

Mechanical Shredder

Concept Generation and Selection

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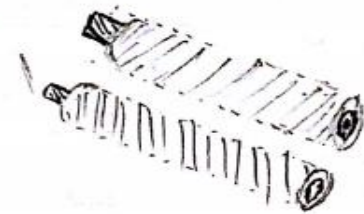
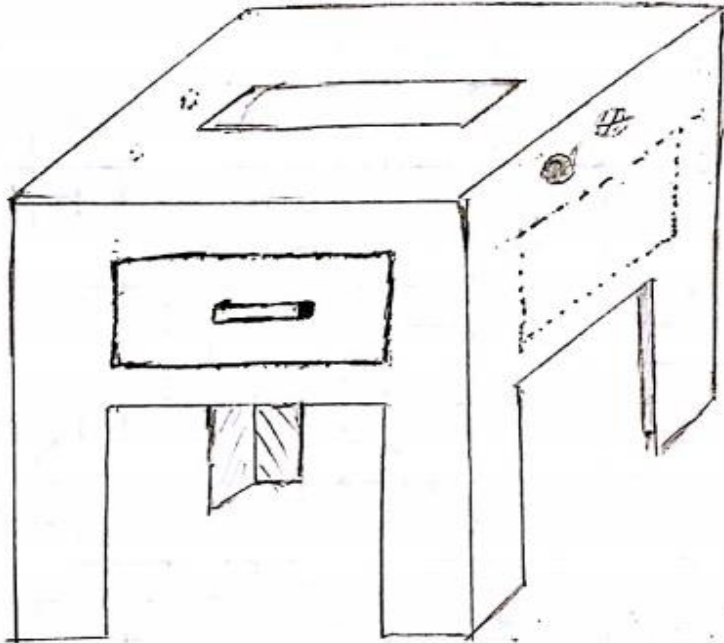
Overview

- Design Concepts
- QFD
- HOQ
- Decision Matrix Criteria
- Averaged Group Decision Matrix
- Final Concepts

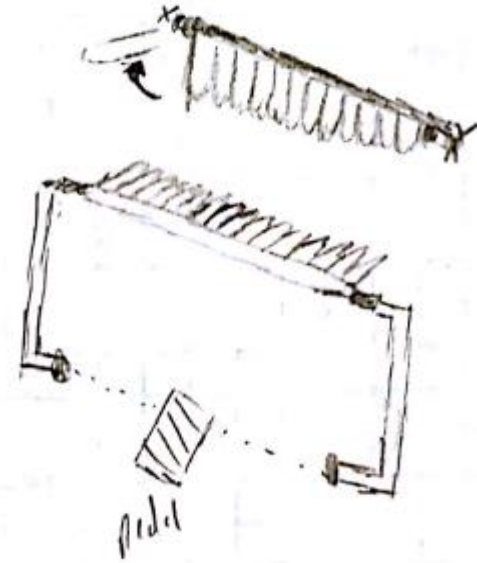
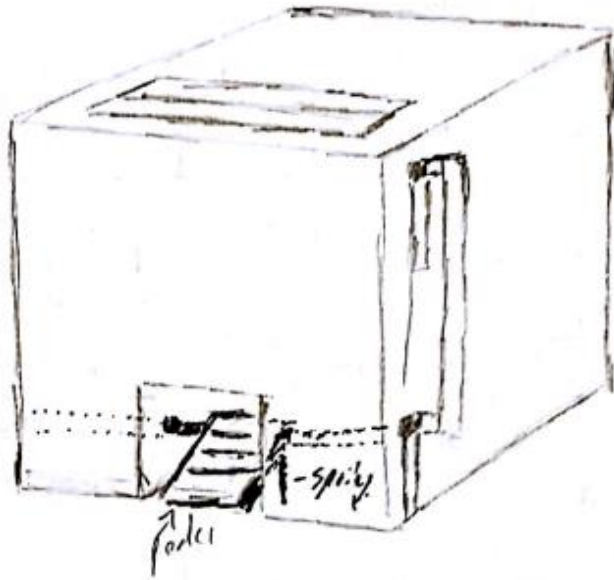
Introduction

- Team designed two concept drawings per member for a mechanical shredder and evaluated each design using a decision matrix.
- Made a two final selections based off of an average decision matrix.

