Next Generation of the DumpsterGard Dumpster Protection System

Overview
We were to inspect and improve the overall performance of the dumpster panel system including the panel material as well as its design, aiming to reduce production costs, lower weight, increase strength, and increased value to the customer.

Objectives
- To determine the mechanical properties of the dumpster panel material
- To study the chemical composition of the material
- To develop CAD drawings of existing product as well as modified/new designs

Approach
- Performed tensile test at both room temperature, 73°F as well as at elevated temperature, 130°F
  - ASTM D638 was followed
  - Guided by Dr. Shelleman
  - Data was collected and analyzed – Stress-strain curve and certain tensile properties
- Performed X-Ray Powder Diffraction to study the chemical composition of the material
  - Intensity vs Two theta curve was generated and analyzed
  - Lack of information of carbon black in the JADE database
- CAD drawings were produced
  - CAD drawing of the existing product
  - CAD drawing of the modified design
- Other concerns regarding the project
  - Alternative materials – researched and received advices from Dr. Mike Chung
  - CES EduPack software – a material database

Outcomes
- The tensile properties of the current product material are comparable to that of the published data. However, material's performance declines at elevated temperature
- Talc and polyethylene were able to be identified in the material through XRD. In addition, some polypropylene and unknown phases (most likely impurities) were also found. They could affect the material’s performance
- CAD drawings of the existing product and modified design were produced. They could be used to make into molds in the future.