

# Two-Step Hub Deployment Mechanism



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# Overview

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# Needs Assessment

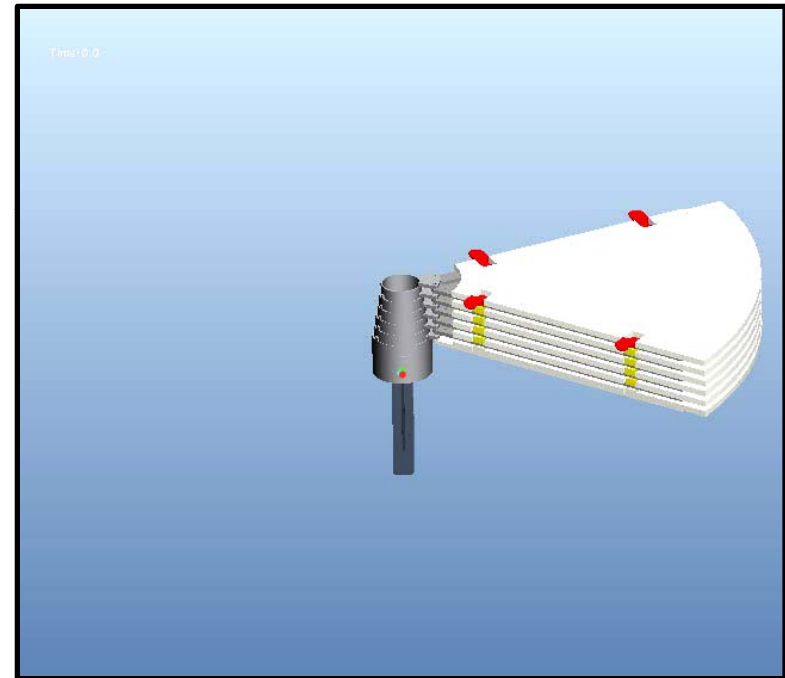
- Two types of reflectors commonly used
  - Mesh
  - Solid
- Ease of transportation
  - Size
  - Weight
- Need for portability of mesh reflector with performance of solid reflector

