

Automated Mirror Cover Naval Precision Optical Interferometer

Team 8
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Rogelio Blanco
Miles Dehlin
Leland Doyle
Salazar Grey
Katherine Hewey
Paul Owen



Aerial view of the NPOI facility

Overview

- Problem Statement
- Concept Generation
- Concept Selection
- Conclusion
- Updated Gantt Chart

Problem Statement

- Automatic mirror cover is needed at NPOI and must operate without interfering with current equipment while maintaining a nitrogen purge.

Concept Generation

- Current System
 - Solid Piece of Lexan
 - Rubber Stopper



Rubber Stopper Used to Hold Mirror Cover



Jim Clark Holding the Current Mirror Cover

Concept Generation

- **Brainstorming**
 - Purpose of the cover
 - Remove Moisture
 - Keep Debris out
 - Parametric Design or Original Idea?
 - Different ways to remove Moisture

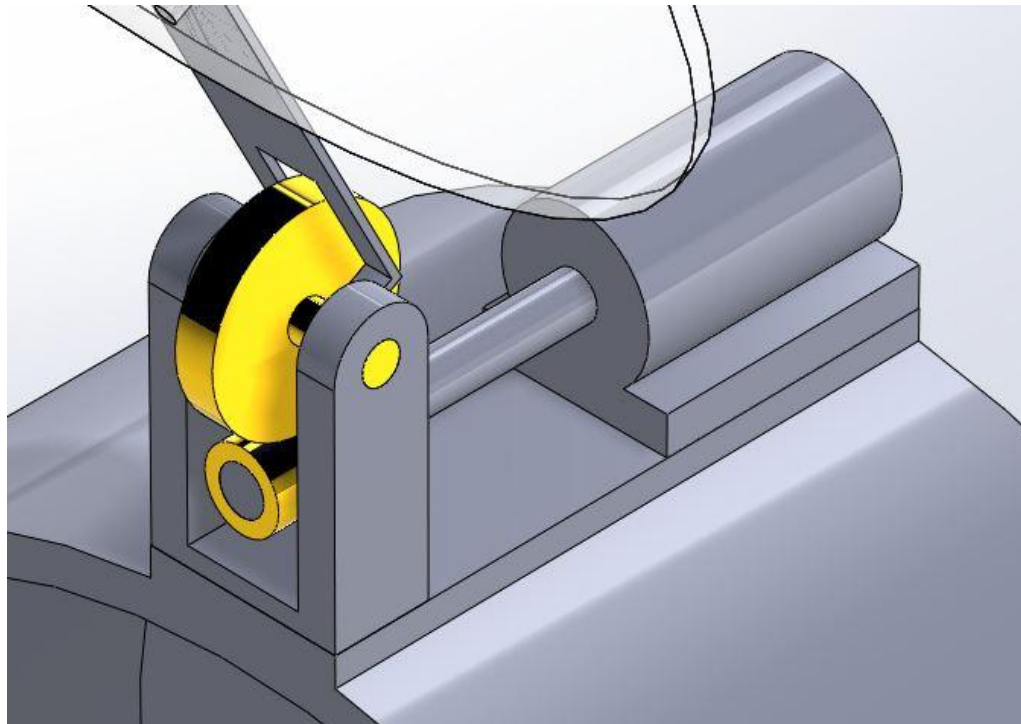
Concept Generation

- **Categorize concept archetypes**
 - Many of our initial concepts are parametric designs
- **Identify the root concept**
 - Clear understanding of base concept was essential for discussion and evaluation

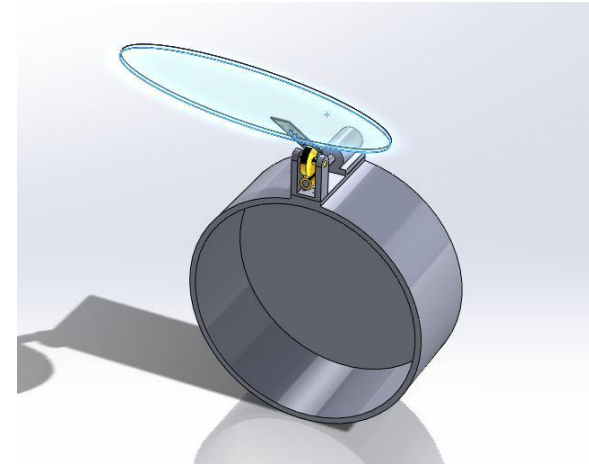
Concept Generation

- Group discussion of specific concerns related to each concept brought issues to light quickly
- Possible courses of action to address potential problems were documented

