Concept Design – Team 6
Solid Panel interlocking Mechanism for Solid Reflector

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Project Overview

Solid Panel Interlocking Mechanism

- 10 panels
- Mesh together
- Lock once deployed
- Deploy in and space ground applications

Design Criteria

- Reliability – must work on its own
- Dependability – must deploy successfully
- Security – strength of panel-panel connections
- Reversibility – for ground applications must be able to be stowed again after deployment

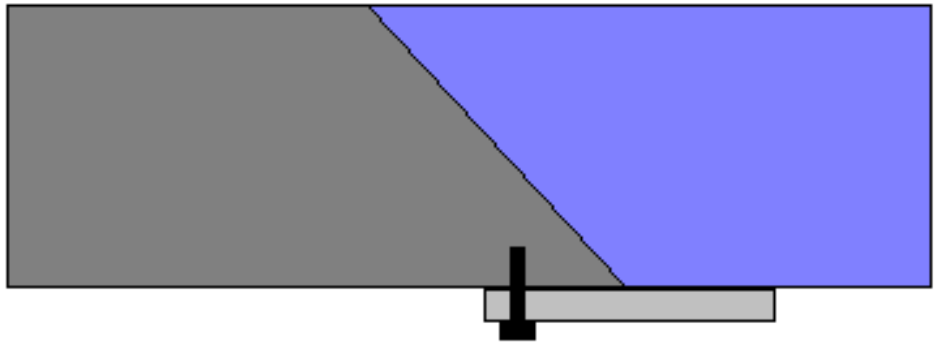
Decision Matrix

		Concept	
Specifications	**Weight Factor**	**Rating**	**Score**
Engagement Proximity	0.3		
Engagement Force	0.05		
Separation Failure	0.15		
Stability	0.05		
Reversibility	0.2		
Complexity	0.15		
Price	0.1		
		Total	

Plate Design

Pros:
- Reversible
- Reliable
- Simple
- Dependable

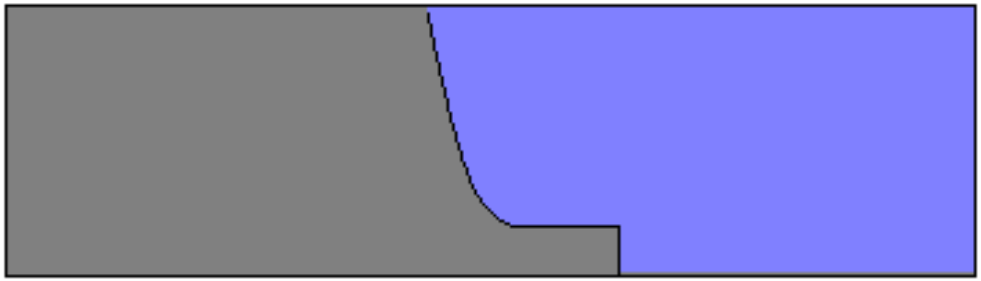
Cons:
- Not secure



Cup and Cone Design

Pros:
- Reversible
- Reliable
- Dependable
- Simple

Cons:
- Low security

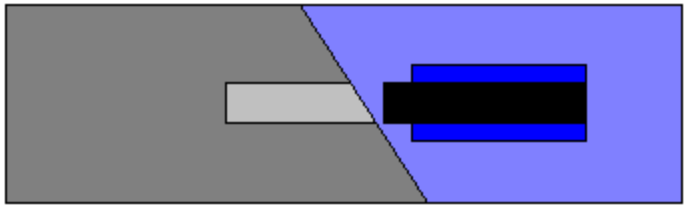


Solenoid Design

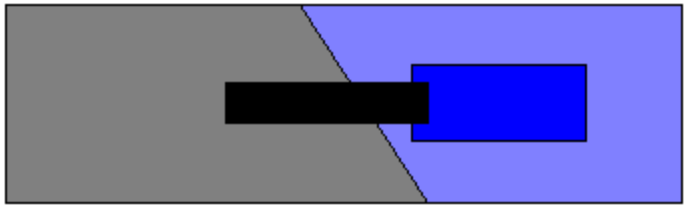
Pros:
- Reversible
- Reliable
- Very Secure