# Project Goals

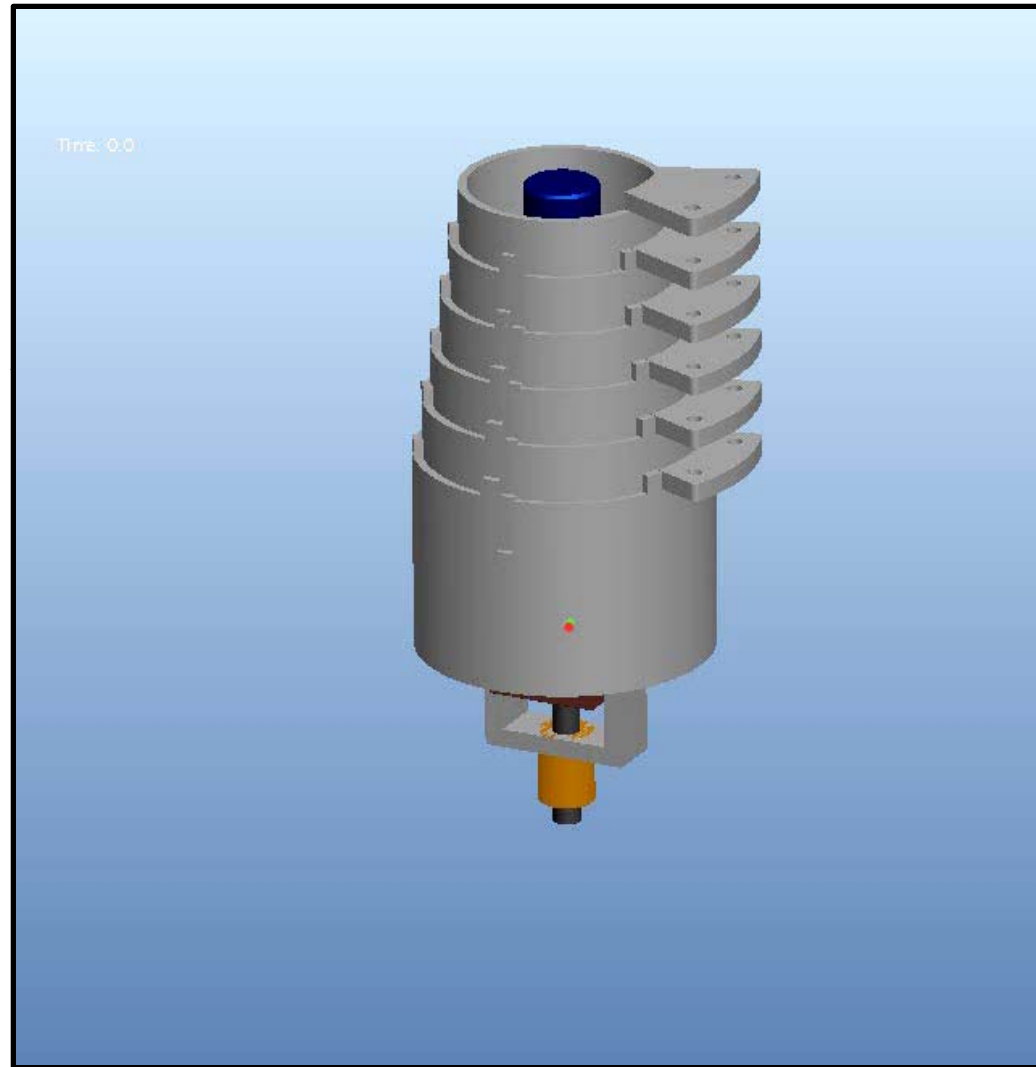
- ✓ Design a hub mechanism to deploy a segmented solid reflector in a two-step motion
- ✓ Create a CAD model to show the dynamic simulation
- ✓ Work together with the Harris Panel Interlocking Team
- Build a functioning scale prototype

