

Aqua Scooter

Problem Definition and Project Plan

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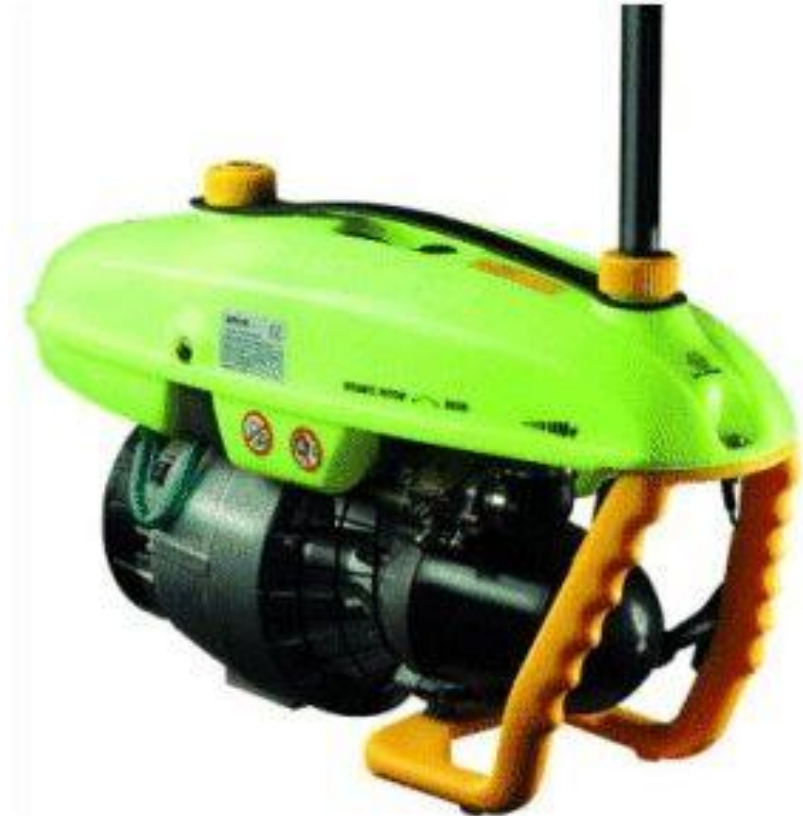


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Overview

- Background
- Why test for emissions?
- Project Goal
- Current Model
- Objectives
- Constraints
- Testing Environment
- Gantt Chart
- Quality Function Deployment (QFD)
- House of Quality
- Summary
- References



<http://www.redferret.net/?p=8163>

Background

- Chemical technician Bernd Boettgers wanted to escape from East Germany.
- His first attempt to test his “water-machine” resulted in an arrest and jail time.
- He worked on a second machine, and after a year of building, entered the sea in September, 1968.
- After over 6 hours of water travel, he was finally spotted by the Danish Lightship, Gedser.
- January, 1978, Aqua Scooter was introduced in the United States.

Why Test for Emissions?

- Advantages of Emission Testing
 - Improves vehicle performance and fuel economy.
 - Reduces carbon monoxide, hydrocarbons, and nitrogen oxides.
 - Ensures proper function of emission controls.

Project Goal

Need

- Current Aqua Scooter model does not meet EPA regulations.

Goal

- Design an improved Aqua Scooter that exceeds EPA regulations.

Current Model

Two- Stroke Engine

- Used for typically greater power to weight ratio.
- Mixed oil and fuel injected into combustion chamber by carburetor.

Exhaust emissions

- Can't meet current EPA regulations.
- Unburned exhaust emissions enter the atmosphere.

Objectives

- Design an aesthetically pleasing AquaScooter, that complies with EPA regulations.
- The new design should be lightweight and provide similar thrust.
- The system must be buoyant and relatively cheap to manufacture.
- Must be safe for a child to use.

Constraints

- ½ gallon, plastic fuel tank
- Gasoline powered
- \$450 max manufacture cost
- Metal engine and muffler housing
- Starter assembly is plastic and metal
- Plastic prop protection
- Control handle included
- Throttle control
- Exhaust valve
- Must be 18 pounds or less
- Must provide at least 50 pounds thrust

Testing Environment

- Initial testing will be conducted in a naturally occurring body of water or team built environment.
- Emissions testing will be done by either the Arizona Department of Transportation, or Arizona Game and Fish Department.

