

# 40 Quart Cooler Design

## Progress Report Presentation

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# Overview

- Client Identification
- Typical Customer
- Client Needs
- Design Description
- CAD Design
- Prototyping
- Testing
- Group Progress



# Client Identification

- Canyon Coolers
  - Entered the market in 2010
  - Competes by maintaining quality at lower price point
- Marketed coolers range from 22 to 800 quarts
  - Manufactured in Thailand
  - Investing in new molds

# Typical Customer

- Outdoors sports enthusiast, camping, hunting, fishing
- Extended excursions in the wilderness
- Keeping food and beverages refrigerated is a necessity
- Needs an extremely reliable product
- Maximum insulation is key choice when purchasing a cooler

# Client Needs

- Unreliable production quality of coolers manufactured in Thailand
- Fairly high failure rate of small components
- Profit is lost in handling returns and exchanges
- Existing 40 quart cooler dimensions are incompatible with some common uses
- Insulation and wall thickness is not quite adequate in the existing 40 quart model

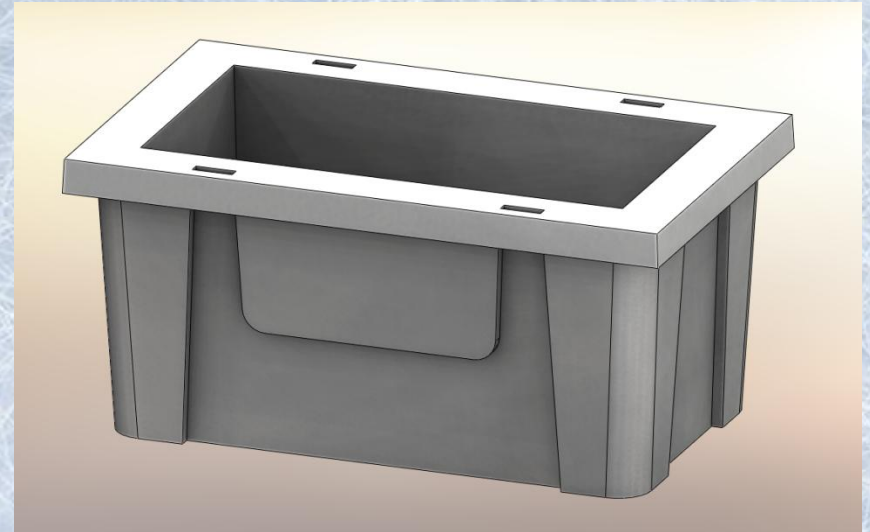
# Design Description

We are designing a 40 quart cooler, with a MSRP of no more than \$189.99 that offers excellent quality and features with the best coolers available on the market.



# CAD Design

- Designing cooler body & lid for Roto-molding
- Adding global and dependent dimension variables
- Meshing body and lid CAD models



# Prototyping

## “Phantom” latch

- CAD file completed
- Two prototype iterations
- Cost estimate for components
- Talking to contacts for injection molding





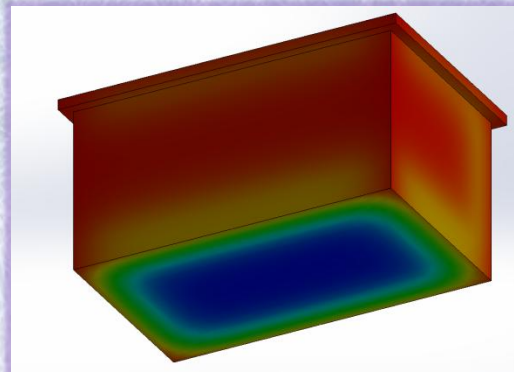
# Prototyping

## Hinge Section

- Redesigned cooler hinge
- Developing a scaled down functional prototype
- Prototyping will be carried out via NAU's rapid prototyping facilities (FDM)

# Testing Overview

- Conduct experiment on existing 40qt cooler to collect heat transfer information
- Model the existing 40qt cooler in CAD software
- Use experimental data to verify the accuracy of the simulation heat transfer analysis
- Model our cooler in CAD software and conduct a heat transfer analysis, to demonstrate performance.