Cons:
- Requires Power
- Alignment tolerance
- Can Fail

Disengaged



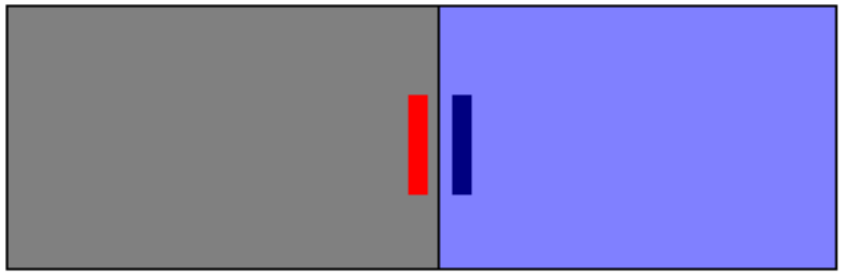
Engaged



Magnet Design

Pros:
- Reversible
- Reliable
- Low Cost
- Simple

Cons:
- Force required to separate



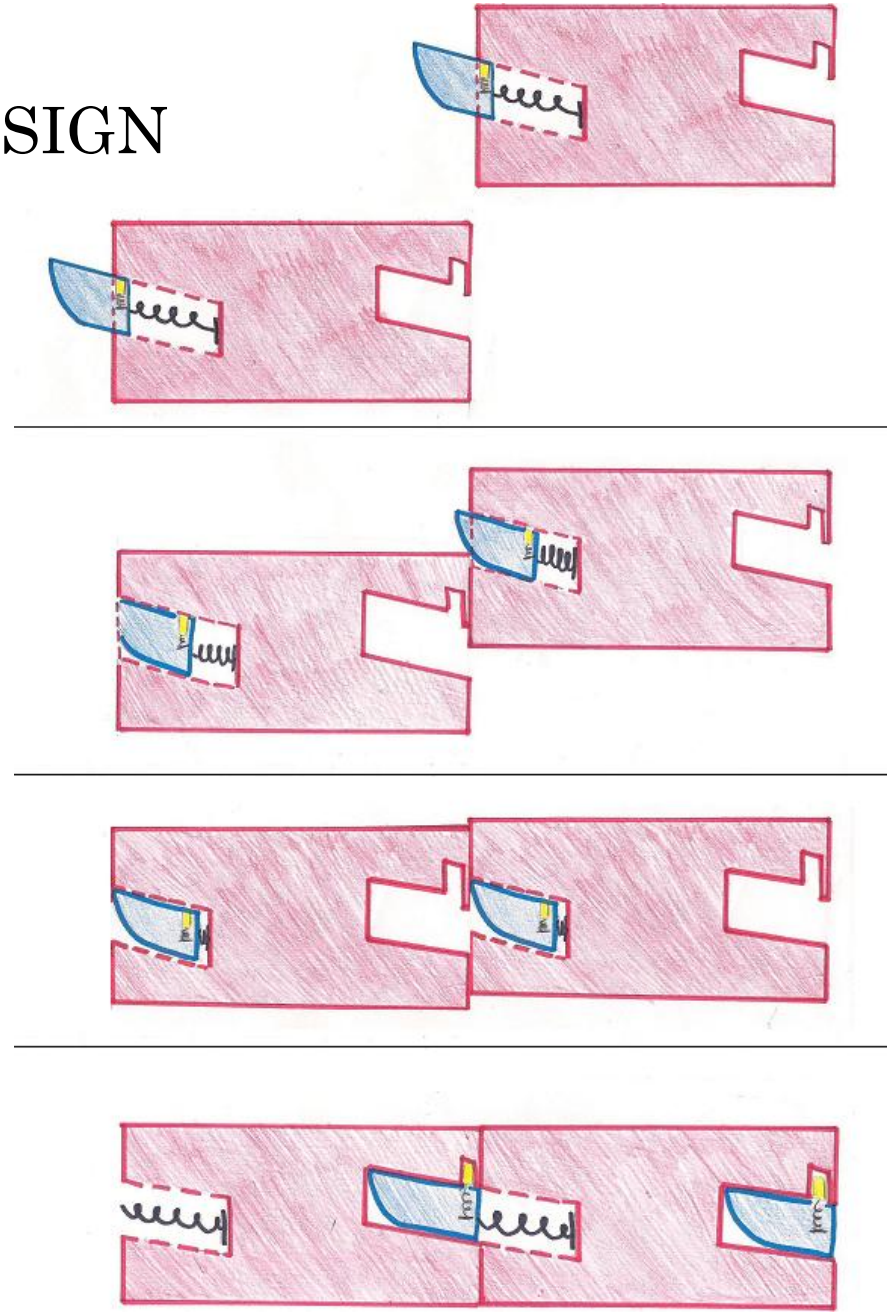
Double Spring Design

Pros:

- Secure
  - Panels interlocked in two positions

Cons:

- Non-reversible
- Complex/multiple moving parts
- Stiffness Limited Design
  - Thin walls must support forces exerted by springs



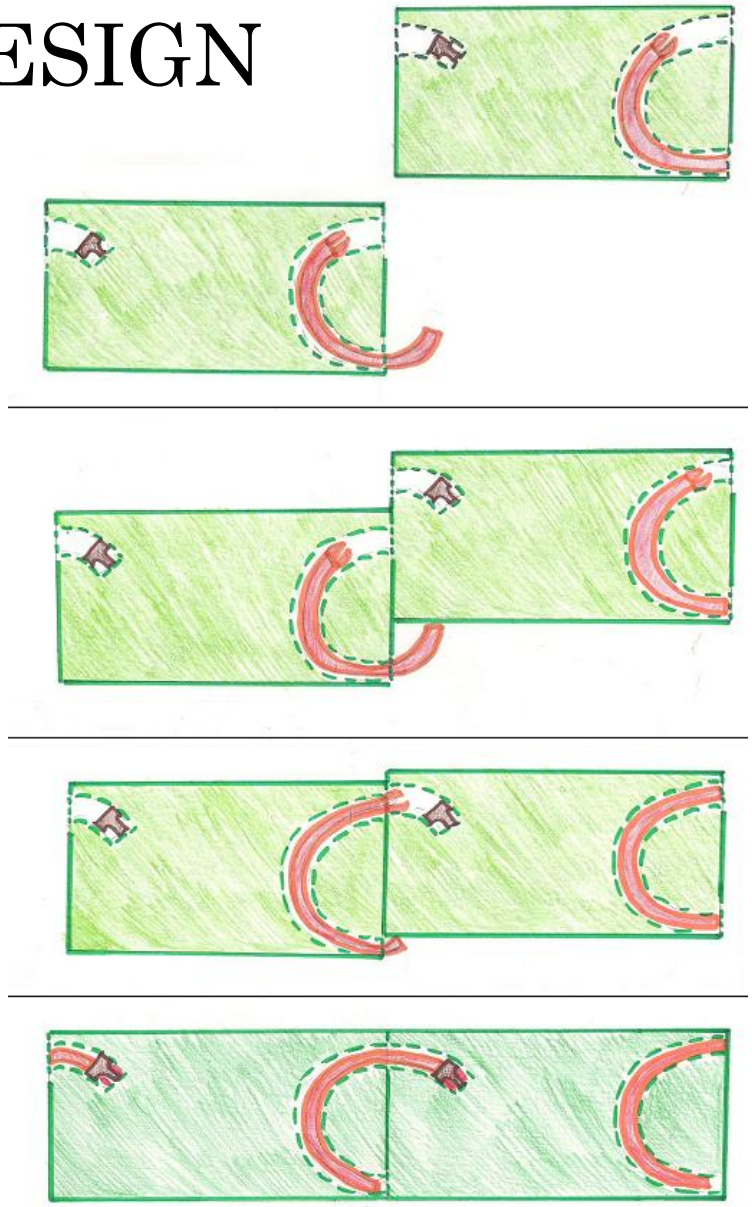
Ring & Latch Design

Pros:

- Secure
  - Latching reduces potential separation failure

Cons:

- Low reliability
- Potential snagging of ring
- Non-reversible
- Requires force of panels to connect ring to latch



Magnet & Pin Design

Pros:

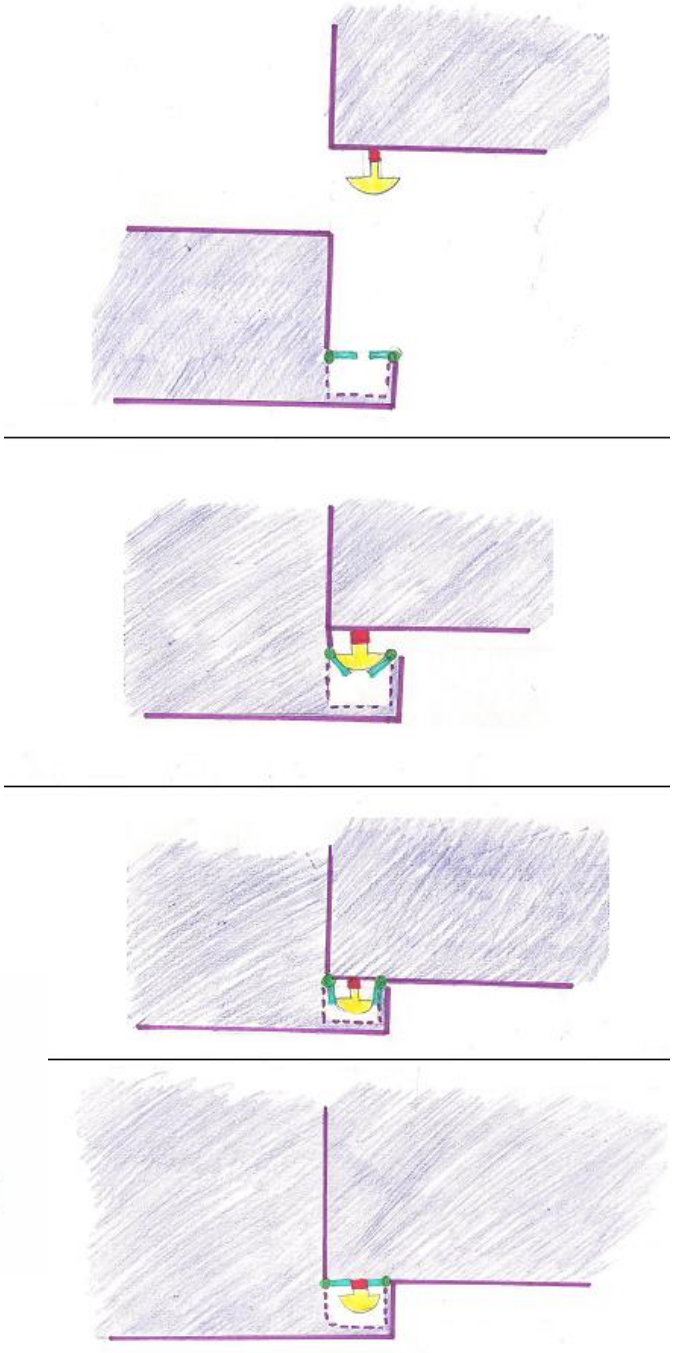
- Reversible

Cons:

- Requires force of panels to open latch

Alternative:

- Non magnetic touch latch



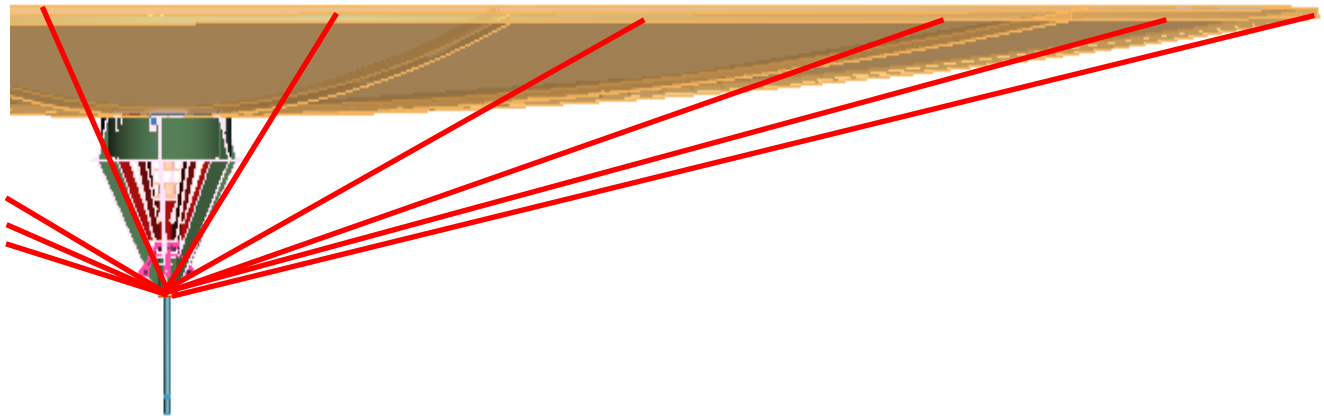
Cable 1: Guyline

Pros

- Increased stability
- Structural support
- Alignment guiding

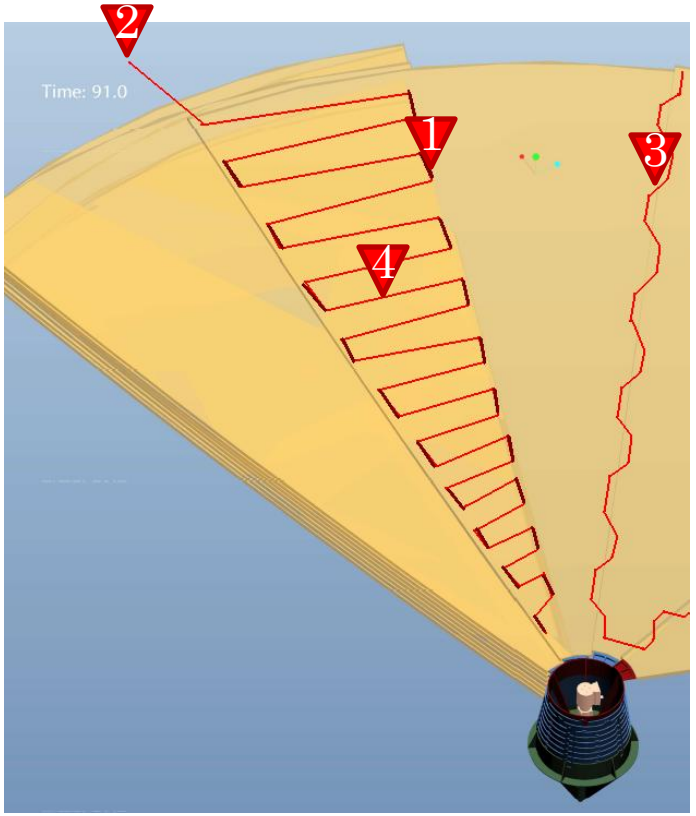
Cons

- Potential to snag
- Only restricts movement in one direction