Gantt Chart

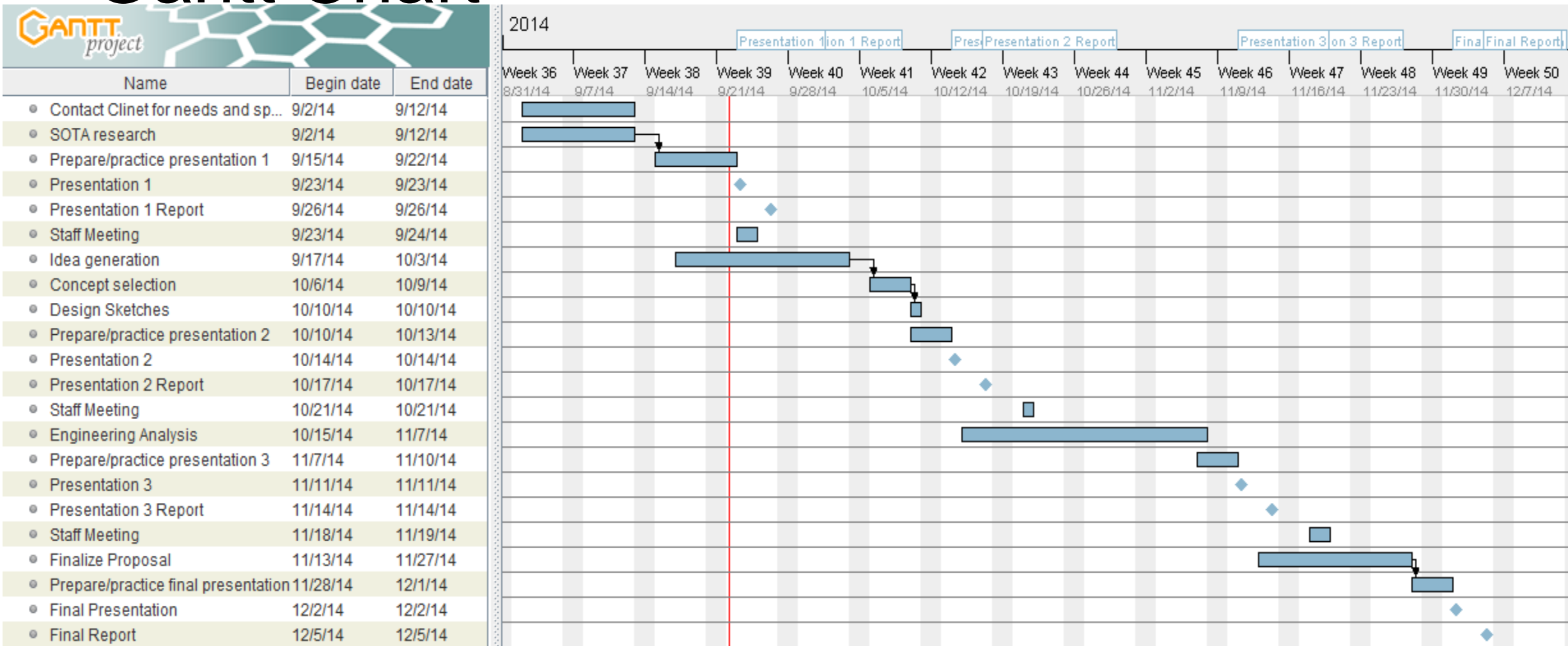


Table 1: Gantt Chart and deadline schedule.

QFD

Aquascooter QFD Matrix		Weight	Byuoancy	Fuel Ccapacity	Thrust	Exhaust emission	Operating Life	Warranty	Cayago Seabob	Seadoo Seascooter
Aesthetically pleasing	X		X						O	O
Child safe	X	X		X	X					O
Lightweight	X	X	X	X						
Floats	X	X	X						O	O
Propels operator through water				X	X				O	O
Runs for extended period			X							
Meets current EPA regs.					X	X	X		O	O
	units	lb.	lb.	gal.	lb.	g/kW-h	Hours/Years	Hours/Months		
		≤ 18	≥ 18	≥ 0.5	≥ 50	≤ 30 of Hydrocarbon, ≤ 490 of Carbon Monoxide	≥ 350/5	≥ 175/30		

- Customer Needs
- Engineering Requirements
- Engineering Targets
- Bench Marks

Table 2: QFD matrix relates customer needs and engineering requirements.

House of Quality

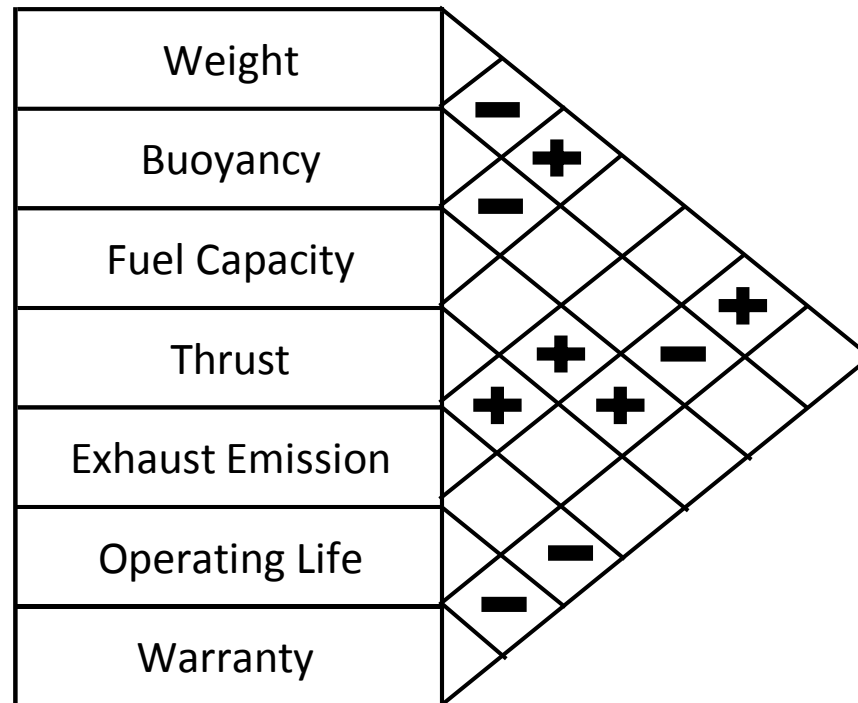


Table 3: House of quality correlates engineering requirements.

Summary

- Current Aqua Scooter can't meet EPA regulations
- Team goal is to redesign to meet EPA regulations
- Upon successful redesign, the client will once again have a product that is marketable in the United States

References

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Any Questions?