

# IDEA

Illinois Design Educators Association



## IDEA Engineering Design Competition 2021

### Career & Technology Education Organization Fundraising Product



### Problem Statement:

Your friends are trying to help your high school's Career & Technology Education - TEECA club sponsor design a product that could be used to dispense and sell candy that can be sold at a profit to benefit the CTE club and its members. This product will be designed and made in the spirit of a Rube Goldberg type apparatus that will perform a simple task in an indirect and overly complicated (and fun) way. In this design challenge you are being tasked with dispensing snack products. Your team's solution may lead to making multiple machines for community use. After reading about your product in the student and local newspapers several other groups have contacted you about your product. Your school's preschool program would like to use it to distribute candy to their preschool students during their annual Halloween dress up day and program. The director of the local senior center would also like to borrow it to entertain their clients while offering a hands-free method to delivery snacks, treats, and candy. Your friends know you are taking a high school engineering design class, will be attending college in the near future to study engineering and product design, and they have challenged you and your team to solve this problem. Your final product will also be entered in the annual TEECA club state competition.

The problem is that the TEECA club needs you to design a product that they can build and use to raise funds to support their various activities. They would like the product to dispense candy and collect money. The sponsor has determined that any snack or candy product can be dispensed by your team's machine. Your ultimate goal is to make a profit for the club. You are also being asked to survey other students and determine the best snacks that could also be sold using your dispenser. The majority of the money it will be collecting will come in as quarters.

In true Rube Goldberg fashion, your solution must perform at least 7 distinct operations before delivering the snack to the recipient. If operations are repeated, they will count as one operation. The solution should include your school's emblem/logo, mascot, and the CTE club's name or initials. Your CTE clients have varying skill levels which must be taken into consideration when designing your dispenser and planning its production. Please keep safety a major consideration when planning your product and its manufacture. The members like to learn new skills, make projects, work as a team, and interact with the other students for sales. If your school has other CTE based clubs please interview members or teachers to gather ideas. Survey these experts, classmates, family members, or industry members to gather ideas and brainstorm possible product solutions. The solution should be original and not a duplication of a current product.



## **Design Constraints:**

The design:

- must be easy to be manufactured by your clients.
- must be able to be manufactured for under \$50.
- must perform 7 distinct operations before delivering the snack to the recipient.
- must be a unique product, not a copy of an existing product—it may share common features.
- must display colors on the product that show school and CTE club identity.
- must consist of at least 6 parts- fasteners/screws/nails, etc are not considered to be parts.
- must have at least one part that is 3D printed.
- must be durable and not need teacher monitoring during sales.
- must fit into a design envelope with dimensions of 36 in. wide x 36 in. deep x 48 in. high.
- may have a delivery zone that could be separate from the main machine and it must fit into a design envelope with dimensions of 12 in. wide x 12 in. deep x 12 in. high.
- must hold and dispense at least 3 different snacks- choice as determined by your research.
- must have a way to securely collect and store payments - it does not have to give change back.
- may be made of any materials you choose.

## **Procedure:**

The team, made up of 3 members, will focus on completing a product solution and presentation to present your firm's design solution to the client. Upon arrival to the IDEA competition, all members of the firm should come prepared to give a presentation of their project solution to a panel of judges. Your firm should arrive at the competition with the presentation and project solution completed ahead of time.

## **Deliverables:**

The presentation should include:

- Design solution/product
- Engineering Notebook documenting the design process and your design solution
- A Gantt Chart documenting the solution process and activities involved
- A full set of engineering drawings for the solution using AutoCAD, Inventor, SolidWorks, etc.
- Bill of Materials-BOM
- Cost estimate—for the solution
- Profit/Loss analysis for fundraising
- Product plan of procedure or assembly instructions and visuals that your clients can follow
- Any mock ups, models, or prototypes that helped you reach your solution
- Any additional information or documentation needed to communicate the design solution

## **Display:**

- Display Board that is maximum of 28" X 40"
- Present your product with a medium of your choice.
- Title and description of the Engineering Design competition and your design solution.
- Documentation of the design process and your design solution

## **Presentation:**

Your team will have up to 10 minutes for the presentation of your product including your design, unique features of your design, estimated cost to produce, and lessons learned through the design process. A 5-minute question and answer period may/will follow your presentation.

## **Other Documentation:**

To be considered for an interview a resume and business card from each team member must be presented to the judges.

## **Judging Criteria:**

Judges will rate the following criteria based off of information learned through the presentations and the design solution.

1. Quality and Clarity of Presentation	20%	20 pts
2. Quality of the Engineering Notebook	20%	20 pts
3. Functionality and Practicality of the Design Solution	20%	20 pts
4. Technical Quality of the Documentation and Drawings	20%	20 pts
5. Technical Quality of the Prototype/Solution	10%	10 pts
6. Meeting of the Presentation Time Requirements	5%	5pts
7. <u>Resumes &amp; Business Cards for each team member</u>	5%	5pts
	100%	100 pts

Each category above will be rated on a scale of zero (poor) to maximum points (excellent).