



SOLAR STIRLING GENERATOR

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CUSTOMER SPECIFICATIONS

Phase 1 QFD

Solar Stirling Generator

10 watts						
5 volts		+				
< \$500		+				
20 lbs max weight		+				
1 year MTBF				++		
weatherproof				++		++
	Prefer	up	--	dn		up up

Correlation codes:

++	very positive correlation
+	positive correlation
-	negative correlation
--	very negative correlation

Engineering Metrics

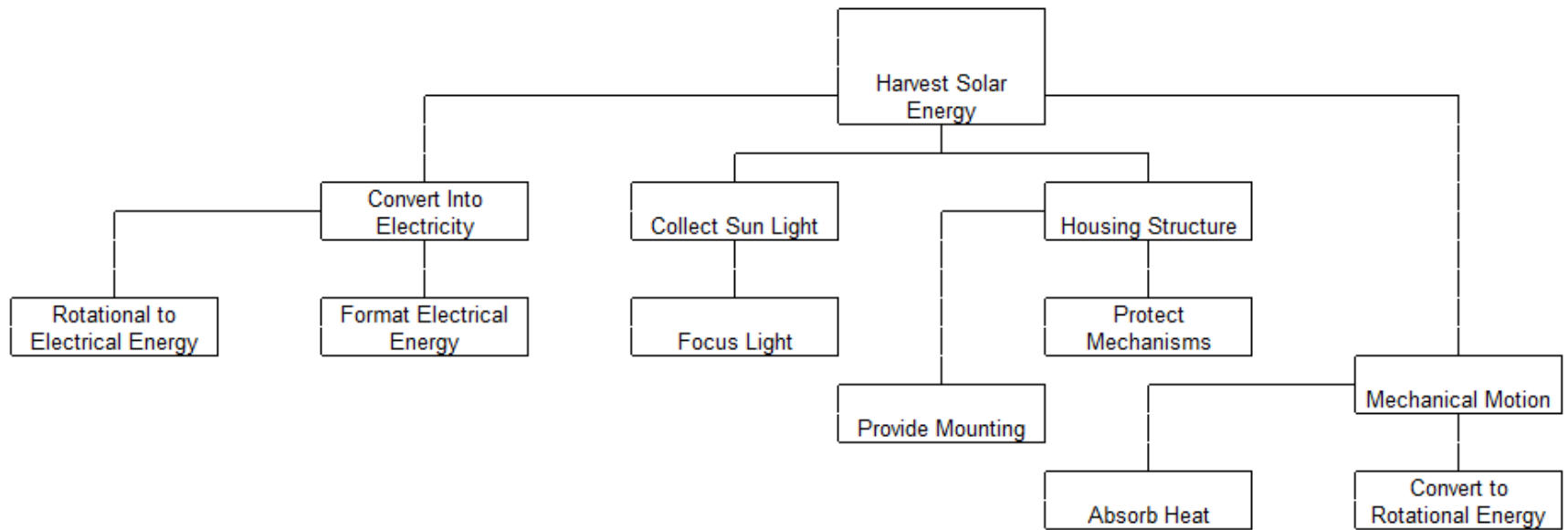
Customer Requirement	Weight	10 watts	5 volts	< \$500	20 lbs max weight	1 year MTBF	weatherproof
USB charger	9	9	9				
stirling engine	9						3
solar power	9					3	3
self starting	3					9	
low maintenance	3					9	9
cheap	3			9			
light	3				9		
safe	9					9	
functional specification	units	W	V	\$	lbs	MTBF	
technical targets		10.00	5	500	20	1 yr	

