

TigerRacing FSAE Electrical System

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Team #58



Project Objective

To design, manufacture, and test an automotive electrical system for the LSU TigerRacing FSAE team. This electrical system must control the engine, shift the transmission, assist the driver, collect data, and keep the driver safe.

Manufacturing

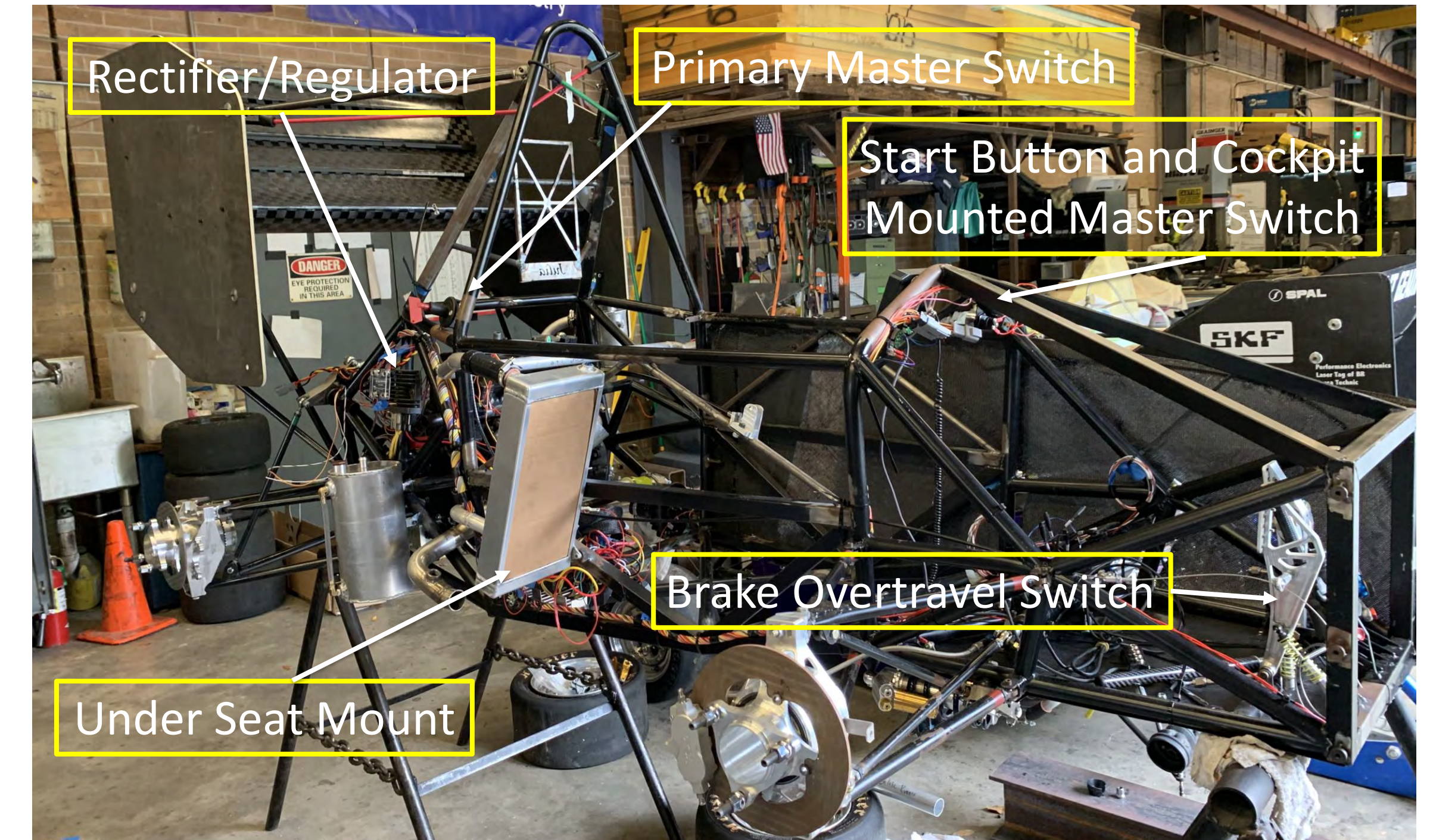
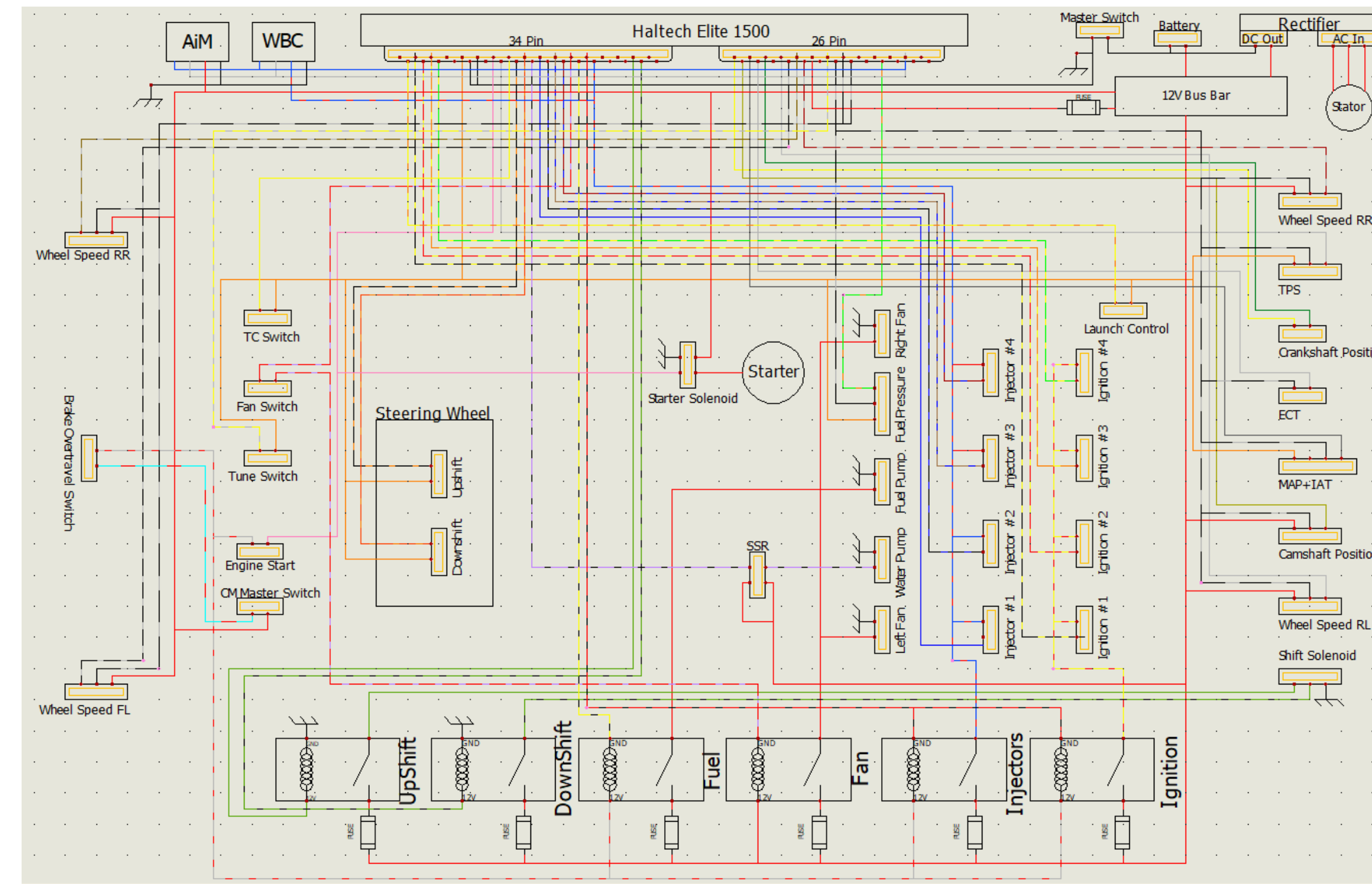
- Terminate wires (Cut, Strip, Crimp)
- Sheathe wires (Concentric twist, Cover Wire)
- Label wires (Print labels, Protect with clear heat shrink)
- Pin connectors (Service loops, Attach connectors)
- Mounting tabs

