## **Essential Question & Scenario**

## Materials Science & Safety: Losing an eye would be out of sight.

**Essential Question:** How are materials chosen when manufacturing a product for the highest degree of safety?

## • Engagement Scenario (must be authentic):

You have been contacted by Eagle Manufacturing to research, compare, and identify the material that will demonstrate the highest degree of safety, durability, ergonomic comfort and cost effectiveness for use in the design and development of eye protection for the entire crew of a Demolition Derby.

You will need to select the material for one set of safety glasses for the driver and a second set for the crew who might be charged with cutting pieces from Derby cars in order for the Derby team to be able to participate in the competition. The glasses for the drivers will need to protect them from flying debris. Those for the crew will need to protect them from the bright light of a cutting torch and flying debris from welding and grinding operations. You will need to investigate if it is possible to design and manufacture full protection in a single set of glasses.

You will need to prepare a report for submission that speaks to the research and testing conducted, the results, and a recommendation that meets the specifications including safety durability, ergonomic comfort, and cost effectiveness. Since in later projects in this course you will be making and testing welds, this report should persuade you, and others, which glasses and safety lenses to use in welding, cutting and testing operations.

## • Client Deliverables:

- $\circ$  Conduct internet research on a minimum of 5 (five) materials that will meet the specifications. Include
  - Cost of material
  - Current uses of material
- Research safety procedures for welding and cutting.
  - Design and conduct material test processes that test for the safety of material against intended hazards. Tests of the following material properties should be included: Durability and safety from flying debris (impact strength)
  - Degree of filtering of high intensity UV, visible, and IR light radiation
  - Ergonomic comfort of design (mass and weight)
- Compare materials using testing results of impact, mass, weight, and transmission showing comparison in a graphic or table
- Recommend the best material to produce the safety glasses or recommend the best commercially available safety glasses on the market based on findings of the literature research and tests.
- Discuss the value of meeting safety regulations, such as those from OSHA. There are ethical and litigation concerns when safety regulations are not followed and accidents occur. A workers quality of life can be affected for the remainder of that workers life. In addition, the cost of repair and court costs for those injured can skyrocket.