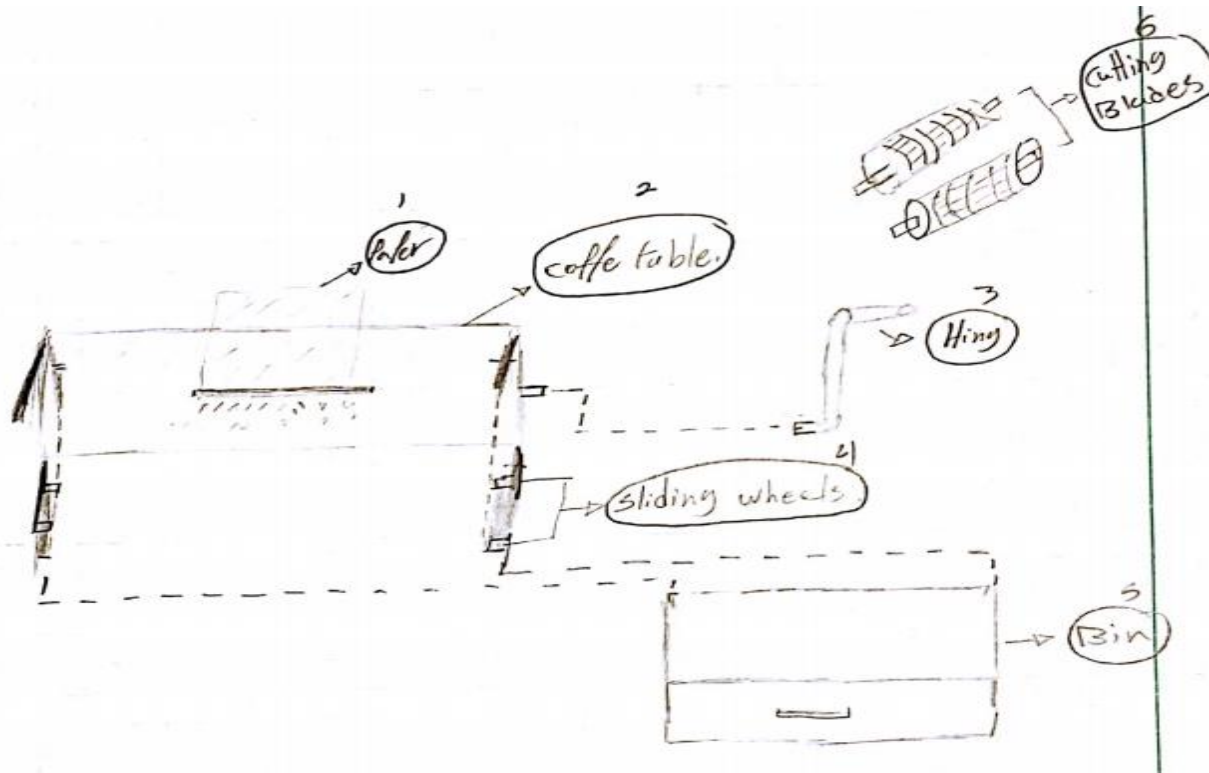
Design 1



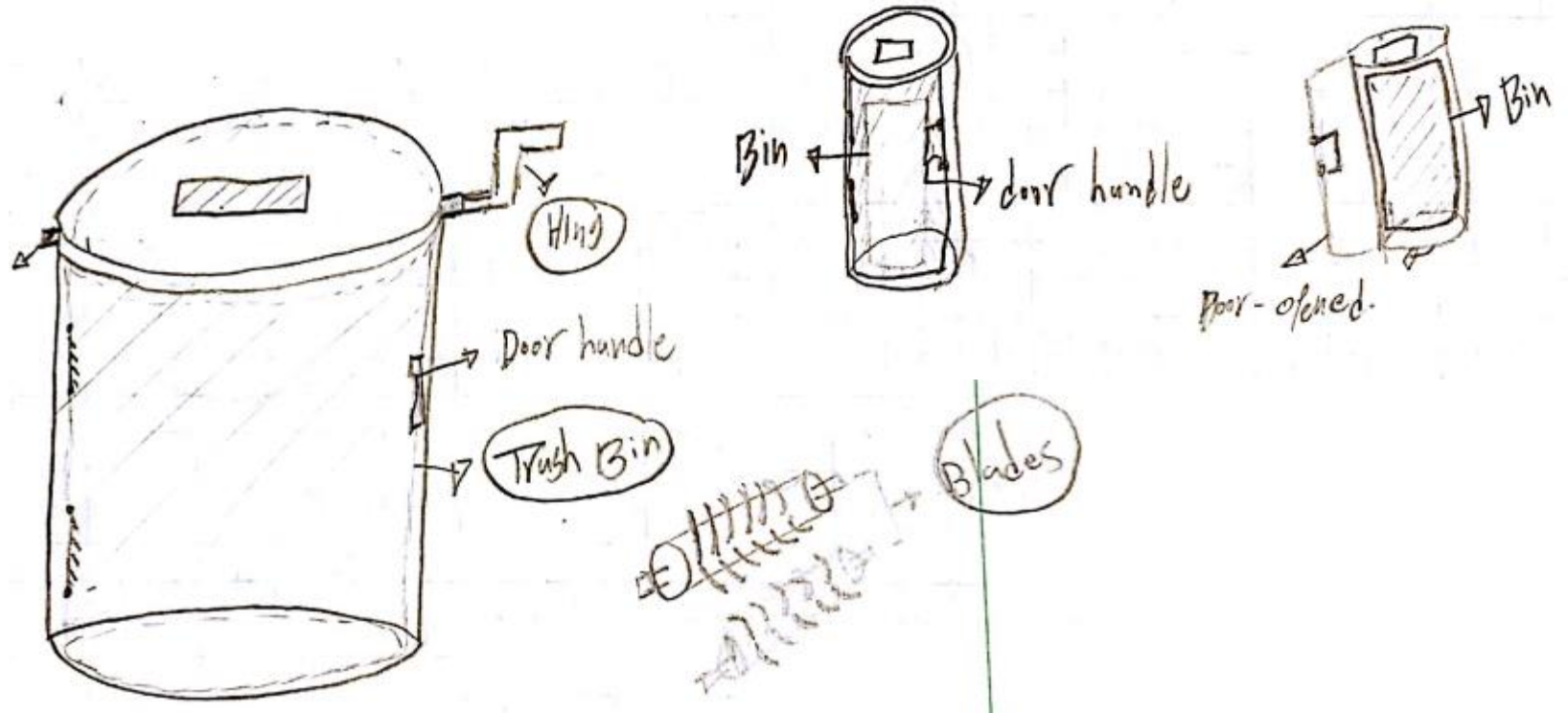
