

Title: Mech 202 Submarine Design Competition

Author: Team 9 Group members

Date: 3/3/2020

Notes:

Legend		
⊖	Strong Relationship	9
○	Moderate Relationship	3
△	Weak Relationship	1
++	Strong Positive Correlation	
+	Positive Correlation	
-	Negative Correlation	
▼	Strong Negative Correlation	
▼	Objective Is To Minimize	
▲	Objective Is To Maximize	
X	Objective Is To Hit Target	

				Column #															Competitive Analysis							
				Direction of Improvement: Minimize (▼), Maximize (▲), or Target (X)															(0= Worst, 5= Best)							
Row #	Max Relationship Value in Row	Relative Weight	Weight / Importance	Quality Characteristics (a.k.a. "Functional Requirements" or "How's") Demanded Quality (a.k.a. "Customer Requirements" or "Whats")	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Our Company	Atlantis WWII Gato Class Submarine https://www.youtube.com/watch?v=B075ZCRLK3	DIY Mini RC Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Green Toys Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Diving Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Torpedo Assembly Model Kit https://www.youtube.com/watch?v=B075ZCRLK3	
					Exterior Dimensions	Water proofing	Material Cost	Interior Layout	Power output	Hydrodynamics											Our Company	Atlantis WWII Gato Class Submarine https://www.youtube.com/watch?v=B075ZCRLK3	DIY Mini RC Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Green Toys Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Diving Submarine https://www.youtube.com/watch?v=B075ZCRLK3	Torpedo Assembly Model Kit https://www.youtube.com/watch?v=B075ZCRLK3
1	9	12.9	9.0		Buoyant on its own	○	○														5	5	5	5	2	4
2	3	12.9	9.0		Requires single action to start				○												5	5	0	5	5	5
3	9	12.9	9.0		Ability to travel horizontally through water		○				○										4	4	5	0	2	4
4	9	12.9	9.0		Ability to travel vertically through water		○				○										3	0	4	0	3	4
5	9	12.9	9.0		Dimensions fall within rules	○			○												5	5	5	1	5	5
6	9	12.9	9.0		Under \$100			○		○											5	4	3	5	5	3
7	3	10.0	7.0		Looks cool	○		○		○	▲										2	4	4	2	3	4
8	9	12.9	9.0		Out performs other submarines				○	○	○										3	3	4	1	2	4
9																										
10																										
Target or Limit Value																										
Difficulty (0= Easy to Accomplish, 10= Extremely Difficult)					4	5	3	7	9	7																
Max Relationship Value in Column					9	9	9	3	9	9																
Weight / Importance					184.3	192.9	145.7	115.7	261.4	357.1																
Relative Weight					14.7	15.3	11.6	9.2	20.8	28.4																

Atlantis WWII Gato Class Submarine
<https://www.youtube.com/watch?v=B075ZCRLK3>

Hobbydip6075ZCRLK3ref=aso_d_f_075ZCRLK3/?tag=hyprod-20&linkCode=d0&hvaid=306812371817&hupos=&hwnetw=&hvrand=131387218504444292&hppone=&hwpw=&hwrp=&hwsrv=&

Supplementary Project II QFD Information

Customers & Requirements:

	Customers		
Requirements	Our Team	Dr. Roberts	Average Weight
Buoyant on its own	9.0	5.0	7.0
Requires single action to start	9.0	5.0	7.0
Ability to travel horizontally through water	9.0	5.0	7.0
Ability to travel vertically through water	9.0	5.0	7.0
Dimensions fall within rules	9.0	9.0	9.0
Under \$100	9.0	5.0	7.0
Looks cool	7.0	5.0	6.0
Outperforms other submarines	9.0	5.0	7.0

Competition Specific Analysis:

Specifications	Competition				
	Atlantis WWI Gato Class Submarine	DIY Mini RC Submarine	Green Toys Submarine	Diving Submarine	Torpedo Assembly Model Kit
Exterior dimensions	36.2 x 12.7 x 7.6 cm	20cm x 10 cm	10.5"L x 5.5"W x 4"H.	4.5 x 0.5 x 2 inches	30cm x 10cm
Waterproofing	Exterior case sealed	Hot glue in sealed bottle	None, full of holes	None, sealed	Sealed outer case
Material Cost	Less than \$5	Around \$2	\$1	\$1	\$10
Interior Layout	Battery, motor, and propeller shaft	Electronics in bottle, motor outside with lego propeller	Large empty open submarine body	Solid metal	Motor, circuit board, propeller shaft, in tube to make a torpedo
Power Output	1 AA	3v lithium battery	n/a, non electric	n/a, non electric	2x AA batteries
Hydrodynamics	Good, modeled after real WW2 submarine	Poor, water bottle with some fins added for stability	Poor, based on a child's toy	Good, based on a real sub	Good, torpedo shaped to allow for efficient movement in water

Who

Dr. Roberts because she will be grading our project against our competition, similar to how a customer would compare options from multiple brands to decide on what to buy.

How vs. How

We designed our product to maximize all of the specified categories in order to exceed our competition. This design shows efficiency in design and function in order to accomplish all desired goals proficiency.

Who vs. What

It is important to Dr. Roberts (the customer) that all of the project criteria are met and that the device is the best at what it does.

What vs. How

This design does a good job meeting all the needs of the competition which is shown in the chart. The design has multiple strong relations which means that each goal is well covered by multiple tasks.

Competition Analysis

At this point the designs of the competition are unknown and likely won't be known until competition day. Because of this we need our design to work well in anticipation that other submarines will work well.

How Much

The analysis of all the relative weights shows that the most important item is hydrodynamics. If the submarine is not hydrodynamic, it will be more difficult for the motor to move the submarine through the water which will result in a slower time across the pool. Poor hydrodynamics will also cause the submarine to have difficulty going straight which could lead to the device not finishing at all.

Now vs. What

Buoyant on its own	The competition will likely have a buoyant device at the beginning, the customer will also expect the device to be buoyant at the start in order for it to be acceptable
Requires single action to start	All the competition will meet the requirement at a similar quality
Ability to travel horizontally through water	Most of our competition should be able to fulfill this requirement at a similar level of quality
Ability to travel vertically through water	Most of the competition will have a similar quality
Dimensions fall within rules	All of our competition will have similar quality
Under \$100	Most of the competition will be similar in this respect
Looks cool	Our device should exceed the quality of most other devices in this category
Outperforms other submarines	Our device will likely perform better then at least half of the competition