

40 Quart Cooler Design

Northern Arizona University
476C Senior Design

Federico Martolini
Dominic Albano
Danny Miller
Bander Almazroua
Dirk Prather

Overview

- Problem Statement
- Concept Generation
- Concept Selection
- Project Progress
- Conclusion
- References
- Question and Answer

Problem Statement

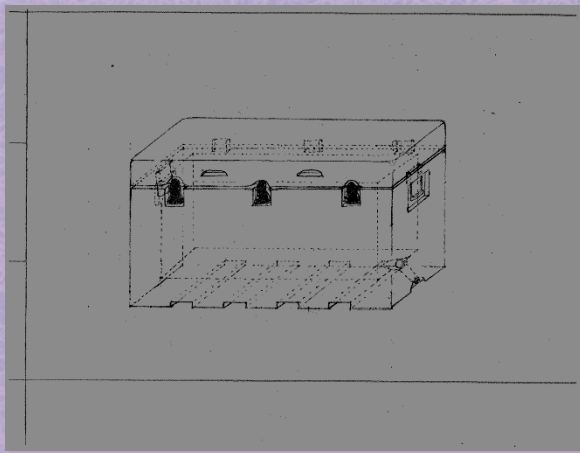
GOAL

Produce a 40-quart cooler that shares quality and features with the best models in the market but at a reduced price.

