

# Retractable Pool Cover

## Concept Generation and Selection

Abdulhadi Alkhaldi, Zachary Keller, Cody Maurice, Bradley Miller,  
and Patrick Weber



NORTHERN  
ARIZONA  
UNIVERSITY

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# Overview

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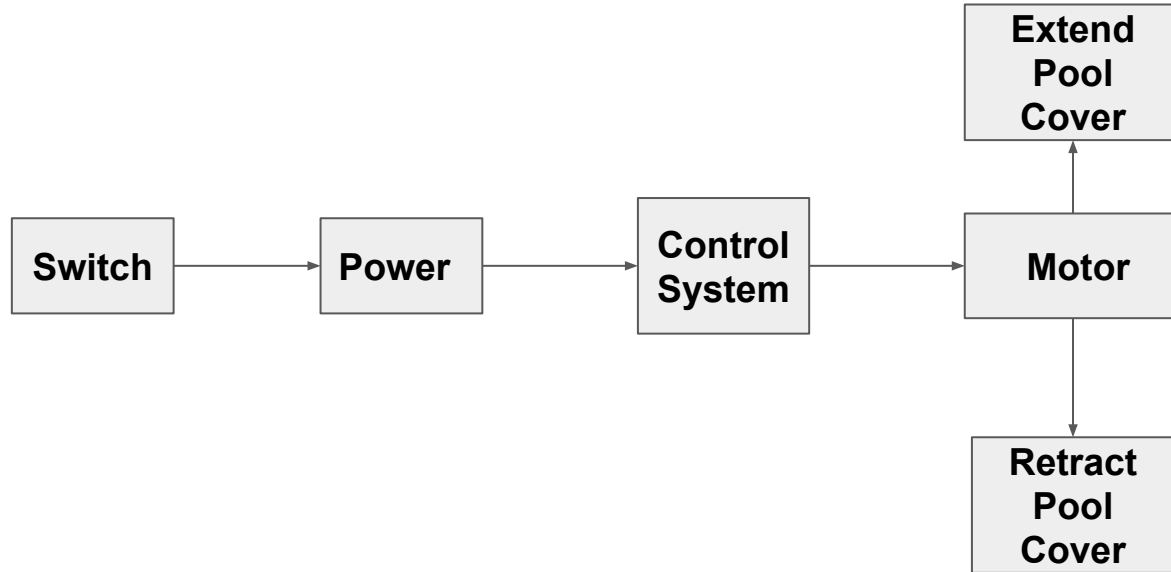
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# Introduction

- Our client, Mr. Brian Herzog, is a resident of Flagstaff, AZ and the retired CEO of Frontline Energy Services
  
- Mr. Herzog would like to bring an affordable and retractable pool cover to the market
  
- There is not an affordable and comparable product on the market today

# Functional Diagram



# Criteria

<b>Motor</b>	<b>Design</b>	<b>Control System</b>	<b>Materials</b>
<ul style="list-style-type: none"><li>❖ Power output</li><li>❖ Safety</li><li>❖ Price</li><li>❖ Lifespan</li><li>❖ Manufacturability</li></ul>	<ul style="list-style-type: none"><li>❖ Volume</li><li>❖ Ease of retraction</li><li>❖ Maintainability</li><li>❖ Manufacturability</li></ul>	<ul style="list-style-type: none"><li>❖ Response time</li><li>❖ Ease of use</li></ul>	<ul style="list-style-type: none"><li>❖ Price</li><li>❖ Water resistance</li><li>❖ Yield strength</li></ul>

# Relative Weights of Criteria: Motor

<b>Criteria</b>	<b>Power Output</b>	<b>Safety</b>	<b>Price</b>	<b>Lifespan</b>	<b>Manufacturability</b>
<b>Power Output</b>	1	0.898	4.22	3.24	2.866
<b>Safety</b>	4.066	1	6.6	5.4	3.6
<b>Price</b>	1.168	0.174	1	2.5	1.106
<b>Lifespan</b>	1.212	0.204	0.772	1	3.566
<b>Manufacturability</b>	0.838	0.312	2.066	1.108	1

