Unit

Middle School

Transportation, Manufacturing, Packaging, Materials and Processes

Homer the Hovercraft

Overview

You are about to partake in the latest toy fad on the market! It's Homer! Homer is invading the homes of every teenager in the country. To keep up with this fast changing toy market you are going to make your own Homer the Hovercraft. Once you learn the skills you can create and package up a toy hovercraft to take home.

Standards

Technological Literacy Standards and Benchmarks

1. Students will develop an understanding of the core concepts of technology. (Standard 2)
   a. Systems thinking involve considering how every part relates to others. (Benchmark N)
   b. Technological systems can be connected to one another. (Benchmark P)
   c. Malfunctions of any part of a system may affect the function and quality of the system. (Benchmark Q)
2. Students will develop the abilities to use and maintain technological products and systems. (Standard 12)
   a. Use tools, materials, and machines safely to diagnose, adjust, and repair systems. (Benchmark I)
   b. Operated and maintain systems in order to achieve a given purpose. (Benchmark K)
3. Students will develop an understanding of and be able to select and use energy and power technologies. (Standard 16)
   a. Energy is the capacity to do work. (Benchmark E.)
   b. Energy can be used to do work, using many processes.
4. Students will develop an understanding of and be able to select and use transportation technologies. (Standard 18)
   a. Transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control, and support that must function together for a system to work effectively.
5. Students will develop an understanding of and be able to select and use manufacturing technologies. (Standard 19)
   a. Manufacturing systems are mechanical processes that change the form of materials through the processes of separating, forming, combining, and conditioning them. (Benchmark F)
   b. Marketing a product involves informing the public about it as well as assisting in selling and distributing it. (Benchmark K)

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Objectives

Upon completion of unit students will:

1. Demonstrate competent skills in sanding and refining a product
2. Safely use tools for their correct purposes
3. Orally discuss how Homer works as a system
4. Give two benefits of manufacturing
5. Identify two purposes of packaging

Teacher Preparation

To successfully prepare for this activity a visual aid of a sample hovercraft is needed. The instructor must also be able to organize the class to best utilize the drill press and glue gun. A safety procedure and/ or contract should be in place as well.

Content Outline

A. Manufacturing
   1. Series of steps
      1.1 Raw Materials
      1.2 Sanding, drilling, cutting, finishing, gluing, etc
      1.3 End product

B. System
   1. Balloon cannot work without the nozzle
   2. Disk cannot work without the nozzle and balloon
   3. Disk, nozzle, balloon will not work with out the sealant

C. Production
   1. Sanding
      1.1 80grit
      1.2 120grit
      1.3 400grit
      1.4 Polish
   2. Drilling
      2.1 Size of the hole equals about of time it will take for the air to escape
      2.2 Safety
         2.2.1 Glasses
         2.2.2 Clamping Plexiglas to the drill press table
         2.2.3 Clamping bottle cap to table
         2.2.3 Brushing away debris
   3. Adhering the nozzle
      3.1 Safety
         3.1.1 Keep hands away from glue gun and glue
         3.1.2 One person at glue gun at a time
      3.2 No leaks

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3.3 Neatness
4. Attaching the balloon
4.1 Stretching balloon over cap
4.2 Do not glue

D. Finishing
1. Decorating
1.1 Neatness
1.2 Make yours stand out

E. Packaging
1. Purpose
1.1 Protect
1.2 Advertise
1.3 Storage in a retail outlet

F. Evaluation
1. Does hovercraft work?
2. Quality of construction
3. Does package perform its function?

Activities/Case Studies

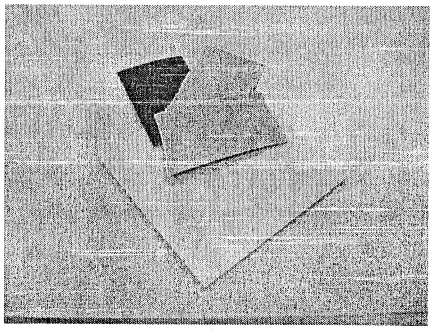
Homer the Hovercraft

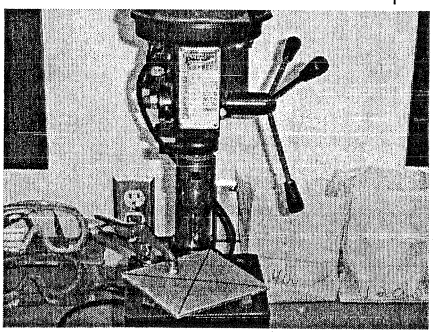
Sixth Grade Technology Education

Time: *Introduction and sanding: 1 class period*
Drilling and decorating Plexiglas: 2 class periods (depending on number of drills and students)
Drilling and gluing bottle cap: 2 class periods
Designing package: 1 class period
Attaching balloon and playing with it: 1 class period
Total: 5-7 class periods

Handouts: Packaging worksheet

Day 1: Introduce the activity to the students. Pass out assessment sheet to illustrate how they will be graded. Explain the concept of manufacturing. Demonstrate sanding and explain how the edges start off with diagonal blade marks, turn into horizontal sanding marks, and end up being a smooth finish. Pass out Plexiglas to the students. Have them keep the protective paper on it while they sand. This saves the surface. It is helpful to have a sample out where students can compare what the edges look like when each step of sanding is finished.