Weights and Correlations

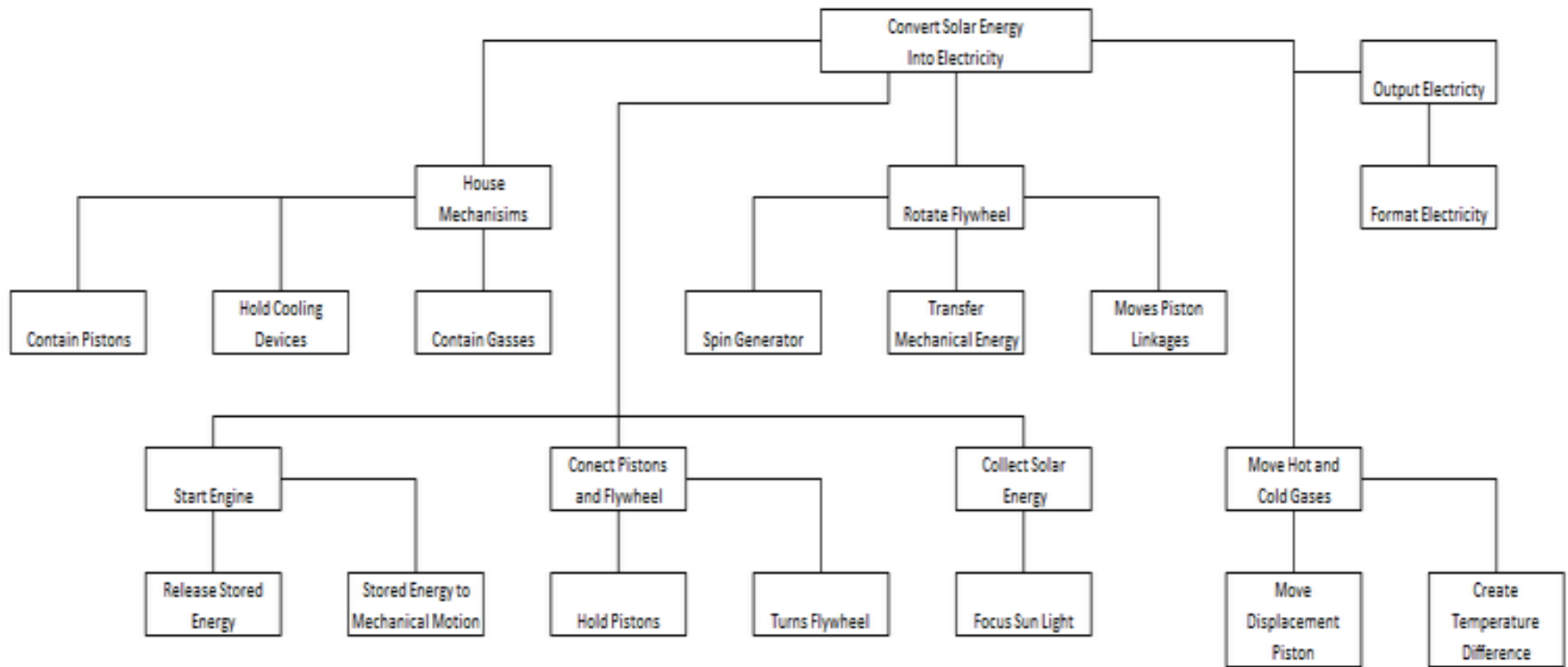
1	incidental
3	moderately important
9	critical



FUNCTIONAL DECOMPOSITION



STRUCTURAL DECOMPOSITION



PUGH ANALYSIS

Project 12471: Pugh Analysis

	Concepts							
	A	B	T	Q	E	R	L	K
Selection Criteria	Datum							
Weight		-	-	-	S	-	+	+
Energy Efficiency (Solar/Generator)		S	-	-	-	-	S	S
Mechanical Simplicity		S	-	+	S	+	-	-
Mechanical Losses		-	S	-	-	-	S	-
Electrical Simplicity		S	-	S	+	+	S	S
Mechanical Durability (life)		+	-	+	S	+	-	+
Electrical Durability (life)		S	+	S	S	S	-	-
Portability		S	-	S	S	S	S	S
Vibration		+	-	+	-	+	S	+
Power Output (Engine Type)		S	-	-	S	-	S	S
Cost		S	-	-	+	-	-	-
Sum + 's		2	1	3	2	4	1	3
Sum S's		7	1	3	6	2	6	4
Sum -'s		2	9	5	3	5	4	4
Net Score	0	0	-8	-2	-1	-1	-3	-1
Rank	1	2	8	6	3	5	7	4
Continue?	yes							

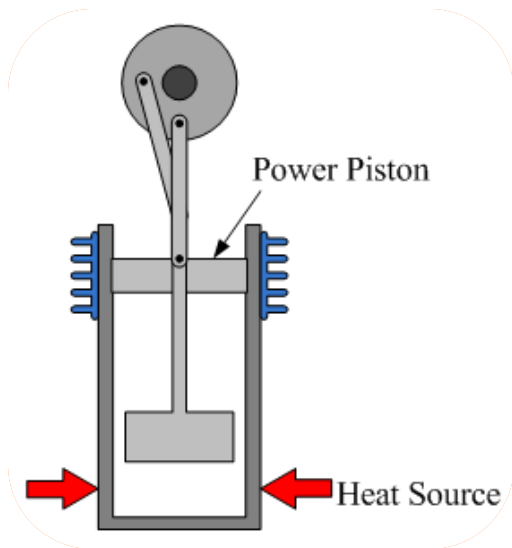
CHOSEN CONCEPT

The following system concept is chosen based on the Pugh Analysis:

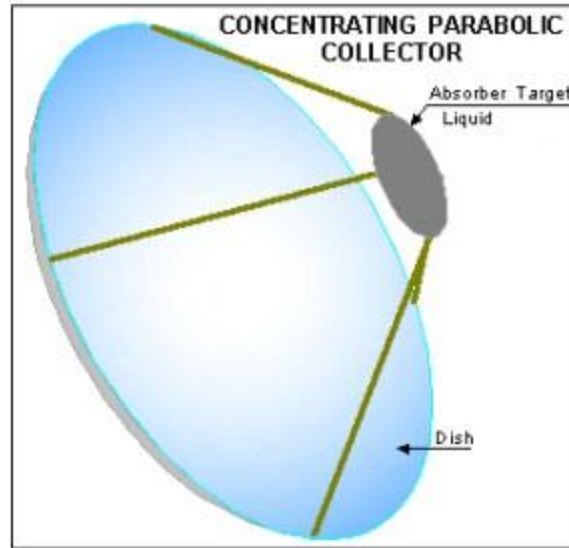
- Solar Collector – Dish
- Engine – Beta
- Drive Mechanism – Bowtie
- Generator – DC Motor
- Battery – Lithium-Ion



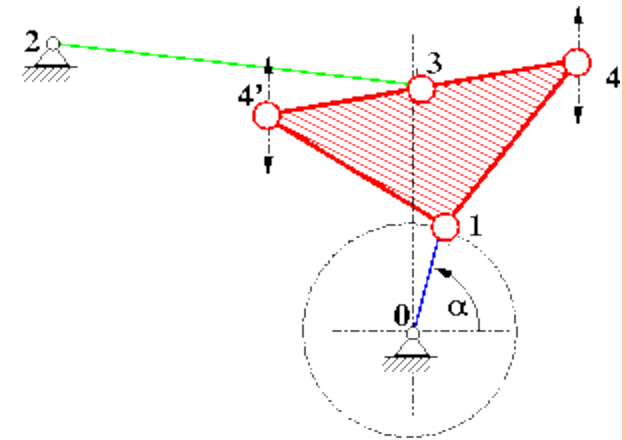
CHOSEN CONCEPT



Engine- Beta

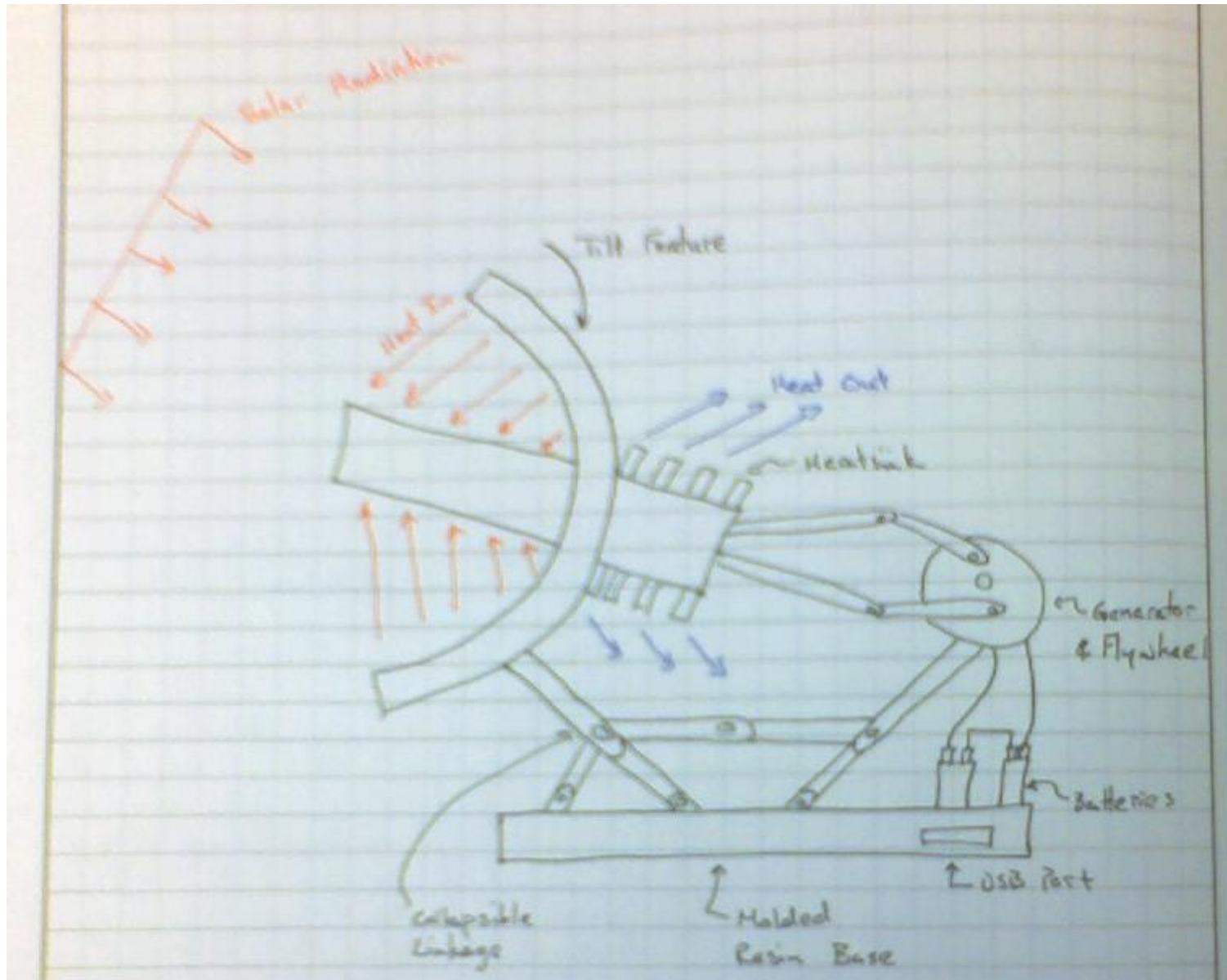


Solar Collector-
Dish



Drive Mechanism-
Bowtie

CONCEPT DESIGN DRAWING



RISK ASSESSMENT

- Team runs out of time
- Individual team member work incomplete
- Individual team member work sub-par
- Team member illness
- Lack of team communication
- Lack of communication with guide
- Parts late or not received from supplier
- Budget exceeded

- Guide requires change during development
- Over extended prototyping phase
- Team member leaves MSD unexpectedly
- Project operation failure near due date
- Interpersonal disputes
- Specifications for project changed
- Unexpected electrical component failure
- Unexpected mechanical component failure
- Tom is expecting a Baby in April



WORK BREAKDOWN STRUCTURE



RACI MATRIX

