Insulations Through Time

Drawing Inspiration from our Ancestors

United Tribes Technical College
Intertribal Research & Resource Center

Activity Overview:

Keeping our homes warm in the winter and cool in the summer is a challenge that involves creative solutions. UTTC faculty and pre-engineering students work to design and test insulations from natural materials. In this activity, you will get a chance to creatively engineer a way to keep a cup of ice from melting. You will also learn about traditional insulations and how you can study engineering at UTTC.

Materials:

- Ice
- A bottle or cup to hold the ice
- Insulation materials (anything on this list will do)
    - Paper
    - Grass
    - Styrofoam
    - Cattail Fluff
    - Soil

UTTC Student Spotlight: Dione Otten, *Mandan, Hidatsa, Arikira*

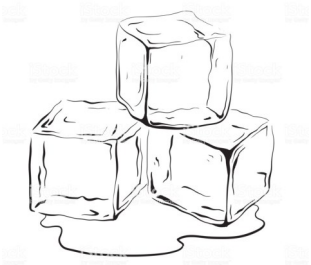
When you face a problem, how do you go about solving the problem? Engineers don't just use science and math to develop solutions to problems, they also use creativity! UTTC Pre-engineering student Dione Otten, worked with Intertribal Research and Resource Center faculty Dr. Gurjot Dhaliwal to create insulations from soy beans. Why soy? Most insulations use synthetic materials that can be harmful to the environment or toxic to humans. Dione and Dr. Dhaliwal designed insulations from soy based materials and then tested to see how effective they are. Using natural materials for insulation isn't a new idea. Read on to learn how your ancestors creatively used natural materials to insulate their homes.

*Dionne Otten (MHA) presenting his research at the American Indian Science and Engineering Society **(AISES)** National Conference.*

Reflect:

Creativity is an important skill for engineers to have as they work to create solutions for problems in their community. Take some time to reflect on how Dione's and Dr. Dhaliwal's work is creative. Think about a time where you were creative. Share your responses with a friend or family member.

Try out engineering with this creative design challenge!



Goal: Use materials found around your house to keep a cup of ice from melting.

Step 1: Find cups that can be used to hold ice

Step 2: Choose a material and create a way to wrap the material around the cups. You can use styrofoam, paper, grasses from outside, or some other creative idea you have. Make it a competition and challenge a friend or family member to design their own using a different material. Or try out a different material on your own with another cup.

Step 3: Fill your cup with ice

Step 4: Observe and Reflect

How long is it taking for the ice to melt?

If you have a thermometer, try taking the temperature of your cups to see how they compare at different time intervals.

Which material is doing the best job at keeping the ice from melting?

What surprised you about the results?

If you were to re-design what would you do differently?

In what ways did you have to be creative in this challenge?

Step 5: Share your creation!

Take a picture of your design and share it with us at UTTC! Tag @unitedtribestech on Social Media.

How does this activity relate to solving challenges in our community?

What do you wear to stay warm in the winter? Sometimes it's challenging to find the right clothing to wear. Keeping houses warm in the winter is also a challenge. Houses use different materials, called insulators, to keep our houses warm. They do so by preventing heat from escaping. Insulators can also keep things cold by preventing heat from entering. In this challenge, you chose a material and then engineered a way to test how well it prevented a cup of ice from melting. Likely, one of the insulation materials you chose for your challenge has been used to insulate homes. Read the insulations through time pages to learn about the history of different insulation materials.

Insulations Through Time

As you read:

Throughout the years, people have used many different kinds of materials for insulation. As you learn about different types, keep in mind how creativity is essential for coming up with new kinds of insulations.

Soil, Sod, Dirt

- Soil/Sod are natural insulators that are used in many cultures.
- Soil can be packed around the structure or used on a roof. However, it usually takes a thick amount of soil to provide substantial thermal insulation.
- Soil/Sod can be used to keep a building warm or cool.

Animal hide stuffed with prairie grasses

- A double-wall of animal hide stuffed with grasses (or just dead air space) serves as insulation and blocks drafts in tipis.
- The air space provides a barrier from the cold, while the grasses provides structure to keep the air pocket open.
- This application is used now in "straw-bale houses."
- Turtle Mountain Community College in Belcourt, ND has an Environmental Research Center insulated with straw bales.

TMCC Environmental Research Center under Construction, photo: Nathaniel Corum

Animal hide stuffed with cattail fluff

- Cattail fluff comes from the seed pods of the cattail plant found along many wetlands in the area.
- The fluff is soft and airy, trapping air and providing insulation from the cold.
- While more often used to stuff moccasins or clothing, cattail fluff can also be used in some winter shelter applications.

Insulations Through Time

Wads of Newspaper

- Before recycling newspapers became the norm, people found other uses for the abundant material. One use was as wall insulation!
- Newspaper blocks drafts and provides a dead air space.
- Some homeowners discover newspaper in the walls when they remodel old homes.
- Today, cellulose insulations are often made from hammer milling waste newspaper.

Styrofoam

- Styrofoam insulation is made of a plastic material.
- This insulation is used in many everyday items including Styrofoam cups, packing peanuts, and coolers.
- Foam board insulation is also used in many construction applications.
- It is made out of styrene which is a petroleum-based product.

Soy Foam

- Soy foam is an insulation made from soybean oil.
- At United Tribes Technical College, we develop and research this sustainable, biobased material.
- The foams have the same R-value as commercial materials and we are developing ways to make the foams fire retardant and less toxic.
- Applications of this insulation include home and commercial buildings.

Talk about it!

What insulations on this list were new to you? What insulations on this list do you think are the most creative? How is the research at UTTC inspired by insulations used by your ancestors? If you were to engineer a brand new insulation, what materials in nature would you try to use?

Share your responses with us on social media or email us at abahnson@uttc.edu

How can you become an engineer?

United Tribes Technical College has many degree paths that can lead to an engineering career. Visit the various websites below to learn more about our programs and reach out to us to learn more!