Design 2



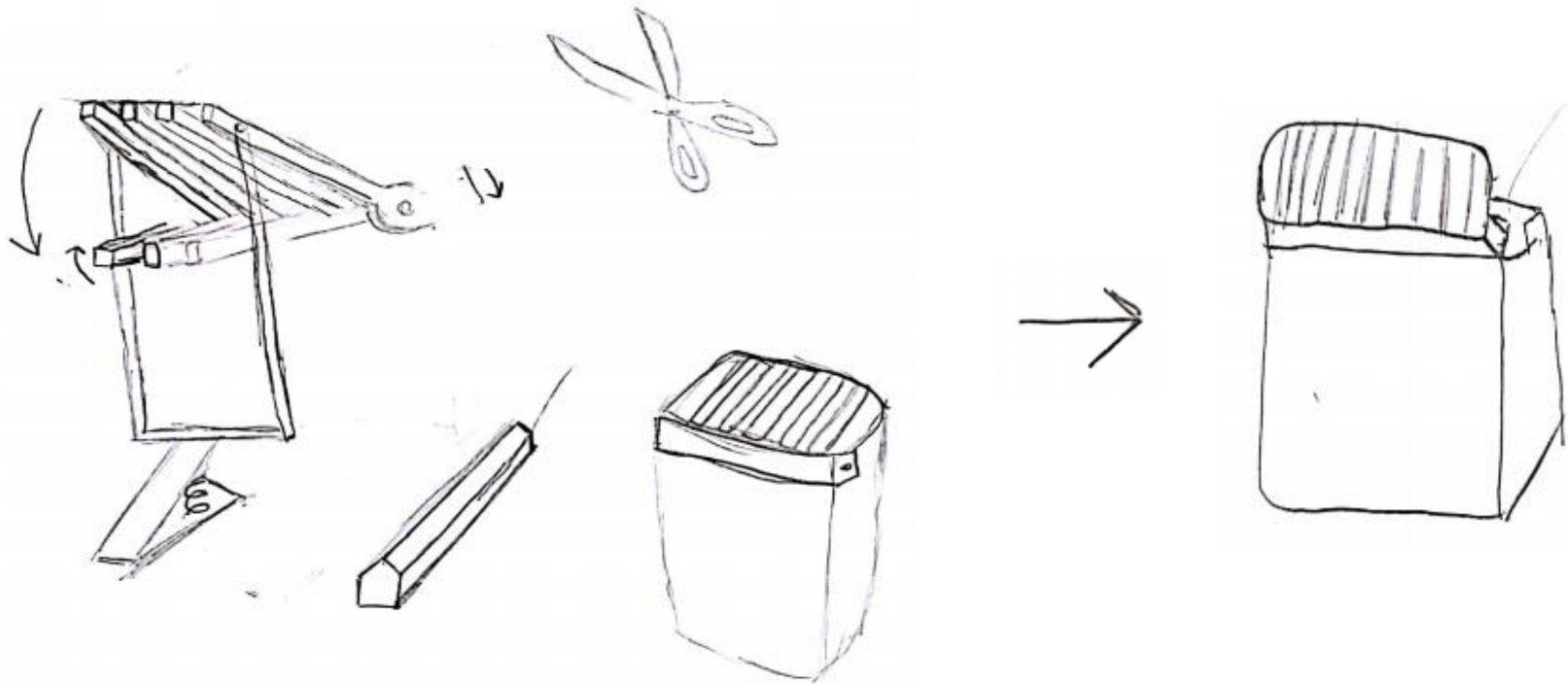
Design 3



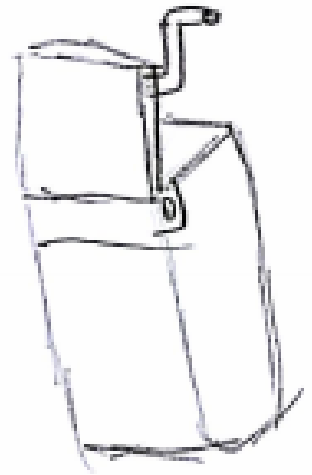
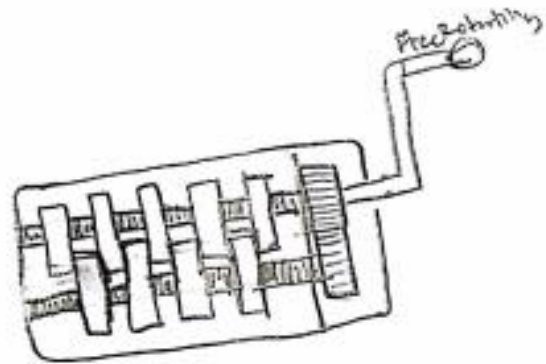
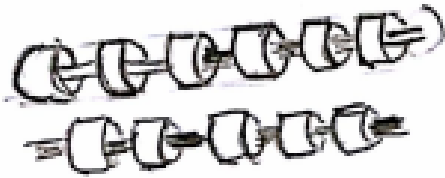
Design 4



