SNACK BAG ASSEMBLY from eGFI (Engineering, GO FOR IT!)
http://teachers.egfi-k12.org/snack-bag-assembly/

"In this delicious undergraduate activity modified for middle school use, teams of students in grades 6 to 8 learn about the field of industrial engineering and efficiency by creating an assembly line to pack as many snack bags in 2 minutes as possible. They then see if they can improve their process."

Grade level: 6 -8

Time: 45 – 60 minutes

Learning objectives

After completing this activity, students should be able to:

- Collect data to frame and solve problems
- Connect time with task completion and productivity
- Understand that work can be broken down into discrete tasks
- Develop ways to improve a process ("work smarter, not harder")
- Understand the role of industrial engineers in making systems more efficient.

Engineering Connection/Motivation
Ever wonder how snack makers assemble and ship such uniform packages of cookies, chips, and candy? Industrial engineers use the design process - Ask – Imagine – Plan – Create – Improve – to examine every part of the manufacturing system and find ways to make the work easier and more efficient, which saves costs and helps keep companies in business
Take a simple example. What would you need to open a pizza shop? You'd have to pay for flour, cheese, and other ingredients. You'd have to pay people to make and deliver the pizza. There's also rent and advertising costs. The more efficiently your pizza parlor can assemble and deliver pies, the more likely it is to turn a profit.

Time management – figuring out how long you will need to complete a homework assignment or chore — is an important life skill. It's also a key element in the work of industrial engineers. They organize the people, materials, and equipment involved in production, and improve systems by breaking big jobs into smaller chunks and studying how to make tasks easier.
Materials
Note: Amounts for 20 children include 100 of each size of plastic bag, 4 bags of cookies, one large container of sprinkles, 2 boxes of Cheez-Its, 2 containers of frosting, 2 large bags M&Ms, paper and markers for each groups, a knife for each group, 3 cups per group to hold sprinkles, frosting, and candies. Adjust the amount per snack bag depending on what you have and size of group.

A complete snack bag (above) must contain: 1 small bag with 12 M&M's and 4 Sour Patch Kids; 1 small bag with 8 Cheez-its; 1 small bag with two cookie sandwiches
For each group of 3-5 students:

- Very small snack bags
- Sandwich bags
- Cookies (small, such as the small chips ahoy or vanilla wafers)
- Sprinkles
- Frosting
- Cheez-Its
- M&Ms
- Sour Patch Kids or other candy
- Paper
- Markers
- Scissors
- Plastic knife for frosting cookies
- Small cups to separate M&Ms, sprinkles, etc
- Plastic table cloth (optional)
- Stopwatch or timer

Procedure

1. Create teams of about 4 students per group.

2. Explain that their task is to create an assembly line to pack as many snack bags in 2 minutes as possible. (Students or teacher can time the 2-minute task.) Only completed snack bags count.

3. Each snack bag will contain a small bag with 10 M&M's and 4 Sour Patch kids; another small snack bag with 2 cookie sandwiches; another snack bag with 8 Cheez-its; and a heart shaped note from Mom.

The cookie sandwiches consist of two cookies, frosted, sprinkled, and put together

4. Students must organize and are allowed to lay out the area beforehand. They can shift people as needed as time progresses and they must complete their bags.

5. If time permits, repeat – but with less time. Ask teams to find ways to improve their process.

Reflection/Assessment

Have students discuss what works best in assembly lines. What worked? How they would improve their assembly line?

This Activity contributed by Susan Freeman, Senior Academic Specialist, Department of Mechanical and Industrial Engineering, Northeastern University College of Engineering.