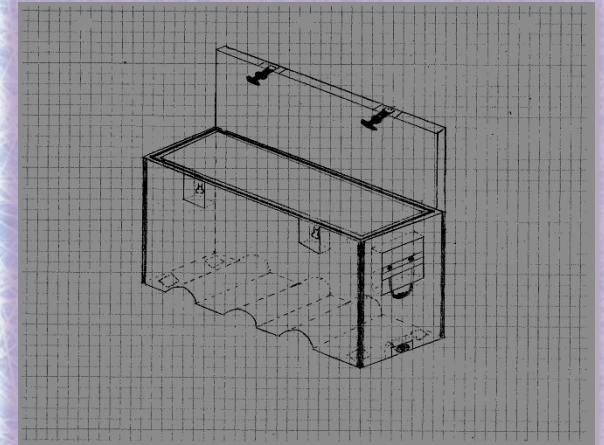


Concept Generation

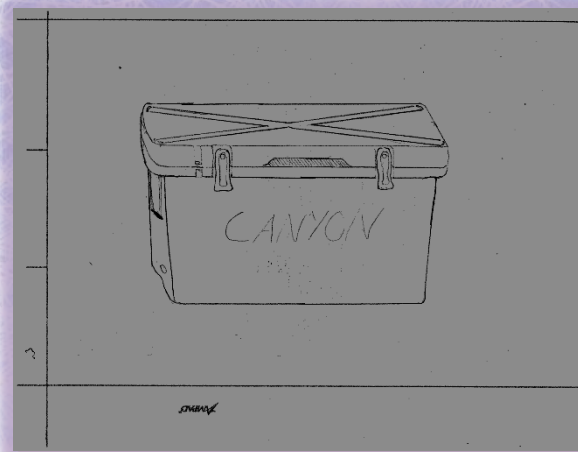
Coolers Overview



Cooler A



Cooler B

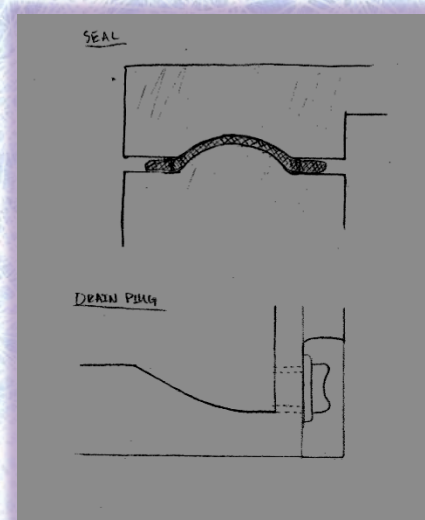
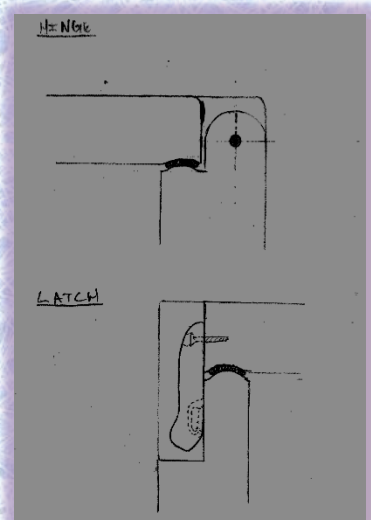
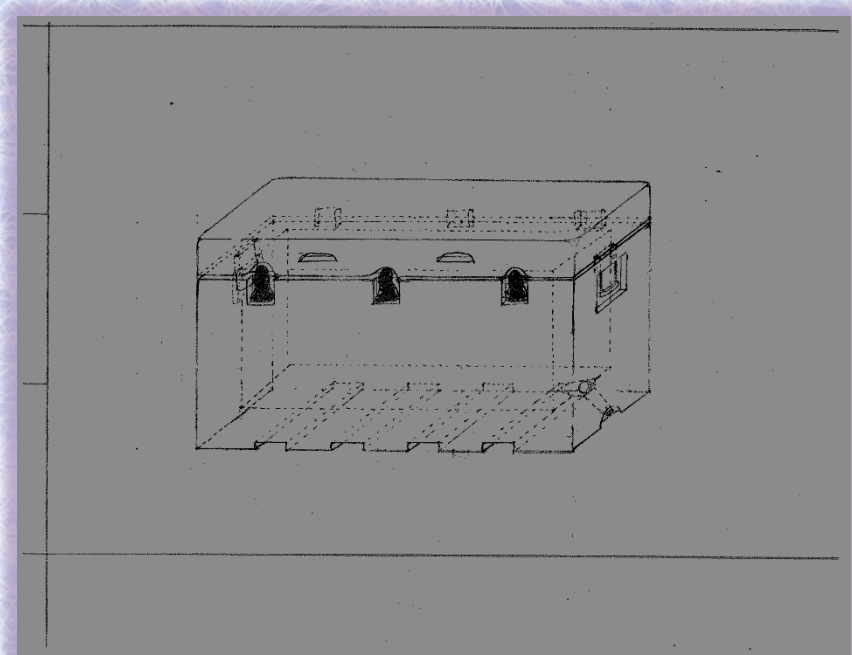


Cooler C

Concept Generation

Cooler A

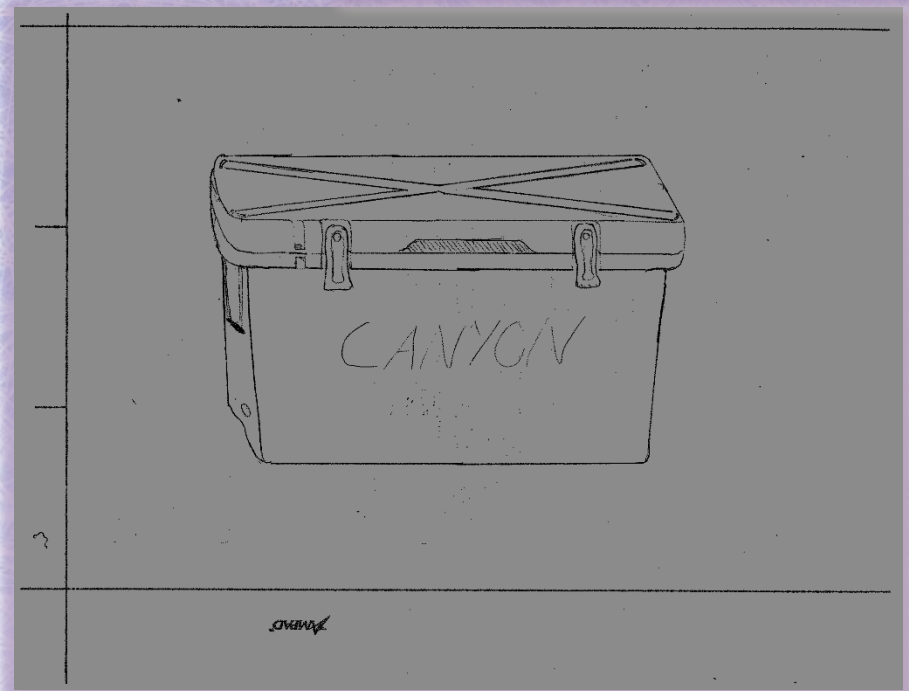
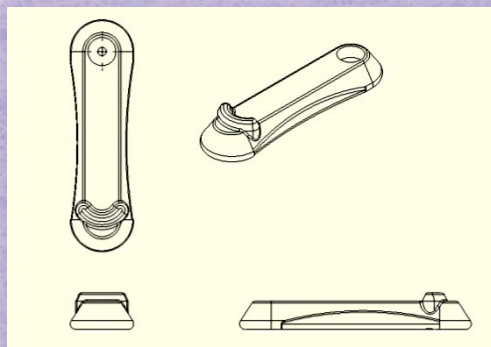
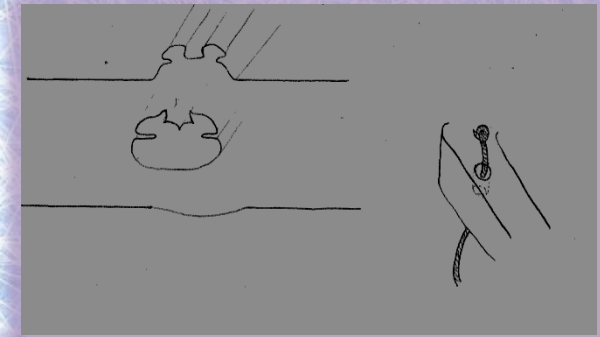
- Three Latches
- Extra Durable
- Maximizes ice retention
- Affordable and effective gasket



