

Christmas Ornament Display Structure

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Team 07

Needs Identification, Product Specification and Project Plan Document

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INTRODUCTION

My Star of Bethlehem LLC is a small business founded by Sandy Lochow in October of 2011 that operates out of Sedona, Arizona. Sandy and her husband, Dieter Otte, grew up just a few miles outside of Hernhut, Germany where the original Hernhut Christmas stars were conceived. After relocating to the United States over ten years ago and missing the Christmas stars she grew up with, Sandy decided to bring the stars to America and open up her own store. My Star of Bethlehem LLC sells Christmas ornaments which are both manufactured and imported directly from Germany.

In order to help market these Christmas ornaments, My Star of Bethlehem LLC would like to have a portable display stand designed and manufactured to highlight their products at venues such as store fronts and malls. The structure will display one ornament at a time elevating it at least six to eight feet above the ground. The design needs to be collapsible, light-weight, easy to setup and easy to take down.

NEEDS IDENTIFICATION

The client indicated that they do not have an aesthetically pleasing way to easily display their Christmas ornaments when marketing their products locally. Presently, when the company is out promoting their products they use a square four legged tent with three tables setup underneath in a U-shaped configuration. The Christmas stars are both displayed on these tables and hung from the top of the tent frame.

GOAL

The goal is to design a better way to display the Christmas ornaments when My Star of Bethlehem LLC is marketing their products to potential customers. This design will provide an effective means to display their products at trade shows, private properties, shopping malls etc. This display structure may also be purchased by customers for private use at an additional cost.

OBJECTIVES

- Inexpensive – It is important that the display stand be affordable and therefore inexpensive so that it is attractive from a sales standpoint and easy to promote.
- Easy to assemble/disassemble – By incorporating into the design an easy assembly, less time will be spent setting up and more time devoted to sales.
- Durability – If the stand material is not strong, it’s likely to damage easily and break. The display stand must not damage the Christmas star and vice versa.
- No Damage to Star – The more damage incurred to the Christmas star from the display stand, the higher the repairs costs are for the consumer. Repair costs should be kept low.
- Recyclable – It would be nice if most or the entire stand is recyclable to both reduce waste and provide the consumer with a portion of the initial investment back if they choose to sell it back to a scrap metal recycler.
- Reliability – A reliable product is easier to market. The less time the customer spends servicing the product, the more time they can spend using it. Additionally, more money is kept in the consumer’s pocket.
- Adjustable Height – The display stand will need to adjusted depending on the venue; shorter for indoor locations and higher for outdoor locations.

Table 1: Objectives with corresponding measurements and units

Objectives	Basis for Measurement	Units
Durability	Lifespan should be \geq the ornament	Years (yr)
Will not damage star	Cost to repair a damaged ornament	Dollars (\$)
Recyclable	Amount of recyclable materials	Percent (%)
Reliability	Will not require frequent maintenance	Years (yr)
Adjustable height	Venue display requirement	Feet (ft)
Ease of assembly	Time to assemble	Time (min)
Inexpensive	Cost to consumer stays within \$500.00	Dollars (\$)

CONSTRAINTS

- Ornament needs to be elevated a minimum of six to eight feet above ground.
- Stand must be small enough to fit in a compact car.
- Display stand must be light enough for one adult to carry.
- Ornament needs to be hung or mounted.
- Stand assembly must not exceed thirty minutes.
- Stand must support three different sized ornaments.
- Structure needs to be free standing.

TESTING ENVIRONMENT

Northern Arizona will be the primary testing environment for the objectives and constraints. The difference in climate between Sedona and Flagstaff will test the quality of the material and endurance of the display structure. The data collected from this testing will improve the understanding of the size, height, weight and durability requirements. After these requirements are addressed, the time to assemble and disassemble the stand can be evaluated.

Although most of the listed objectives and constraints can and will be tested, some require more time than is available for this project. Case in point, to test the durability and reliability of the display stand, it will take years of monitoring and recording how often the stand requires maintenance and how long it lasts in terms of its lifetime. To test the ‘inexpensive’ objective, the total cost in dollars for the display stand which includes manufacturing, materials, labor, processing etc. can only be estimated. Once it is built and put together, a more accurate cost can be calculated based on the amount and type of material, manufacturing and processing costs, and labor.

RECAPITULATION OF PROBLEM STATEMENT

Problem Statement

Need: My Star of Bethlehem LLC does not have an aesthetically pleasing way to easily display their Christmas ornaments when marketing their products locally.

Goal: Design a better way to display the Christmas ornaments when My Star of Bethlehem LLC is marketing their products to potential customers.