# Relative Weights of Criteria: Motor

<b>Criteria</b>	<b>Power Output</b>	<b>Safety</b>	<b>Price</b>	<b>Lifespan</b>	<b>Manufacturability</b>
<b>Power Output</b>	0.227	0.2586	0.2848	0.2238	0.2542
<b>Safety</b>	0.4782	0.338	0.4592	0.4054	0.3094
<b>Price</b>	0.0982	0.074	0.0708	0.2072	0.081
<b>Lifespan</b>	0.1074	0.0914	0.0484	0.0818	0.259
<b>Manufacturability</b>	0.1578	0.145	0.1374	0.0816	0.097

# Relative Weights of Criteria

<b>Motor</b>	
<b>Criteria</b>	<b>Weight</b>
<b>Power Output</b>	0.245
<b>Safety</b>	0.4118
<b>Price</b>	0.1015
<b>Lifespan</b>	0.1128
<b>Manufacturability</b>	0.1289

<b>Design</b>	
<b>Criteria</b>	<b>Weight</b>
<b>Volume</b>	0.3662
<b>Ease of Retraction</b>	0.2783
<b>Maintainability</b>	0.2056
<b>Manufacturability</b>	0.1499



# Relative Weights of Criteria

<b>Control System</b>	
<b>Criteria</b>	<b>Weight</b>
<b>Response Time</b>	0.5915
<b>Ease of Use</b>	0.4085

<b>Materials</b>	
<b>Criteria</b>	<b>Weight</b>
<b>Price</b>	0.2165
<b>Water Resistance</b>	0.2461
<b>Yield Strength</b>	0.5374

# Concept Generation: Motor



**Electric**



directindustry.com

**Hydraulic**

# Decision Matrix: Motor

		Electric		Hydraulic	
Criteria	Weight	Scale	Weighted Scale	Scale	Weighted Scale
Power output	0.245	10	2.45	10	2.45
Safety	0.4118	4	1.647	8	1.647
Price	0.1015	7	0.711	6	0.609
Lifespan	0.1128	7	0.79	7	0.79
Manufacturability	0.1289	8	1.031	8	1.031
<b>Sum</b>	<b>1.0</b>	<b>36</b>	<b>6.629</b>	<b>39</b>	<b>8.174</b>

# Concept Generation: Design

Stacking



[baseballhighway.files.wordpress.com](http://baseballhighway.files.wordpress.com)

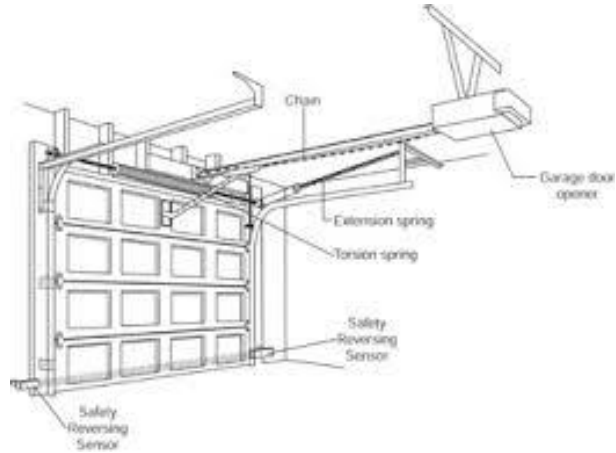
Rolling



[megastoragesheds.com](http://megastoragesheds.com)

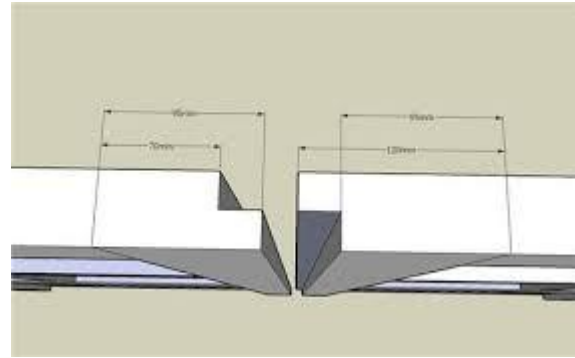
# Concept Generation: Design, Continued

## Garage Door



[fixitclub.com](http://fixitclub.com)

## Meet in Middle



[getwoodworking.com](http://getwoodworking.com)

