P09222 – Formula ECU

Customer Needs

Priority

Functionality	Ergonomics	Esthetics
-Reliability -Vibration/Heat Tolerance -Cost of Manufacturing -Waterproof -Performance -Document functional concepts -Same Pin-outs (ease of testing) -Weight - GUI	-Accessibility on Vehicle -Portability -Simple GUI	-Coordination with car design (likely hidden)

Formula Budget: $1000

Defined Needs

- **Functionality**
- **Reliability testing** – to be completed through the NI DAQ testing plan to verify the system capabilities at extreme points and validation over long periods of time.
- **Heat Tolerance** – the unit itself is expected to generate only moderate amounts of heat. Specifically MOSFETs (which drive the fuel injectors), voltage regulation and the processor create the majority of this heat. Copper pads were placed under the MOSFETs and regulators to dissipate heat and Therm-a-gap gel inside the case will abduct heat away from the board.
- **Vibration Tolerance** – The Therm-a-gap gel which is being used to solve heat tolerance issues is a very thick porous material with vibration reducing capabilities. The gel filling the case will dampen the vibrations experienced by the car.
- **Cost of Manufacturing** – material cost for case being investigated. PCB boards cost is minimal at high production levels.
- **Waterproof** – The case itself is welded. Silicone based sealant will be applied to all gaps and connections.
- **Performance** – Timing accuracy must be within +/- ½ degree and are requested to be +/- ¼ degree. For all other performance specifications see Design Specifications.
- **Documents Functional Concepts** – Request of user manual for the ECU system is a necessary deliverable by the end of senior design 2.
- **Accessibility** – The unit can be placed anywhere on the car that the connector cables allow it to reach. The formula team will be able to dictate their accessibility.
- **GUI** – The driver should be able to monitor all inputs and outputs through the GUI including a computation of ignition and injection accuracy.