Objectives:

Objectives	Basis for Measurement	Units
Durability	Lifespan should be \geq the ornament	Years (yr)
Will not damage star	Cost to repair a damaged ornament	Dollars (\$)
Recyclable	Amount of recyclable materials	Percent (%)
Reliability	Will not require frequent maintenance	Years (yr)
Adjustable height	Venue display requirement	Feet (ft)
Ease of assembly	Time to assemble	Time (min)
Inexpensive	Cost to consumer stays within \$500.00	Dollars (\$)

Constraints:

- Ornament needs to be elevated a minimum of six to eight feet above ground.
- Stand must be small enough to fit in a compact in a compact car.
- Display stand must be light enough for one adult to carry.
- The total cost should not exceed five hundred dollars.
- Ornament needs to be hung or mounted.
- Stand assembly must not exceed thirty minutes.
- Stand must support three different sized ornaments.
- Structure needs to be free standing.

CRITERIA TREE

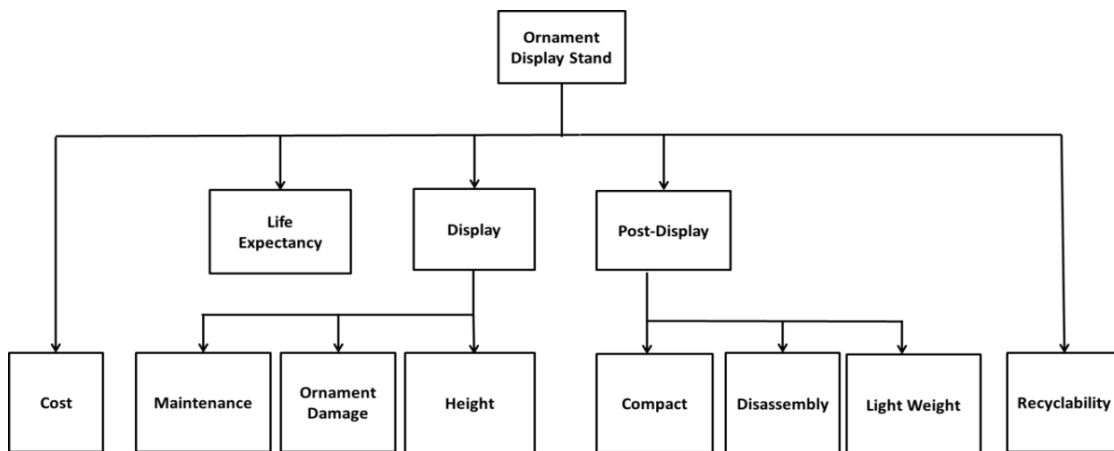


Figure 1: Criteria tree with design criteria

QUALITY FUNCTION DEPLOYMENT

	Engineering Requirements							
	Yeild Strength	Modulus of elasticity	Material thickness	Height	Weight	Deflection	Center of gravity	Cost
Customer Requirements								
Freestanding	X		X		X		X	X
Collapsible			X	X	X	X		X
Lightweight	X		X	X	X			
Easy to assemble and disassemble				X	X			
Ornament elevated at least 6 to 8 feet off the ground	X	X	X	X	X	X	X	X
Portable			X	X	X			
Resistant to weather	X	X				X	X	X

