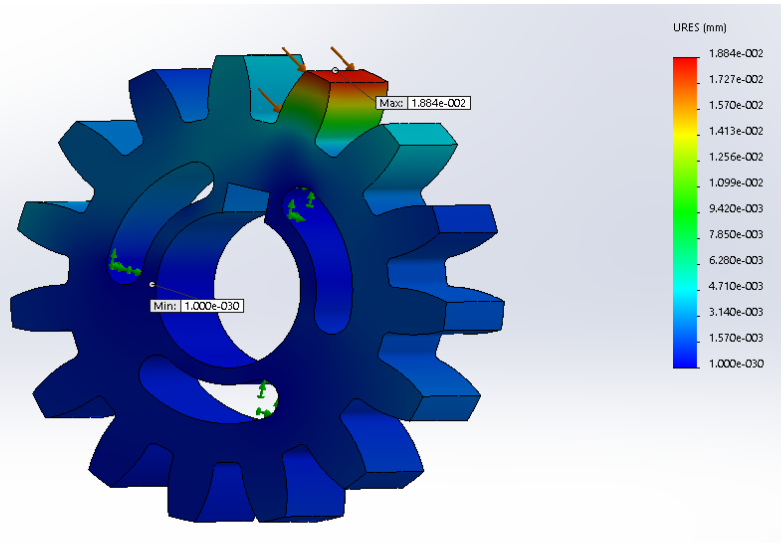
# Testing

- Mesh Testing



# Solidworks Simulations

## Shear Forces



# Machining/Assembly



Fadec

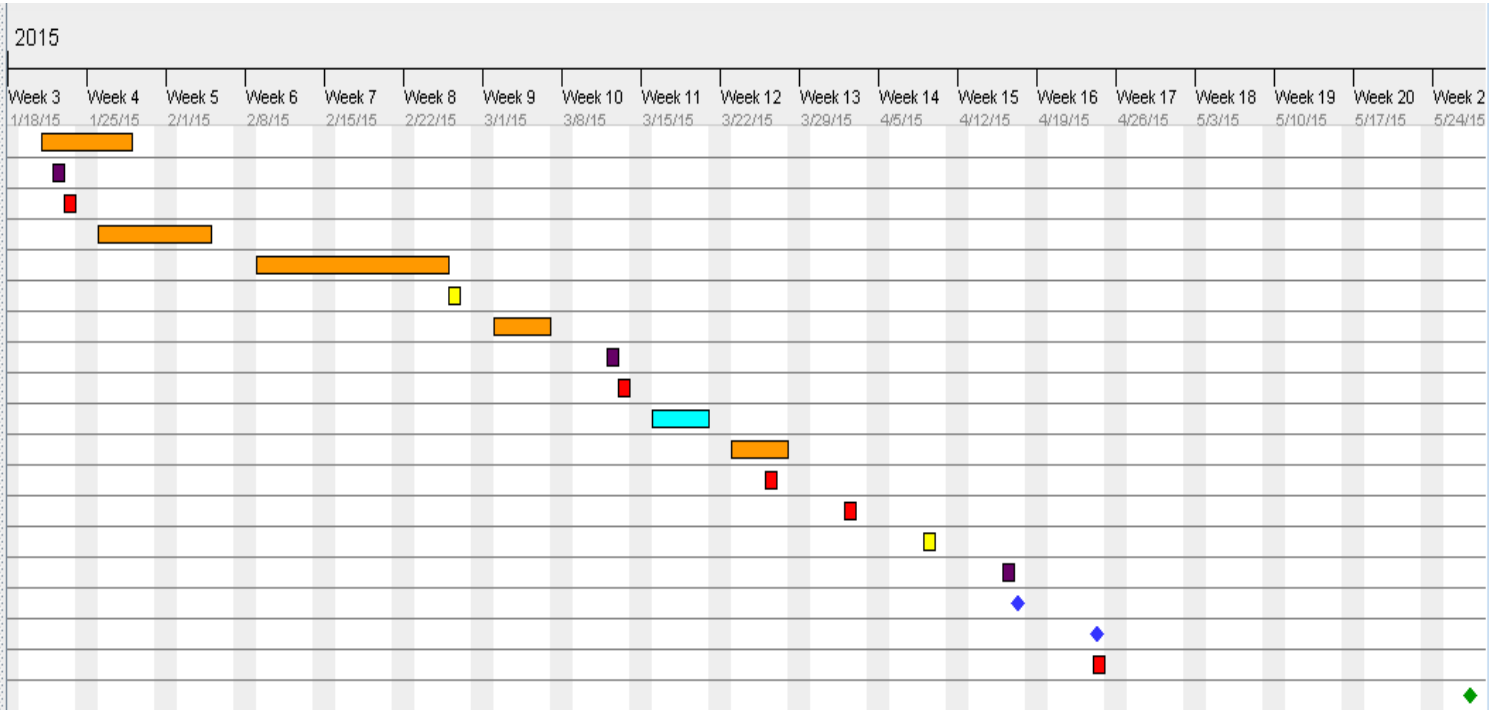
# Bill of Materials

Materials	Quantity	Cost for One Unit of Material	Overall Cost of Each Material	Free/Donated
7075 T6 Aluminum (4" diameter, 2' bars)	1	\$307.44	\$307.44	x
7075 T6 Aluminum (3" diameter, 5' bars)	1	\$298.87	\$298.87	x
7075 T6 Aluminum (2" diameter, 4' bars)	1	\$87.24	\$87.24	x
6061 T6 Aluminum (0.5" thick, 1'x3' plates)	1	\$164.92	\$164.92	x
6061 T6 Aluminum (0.25" thick, 1'x3' plates)	1	\$76.69	\$76.69	x
4340 Normalized Steel (5/8" inch diameter, 5' bar)	2	\$95.64	\$191.28	x
Bearings	6	\$7.36	\$44.16	
Clutch	1	\$300.00	\$300.00	
Differential	1	\$400.00	\$400.00	x
80 tooth sprocket	1	\$25.00	\$25.00	
10 tooth sprocket	1	\$10.00	\$10.00	

Total \$1,905.60

**Total, subtracting free/donated \$379.16**

# Gantt Chart



- Orange = Gear/Transmission Building
- Purple = Presentations
- Red = Deliverables
- Yellow = Staff Meetings

- Light Blue = Spring Break
- Blue = Final Report and Presentation
- Green = Portland, Oregon Competition

# Conclusion

- Shear testing until end of January
- Gears, bearing, shaft Ordering through February
- Gears and shift fork building until end of February
- Transmission built by end of March
- Competition in Portland, Oregon at the end of May

# References

- Fadec Picture
  - <https://www.facebook.com/FadecEng/photos/pb.179225548878310.-2207520000.1421962948./286764138124450/?type=3&theater>

# Questions?