2019 PepsiCo/Society of Women Engineers

STUDENT ENGINEERING CHALLENGE

“We are in the business of discovery, but discovery is not about what you discover in the lab. Discovery is about wherever the idea comes from; embrace it! That is discovery. Look inside, outside, in developing markets or emerging markets.” – Dr. Mehmood Khan, PepsiCo Vice Chairman, and Chief Scientific Officer, Global Research and Development at PepsiCo

Who We Are

PepsiCo products are enjoyed by consumers one billion times a day in more than 200 countries and territories around the world. PepsiCo generated more than $63 billion in net revenue in 2017, driven by a complementary food and beverage portfolio that includes Frito-Lay, Gatorade, Pepsi-Cola, Quaker and Tropicana. PepsiCo’s product portfolio includes a wide range of enjoyable foods and beverages, including 22 brands that generate more than $1 billion each in estimated annual retail sales.

At the heart of PepsiCo is Performance with Purpose – our fundamental belief that the success of our company is inextricably linked to the sustainability of the world around us. We believe that continuously improving the products we sell, operating responsibly to protect our planet and empowering people around the world is what enables PepsiCo to run a successful global company that creates long-term value for society and our shareholders.

Challenge Statement

In the tradition of the PepsiCo and SWE Engineering Challenge, we are calling for your innovative ideas and technical solutions. For this year’s program, you will have the opportunity to respond to a challenge stemming from one of the following PepsiCo topics: eCommerce, Zero Waste, or Process Optimization. Please find a summary about each category and the associated challenge statement below. To participate, please choose one challenge to which to respond.
**1. eCommerce**

Consumers have embraced online shopping thanks to its convenience and value. Since the eCommerce supply chain is four times longer than that of conventional stores (brick & mortar), traditional products require incremental packaging for extra protection at a higher cost. Typically, only high-value and lightweight items like electronics can absorb the higher cost. There is an increasing demand for food and beverage products in eCommerce, but they are typically bulky and/or heavy and therefore more challenging to deliver at lower prices.

**Challenge:**

Present a comprehensive solution e.g. product, packaging, supply chain, business model etc. applicable to a food and/or beverage offering in eCommerce. You do not need to use traditional packaging (e.g. a corrugate box filled with air packs) or a current model for distribution and shipping (e.g. warehouse fulfillment to truck delivery). Also, consider the following when developing your proposed solution:

- The types of food and/or beverage products that are most suitable for online offerings e.g., refrigerated goods would require refrigerated storage and transport, and therefore require additional logistics to deliver via the traditional warehouse/delivery truck method
- How to generate additional value by creating combinations of different PepsiCo products e.g., a children’s post-sport game snack pack for 12 consisting of Quaker Chewy granola bars, 12oz Gatorade bottles, and Frito-Lay 1oz chips.
- Packaging materials
- Cost of packaging
- Packaging sustainability
- How to construct the package (i.e. manually pack the bag and bottle or automated)
- Innovative ways to deliver products to consumers at a lower cost in a faster manner
- Product protection through distribution/shipping challenges (e.g., uncertain loads, drops onto concrete, etc.)
- Consumer experience

**2. Zero Waste**

PepsiCo is committed to minimizing its impact on the environment, as highlighted in its Performance with Purpose 2025 goals. This includes making every effort to reuse materials in productive ways. For example, PepsiCo provides organic matter, such as potato peels, to farms, where they are used in animal feed. Additionally, the Quaker facility in Cedar Rapids, Iowa, sells oat hulls to the University of Iowa, which converts the hulls into energy, replacing fossil fuels and supporting the University’s renewable energy program. The company is also looking to identify ways to maximize value from the orange peels that remain after juice is extracted.

**Challenge:**

Tropicana orange juice processing generates a significant amount of orange peels, which can be then made into a variety of byproducts. Design a process to extract more value from the 1,000,000 lbs of orange peels produced each day. Identify both the final product and the processes required to obtain the product. Please attach an excel spreadsheet that includes assumptions, equations, and calculations used to work out the product yields. Also, consider the following when developing your solution:
For additional resources, consider referencing *The Orange Book* provided by Tetra Pak that can be found at https://orangebook.tetrapak.com/.

### 3. Process Optimization

Food for Good (FFG) is a purpose-driven initiative within the PepsiCo Foundation that tackles child hunger by making healthy food more physically and financially accessible for low-income families. FFG uses PepsiCo’s expertise in taste, nutrition, and distribution – leveraging the country’s largest food-moving fleet – to reach underserved families across the United States with nutritious meals during Summer and after-school. FFG is effectively a foodservice business with cold and hot chain processes, depending on the location, that leverages a series of warehouses to pack and move meals. As with PepsiCo’s broader operations, FFG relies on optimized processes and an effective use of space to maximize resources and capacity to deliver meals. As FFG expands, it faces physical and logistical limitations that will need to be unlocked to ensure sustainable growth.

**Challenge:**

The cold meals (a sandwich, fruit and milk) that FFG distributes are individually packaged in a plastic bag by a meal caterer and then placed in an Orbis tote lined with a proprietary insulating material (see image below). The liner of the insulating material is a woven polypropylene material that is water resistant (similar to the fabric used to make camping tents). The insulated liner is "charged" to cold temperatures in the freezer each night and can maintain its cold temperature for approximately 12 hours so that the food reaches each delivery point below 41°F.

Each FFG warehouse packs nearly 500 totes a day, which are delivered by ambient temperature trucks. Upon arrival, the totes are unpacked and lunches are distributed, with the now empty totes remaining on site until they are picked up the following day. Each truck driver will pick up the empty totes and return them to the warehouse.

Additionally, the drivers will quickly carryout a visual inspection of the totes and set aside any which require cleaning or have a noticeable odor. Some of the lunches can get damaged and contents may spill into the totes. Most commonly, the culprit is a leaking milk box. Boxes can also accumulate dirt.

The cleaning process consists of spraying a liquid cleaner/disinfectant and a towel wipe down, but the process is not consistent, only partially effective in eliminating unwanted odors and very time consuming. The current “wipe down” process in place cannot keep up with the demand for clean totes. To that end, identify a better process (technology, materials, or process) to improve cleaning output and efficacy. Any proposed cleaning agents and materials should adhere to FDA Good Manufacturing Practices. Also, consider the following when developing your process:
• Process
  o Outline and define any necessary standard operating procedures
• Materials
  o Describe any new packaging and/or cleaning materials
• Costs
  o Include estimated equipment (if any) and operating costs
• Sustainability Impacts
  o Water i.e. volume required, waste water disposal
  o Waste i.e. amount of single use materials, recyclability
Challenge Requirements

For an impactful proposal, please consider the items noted below and see the Terms and Conditions document for the grading rubric.

1. Identify technologies and technical solutions for the challenge statement/category you chose.
2. Do your research and be creative!
3. Provide details in each of the categories, as outlined in the provided poster template, around how feasibly your solution could be executed in terms of the following, but not limited to:
   a. Design justification
   b. Challenges and potential drawbacks
   c. Manufacturing strategy
   d. Engineering drawings
   e. Timeline
   f. Environmental impact
   g. Cost analysis
   h. Voice of the customer
   i. References
4. Write an abstract no longer than 250 words to summarize your solution.
5. Submit your entry between February 18, 2019 to July 5, 2019.

Be sure to read the guidelines for submissions in the Terms and Conditions section of our website at http://PepsicoStudentChallenge.swe.org/

References

3. PepsiCo’s Food for Good: http://pepsicofoodforgood.com/