Engineering Specifications

Specification	Value	Unit	Result
Consume less than 30 amps at operating conditions	<30	Amps	18.99
Accelerate 75 meters in less than 4.3 seconds	4.3	Seconds	4.25
Weigh less than 6.5 Kilograms	6.5	Kilograms	6.35
Provide 200 CCA to start the engine	200	CCA	210
Withstand 50°C under seat temperature	50	Celsius	85

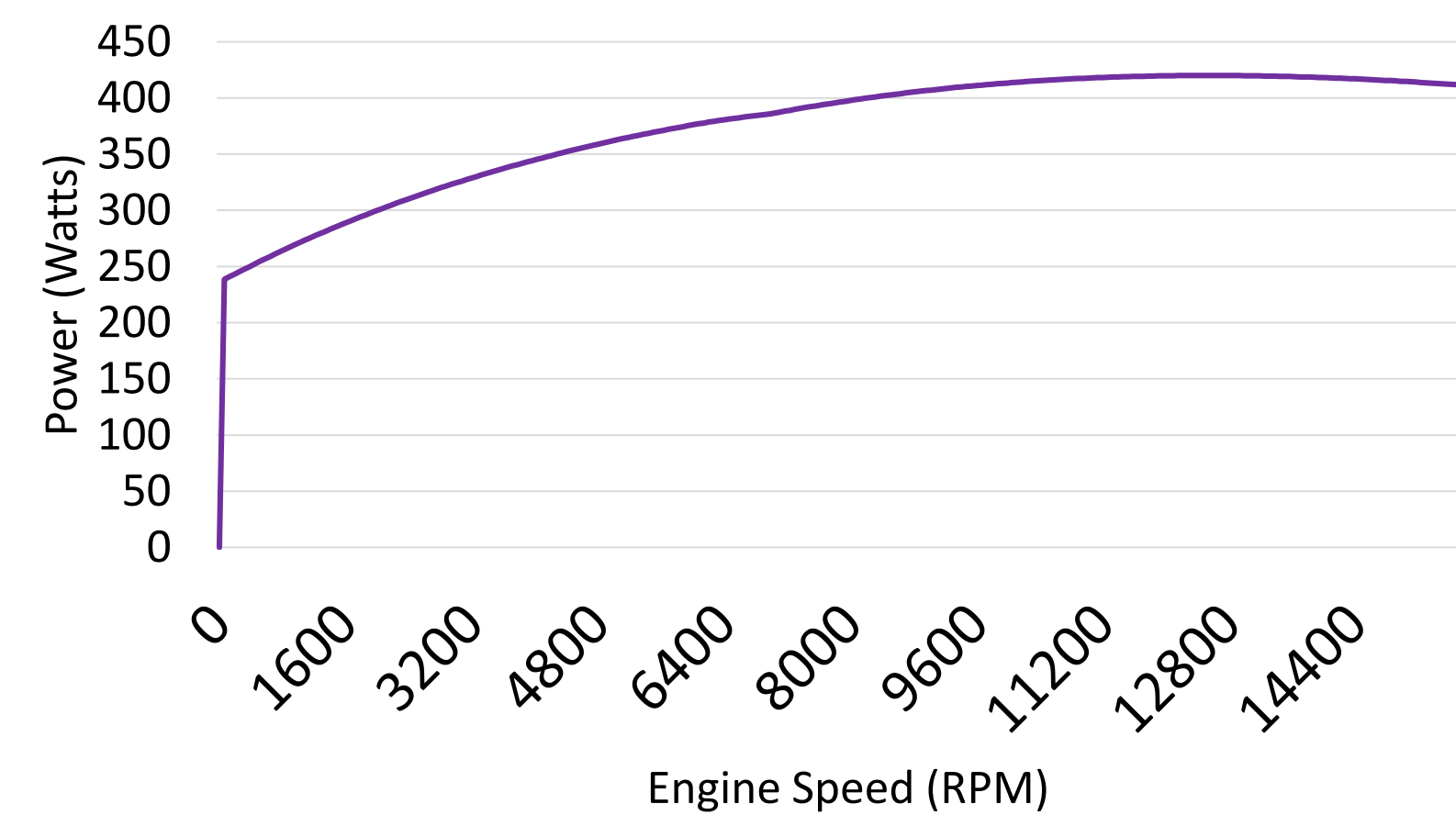
Safety

- Proper PPE when manufacturing
- Primary master switch (Kills all electrical power)
- Cockpit mounted master switch (Kills fuel supply)
- Brake over travel switch (Kills fuel in the event that the brake system loses brake pressure.)