# Concept Requirements

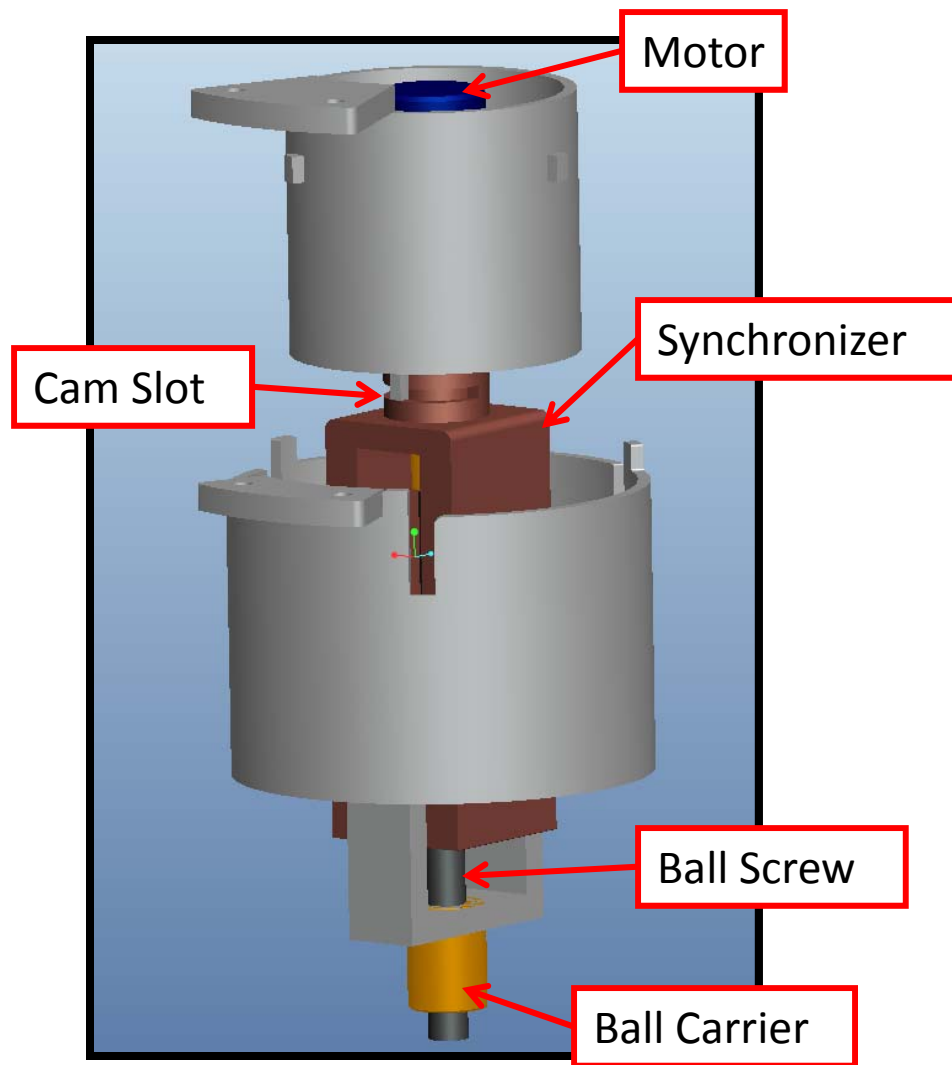
- Must rotate panels into position and retract them into the same surface plane while maintaining desired spacing between panels during deployment
- Deployment of final design achieved through use of two separate motions
  - Deployment
  - Retraction



