



Robot Utility Tank (R.U.T.) Final Testing Results

Design Requirements

Table 1: Engineering and Customer Requirements

Customer Requirements	
CR1	Total production cost under \$2000
CR2	Follow power safety guidelines outlined in IEEE 835-1994
CR3	Complete CAD package and BOM
CR4	Design wheel and track system
CR5	Manufacture robot components

Engineering Requirements	
ER1	Track length minimum 75% of original
ER2	Weight of full assembly under 100lbs
ER3	Torque must be 50% capacity of original
ER4	Power consumption
ER5	Max payload 50lbs

Table 1: Experiments/ Relevant DR's

Experiment/Test	Relevant DR's
Ex1 – 3.5 Minute Run	ER4, CR2, CR4
Ex2 – Inclined/ Terrain Test	ER4, CR2, CR4
Ex3 – Payload Test	ER4, CR2, CR4, ER5, ER3
Ex4 – Speed	ER3, ER4, CR4

Top Level Testing Summary

- Tests were created to test overall components working together and to ensure track system performs as designed.
- During Testing we saw our design exceeded initial requirements in run time and traversing various terrains.
- We plan to further test the payload capabilities as well as the overall speed of our design

Table 2: Specification Sheet**Specification Sheet:**

Customer Requirement	CR Met?	Client Acceptable?
CR1: Budget under \$2000.00	To Date \$1600.00	Yes
CR2: Is the Electrical safe?	Yes	Yes
CR3: Complete CAD/ BOM	Yes	Yes
CR4: Design Wheel/ Track System	Yes	Yes
CR5: Manufacture Robot Components	Yes	Yes

Spec Sheet

Engineering Requirements	Target	Tolerance	Measured Value	ER Met?	Client Acceptable?
ER1: 75% of original wheelbase length	26.25 In.	+/- 4 In.	29.5 In	Yes	Yes
ER2: Robot Weight	100 lbs.	+/- 15 Pounds	97 lbs.	Yes	Yes
ER3: Torque 50% of original	11 N.m	+/- 2 N.m	11 N.m	Yes	Yes
ER4: Power Consumption	10 min runtime	+/- 2 mins	30 Minute	Yes	Yes
ER5: Max Payload	50 lbs.	+/- 10 lbs.	50 lbs.	Yes	Yes

Trial	Weight (lbs.)
1	10
2	20
3	30
4	40
5	50
6	170

Table 3: Payload Test Results

Trial	Time (s)	Speed (Mph)
1	3.30	2.07
2	3.27	2.08
3	3.18	2.14

Table 4: Speed Test Results

- Average: 2.10 Mph

Payload/Speed Test Results



B-Roll



QFD

Design Requirements		Customer Requirements							Customer Competitive Assessment					CCA Key: A-GRT 1000 B-HD2 C-LT2
		Importance	Cost	Length	Weight	Torque	Power Consumption	Max Payload	1 Worst	2	3	4	5 Best	
Total Cost below \$2000 USD		9	9	6	6	6	3	6	A		B		C	
Safety		7	3	3	3	6	5	5			B,C		A	
Complete CAD/BOM		7	9	6	1	6	6	9			A,B,C			
Design wheel and track system		9	9	9	9	6	6	9			B,C		A	
Improve a subsystem		9	6	6	3	1	6	3			A,B,C			
Working design		9	6	3	3	6	3	6		B	C	A		
Technical Importance: Absolute			354	279	217	255	239	314						
Technical Importance: Relative			30%	15%	10%	15%	12%	18%						
Target Value			###	36	154	N/A	N/A	200						
USL			###	36	150	N/A	N/A	250						
LSL			###	30	100	N/A	N/A	100						
Units			USD	Inch	Lbs	Ft/lb	kW*H	Lbs						
Design Competitive Assessment	Worst: 1		A	C	A			C						
	2													
	3		B	B	B	A,B	B,C	B						
	4					C								
	Best: 5		C	A	C		A	A						

