Performance Task: Automotive Materials Engineer - Fuel Efficiency (Grade 11 )



Understandings (Big Ideas)

* Matter has observable physical properties and the potential to mix and form new materials.
* People acting individually and/or as groups influence the environment.



Essential Questions

* How do scientists identify and sort materials?
* How do humans influence the environment?

**Goal**

Your goal is to determine methods involving the materials used to build vehicles that can be considered by an automobile maker that may help the vehicles in the fleet achieve better gas mileage. Your determinations, once accepted, will become part of a marketing campaign to inform the public of the changes being undertaken to help increase fuel mileage, and as a result, help the environment.

**Role**

You have been hired by an automobile maker as a materials engineer to help determine how best to help achieve increased fuel mileage for all of the automobiles within the automobile maker's fleet through the use of lightweight materials.

**Audience**

You will be presenting to the engineers and administrators representing the automaker. If your ideas are accepted, you will need to develop information to share with consumers who will be concerned with the changes to the materials used by the automaker to increase fuel mileage in all automobiles within the fleet.

**Situation**

In the United States, the federal government has mandated improved automobile fuel efficiency in the form of the Corporate Average Fuel Economy (CAFE). President Obama is in the process of revising this mandate to roughly double automaker's fleet-wide vehicle fuel economy averages to 54.5 mpg by 2025. Your knowledge of science and manufacturing will be critical to the ongoing success of a small automaker. You will need to research ways to increase fuel economy in vehicles through the use of lightweight materials for certain parts and areas of the automobile. You will also need to be concerned with the continued safety for the passengers in the vehicles using lightweight materials.

**Products**

Diagram: Create a diagram of the injection molding process. This diagram should allow people who know little about the process to gain a basic understanding. The diagram should contain captions explaining each step in the process. The diagram should use appropriate pictures representing the process.

Commercial Webcast: Create a 1 to 3 minute webcast that will be located on the automaker's website. This commercial should highlight the value of the changes to the automobiles and how these changes can positively impact the environment. It would be beneficial to audiences to show the positive changes in an easy to understand graph or chart.

Oral presentation: You will create a 3-5 minute oral presentation that will be given to the engineers and administrators for the automaker. This presentation should be scientific in nature as you present how lightweight materials could be manufactured and utilized to help reduce the overall weight of the vehicle. The presentation should also include information related to the cost, strength, and durability of the chosen materials including the parts that would utilize the materials.

Article: A popular automobile magazine has asked your company to submit a 2-3 page article discussing the manufacturing process and the changes that are forthcoming that will increase fuel mileage within the fleet of vehicles. The company has chosen you to write this article. Please use articles and web-based resources to support your writing.

Photostory: Create a 10-15 slide slide show that highlights the many changes that automakers around the world have been making to their vehicles to help make the autos more fuel efficient. These slides should use media to tell the story.

Source: DesignedSTEM