Team 15

Adiabats

40 Quart Cooler Design

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Overview

- *Introduction*
- *Needs Identification*
- *Problem Statement*
- *Criteria*
- *Functional Diagram*
- *House of Quality*
- *Project Plan*

Introduction

- *Canyon Coolers is a local Flagstaff business*
- *The coolers produced are extremely high quality and offer excellent ice retention*
- *Various product lines are already available: portable coolers, pro coolers, commercial, etc…*
- *The various cooler families are designed to satisfy different needs and also are reasonably priced*
- *Sales for 40 quart coolers are the fastest growing*

Need Identification

- *Canyon Coolers needs to reinvent an existing 40 quart cooler to provide excellent performance at a competitive price.*
- *This cooler needs to include a variety of extra features such as an easily accessible sleeve, retractable wheels, locking system etc…*
- *The price for prototype building and casting needs to be as low as possible while maintaining desired quality standards*

Problem Statement

~ Goal ~

Goal: *Design a 40 quart cooler that competes with the best models in the market at a lower cost.*

Scope: *Improved quality can come with additional costs, and cost is a strict constraint in this project. Therefore some planned upgrades on design will have to be reconsidered or possibly thrown out all together*

Problem Statement

~ Objectives ~

Objective	*Basis for Measurement*	*Units*
Well Insulated	*Significant ice retention*	*Watts & t*
Sturdy	*No major dents upon impact*	*m*
Inexpensive	*Low MSRP*	*$*
Light Weight	*Easily carried by one person*	*kg*
Dimensions	*Nests into other coolers (shipping), and compatible with common sources of use*	*m*
Maintains Shape	*No warp from temperature changes*	*Degrees*
Low Maintenance	*Costly for distributer to fix*	*$*

Problem Statement

~ Constraints ~

- ***Dimensions***
  - *Must nest inside a larger cooler size to reduce shipping costs*
  - *Must be compatible in wider ranges of use*
- ***Weight***
  - *Less than 7 kg empty*
- ***Durability***
  - *Latch needs to withstand high stresses*
  - *Cooler body and lid must be well integrated and impervious to small stresses*
- ***Cost***
  - *Easy and cheaper to produce than current model*
  - *MSRP at or lower than that of current 40 quart design*
- ***Function***
  - *Hold ice for at least one week*
  - *Air-tight and water-tight*

Problem Statement

~ Test Environment ~

- ***Types***
  - *Ice retention*
  - *Durability*
- ***Conditions***
  - *Typical consumer use*
  - *Ideal consumer use*
- ***Location***
  - *In direct sunlight*
  - *Inside a car*
  - *Sitting on different surface types (truck bed, sand, grass)*

Recapitulation

Need: *Canyon Coolers could use a small sized cooler that provides flagship quality at a reasonable price*

Goal: *Design a 40 quart cooler that competes with the best models in the market at a lower cost.*

Objectives:

Objective	Basis for Measurement	Units
Well Insulated	Significant ice retention	Watts
Sturdy	No major dents upon impact	m
Inexpensive	Low MSRP	$
Light Weight	Easily carried by one person	kg
Dimensions	Nests into other coolers (shipping), and compatible with common sources of use	m
Maintains Shape	No warp from temperature changes	Degrees
Low Maintenance	Costly for distributer to fix	$

