

Project: Hot Pack Engineering Build

Challenge/Scenario: You must design and build a hot pack.

You will be using the **Engineering Design Process** to complete your task:

Engineering Design Process

1. Identify the Problem (I filled in this step for you.)
2. Gather Information (Answer the questions)
3. Develop a Design (Create a sketch and materials list)
4. Prototype and Test the Design (Build and test your design and document your results)
5. Redesign your Prototype (Create a sketch and fill out the table for what you will change)
6. Turn in your project (Look for the [SUBMIT ASSIGNMENT HERE](#) link in this module)

- 1. Identify the Problem:** The first step in the **Engineering Design Process** is to identify the problem. This includes identifying any criteria (requirements) and constraints (limitations).

Problem: This should be a single sentence that summarizes the main problem of the challenge/scenario.

How do I build a hot pack that meets all the requirements below?

Criteria	Constraints
<ul style="list-style-type: none">- Must change temperature by 10°C to 14°C when pack is active.- It must be able to be activated within 30 seconds- It must be lightweight and portable- It must not leak or rupture- The salt and water must stay separate until you are ready to activate it.	Time – You only have 1 day in class to build and 1 day to test and redesign. Budget – you only have a budget of \$35 for build and redesign. (No returns to the store.) No items may be brought from home. All items must come from the store.

2. Gather Information: The next step in the **Engineering Design Process** is to gather information and consider ideas.

How much salt will you need? (Use the Gizmo to test this.)

How does a hot/cold pack usually work?

Will the material you make it out of affect the temperature outside the pack?

- 3. Develop a Plan:** The next step in the **Engineering Design Process** is to develop a plan. You need to create a labeled sketch of your design to keep .
- a. Sketch out a diagram of the design you intend to build. Be sure to **clearly label** the parts so you know what to make it out of.
 - b. Label all of the parts and determine the budget for the design.

Draw and label the group diagram.

4. Fill out your materials list and make sure you are within your budget. You must have this filled out in order to get materials from the store.

Item Description	Quantity

5. **Prototype and Test the Design:** Build your Prototype in class. Then test your design. Record your test results below:

1st PROTOTYPE TEST RESULTS

Starting Temp:

Ending Temp:

Did it meet the 10 to 14 degree temp difference?

If no, why not?

Did it leak?

If yes, how can you fix that in the redesign?

Did the salt and water stay separate until you were ready to activate it?

If no, how can you fix that in the redesign?

Were you able to activate it in 30 seconds?

If no, how can you fix that in the redesign?

6. Redesign your prototype – this is where you make improvements on your design. Create a sketch and label it for what you will change when you redesign. Fill out the table below stating what you changed and why you think that will solve any issues you had. How can you maximize or minimize heat transfer?

Draw and label the diagram.

Modification Made	Reasoning