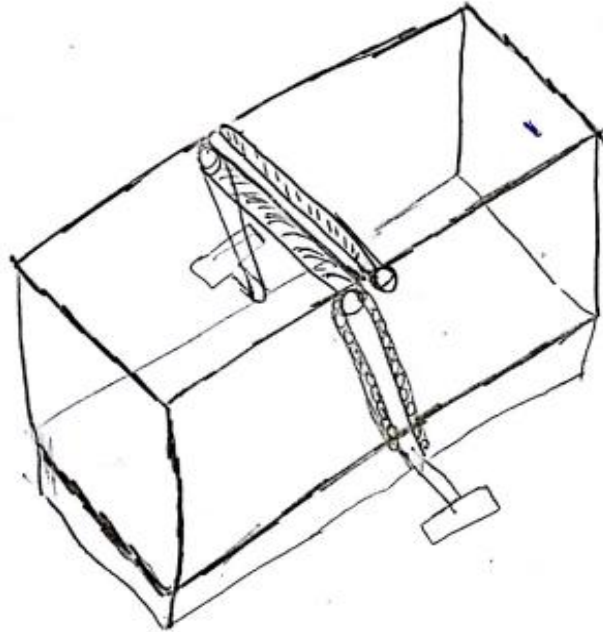
Design 5



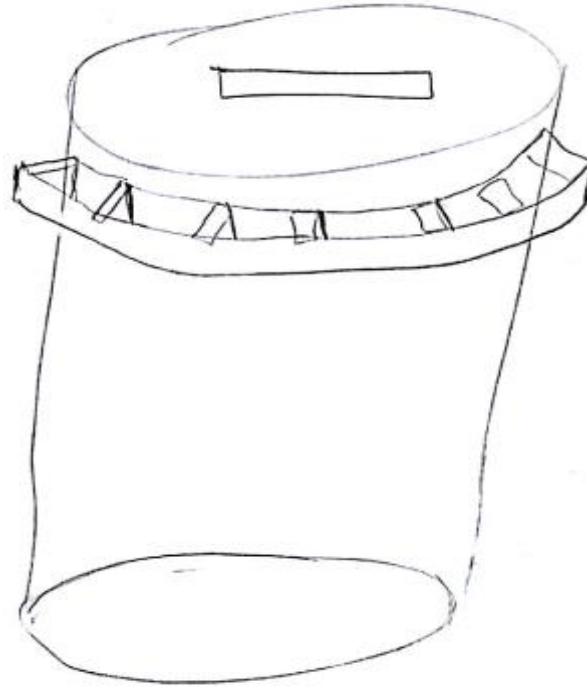
Design 6



Design 7



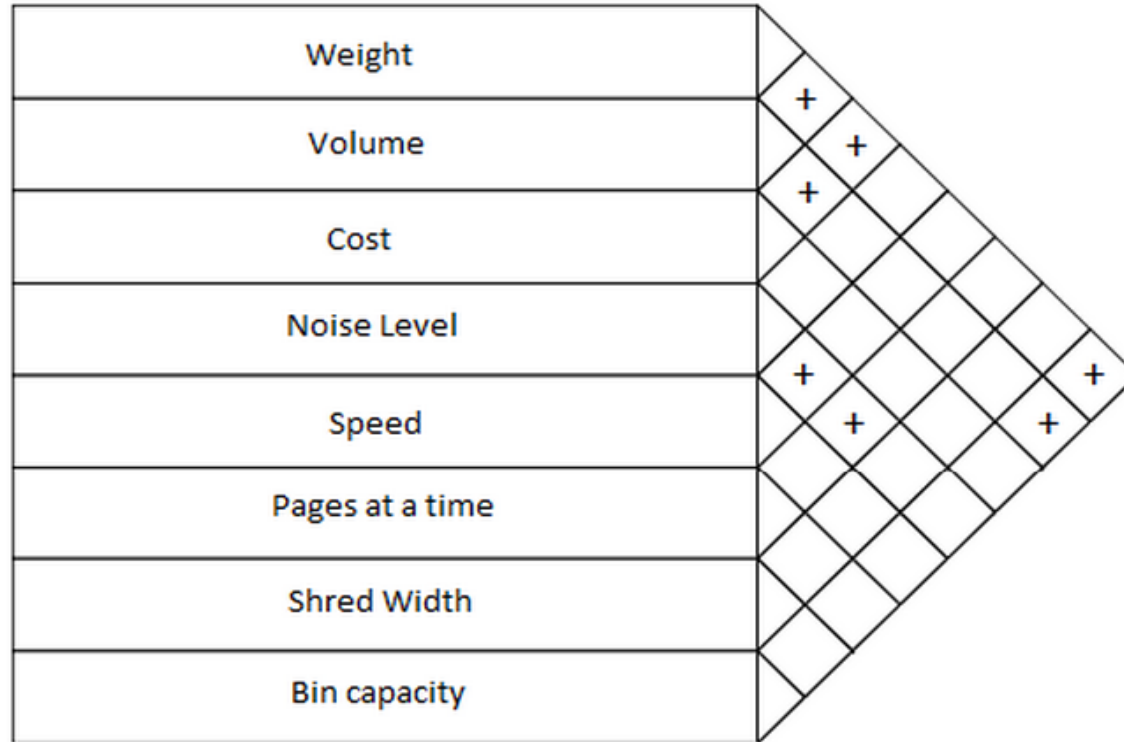
Design 8



QFD

		Engineering Requirements							
		Weight	Volume	Cost	Noise Level	Speed	Pages at a Time	Shred Width	Bin Capacity
Customer Requirements	Minimum Carbon Footprint		X						
	Reliable					X	X	X	
	Inexpensive	X	X	X					X
	All Mechanical System				X	X			
	Cost Effective			X		X	X		