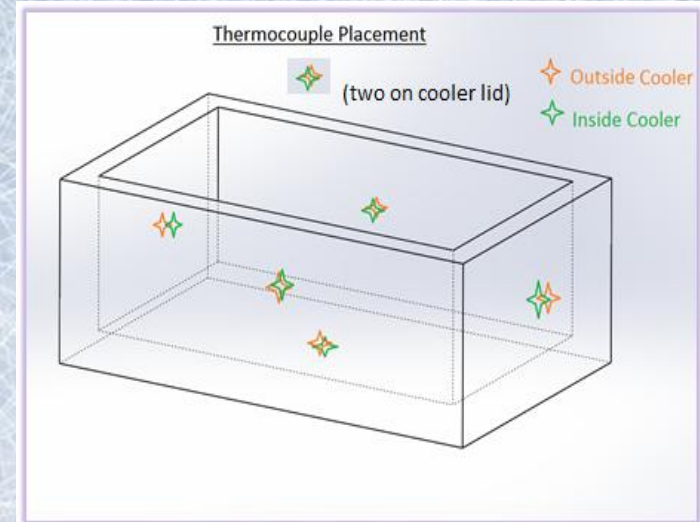
# Testing

## Procedure

- Tested in constant room temperature
- 12 J type thermocouples and data logging software
- 1 block of ice
- Test until a steady state is achieved

## Purpose

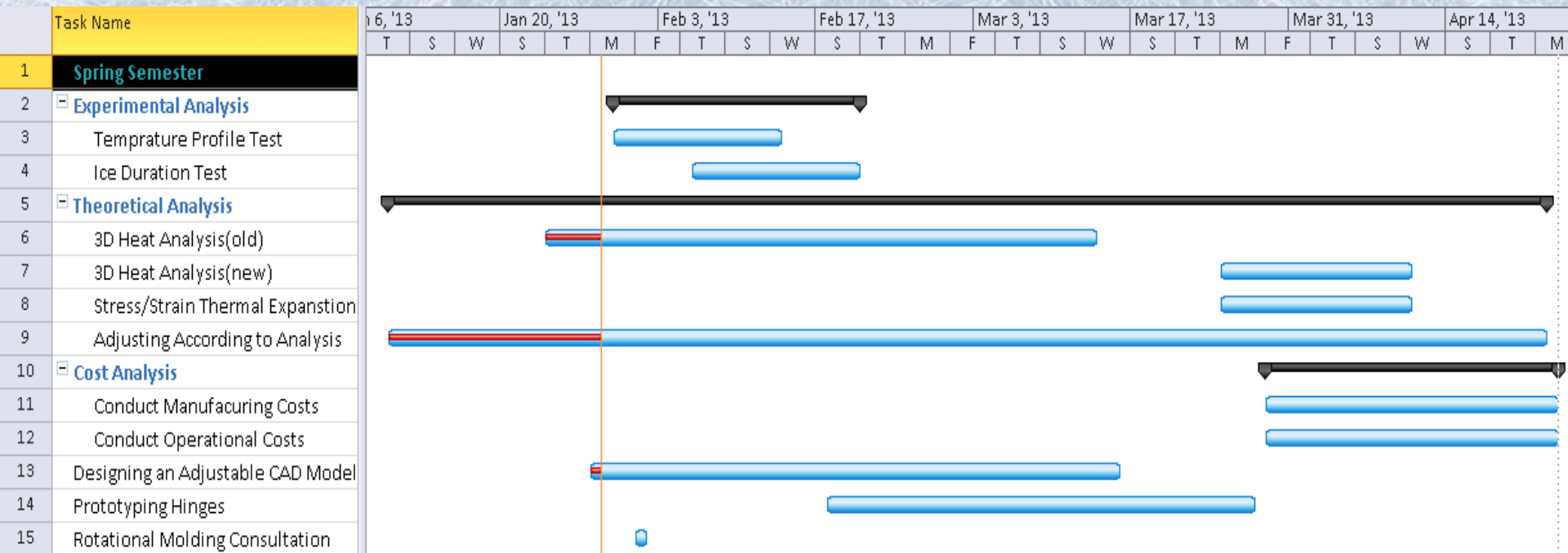
- Get data to determine real heat loss values
- Use data to verify our theoretical analysis



# Semester Overview

- Conducting experiments to validate our computer simulations
  - Heat transfer and stress\strain analysis
- Manufacturing research for injection and rotational molding
  - Visit Michael Bros. Rotational Molding Company in Prescott AZ.
  - Find a client for injection molding the improved latch
- Manufacture a fully functional “Phantom Latch”
- Develop a scaled down functional model of the improved hinge assembly.
- Create manufacturable body and lid molds in CAD software
- Final cost analysis
- Present to client and UGRADS

# Group Progress



# References

- <http://www.canyoncoolers.com>
- <http://www.solidworks.com/>
- <http://www.VoltPlastics.com/pdf/VOLTCatalog24.pdf>
- Make-It Manufacturing, Inc.
- Michael Brothers Inc.

# Questions?