Engineering Analysis

Engine Stator Power Output



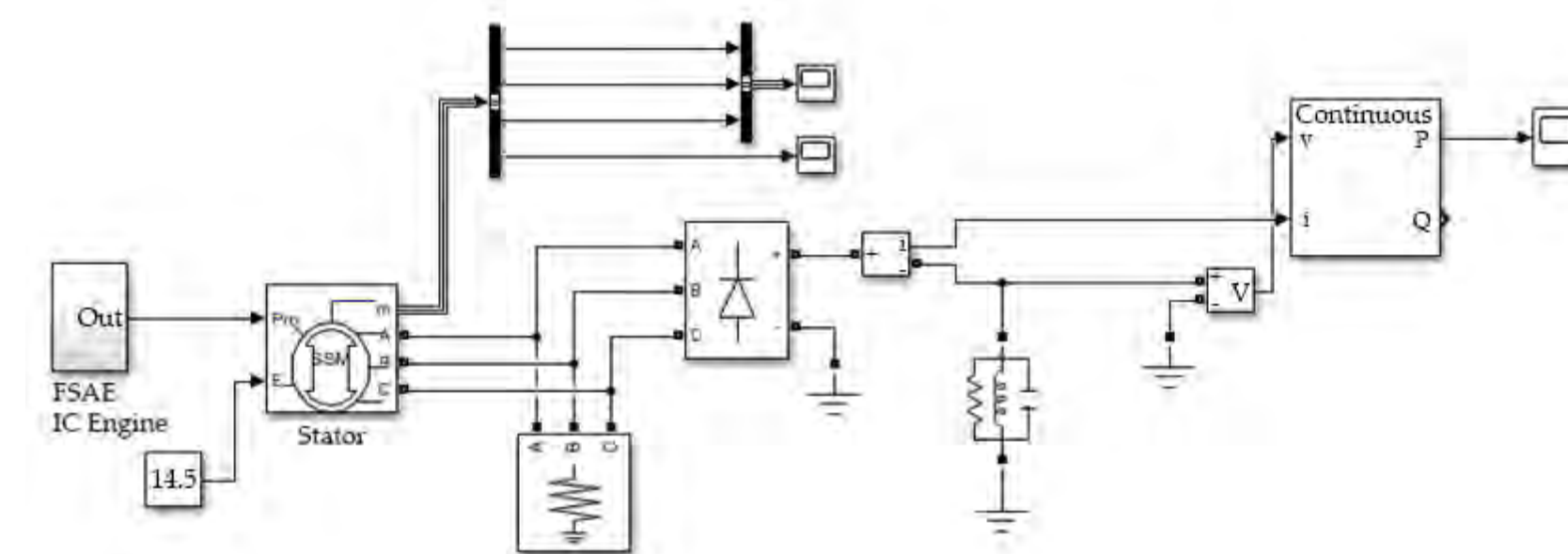
Wire Sizing

$$CM = \frac{\rho \times 2 \times I \times L}{\text{Allowable Voltage Drop}}$$

$$\frac{11.2 \times 2 \times 5\text{Amps} \times 1.5\text{ft}}{0.3\text{Volts}} = 560 = 22\text{AWG}$$