	Units	lbs	ft ³	\$	db	Pages/Min	x Pages/Iteration	inches	gallons
		20-25	5	100	65	36	10	0.25	5.25

HOQ



Decision Matrix Criteria

Reliability (15%)

Cost Effective (13%)

Materials (Shredded material+10 Pages) (13%)

System Operation (11%)

Volume (9%)

Speed (8%)

Ease of Use (7%)

Stability (6%)

Bin Size (5%)

Shred Width (5%)

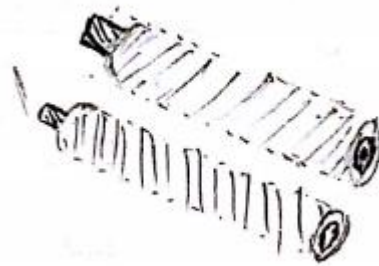
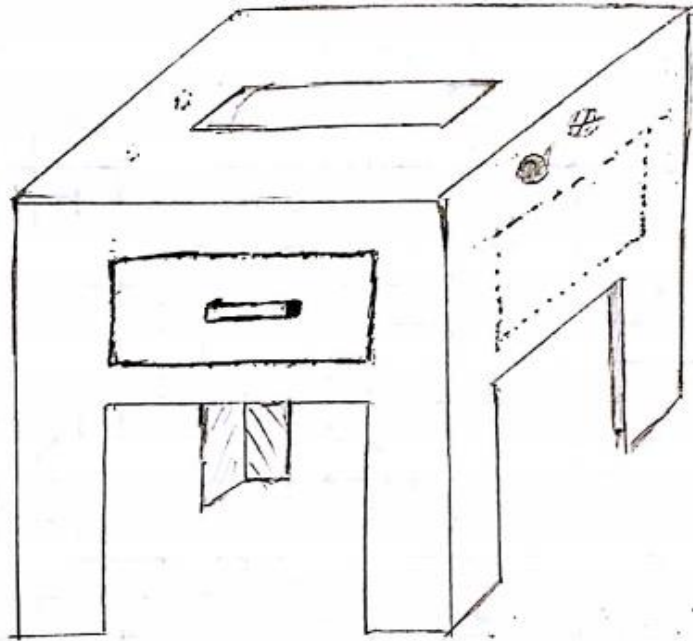
Noise Level (4%)