Figure 2: Comparison of customer requirements to engineering requirements

HOUSE OF QUALITY

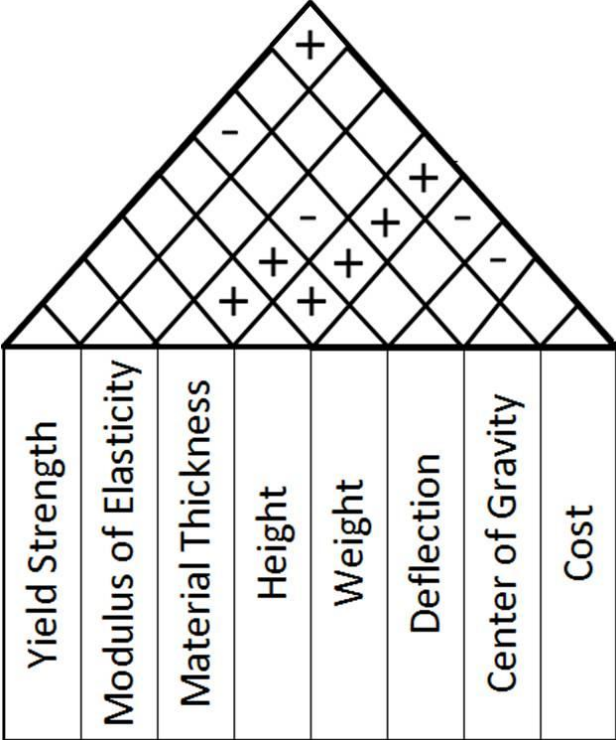


Figure 3: Comparison of engineering requirements

PROJECT TIMELINE

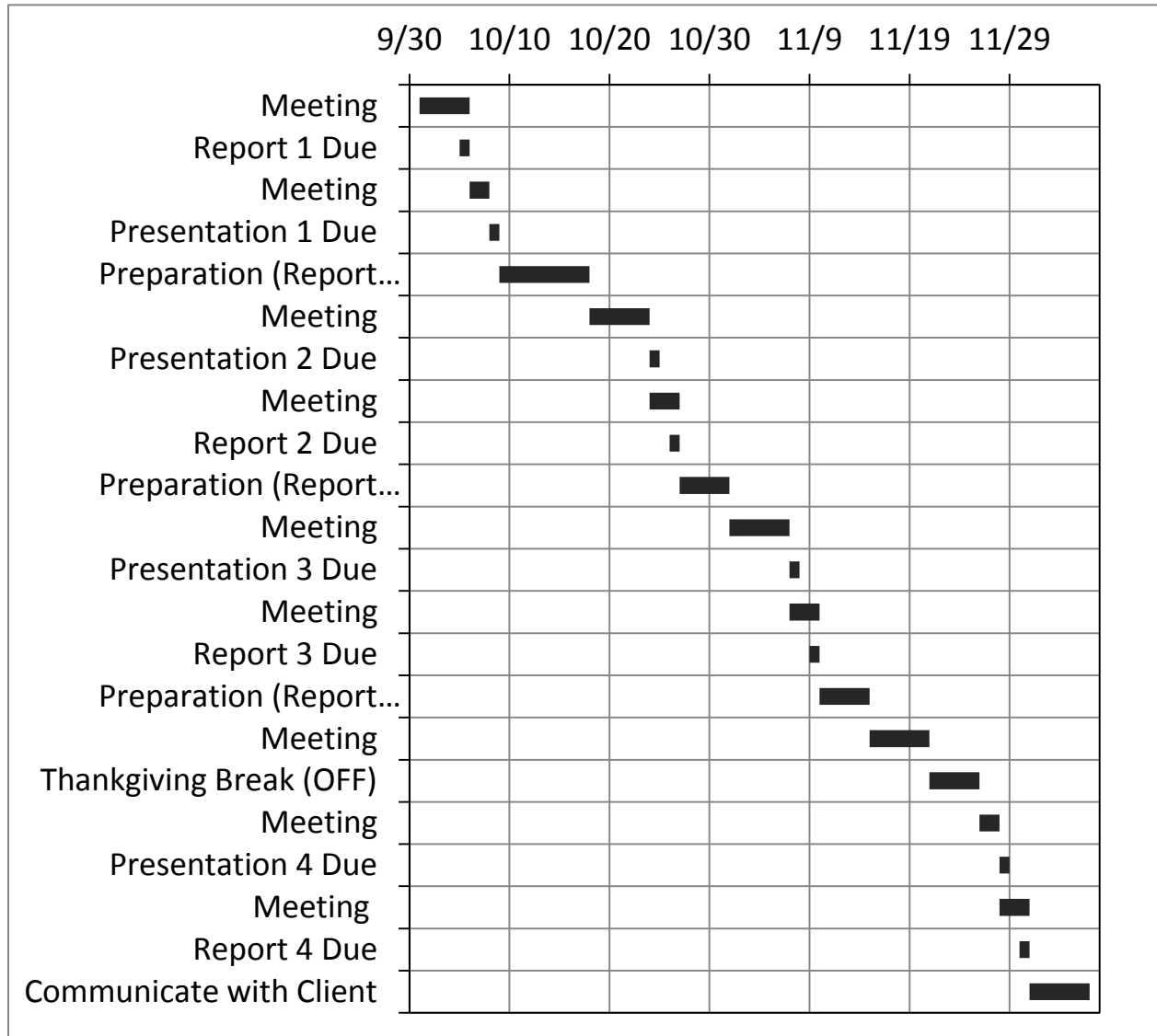


Figure 4: Project plan timeline

REFERENCES

[1] Otte, Dieter. (2012). *My Star of Bethlehem; The Star That Keeps on Giving*. Retrieved from <http://mystarofbethlehem.com/>