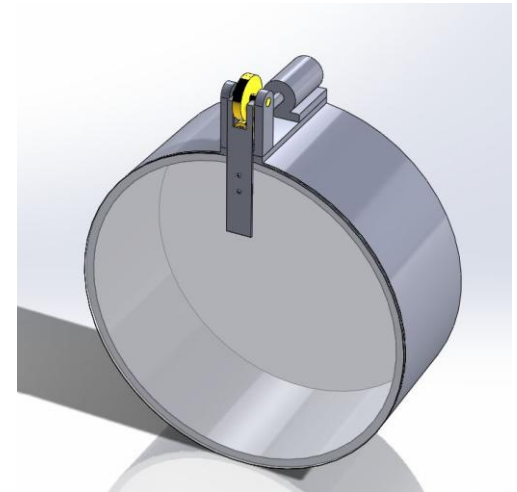
Worm Gear Design



Mechanism Close up

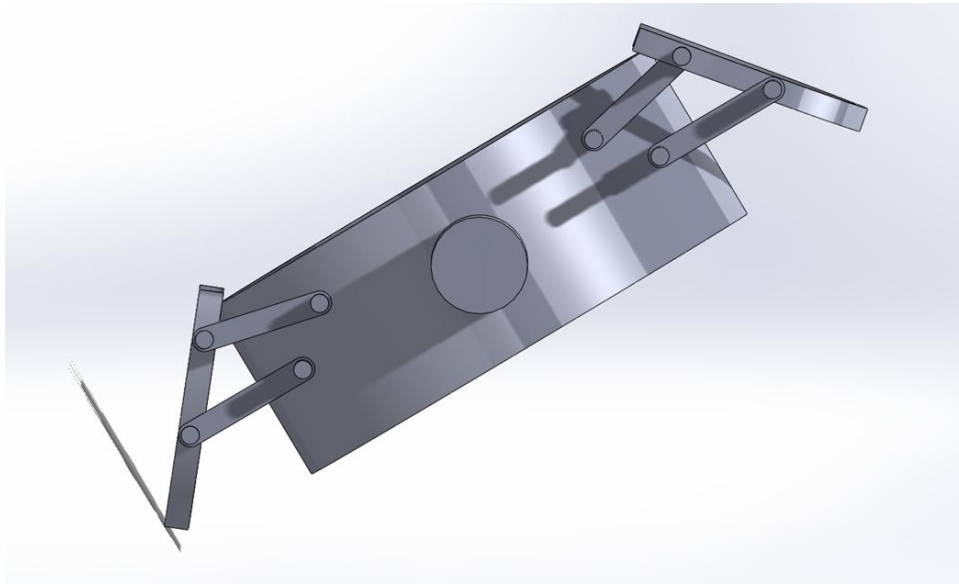


Cover Open

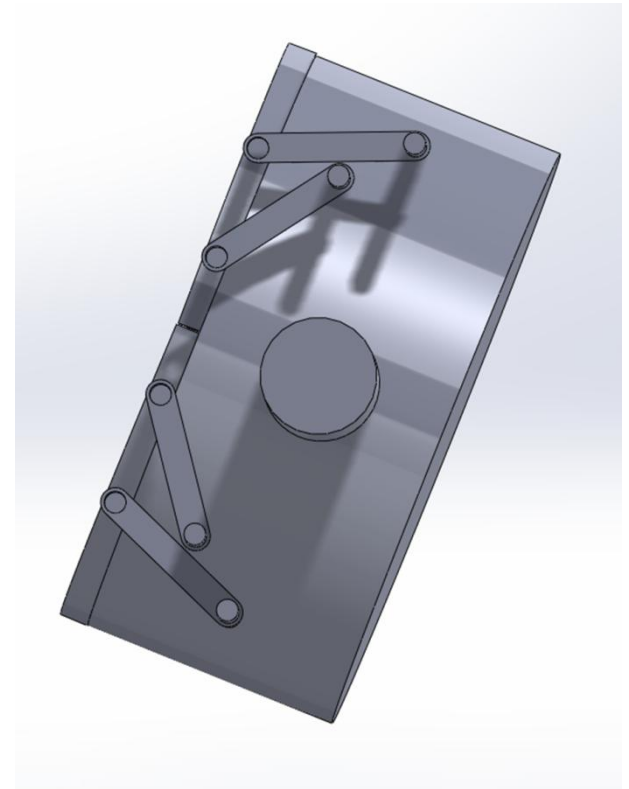


Cover Closed

Four Link Design

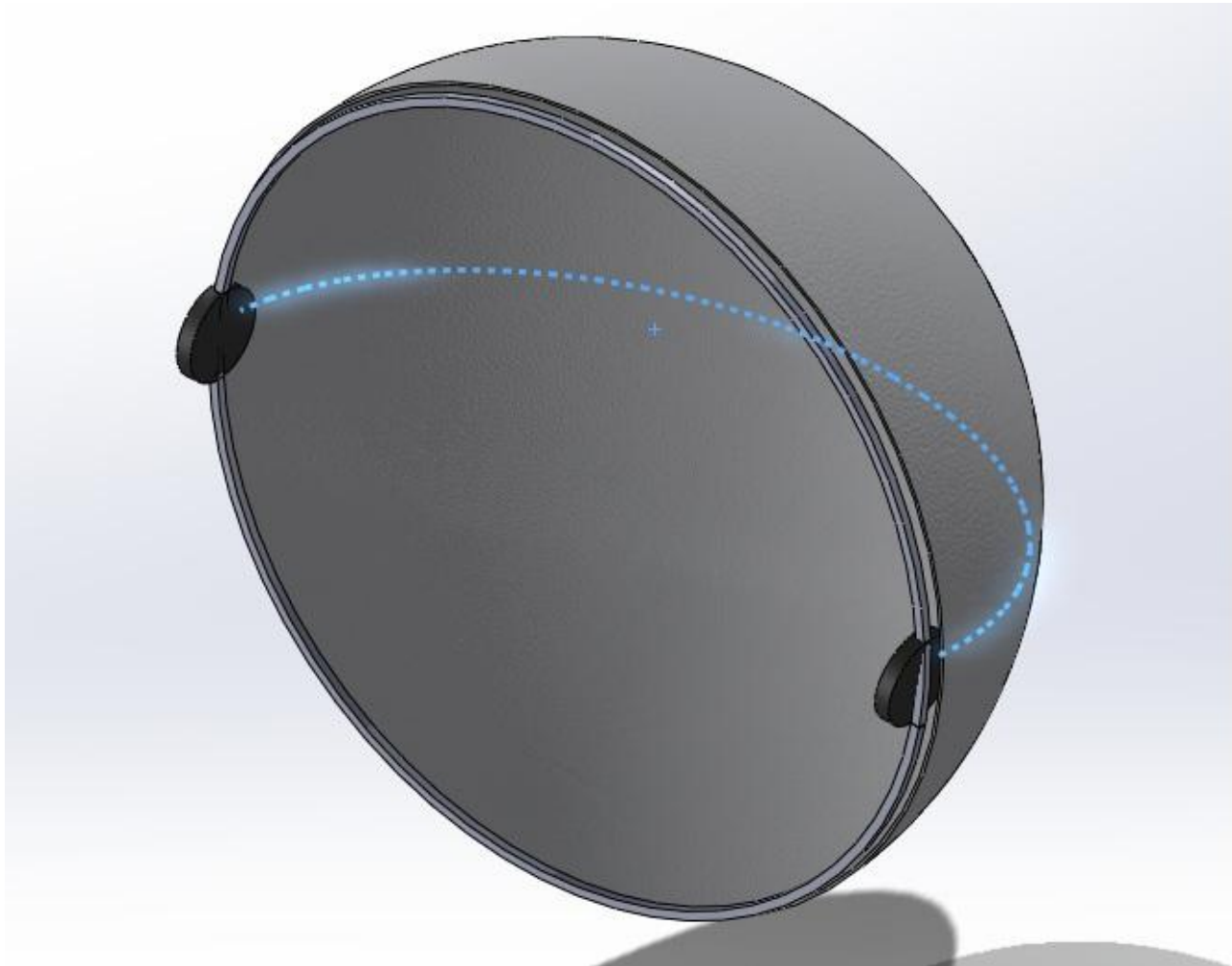


Cover Open



Cover Closed

Inflatable Baby Carriage



Concept Selection

- Using a design criteria tree, our group assigned values to weight areas of design that were important to our client
- A design matrix was built to be filled in with group assessments of particular designs