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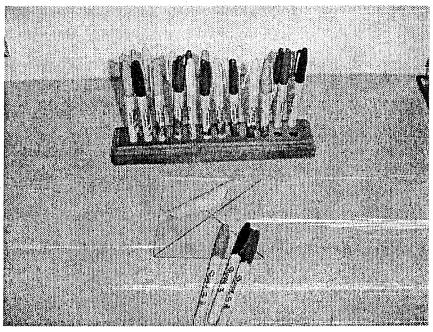
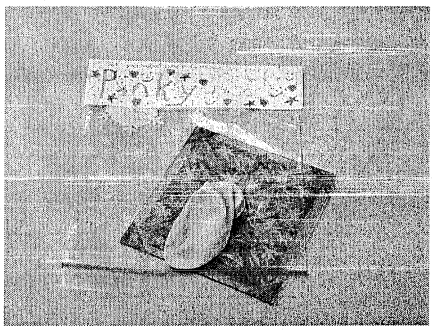
Day 2-3: Cover or refresh the students on drill press safety. As the students finish sanding they can then mark the center of the Plexiglas and drill a 1/8" hole in it. You can split the class and have some of them drill and the other half can decorate their Plexiglas. Use permanent markers to decorate. Tell the students to bring in a bottle cap to use tomorrow.



Day 4: Students who are finished decorating and drilling can now drill their bottle cap. Once drilled they can then use the hot glue gun to glue on the bottle cap ensuring a clean seal to the Plexiglas. Remind them of the importance of neat work

Day 5: Introduce the concept and significance of packaging. Show how the package works. Give the students the packaging worksheet to be completed with colored pencils or markers. If time permits, the package can be completed using Microsoft Word, Appleworks, or another drawing program.

Day 6: Pass out grade slips and remind them how you grade each step. Have them grade themselves. When finished with everything the students can get checked off by you and rewarded for making a quality hovercraft by getting their balloon and plastic baggie. They can then stretch the balloon over the bottle cap and let it fly on a smooth surface.



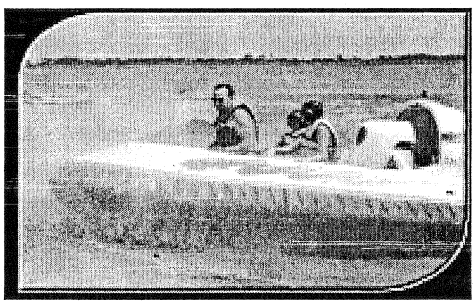
Day 7: Allow some time for the students to play with their hovercrafts. If equipment and space is available, make a small ramp and hold a competition.

Assessment

I allow the students to assess their own work. As they finish, the students show me what they think they have earned for a grade on the activity using the point sheet below. I have a quick talk with them on whether I agree with them or not on all points then put the score in the grade book, which we both agreed on. (The students are usually tougher graders than I am.)

Name:_____ **Hour:**_____

1)	SANDING	_____/10 POINTS
2)	DECORATING	_____/10 POINTS
3)	GLUE	_____/10 POINTS
4)	DRILLING	_____/10 POINTS
5)	PACKAGING	_____/10POINTS
	TOTAL:	_____/50 POINTS



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Resources

5 ½" x 5 ½" x 1/8" Plexiglas for each student
80-grit sandpaper
120-grit sandpaper
400-grit sandpaper
Permanent markers
Bottle cap for each student
Hot glue gun and slugs
Drill press
1/8" drill bit and drill press
Ziploc baggie for each student
Packaging worksheet
9" balloon for each student
Safety glasses
Buffing wheel (optional)

Academic Connections

Model Academic Standards For English Language Arts
By the end of grade eight, students will:

E.8.1 Use computers to acquire, organize, analyze, and communicate information
- Demonstrate efficient word-processing skills
- Perform basic computer operations on various platforms

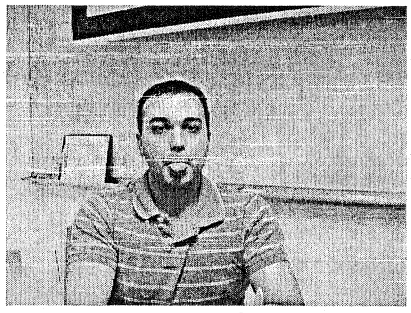
E.8.2 Make informed judgments about media and products
- Recognize common structural features found in print and broadcast advertising.
- Compare the effect of particular symbols and images seen in various media.

E.8.3 Create media products appropriate to audience and purpose.
- Use desktop publishing to produce products such as brochures and newsletters designed for particular organizations and audiences.

Possible Book Connection: *Dork in Disguise: by Susie Gorman*

About the Author

Jay Hansen



I graduated from the University of Wisconsin Stout in 1999. Since then I have taught for the Menasha Joint School District. Over the past six years, my teaching experiences range from 6th grade exploratory classes to focused vocations at the high school level. In 2003 I completed my masters degree from Cardinal Stritch University in Educational Computation.

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Hovercraft Package Design

Hovercraft package must include:

Front – Name of hovercraft
Name of company that makes it
Price (any price you want)
Slogan (We love to see you smile)
Should be colored and neat (no white showing)
Back - Name of hovercraft
UPC code (bar code)
Instructions
Should be colored and neat looking.

Instructions: Design your package in the space below. Be sure to draw the top rectangle upside down or when you fold it over you will have to stand on your head to read it. When finished, cut along dotted line and fold on the solid line

Upside down

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Right side up

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