


SWEducational

ACTIVITY PACKET MANUFACTURING ENGINEERING EDITION

WHAT IS MANUFACTURING ENGINEERING?

Manufacturing Engineering works on designing and operating processes to make items. For example, these types of engineers design machines that mold plastic to make toys, robots that build products, and other systems to build items we use every day. Thanks to Manufacturing Engineers, there are many toys, appliances, electronics, and more types of items that we use every day.



Do you like prizes? How about showing off your project work? The **FIRST 5** students to submit a photo of their **completed Manufacturing Engineering activity (Activity 1 or 2, or both!)** through the link below will win a gift card of their choice from the list!

PHOTO RAFFLE

Get your cameras ready and stay tuned... there will be a photo raffle in the next packet!

Gift Cards to...

- Starbucks
- XBOX
- PlayStation
- iTunes
- More!

Submit [Here!](https://forms.gle/AcEXCZkePKxmqJCJA) Or type the link below:

<https://forms.gle/AcEXCZkePKxmqJCJA>

IMPORTANT TERMS

Manufacturing: the process of making a large amount of a single object

- A company that assembles new laptops would be manufacturing them.
- In this activity, you will be exploring the best way to create an egg container. If you were to create many of the same egg container, you would be manufacturing.
- What other objects in your home are manufactured?

Cost-effectiveness: producing good results without costing a lot of money

- One example of a cost-effective decision is using solar panels on your house to supply energy.
- In this activity, some of your materials may be recyclable and did not cost you anything but they are strong and good materials to use. They would be cost-effective materials.
- Why is it important to think about cost-effectiveness in engineering?

Quality Control: maintaining a product to a consistency high set standard by testing it at various points

- For example, when making jelly beans, a small amount are sampled from every batch and checked for their size and color for quality control.
- If you were to make multiple of the same egg drop contraptions, you could test them to a standard for quality control.
- What are some standards that you could have for your egg drop?

ACTIVITY INSTRUCTIONS

Today, you will be doing an egg drop test! Manufacturing engineers are responsible for the production of different things, ensuring the best quality as possible. Using just materials you can find at home, practice this skill in this activity by finding the best ways to protect an egg from breaking when dropped from different heights!



SUPPLIES

- At least 2 eggs
- Paper towels
- Plastic bag/ scrap papers/ newspapers
- Rulers or measuring tape
- Paper and pen/pencil
- Any craft/recyclable materials you can use to protect the egg! Some suggestions:
 - Scrap papers
 - Tape
 - Paper cup
 - Popsicle sticks
 - Cardboard/old boxes, etc

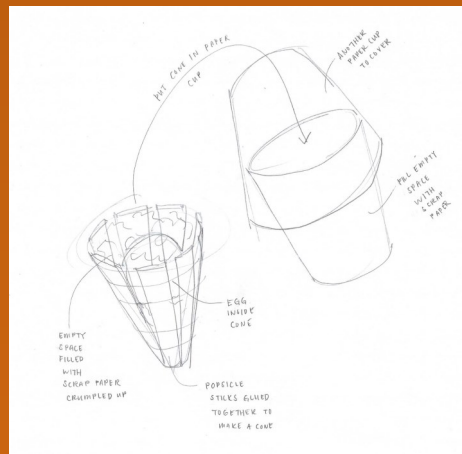


STEPS

1. Gather your materials and ask an adult first if you are allowed to use those materials. The photo below just shows a few examples of materials that can be used but feel free to find more different materials!



2. Begin brainstorming designs. Feel free to sketch out your ideas first if you'd like but you can also go straight into putting materials together! Remember: The goal of this activity is to protect the egg in the best way possible! This means not only preventing the egg from cracking and breaking but also using the least number of materials as possible! In the real world, this relates to making a quality product and doing so in a cost-effective way.
 - a. Some questions to consider while brainstorming:
 - i. What can provide cushion for the egg?
 - ii. In your gathered materials, which is/are the strongest?
 - iii. What will have less damage during impact when dropping from a height: heavier or lighter materials?
 - iv. Is there a way to combine the least amount of materials but still provide maximum protection for the egg?



3. After brainstorming, begin to build your egg protection device. If you are cutting any materials or using hot glue for your design, be sure to have an adult assist you. See the photo below for an example based on the sketch in the previous step.



4. Now that you've built your design, go to an open space where you can drop the egg from different heights. Place a plastic bag/some scrap papers/newspapers on the floor where the egg will land to help with cleaning up later.



5. You can now test your protection device! Have an adult help you, especially for testing from higher heights. Measure 3 feet from the floor using your ruler or measuring tape. This will be the first height you will test from. Make sure to drop it as close to the plastic bag/scrap papers/newspapers as possible so you can clean up easily if the egg cracks.
- Did the egg crack? If it didn't, test it again but now from a height of 4 feet. If it does not crack again, do the test again at a greater height. If your design worked for every test, think about what made it successful and think of ways it can be improved.
 - Remember, it's okay if the egg cracks! Engineers always do multiple tests. They gather information from each test and think of more ideas to improve their designs! Why do you think the egg broke? Do you need to add more padding to the device? Do you need to use different materials? What other improvements can you make? Repeat this process until you build a design you are satisfied with!



The design in this example was able to protect the egg! However, it did use quite a lot of materials, which is something that can be improved on for a new design!

6. You are now done with the activity, be sure to clean up your workspace!

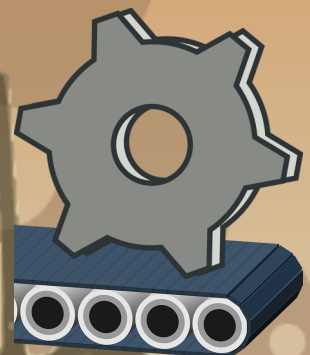
RESOURCE LINKS / VIDEOS

- What do Manufacturing Engineers do?:

<https://tryengineering.org/profile/manufacturing-engineering/>

- Manufacturing Engineering Overview:

<https://www.youtube.com/watch?v=URZWNnkZLYg>



- Manufacturing Engineering Magazines:

<https://www.sme.org/smemedia/manufacturing-engineering-magazine/>

- Day in the Life of a Manufacturing Engineer (drawing):

<https://www.youtube.com/watch?v=EOLzYL8ltCw>

- Meet a Manufacturing Engineer at GE Aviation:

<https://www.youtube.com/watch?v=ypZiSguq4jM>

- Meet a Manufacturing Engineer at Space Systems Loral:

<https://connectedstudios.org/url-zvshrn9KkwgSynhiuxJHLDtWFcMwpeCD-oCeEMBND>

- How things are Made: an Animated Introduction to Manufacturing:

https://www.youtube.com/watch?v=Um_g8sQ_p3Y

- How its made playlist:

https://www.youtube.com/channel/UCF4J3p_XByjvWBJUWAZ60lQ/videos

- Science Channel How it's made Playlist:

https://www.youtube.com/watch?v=Yx8EmMuMjgM&list=PL39_ud5aKSvnYDhKdB7wTDUZRIE8RaJat

- Cal Poly Industrial and Manufacturing Senior Project Videos:

<http://www.ime.calpoly.edu/activities/senior-project-presentations>

- Cal Poly Industrial and Manufacturing Senior Projects PDFs:

<https://digitalcommons.calpoly.edu/imesp/>

