



This engaging rich task has been developed by the Education Department at the Children’s Museum of Pittsburgh. Rich tasks are open-ended investigations designed for you to work alone or in a group and may be conducted during, before or after your visit to How People Make Things to enhance your experience.

Foil Embossing

Deforming is a process where material is forced into a new shape. In manufacturing, people use tools like hammers, mallets and even air to deform materials. Many machines are used to deform materials like metal, plastic and even wood. To deform a material, force must be used. **Force** is a push or pull upon an object. In manufacturing, people use powerful machines to bend, roll or stamp metal.

In this activity, you will use simple tools and found objects to deform aluminum foil in a variety of ways.

Suggested Materials

- 5x7 sheets of aluminum foil
- Muffin tin
- 4x6 sheets of matte board or medium weight cardboard
- Thin buttons
- Craft matchsticks
- Foam shapes
- Other thin pieces of found texture, including lace, yarn, sand paper, etc.
- Scissors
- Masking tape
- Hot glue gun
- Tacky glue
- Black tempera paint
- Paintbrush
- Paper towels
- Etching press (optional), or hand roller
- Embossing tools (optional)

Task Tools

- Observation Page (see Rich Task Tool Sheet)
- An inquiring mind!

Procedures/Investigation

- Press a sheet of aluminum foil into one cup of the muffin tin. Use your finger tips to push the foil tightly in along the edges.
- Gently peel the foil out. Observe how the foil has deformed, taking on the shape of the muffin tin cup.
- Trim the edges of the foil with scissors to create a cup of your own.
- Apply what you’ve observed about deforming to plan the embossing project –
 - Layer and glue buttons, textured pieces, etc. to the matte board to create a design.
 - Carefully cover the board with a sheet of foil.
 - Smooth the surface of the foil to prevent tearing,
 - Tape the foil edges on the back of the board.
 - Run the piece through a printing press under medium pressure, or use a hand roller and a thin towel to further press and rub the design into the foil.
 - Cover the entire foil embossed design with a thin layer of tempera paint.
 - Wipe off most of the paint with a towel. Small amounts will stick to the edges, further enhancing the deformed relief design.



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- Let the paint dry. When it has finished, gently peel the tape from the back of the matte board and lift the foil from the board.
 - Use scissors to trim the folded edges from the foil embossed design. Notice how the foil still holds the shape of the textures from the matte board.

Teacher Hints

- Use heavy weight aluminum foil to prevent tearing.
- Boards run through an etching press can be further enhanced with light embossing tools.
- Have students begin the Task Tool Sheet before they try the muffin tin observation. They'll continue the worksheet before and after the foil embossing project.
- Review the following definitions:
 - **Deforming** is when a material is forced into a new shape.
 - **Force** is a push or pull on an object.

Questions to Think About

- How did you use force to deform the foil in the muffin tin?
- What can you predict will happen to the foil when it's placed over the textured matte board?
- What other materials could you deform in this manner? What materials would not deform in a way similar to the foil? What characteristics do each share?
- How do the different textures translate to the foil? What features are lost? What features become more prominent?
- How does the paint enhance the image?

Ways to Extend Your Investigation

- Cover plain matte board with aluminum foil and use embossing tools directly onto the foil for a more "hand drawn" look.
- Use stamps to deform the foil in a way similar to coin manufacturing. In the United States, coins are made at one of the three US Mints. At the mint, pennies, nickels, dimes and quarters are made by taking sheets of material like copper and nickel are flattened and cut into the proper thickness and different sizes of circles. When quarters are made, the metal is cut, and then a large stamp is used to deform the surface of the coin. An imprint of George Washington is stamped into the front. When they design new quarters, they make new stamps. Force is used to make an imprint into the metal material. Some material requires more force to flatten and imprint the material because it is harder or softer.

International Technology Education Association Standards

- ITEA STL The Nature of Technology – 3. Understanding the relationship between technologies and the connection between technology and other fields of study.
- ITEA STL Technology and Society – 6. Understanding the role of society in the development and use of technology.
- ITEA STL Technology and Society – 7. Understanding the influence of technology on history.
- ITEA STL Design – 9. Understanding troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- ITEA STL Abilities for a Technological World – 13. Assess the impact of products and systems.
- ITEA STL The Designed World – 19. Understanding and selection and use of manufacturing technologies.

National Academic Standards

- NA-VA.K-4.1 Understanding and Applying Media, Techniques, and Processes.
- NA-VA.K-4.2 Using knowledge of Structures and Functions
- NA-VA.K-4.4 Making connections between visual art and other disciplines.

- NS.K-4.2 Physical Science



Foil Deformation and Embossing

1. Before you begin, predict what will happen to the foil sheet when you force it into the muffin tin cup. _____

2. After forcing the foil in the muffin tin cup, describe how the foil has been deformed.

3. Think about what physical properties you have observed with the aluminum foil. Predict what will happen when you place the foil over the textured materials and run it through the printing press (or use a hand roller). _____

4. After you have completed the embossing activity, describe how the foil has deformed. How is this similar or different from the muffin tin observation? _____

5. What physical properties does the aluminum foil possess that makes it ideal for deforming?

6. What household materials could you try these activities with that would NOT deform?

7. List some manufactured items you use daily that are deformed. Think about some examples that are stamped or embossed like the foil in the second activity, as well as objects that are forced into a shape like the aluminum foil in the muffin tin.