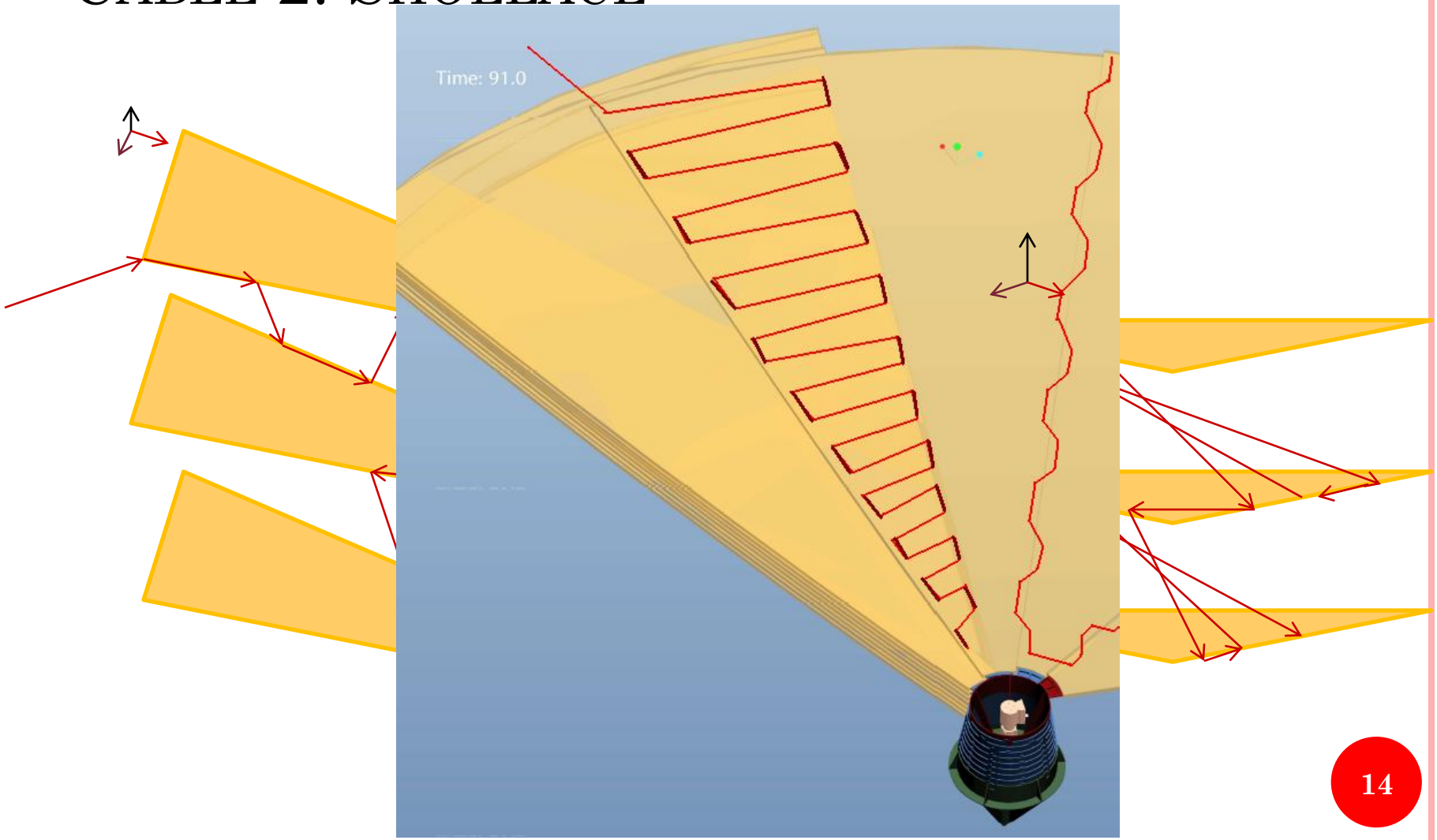


Cable 2: Shoelace

1. Cable (Red) runs through "slots" in the panel edges (Dark Red)
2. Slack is pulled out by some external means
3. Once deployed, cable holds panels securely in place
4. To achieve stowed position, cable must initially zigzag between panels



