NHRA Top Fuel Intake Leveling Device

Midterm Presentation 1

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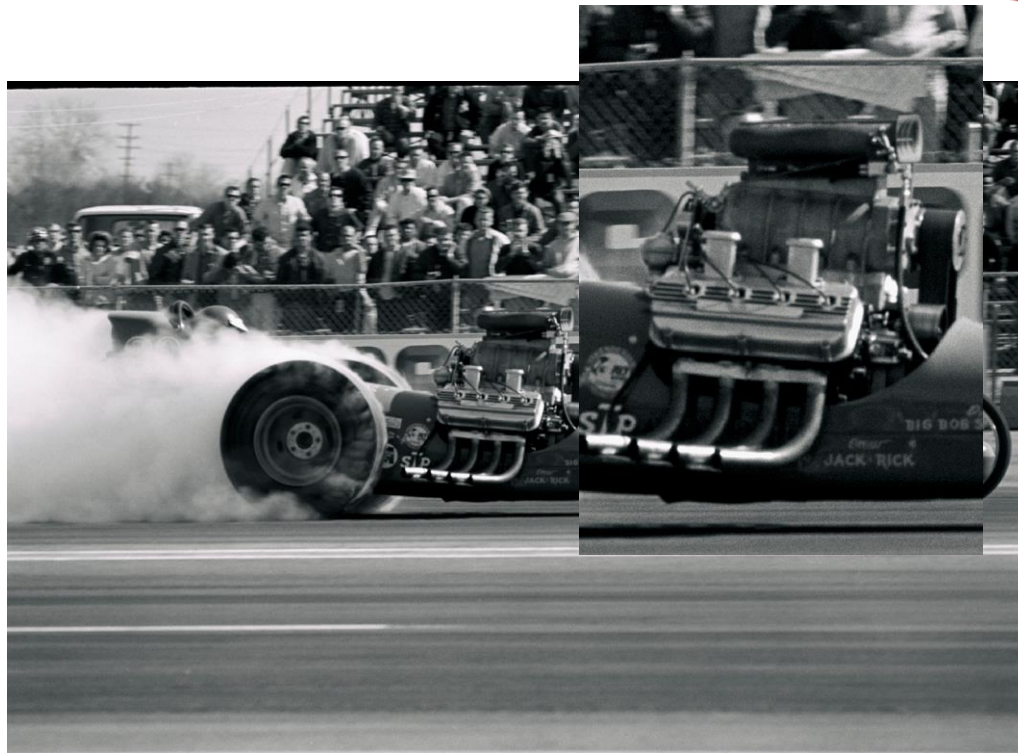
Troy Placid

Date: 10/11/16

Figure 1. Drag Racing Car

Presenter: Troy Placid

Project Overview

- Engine must be rebuilt within 20 minutes
- Traditionally a dial indicator is used to align the intake manifold to the engine block and the supercharger to the intake manifold
- We came up with a device to aid team members to quickly level both

Figure 2. Engine Assembly

Presenter: Troy Placid

Needs Assessment

Client Needs:

Fast Interface

Accurate to ± 0.005"

Easy to use

Fits in toolbox

Durable housing

Stand alone device

Background Information

Supercharger

    Air compression device

    Allows the engine to burn more fuel in the cylinder

Intake Manifold

    Supplies the compressed air from the supercharger into the piston cylinders

    Important to provide an even and smooth distribution to the cylinders

Problems

    Sections become slightly separated due to the amount of vibration

    The engine is pushed to its absolute limit

Digital Level

    Measures changes in angle

    Capacitive and piezoelectric accelerometer
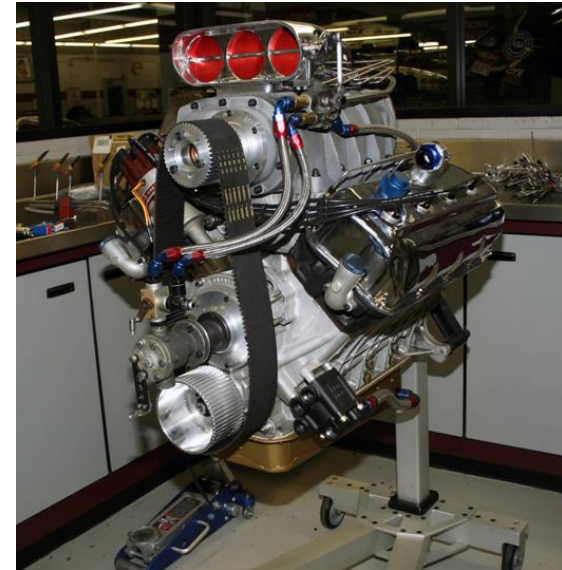