	Thomas Gamer (Lead Engineer)	David Volzer (Mechanical Engineer)	Tara Dougherty (Thermal Engineer)	Daniel Thering (Electrical Engineer)	Dr. Raisanen (Faculty Guide)
Defining Team Roles	A	C	C	C	I
Generate Risk Assessment	A	R	R	R	I
Defining Customer Needs	C	A	R	R	I
Functional Decomposition	C	R	R	A	I
Generate Specifications	C	A	R	R	I
Create 1 Page Project Summary	C	R	A	R	I
Create Work Breakdown Structure	A	C	C	C	I
Create Gantt Chart	A	C	C	C	I
Structural Decomposition	C	R	A	R	I
Concept Generation	R	A	R	R	I
Concept Evaluation	R	A	R	R	C
Concept Selection	R	A	R	R	I
Generate Test Plans	A	R	R	R	I
Determine Mechanical System Architecture	R	A	R	R	C/I
Determine Electrical System Architecture	C	C	C	A	C/I
Determine Thermal System Architecture	C	C	A	I	C/I
Determine Solar Collector Architecture	A	C	C	I	C/I
Determine Feasability	C	R	R	R	I
System Simulation	A	C	C	R	I
Create Bill of Materials	C	A	R	R	I
Create Solid Model	C	C	A	I	I
Create Detailed Fabrication Drawings	I	R	A	I	I
Create Circuit Drawing	C	I	I	A	I

R	Responsible
A	Accountable
C	Consult
I	Inform



GANTT CHART

