Final Design Presentation: Quick Change Electrical Connection

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Overview

- Problem Statement
- Criteria
- Concept Selection
- Current Concept
- Gantt Chart
- Conclusion

Intro

- Client: Raytheon Missile Systems
  - Started 90 years ago
  - Defense, aerospace, and government applications
- Quick Change Electrical Connection

Problem Statement

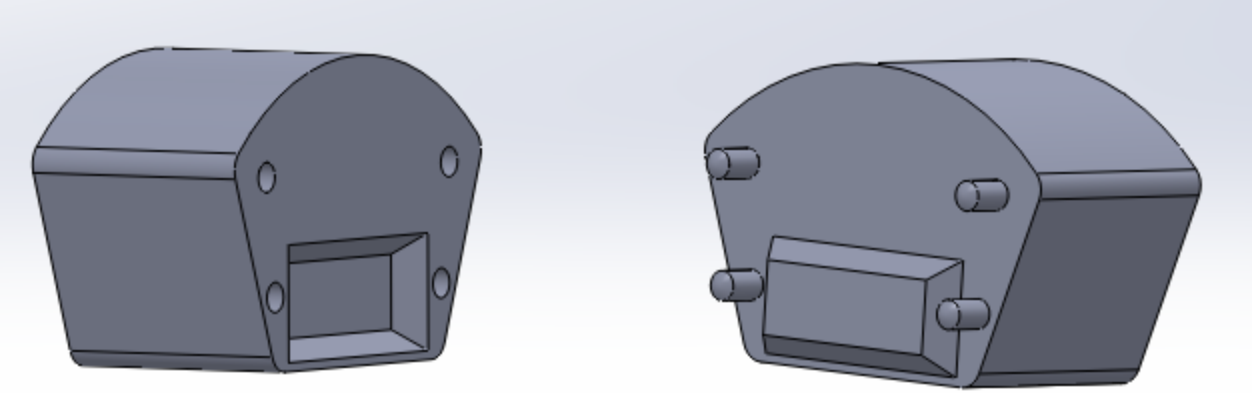
- The current nose assembly is unable to provide the ability to quickly install the nose without compromising the electrical connection.
- Goal
  - Design an improved electrical connection alignment.

Constraints

- Focus on evaluating materials under the specified operating conditions
  - Power Loads
    - Transportation Loads
    - Bomb Rack Ejection
  - Temperature
  - Sand/Dust
  - Vibration
  - Water/Ice
  - Salt
  - Jet Fuel

