Release Lanyard Design

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Needs Identification

Document

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1. Introduction

Raytheon is a well-known company that specializes in defense electronics. They have found that there are issues with their weapon arming mechanism due to extreme temperature changes and contaminates entering the lanyard system. This lanyard can best be compared to a pull cored of a parachute; where the lanyard must be pulled to initiate the arming sequence.

2. Needs Identification

This project will consist of developing a new design for an arming system lanyard and a functional prototype. The current lanyard design does not address issues relating to extreme temperatures and environmental effects, which leads to system malfunction.

3. Problem Statement

a. Goal

To design a low cost release lanyard that can withstand extreme temperatures and environmental effects.

b. Objectives

With the information provided to us by our client, we have constructed the following table based on the most important criterion.

Table 1: Objectives

Objectives	Basis for Measurement	Units
Inexpensive	Manufacturing Cost Based on Current Design	$$
Maintain Current Location of Devices	Location Based on Current Design	Meters
Installation and Assembly	Timed Trial	Seconds
Successful Activation of Devices	Minimum Force Required	Newtons
Low Susceptibility to Contamination	Amount of Contamination Required to Induce Failure	Kilograms
High Performance Reliability	Number of Successful Attempts vs. Failed	%
Increase Maneuverability	Pivot Radius of Device	Meters

c. Constraints

i. The device has to fit the within the dimensions of the environmental testing chamber which can simulate the conditions that currently used product are failing under.

ii. The placements of the lanyard mounts and associated devices such as the battery have already been predetermined.

iii. The allowable cost must not exceed that of the current design of $300 in material cost.

iv. Must be easily assembled within 30 minutes.

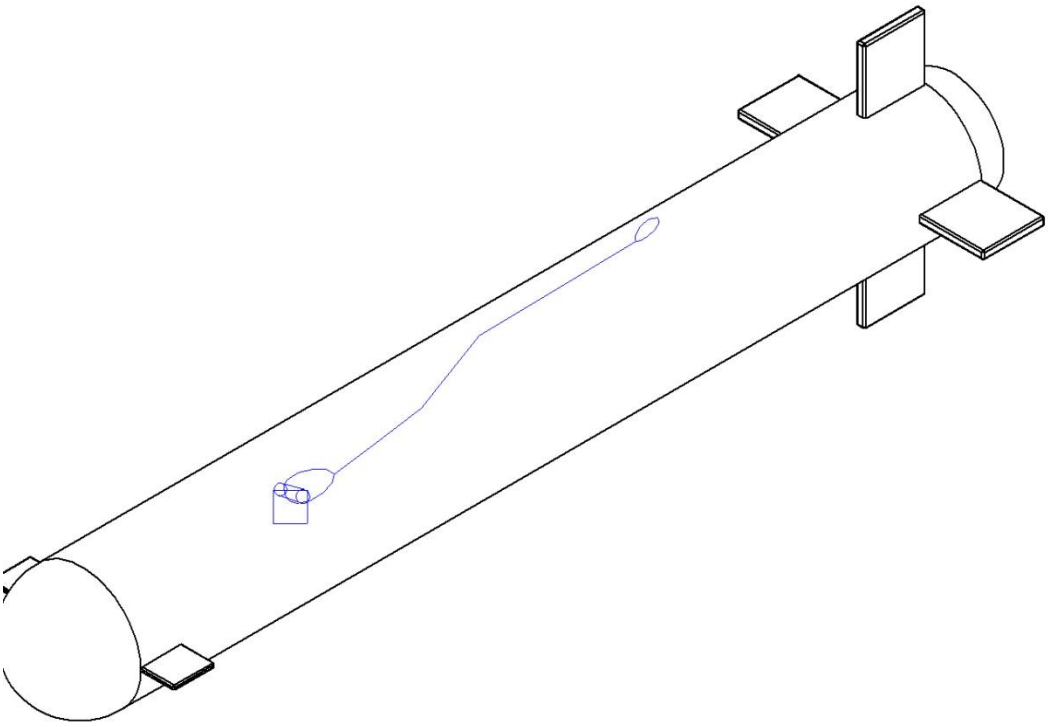

Figure 1: Release lanyard placement and design

4. Criteria Tree

We have constructed a criteria tree, found below in Figure 2, based on the information provided in Table 1.