Portable (4%)

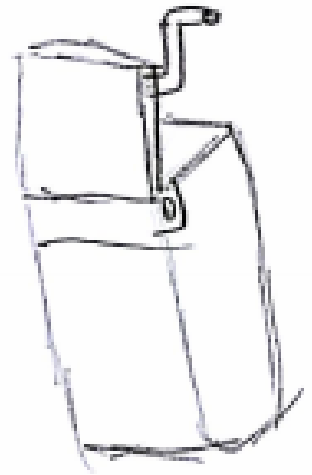
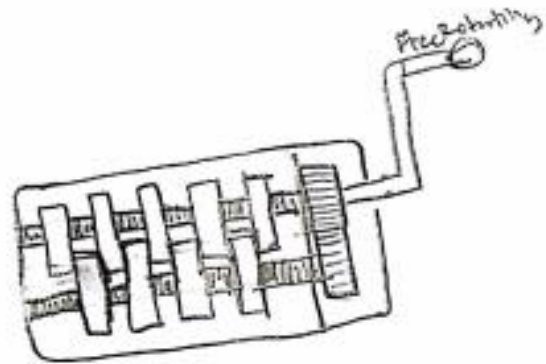
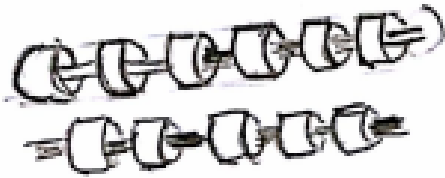
Averaged Group Decision Matrix

Group Decision Matrix Average								
Grade Scale 1-10	Design 1	Design 2	Design 3	Design 4	Design 5	Design 6	Design 7	Design 8
Reliability (15%)	1.2	0.975	1.0875	1.0875	1.0125	1.1625	1.0125	1.0125
Cost Effective (13%)	0.9425	0.8775	0.8775	0.9425	1.0075	1.04	0.8775	0.91
Materials (Shredded material+10 Pages) (13%)	1.0075	0.845	0.8775	0.8125	0.845	0.975	1.04	0.715
System Operation (11%)	0.88	0.825	0.825	0.825	0.825	0.88	0.825	0.6875
Volume (9%)	0.54	0.7425	0.5625	0.54	0.72	0.6975	0.5175	0.72
Speed (8%)	0.54	0.56	0.52	0.52	0.54	0.56	0.68	0.44
Ease of Use (7%)	0.6125	0.6125	0.5775	0.5775	0.6125	0.595	0.525	0.4725
Stability (6%)	0.51	0.465	0.465	0.405	0.465	0.45	0.435	0.3
Bin Size (5%)	0.2625	0.375	0.3375	0.325	0.4	0.3875	0.325	0.4
Shred Width (5%)	0.375	0.3625	0.375	0.35	0.3375	0.3625	0.4	0.35
Noise Level (4%)	0.28	0.29	0.27	0.26	0.29	0.27	0.26	0.24
Portable (4%)	0.26	0.26	0.24	0.31	0.35	0.34	0.24	0.34
Total:	7.41	7.19	7.015	6.955	7.405	7.72	7.1375	6.5875

Final Concept: Design 1



Final Concept: Design 6



Conclusions

- Design Concepts
 - Each member came up with two concepts that were to be evaluated by all team members.
- Decision Matrix Criteria
 - QFD and HOQ used to develop a decision matrix.
- Averaged Group Decision Matrix
 - Used average decision matrix to select two final designs that we will take in to our “Engineering Analysis” phase.