Department of MECHANICAL ENGINEERING
THE UNIVERSITY OF UTAH

Innovative Solutions: Ice Bag & Grease Disposal Container

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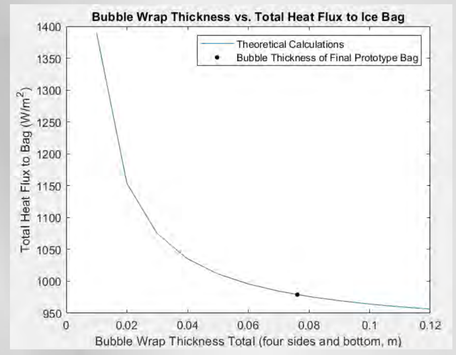
Introduction:

The objective of this project is to design a ice bag that addresses current consumer market issues with durability, clumping, and insulation to better preserve ice.

Objectives:

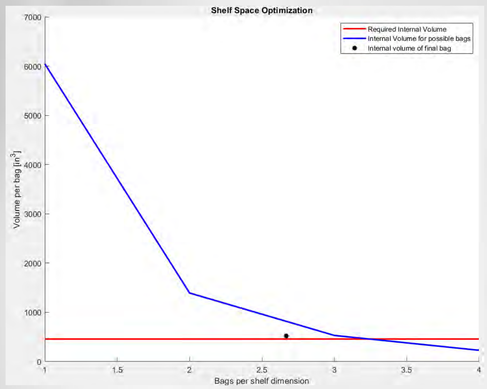
- Ice remains visible
- Bag stands on its own
- Can hold 7 lbs of ice
- Bag is resealable
- Bag has a handle
- Preserves ice 3+ times longer

Engineering Analysis:



- Used 1D heat conduction equations to determine the bottom of the bag must stay insulated
- Graph shows theoretical calculations for bubble wrap thicknesses, optimal determined from this
- Volume calculations on both ice and bag used to determine ideal bag dimensions

Recommendations:



Dimensions:

- Outer dimensions: 11 x 5.5 x 12 inches
8 bags per shelf

Material List:

- Vertically directioned air filled tube bubble wrap
- Packing tape to secure bag wall and base panels
- Sliding zipper for closure

Test Result Images:

Insulation test images from left to right: existing ice bag after 3 hours, prototype bag after 3 hours

Experiments:

Amount Of Ice Left In Bag	Existing Ice Bag	Percentage Melted	Prototype Bag	Percentage Melted
Starting Time	5 lbs	N/A	5 lbs	N/A
After Hour 1	4 lbs, 4.5 oz	14.375%	5 lbs	0%
After Hour 2	2 lbs, 14.7 oz	41.625%	4 lbs, 2.1 oz	17.375%
After Hour 3	13.3 oz	83.375%	2 lbs, 14.1 oz	42.375%

Conclusion:

The ice bag design minimized thermal transfer and maintained ice longevity, preserving ice more than 3 times longer than conventional store bought bags.

Design Objective	Ice remains visible	Bag stands on its own	Bag is resealable	Bag has a handle	Holds 7 lbs of ice	Preserves Ice 3+ Times Longer
Result	Passed	Passed	Passed	Passed	Passed	3.4 Times Longer

Introduction:

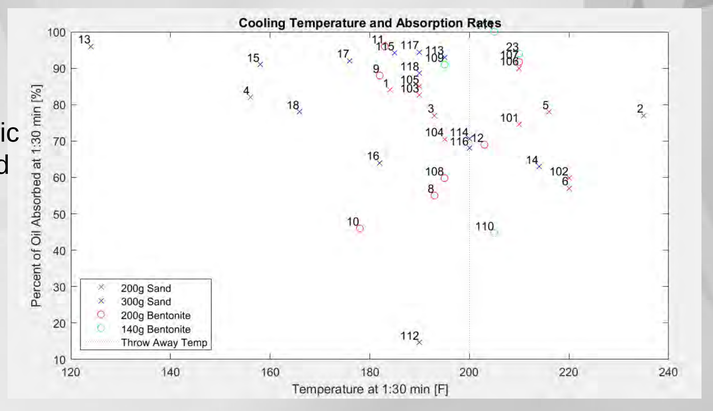
The objective of this project is to design a product that can contain and dispose of used kitchen grease quickly.

Objectives:

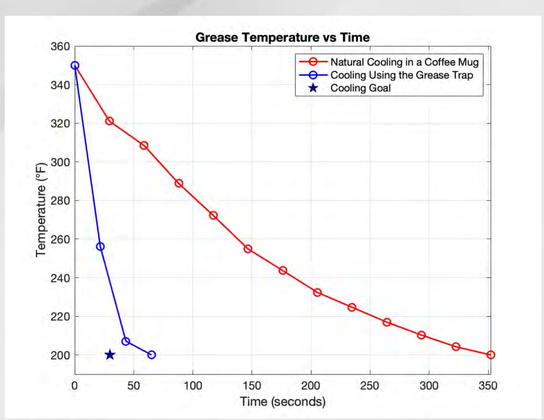
- Container is sealable
- Combined height does not exceed 5”
- Cools grease to 200°F in 30 sec

Engineering Analysis:

- Graph showing variations of the prototype with different material compositions
- Used various equations to determine viability of material compositions like specific heat capacity, Newton's Law of Cooling and Fourier’s Law of Heat Conduction



Recommendations:



Dimensions:

- Outer box dimensions 6 x 9 x 3 inches
- 5 boxes to a package
- Total height of package 5 inches
- Small, medium, and large sizes

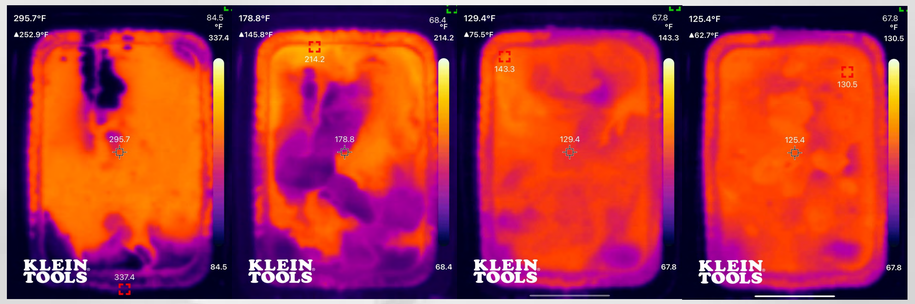
Material List:

- Proprietary mix of up to 11 different materials
- 1 aluminum box
- 1 lined cardboard lid

Experiments:

Thermal Imaging Results:

- T0: 337.4 °F
- T1: 214.2 °F
- T2:143.3 °F
- T3:130.5 °F



T0: 0 seconds T1: 30 Seconds T2: 60 Seconds T3: 90 Seconds

Conclusion:

Using our proprietary mix of materials, cooking grease or oil can be cooled from 350 °F to a throw-away safe temperature of 200 °F in less than one minute

Design Objective	Cools the grease to 200°F in 30 seconds	Container is sealable	Total combined height does not exceed 5”
Result	25 Seconds	Passed	Passed