Figure 3. Nitromethane Motor

Presenter: Troy Placid

House of Quality

Customer Needs	Priority	Technical Specifications				
		Accurate to +/- 0.005	Processor speed	Independent power sourse	Durable Case	Method for quick repeatable replacement
Price	1	1	1	1	1	1
Portable	5				2	
Stand alone os	5			5		
Calcualtes under 1 second	5		5			
impact resistanct	4				5	
fast startup	4		5			
simple and fast interface	4		3			
Interface seen from both sides of engine	5					
fast calibration	4		3			5
Meets Accuracy needs	4	5				
Score		21	70	26	31	21
Relative Weight		12.4	41.4	15.3	18.3	12.4
Rank		4	1	3	2	4

Figure 5. HOQ

Presenter: Matt Burst

Decision Matrix

To choose the best method to fit the needs of our sponsor we employed shingijiutsu seven ways method.

After we came up with all the different ways of going about this we were left with three methods of achieving the goal.

Presenter: Matt Burst

Components

Arduino

3-axis Gyro accurate to 0.005"

RGB-LEDs

Power Supply

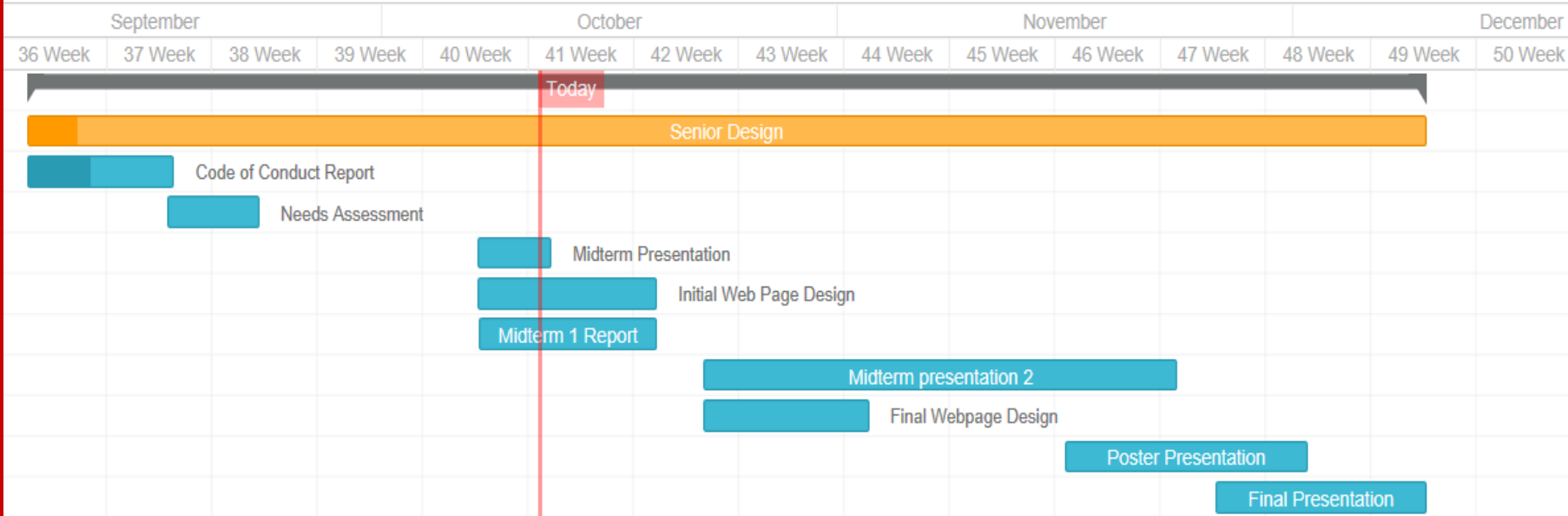Switches

Buttons

Durable Housing

7

Timeline (Gantt chart)

Figure 6. Gantt Chart

Presenter: Landon Kipker

Conceptual Design

- The design of the housing for the device will be a small enclosure that will protect the module inside from damages

- The housing will be ergonomic and portable in order for fast and easy placement onto the engine of the dragster

- The housing also needs to be designed so that it will be placed in the same spot on the engine to ensure consistency in the accuracy of the measurements.

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References

[1] Hays, Michael, D.Eng. "Project Overview." Telephone interview. 28 Sept. 2016.

Presenter: Landon Kipker

Questions?