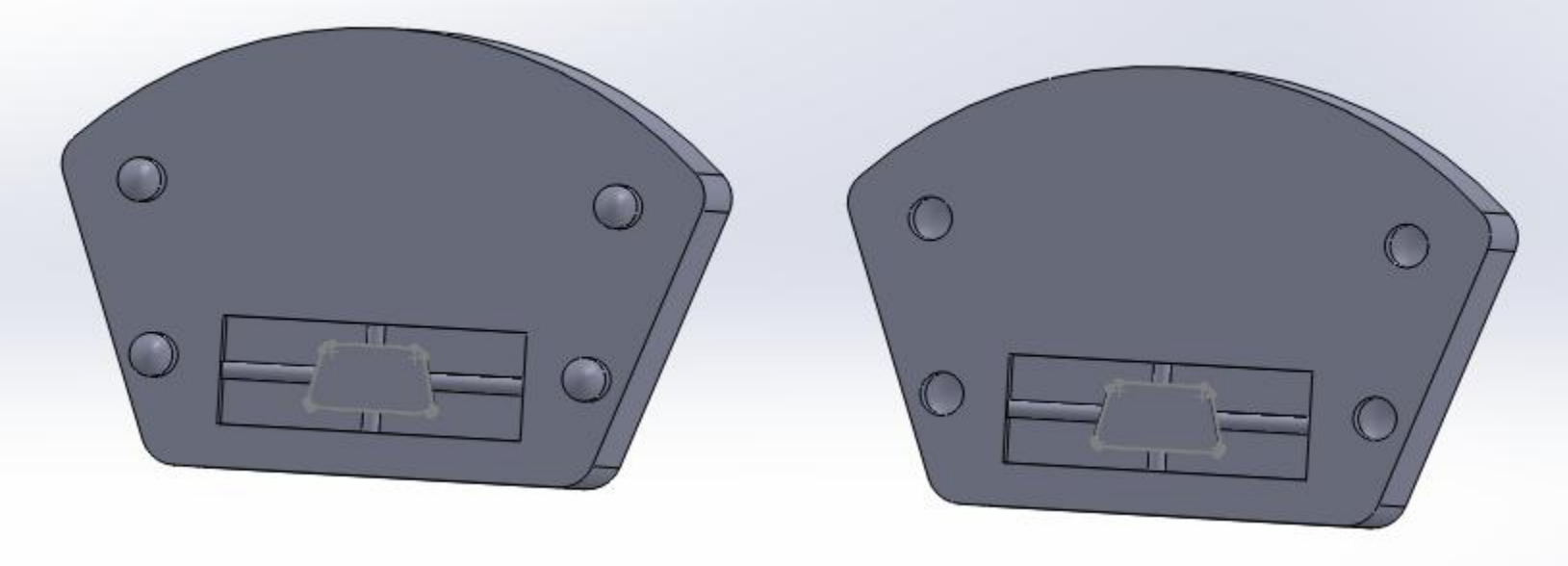
Concept Selection

- Solid Guided Connection



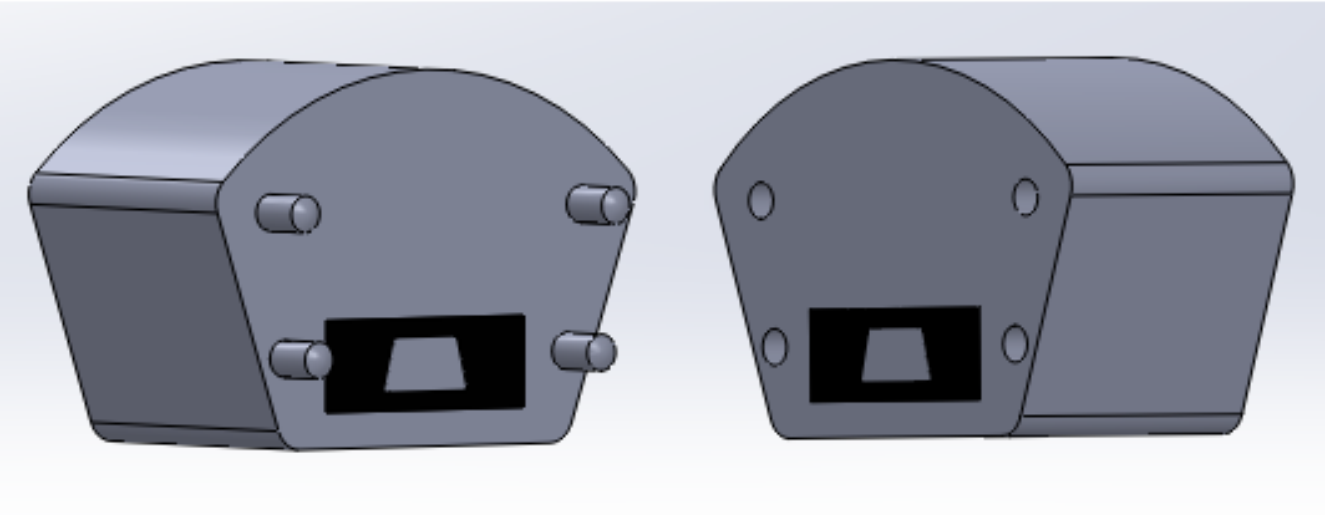
Concept Generation

- Stabilizing Rods



Concept Generation

- Flexible Material

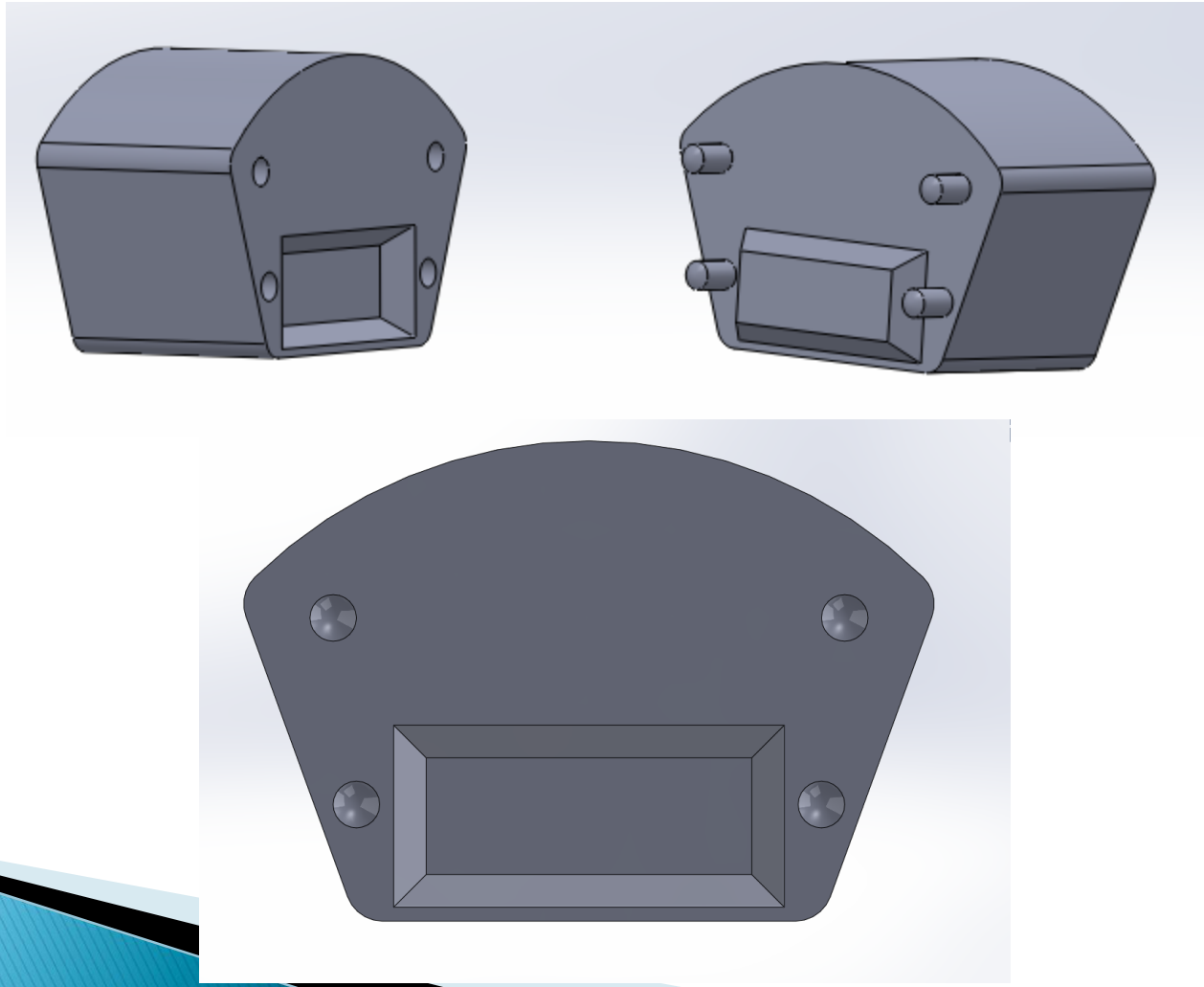


Analysis

- Ideal Material Properties
  - Low Thermal Conductivity
  - Corrosion/Rust Resistant
  - Ductile
  - High Hardness
  - High Tensile Strength
- Trying to find the best balance

Proposed Design

- Solid Guided Connection



Dimension Analysis

- Note: Dimensions are multiplied by a factor to save proprietary information
  - 1in depth on the Nose Side
  - The slant will come in .7 inches
  - Slant is 125 degrees
  - Connector Dimensions are 7 x 2.5 inches
- Electrical Connector:
  - Similar to:

Material Selection

- Outside shell of missile will take most of the forces produced from bomb rack ejection
  - Corrosion is more important
- Material Choice: AISI 303 Stainless Steel
  - Annealed
    - Makes it Stronger and Less Brittle
  - E = 27.6 Mpsi
  - Yield Strength = 35 kpsi
  - Ultimate Strength = 87.3 kpsi
  - Resistant to Corrosion
  - Melting Point: 1400 ° C