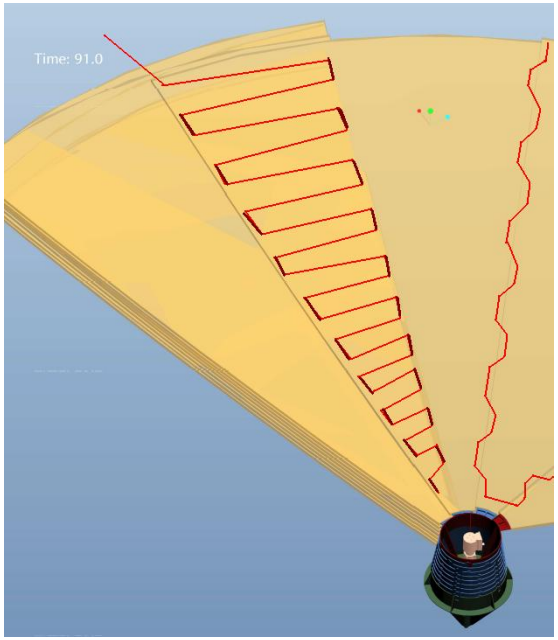
Cable 2: Shoelace



Cable 2: Shoelace

Pros

- Secure
- Assisted alignment

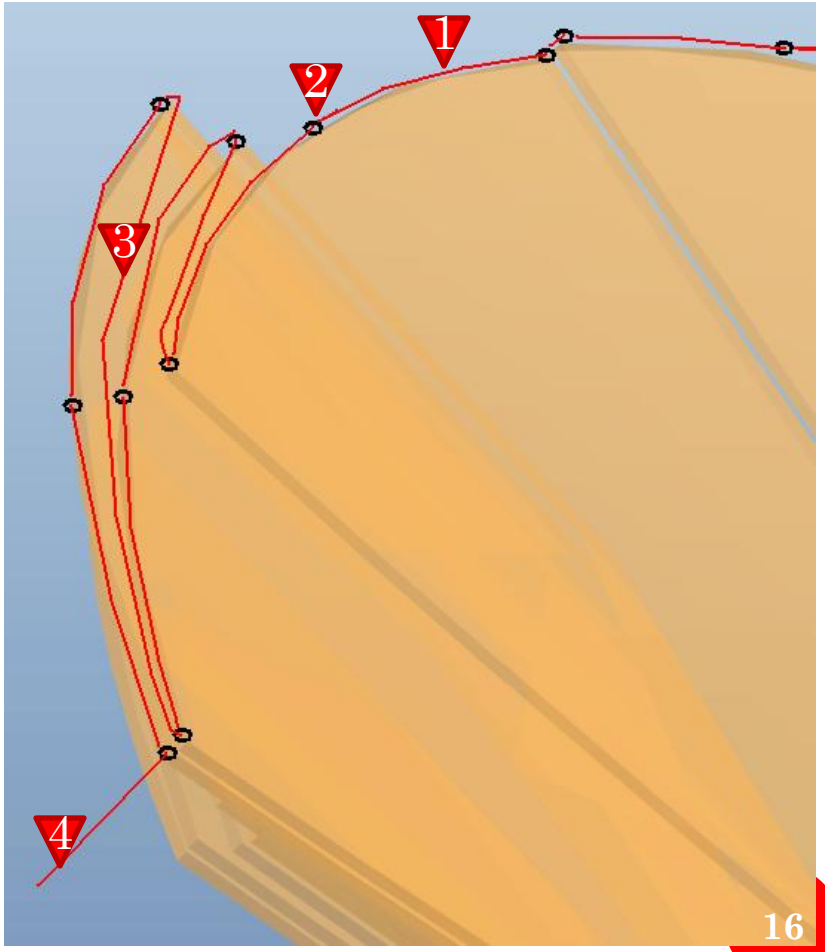


Cons

- Potential to snag
- Requires extra motor

Cable 3: Ring Tensioner

1. Cable runs the circumference of the deployed reflector
2. The cable is guided by rings attached to the surface of the panel
3. A stowed position is achieved by the cable "zigzagging" between panels
4. Slack is drawn out by some external means (e.g. motor + spool)



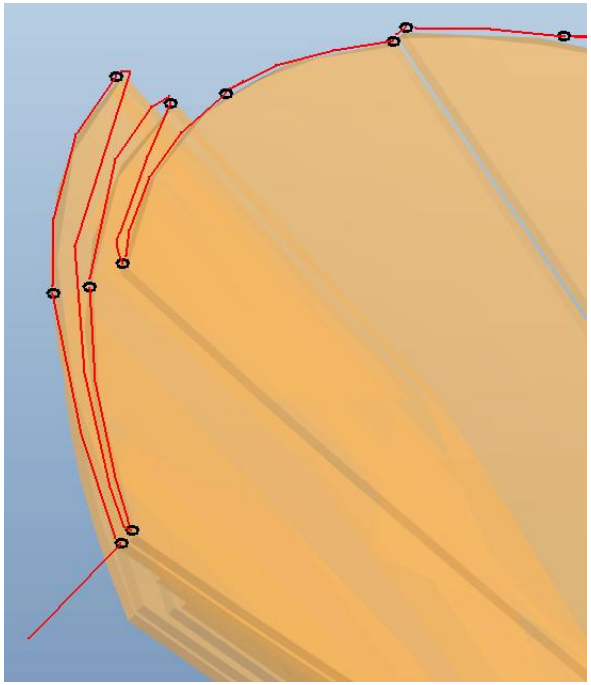
Cable 3: Ring Tensioner

Pros

- Secure
- Assisted alignment
- Versatile application

Cons

- Potential to snag
- Requires extra motor



Questions?