Concept Generation

Cooler B

- Versatile tie downs
- Reverse compatible latch
- Tapered body
- Rubber gaskets
- Recessed features

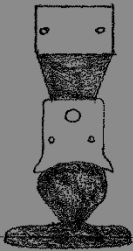


Concept Generation

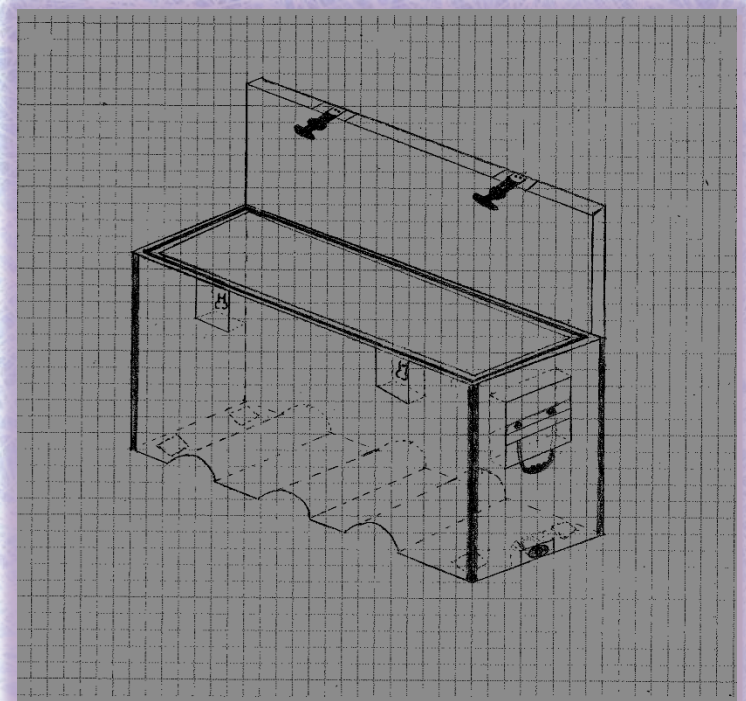
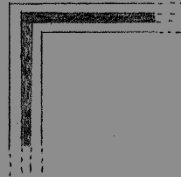
Cooler C

- Most Durable
- Superior ice retention
- Standardized latches
- Simplistic design
- Recessed features

RUBBER T-LATCH FRONT VIEW



SEAL TOP VIEW DETAIL



Concept Selection

Pairwise Comparison: Features

	Cost	Ergonomics	Ice retention	Durability	Latches	Lock slot	Tie downs	Drain Plug	Aesthetics	Dynamic Handle	Total	Normalized total
Cost	NA	1	0	0	1	1	1	1	1	1	7	0.155
Ergonomics	0	NA	0	0	1	1	1	1	1	1	6	0.133
Ice retention	1	1	NA	1	1	1	1	1	1	1	9	0.2
Durability	0	1	0	NA	1	1	1	1	1	1	7	0.155
Latches	0	0	0	0	NA	1	1	0	1	1	4	0.0888
Lock slot	0	0	0	0	0	NA	0	0	1	0	1	0.0222
Tie downs	0	0	0	0	0	1	NA	0	0	0	1	0.0222
Drain Plug	0	1	0	0	0	1	1	NA	1	1	5	0.111
Aesthetics	0	0	0	0	0	1	1	0	NA	0	2	0.0444
Dynamic Handle	0	0	0	0	0	1	1	0	1	NA	3	0.0666

Concept Selection

Multi Criteria Scale

Value	Cost (\$)	Ergonomics	Ice retention (Hours)	Durability (Cycles)	Latches	Lock slot	Tie downs	Drain Plug	Aesthetics	Dynamic Handle
5	179.99	Excellent	240	100000	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
4	184.99	Good	192	50000	Good	Good	Good	Good	Good	Good
3	189.99	Satisfactory	144	10000	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
2	194.99	Adequate	96	1000	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
1	199.99	Tolerable	48	500	Tolerable	Tolerable	Tolerable	Tolerable	Tolerable	Tolerable
0	200+	Poor	24	100	Poor	Poor	Poor	Poor	Poor	Poor