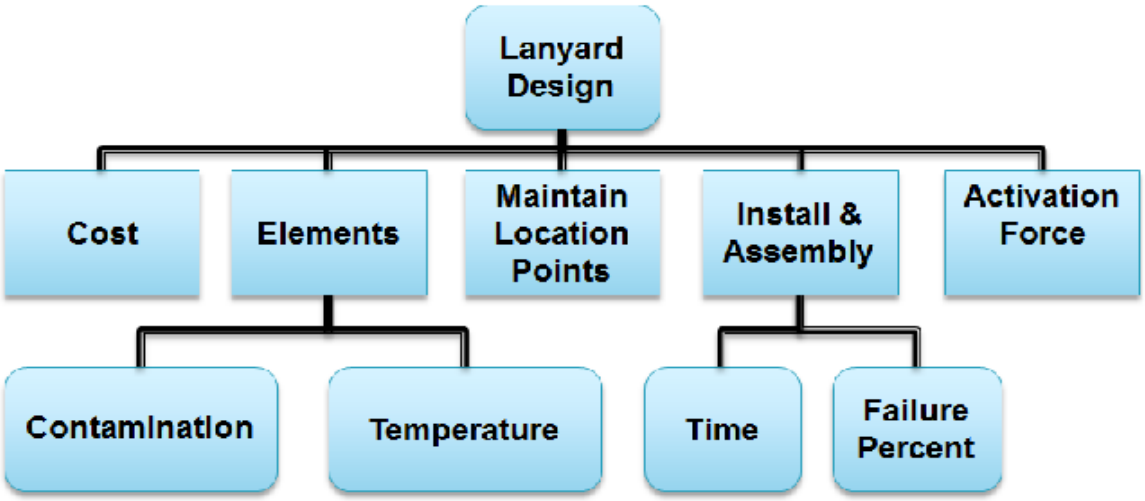

Figure 2: Criteria Tree

5. Quality Function Deployment with House of Quality

We have related the customer requirements to the quantifiable engineering requirements of the project in Figure 3, found below. The house of quality below in Figure 4 related the engineering requirements to each other.

		Engineering Requirements					
		Cost	Weight	Material Thickness	Size Dimensions	Force Requirement	Yield Strength
Customer Requirements	Activates Weapon					X	
	Inexpensive	X		X			
	Ease of Assembly	X					
	Ease of Installation	X					
	Impervious to Environmental Conditions		X	X			X
	Set Installation Locations	X			X		
	Units	$	kg	m	m^2	N	Mpa
		TBD	TBD	TBD	TBD	TBD	TBD
		Engineering Targets					

Figure 3: Quality Function Development

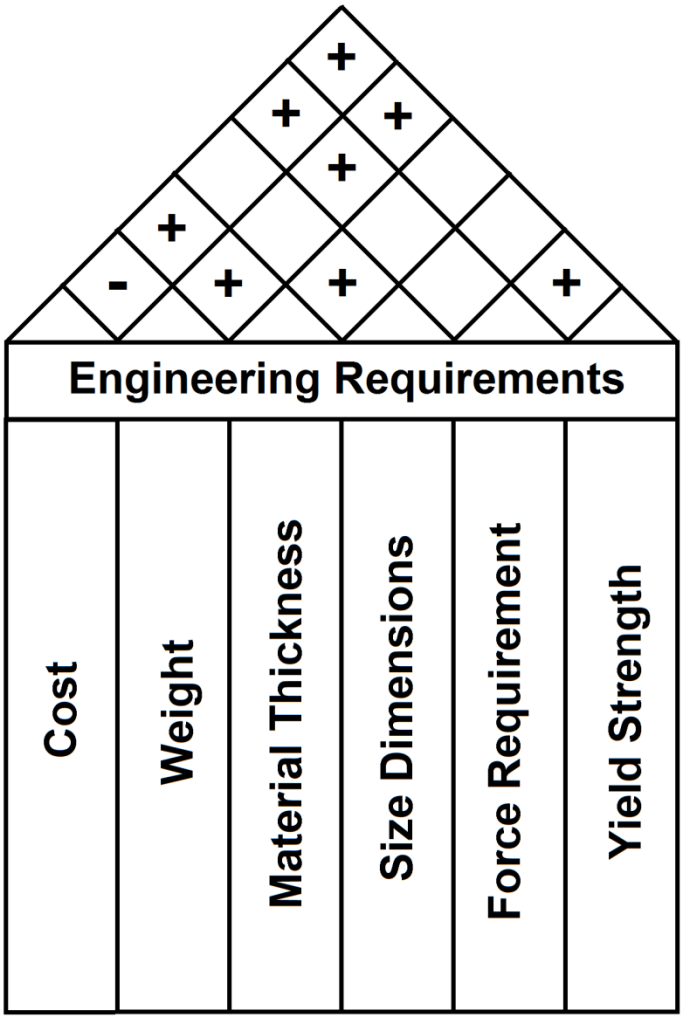

Figure 4: House of Quality

6. Project Plan Gantt Chart

The Gantt Chart below in Figure 5 will provide the framework for the completion of this project. The chart will also aid in allocating our project resources and provide milestones to evaluate our overall progress.

Figure 5: Gantt Chart