Weighting Factors



Criteria Tree With Weighted Factors

Decision Matrix

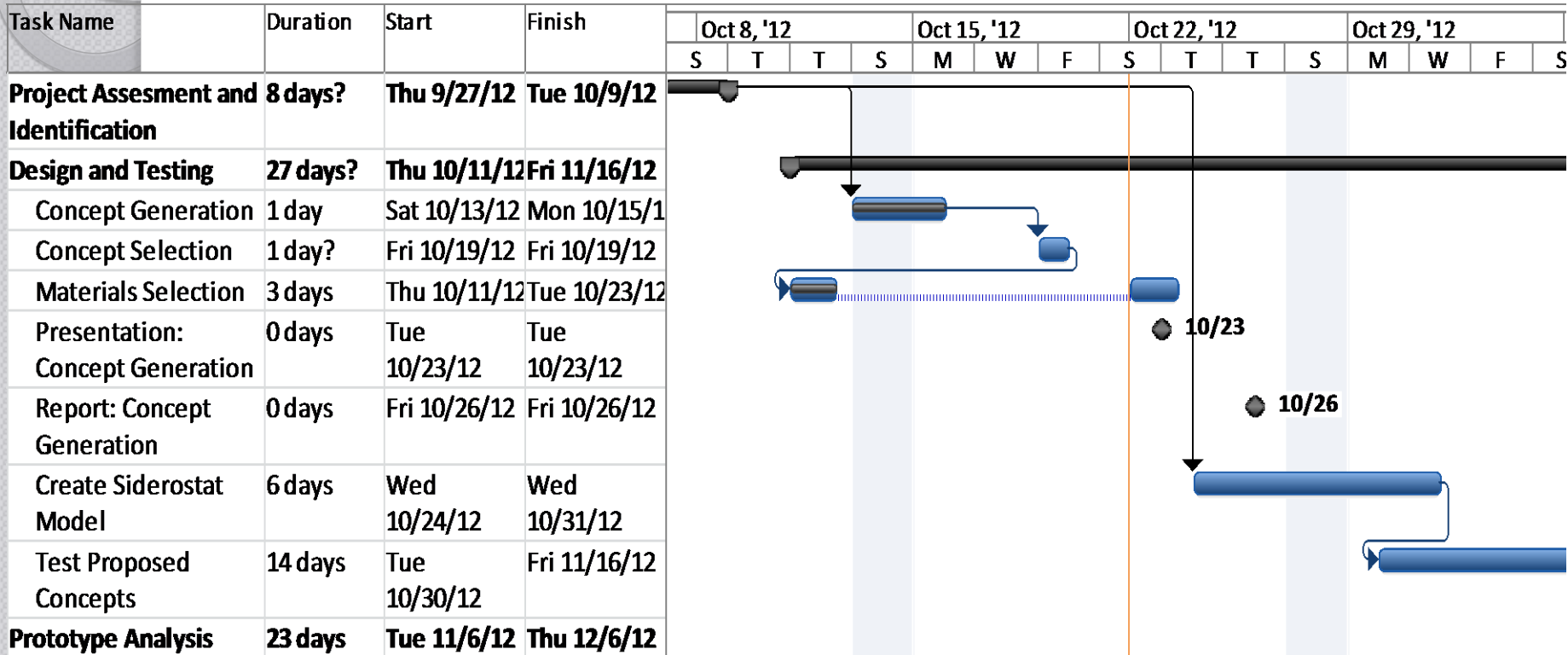
Criteria	Design Options			
	Pneumatic Roller	Two Piece Four Link	Inflatable	Worm Gear
Doesn't Block Light	6	9	9	8
Balance	8	8	7	6
Clearance	5	4	9	2
Impact	6	8	9	8
Simplicity	4	8	4	8
Reliability	5	5	6	7
Purge	3	7	3	7
Auto Shut Off	7	7	9	7
Lubrication	3	3	7	2
Installation	2	5	7	8
Life	8	6	2	7
Cold Weather	5	5	3	5
Power Loss	6	6	9	4
Cost	5	8	5	8
Total	73	89	89	87
Weighted Total	4.885	6.739	5.491	6.386

Top Four Concepts Shown in Weighted Matrix

Conclusion

- After evaluating different design concepts, our team will begin testing and prototyping the designs that scored highest on our design matrix

Updated Gantt chart



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- Questions?