Concept Selection Decision Matrix

Non Weighted Analysis

Design Option	Cooler A	Cooler B	Cooler C
Cost	2.8	3	3
Ergonomics	3	4	2.5
Ice retention	4	3.5	4.5
Durability	5	4	5
Latches	5	4	4
Lock slot	0	4	3
Tie downs	2	4	2
Drain Plug	3	3	3
Asthetics	3.5	4.5	3
Dynamic Handle	4	4.5	2

Weighted Analysis

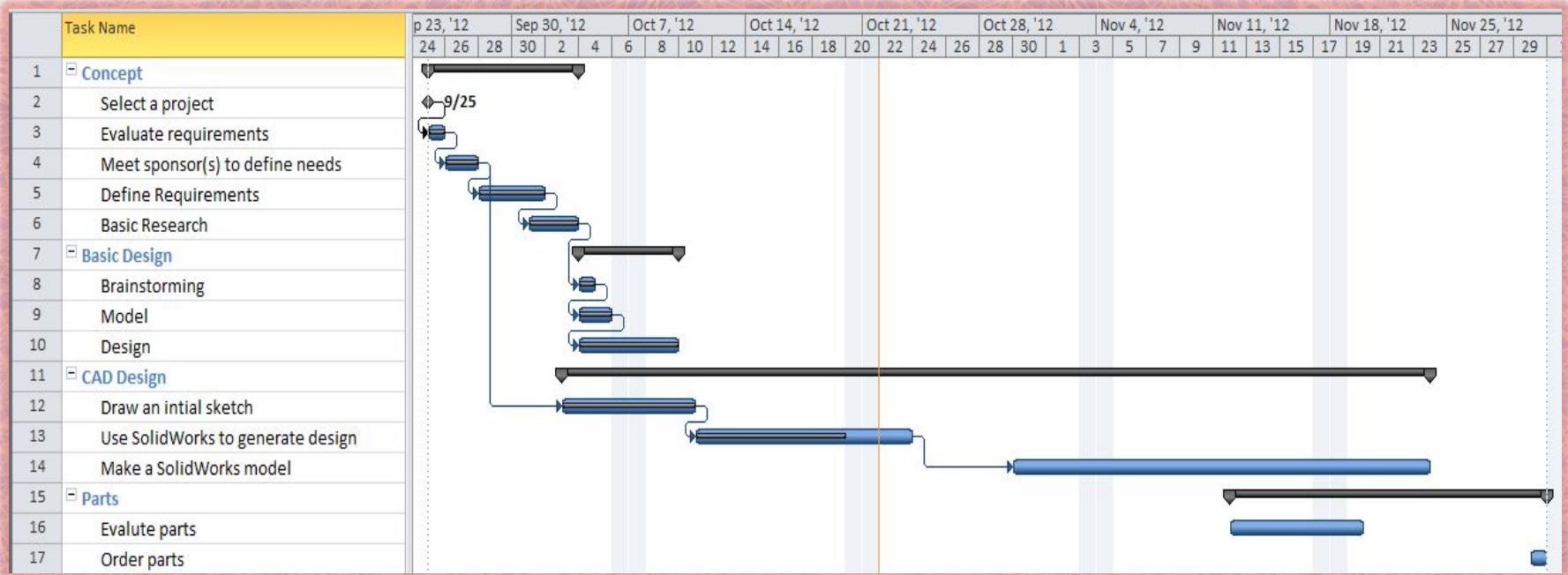
Design Option	Weight	Cooler A	Cooler B	Cooler C
Cost	0.156	0.436	0.467	0.467
Ergonomics	0.133	0.400	0.533	0.333
Ice retention	0.200	0.800	0.700	0.900
Durability	0.156	0.778	0.622	0.778
Latches	0.089	0.444	0.356	0.356
Lock slot	0.022	0.000	0.089	0.067
Tie downs	0.022	0.044	0.089	0.044
Drain Plug	0.111	0.333	0.333	0.333
Asthetics	0.044	0.156	0.200	0.133
Dynamic Handle	0.067	0.267	0.300	0.133
Totals	1.000	3.658	3.689	3.544

Conclusion

- Analysis favors design B
- Discuss decision with client
- Make necessary adjustments
- Move forward with CAD software

Project Progress

Gantt Chart



References

- www.canyoncoolers.com
- <http://www.thmarine.com/>
- <http://www.grainger.com/Grainger/BATTALION-T-Handle-Latch-1XPA8>