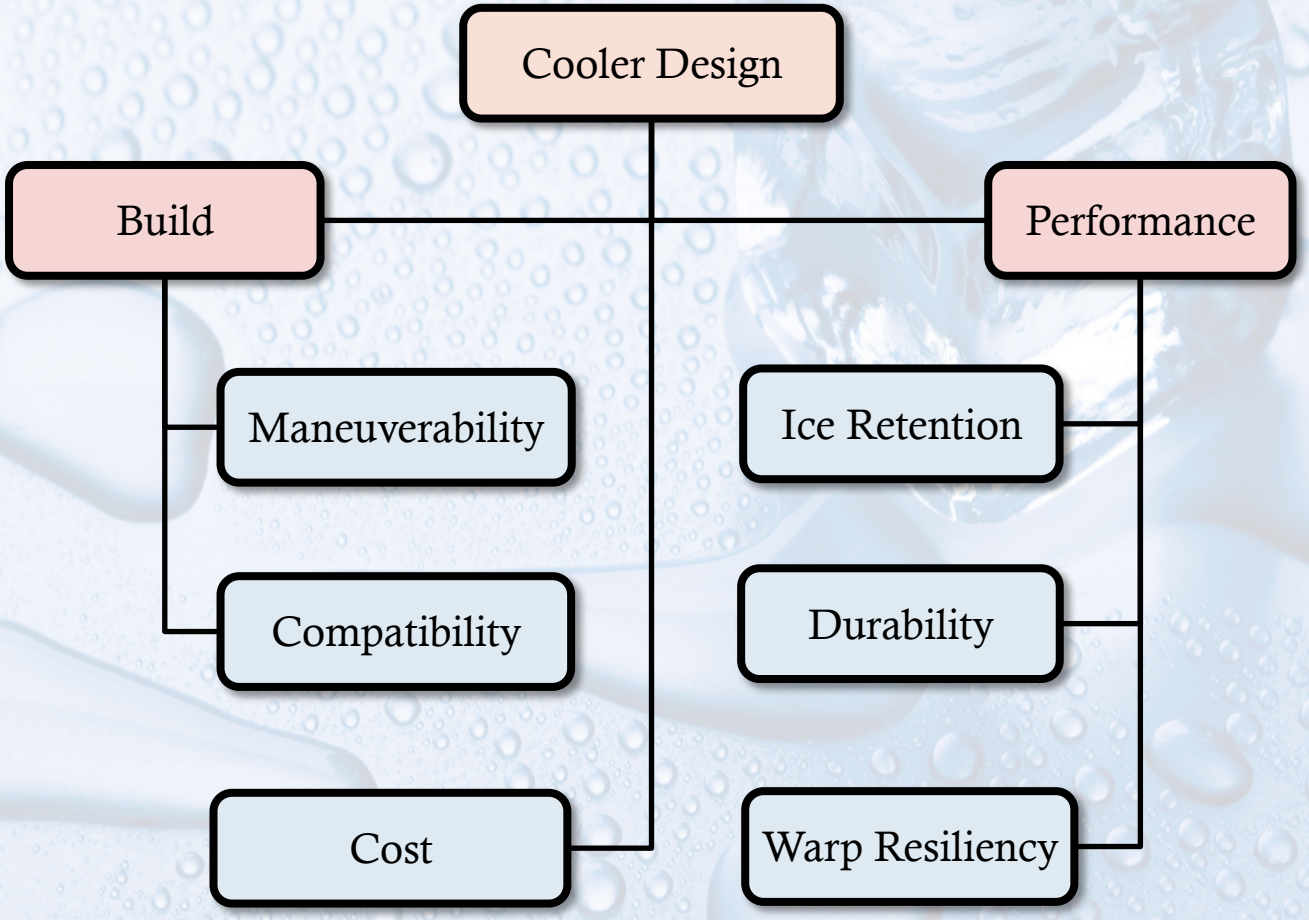
Constraints:

- ✓ *Must nest inside a larger cooler size to reduce shipping costs*
- ✓ *Less than 7 kg empty*
- ✓ *Cooler body and lid must be well integrated and withstand common wear*
- ✓ *MSRP at or lower than that of current 40 quart design*
- ✓ *Hold ice for at least one week*
- ✓ *Air-tight and water-tight*

Criteria

Objective	***Criteria***
Well Insulated	*Ice Retention*
Sturdy	*Durability*
Inexpensive	*Cost*
Light Weight	*Maneuverability*
Dimensions	*Compatibility*
Maintains Shape	*Deflection/Warp Resiliency*
Low Maintenance	*Reparability*

