Next Generation EV/HEV Battery Temperature Sensor

Overview:
Amphenol Advanced Sensors had tasked the team with designing the next generation of battery health sensors for use in Electric Vehicles (EVs) or Hybrid Electric Vehicles (HEVs). The goal of the project was to consider manufacturing process changes to make the assembly of the sensor more efficient, as the current generation requires manual labor to be produced. Amphenol Advanced Sensors supplied the first generation temperature sensor to use as a reference, so the design was more focused on the physical housing of the sensor.

Objectives:
- Create a functioning sensor capable of measuring surface temperature
- Improve the ease at which the sensor is manufactured, such that the manufacturing process requires less manual labor
- The design changes made to the sensor should not increase the cost or time response of the sensor when compared to the current generation

Approach:
- The customer needs were given by engineers at Amphenol Advanced Sensors and were refined by the primary contact, Shane Schneider
- Research was done to predict the kind of battery that EVs/HEVs will be using in the next 5 years, and what parameter can be used to measure the health of that battery
- After the generation of 4 different concept designs, an AHP chart was used to select the best design, which turned out to be a Shell casing model
- The casing was 3D printed at a 3rd party location and used to construct multiple sensors, using three different thermistor types offered by the sponsor
- Each design was tested for response time and durability, and evaluated for cost effectiveness

Outcomes:
- New model showed improved time response across different sensor models
- Cost to produce prototype model was much larger than that of the current model, but this is expected to lower with economies of sale
- A more protective heat resistant casing provided increased durability for the weakest junctions of the sensor
- Manufacturing time for the new model is expected to be lower than that of the current by the elimination of manual labor processes