Analysis Types

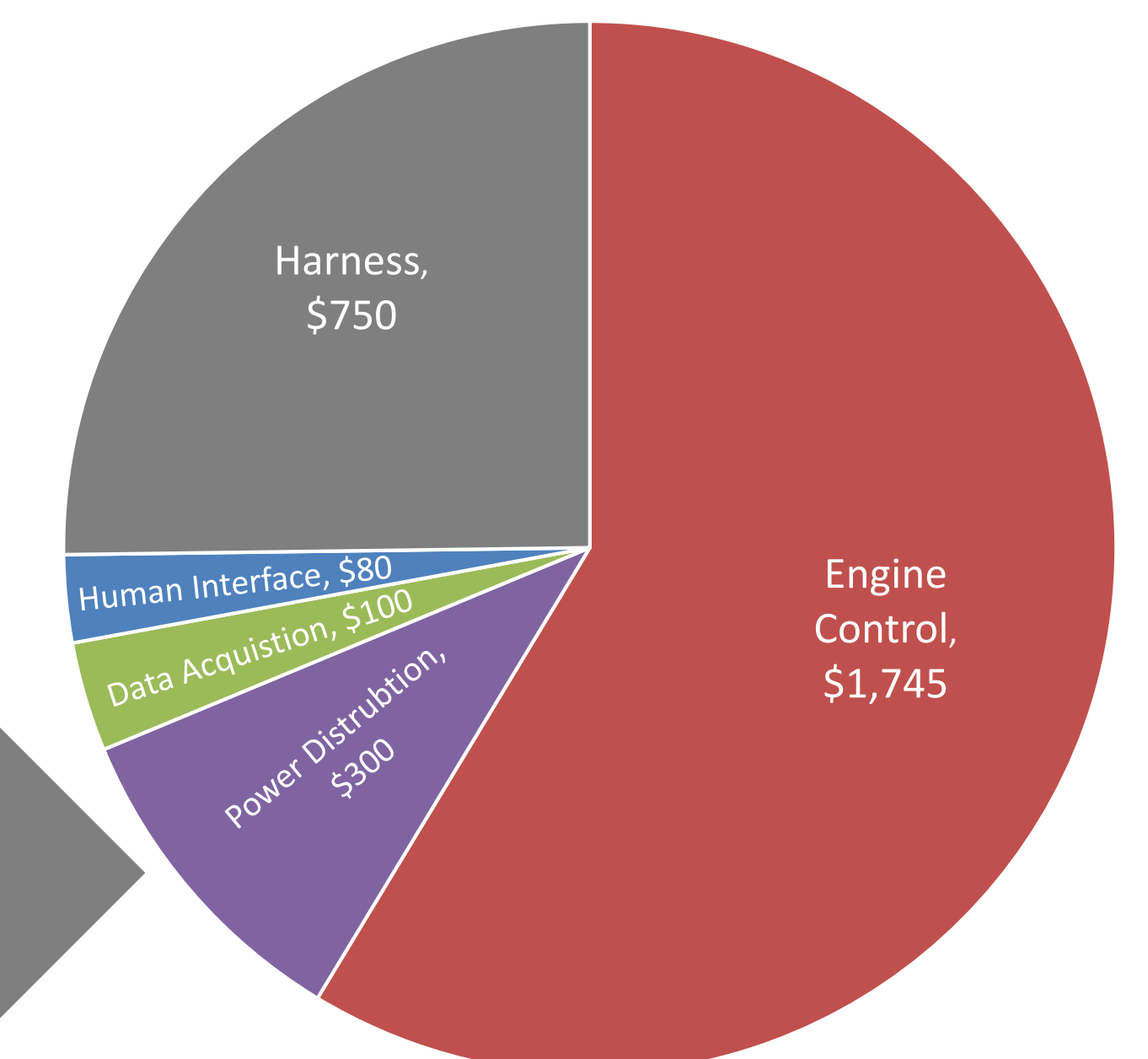
- Wire sizing
- Physical layout
- PCB layout
- Temperature analysis
- Power requirements



Testing and Validation

- Continuity testing (Check for open circuits)
- Temperature (Withstand engine temperature)
- Functionality (All systems work in multiple scenarios)
- Signal analysis (Test CAN, shifting, and sensor signal)

Budget



Total: \$2,975

Concept Selection
(September - October)

Design
(October - December)

Purchasing
(December - February)

Manufacturing
(January - April)

Testing
(April - May)

Competition
(May)