# Decision Matrix: Design

		Stacking		Rolling		Garage Door		Meet in Middle	
Criteria	Weight	Scale	Weighted Scale	Scale	Weighted Scale	Scale	Weighted Scale	Scale	Weighted Scale
Volume	0.3662	7	2.563	7	2.563	9	3.296	4	1.465
Ease of retraction	0.2783	7	1.948	7	1.948	5	1.392	8	2.226
Maintainability	0.2056	9	1.85	8	1.645	7	1.439	6	1.234
Manufacturability	0.1499	9	1.349	7	1.049	6	0.899	4	0.6
<b>Sum</b>	<b>1.0</b>	<b>32</b>	<b>7.71</b>	<b>29</b>	<b>7.205</b>	<b>27</b>	<b>7.026</b>	<b>22</b>	<b>5.525</b>

# Concept Generation: Control System

Key Start



[dreamstime.com](http://dreamstime.com)

Remote Start



[haywardflowcontrol.com](http://haywardflowcontrol.com)

Button Start



[electrosome.com](http://electrosome.com)

Lever Start



[actusink.com](http://actusink.com)

# Decision Matrix: Control System

		Key Start		Remote Start		Button/Switch		Lever Start	
Criteria	Weight	Scale	Weighted Scale	Scale	Weighted Scale	Scale	Weighted Scale	Scale	Weighted Scale
Response time	0.5915	10	5.915	9	5.234	9	5.234	9	5.234
Ease of use	0.4085	9	3.677	10	4.085	10	4.085	8	3.268
<b>Sum</b>	<b>1.0</b>	<b>19</b>	<b>9.592</b>	<b>19</b>	<b>9.319</b>	<b>19</b>	<b>9.319</b>	<b>17</b>	<b>8.502</b>



# Concept Generation: Materials

Aluminum



[myaluminumsupply.com](http://myaluminumsupply.com)

Stainless Steel



[quickshipmetals.com](http://quickshipmetals.com)

Brass



[hagstoz.com](http://hagstoz.com)

# Concept Generation: Materials, Continued

Polymer



[polyzone.com](http://polyzone.com)

Fiberglass



[acpsales.com](http://acpsales.com)

# Decision Matrix: Materials

		Aluminum		Stainless Steel	
Criteria	Weight	Scale	Weighted Scale	Scale	Weighted Scale
Price	0.217	8	1.732	4	0.866
Water Resistance	0.246	8	1.969	9	2.215
Yield Strength	0.537	9	4.837	9	4.837
<b>Sum</b>	<b>1.0</b>	<b>25</b>	<b>8.538</b>	<b>22</b>	<b>7.918</b>

# Decision Matrix: Materials, Continued

		Brass		Polymer		Fiberglass	
Criteria	Weight	Scale	Weighted Scale	Scale	Weighted Scale	Scale	Weighted Scale
Price	0.2165	6	1.299	4	0.866	5	1.083
Water Resistance	0.2461	7	1.723	9	2.215	10	2.461
Yield Strength	0.5374	8	4.299	6	3.224	10	5.374
<b>Sum</b>	<b>1.0</b>	<b>21</b>	<b>7.321</b>	<b>19</b>	<b>6.305</b>	<b>25</b>	<b>8.918</b>

# Updated Project Plan

Task	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16
Introduction	█															
-Meet With Client		█	█													
Problem Definition & Project Plan			█	█												
-Need Statement and Project Goal			█													
-Objectives and Constraints				█												
-QFD and SOTA				█												
-Project Plan				█												
Concept Generation & Selection					█	█										
-Design Generation/Brainstorming					█	█										
-Design Evaluation & Selection						█	█									
Proof of Concept & Prototyping								█	█	█						
-Develop Prototype								█	█	█						
-Build Prototype									█	█	█					
-Test prototype										█	█	█				
Final Project Proposal													█	█		
-Final Project Presentation														█	█	
<b>Deliverables</b>																
Problem Definition & Project Plan Presentation				◆												
Concept Gen. & Selection Presentation								◆								
Proof of Concept Demonstration												◆				
Project Proposal Due & Presentation															◆	

# Conclusions

- The components of the retractable cover were established
- The criteria for each component was established and weighted
- Different concepts for each component were generated
- These concepts were then combined with the weighted criteria in a decision matrix to choose the best choice

# Conclusions

- The best choice for each design concept
  - Motor: Hydraulic
  - Design: Stacking
  - Control System: Key Start
  - Material: Fiberglass
- The project plan was updated