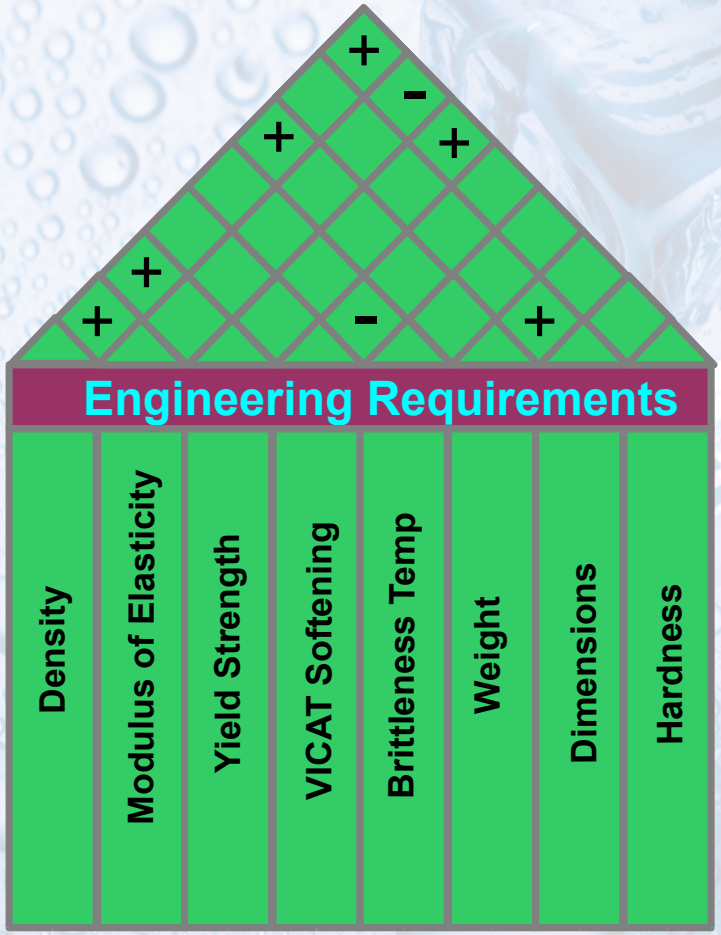
Criteria Tree



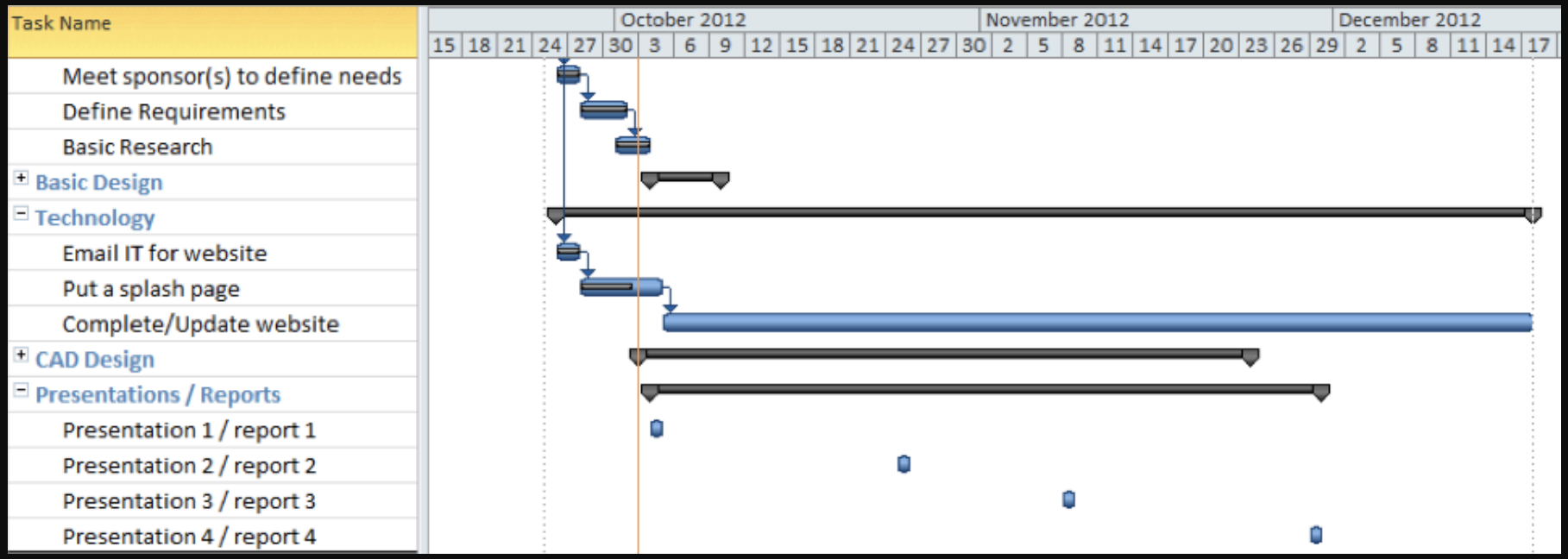
Quality Function Deployment

		Engineering Requirements								Benchmarks	
		Yield Strength	Modulus of elasticity	VICAT Softening Point	Brittleness Temp	Density	Weight	dimensions	Hardness	Yeti Coolers	Engel Coolers
Customer Requirements	Looks Good						X	X		0	
	Keeps Things Cold				X	X	X				0
	Sturdy	X	X			X		X	X		0
	Inexpensive					X	X	X			0
	Light Weight					X	X			0	
	Portable						X	X		0	
	Resists Damage	X	X	X	X				X	0	
	Units	MPa	Gpa	°C	°C	g/cc	Kg	m*m*m	Shore D		
		25	0.7	120	-118	0.95	10	0.03785m^3	65		
		Engineering Targets									

House of Quality



Project Planning



References

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- www.canyoncoolers.com
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