Cost Analysis

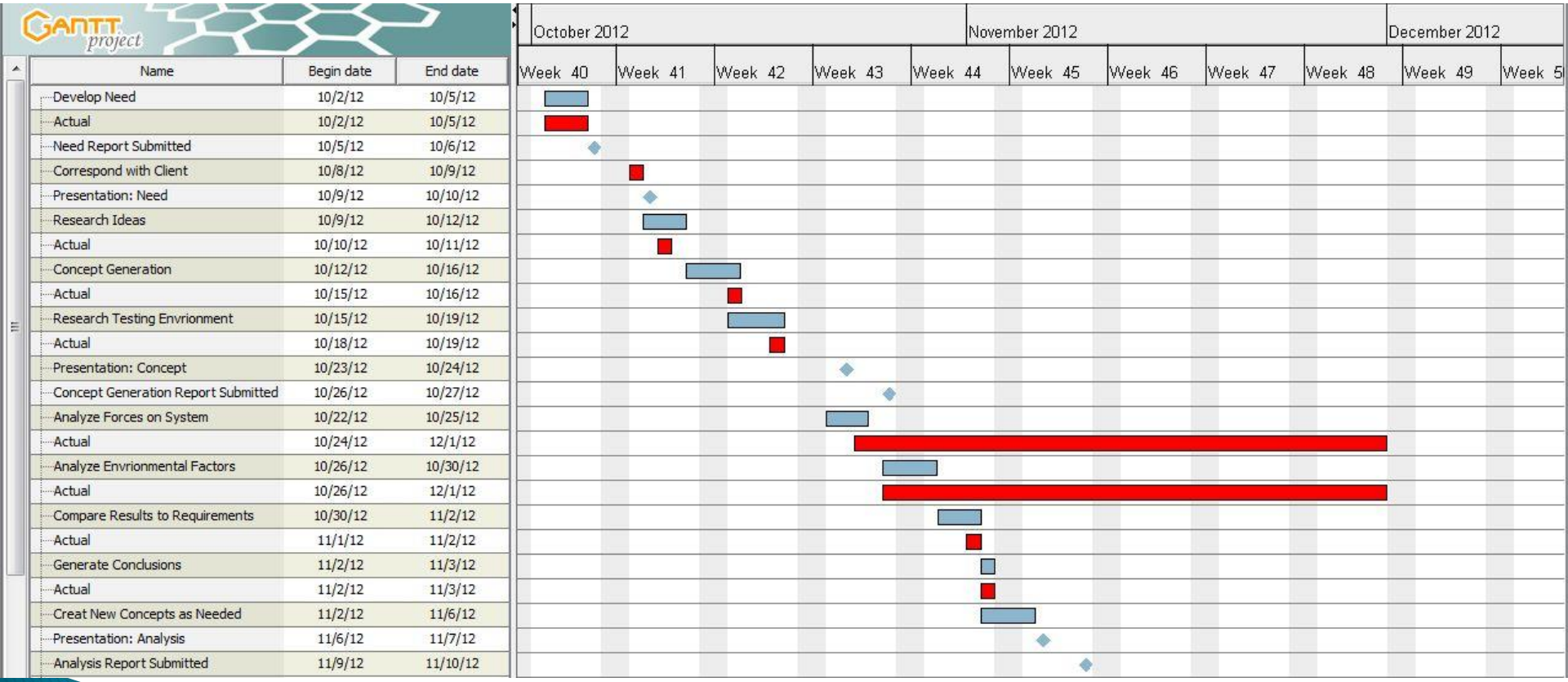
Category	Units	Cost
Material	$3-6 per kg	$7.20
Manufacturing	Free (Machine Shop)	
Electrical Connector	$20	$20
Totals		**$27.20**

Note:

- The price is multiplied by the same factor for the dimensions
- This our cost analysis for development. We will discuss with Raytheon at a later date for their manufacturing costs.
  - Man Hours
  - Production Cost
  - Cost of Material

