General Motors 2: Light Measurement Solution

Overview
General Motors requires an assembly which ensures the uniformity of their LED daytime running lights. This is done by measuring the chromaticity and intensity of each individual LED and comparing the data against a model unit.

Objectives
This team identify the best possible method for measuring light output of automotive lighting LEDs to ensure uniformity among a single set of LEDs. Also we created a fixture design to reliably take required measurement.

Approach
- Generate customer needs and engineering requirements by conference meet and email communication with GM Company.
- Gather information of different LED companies and LED analyzer companies.
- Create selection matrix to determine the higher-rated LED analyzer company.
- Visit the GM plant to obtain LED models that are being used in the project, as well as get a feedback on the selection matrix.
- Reach out LED companies to get a better understanding of LED testing procedure.
- Improve selection matrix, determine the LED analyzer that is going to be used in project.
- Create multiple LED test fixture prototypes with SolidWorks, using 3D printer to obtain the prototype.
- Finalize the fixture design and materials with GM, fixture and LED analyzer from FEASA Company were sent to us.
- Performing LED tests, including intensity, chromaticity, temperature tests.
- Generate plots using Matlab to demonstrate the results.
- The results are the normal distribution of CIE x and y coordinates. From that, we are able to determine how much portion of LED would be considered as valid, and therefore ensure the LED strips output consistent light in headlight assembly.

Outcomes
- The sponsor will save $4,000,000 as a result of this project during manufacture process.
- The project provides a viable solution to GM on testifying LED.
- The project reduced the cost by eliminating invalid LEDs before assembling process.
- Designed a test fixture that is currently being used in General Motors Company.
- Matlab and Visual Basic codes that is being used by General Motors to gather data.