# Final Design



# Final Design Breakdown



- Motor shaft initially fixed to synchronizer
- Once rotation is complete, synchronizer is pushed downward by the cam slot
- This disconnects the synchronizer from the motor

# Potential Problems

- Scheduling
  - Machining time
  - Anodizing time
- Build up from anodizing
  - Could interfere with ring spacing



# Cost Analysis

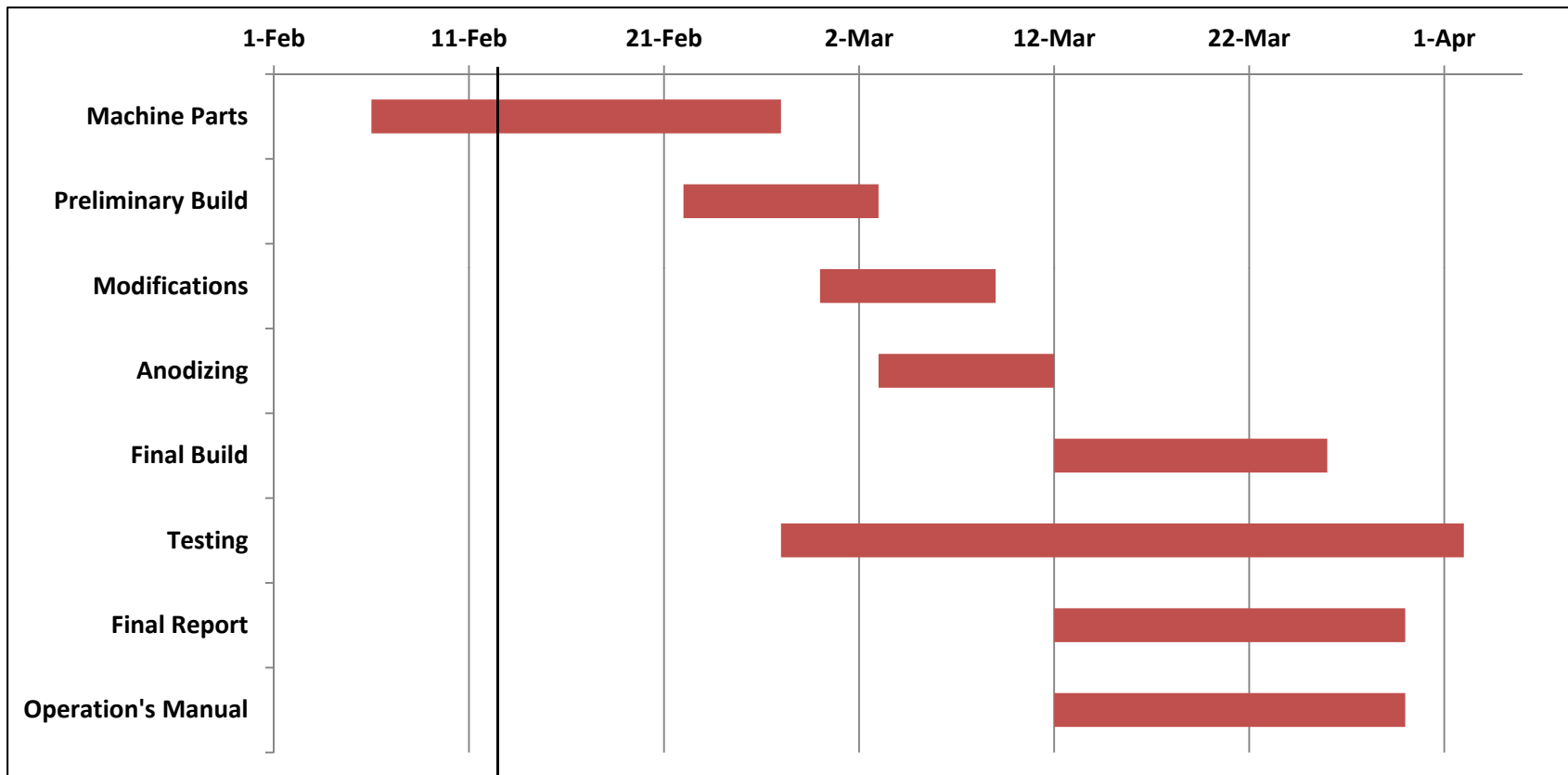
	Quantity	Cost/Unit	Total Cost	Place of Purchase
<b>Aluminum 6061</b> (Hub Rings)	1 - [1 ft tube (4.5" diameter)] 1 - [1 ft tube (4.0" diameter)] 1 - [1 ft tube (3.5" diameter)] 1 - [1 ft tube (3.0" diameter)]	76.16 69.89 65.42 60.57	275.04	Mcmaster
<b>Aluminum 6061</b> (Connecting Bars)	1 - [3/16" thick, 1/2" wide rectangular bars (3 feet)]	14.19	14.19	Mcmaster
<b>Aluminum 6061</b> (Hub Rings)	1 - [1/4" thick, 1 1/4" wide rectangular bars (1 ft)]	14.18	14.18	Mcmaster
<b>Hard anodizing with teflon coating</b>	All aluminum	450.00	481.50	A.M. Metal Finishing
<b>Motor</b>	1 - MicroMo 2657 DC motor	742.90	742.90	MicroMo
<b>Feedback Controller</b>	1 - Feedback Controller	491.00	491.00	MicroMo
<b>Ball Screw</b>	1 - [3/8" diameter, 1/8" travel dist./turn, 1 ft. long]	23.67	23.67	Mcmaster
<b>Ball Screw nut</b>	1 - [3/8" diameter, 1/8" travel dist./turn, 136 lb load cap.]	91.24	91.24	Mcmaster
<b>Machining Cost (man hours)</b>	3 hours/ring with 6 rings 2 hours - synchronizer	20 hours	20 hours	FSU machine shop
<b>Total (\$)</b>			<b>2133.72</b>	

# Project Status

- All materials and parts have been received
- Motor has been ordered
  - MicroMo2657 DC Motor
  - Includes feedback controller
- Rings are currently being machined



# Project Status



# Next Steps

- Receive motor and machined rings
- Move forward with preliminary build
- Send rings out to be anodized
- Final Build
- Testing
- Final Report and Operation Manual

Questions?