Gantt Chart

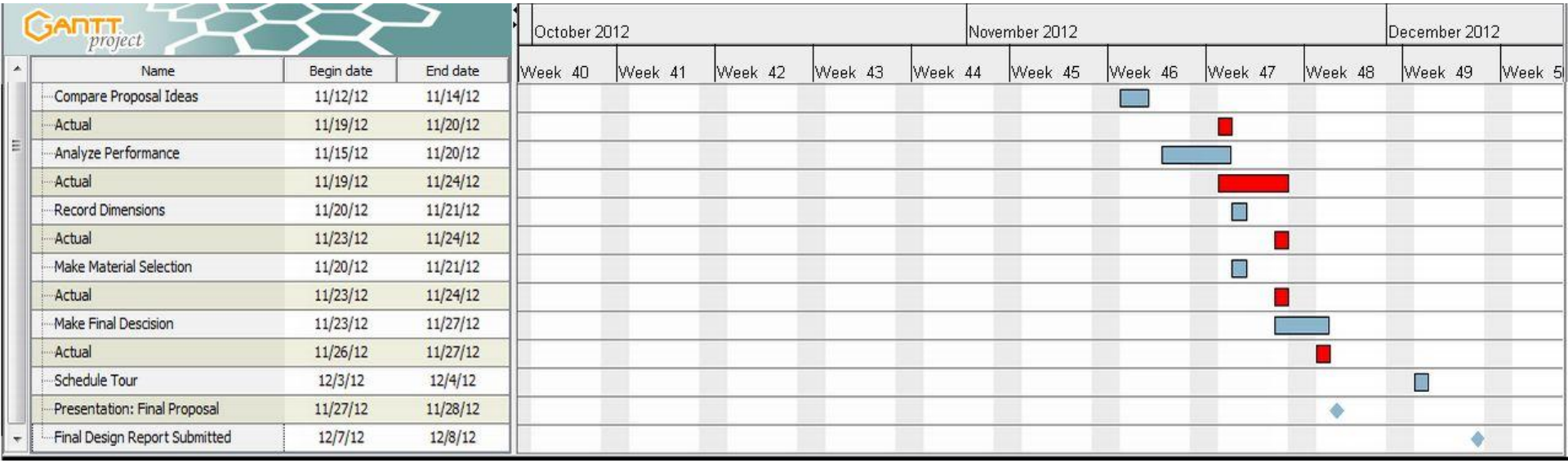
- Previous Chart



Name	Begin date	End date
Develop Need	10/2/12	10/5/12
Actual	10/2/12	10/5/12
Need Report Submitted	10/5/12	10/6/12
Correspond with Client	10/8/12	10/9/12
Presentation: Need	10/9/12	10/10/12
Research Ideas	10/9/12	10/12/12
Actual	10/10/12	10/11/12
Concept Generation	10/12/12	10/16/12
Actual	10/15/12	10/16/12
Research Testing Envrionment	10/15/12	10/19/12
Actual	10/18/12	10/19/12
Presentation: Concept	10/23/12	10/24/12
Concept Generation Report Submitted	10/26/12	10/27/12
Analyze Forces on System	10/22/12	10/25/12
Actual	10/24/12	12/1/12
Analyze Envrionmental Factors	10/26/12	10/30/12
Actual	10/26/12	12/1/12
Compare Results to Requirements	10/30/12	11/2/12
Actual	11/1/12	11/2/12
Generate Conclusions	11/2/12	11/3/12
Actual	11/2/12	11/3/12
Creat New Concepts as Needed	11/2/12	11/6/12
Presentation: Analysis	11/6/12	11/7/12
Analysis Report Submitted	11/9/12	11/10/12

Gantt Chart

- Final Proposal Timeline



Name	Begin date	End date
Compare Proposal Ideas	11/12/12	11/14/12
Actual	11/19/12	11/20/12
Analyze Performance	11/15/12	11/20/12
Actual	11/19/12	11/24/12
Record Dimensions	11/20/12	11/21/12
Actual	11/23/12	11/24/12
Make Material Selection	11/20/12	11/21/12
Actual	11/23/12	11/24/12
Make Final Descision	11/23/12	11/27/12
Actual	11/26/12	11/27/12
Schedule Tour	12/3/12	12/4/12
Presentation: Final Proposal	11/27/12	11/28/12
Final Design Report Submitted	12/7/12	12/8/12

Conclusion

- Problem Statement
- Concept Selection
- Final Proposal
  - Dimensions
  - Material Selection
  - Cost Analysis
- Gantt Chart

Questions?