SunRing™ Advanced Manufacturing and Field Deployment

Award #: SUB-2023-10314

HelioCon Workshop – July 12th, 2023

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SunRing Overview

- SunRing heliostat was developed under SETO Drop-C project (DE-EE0008024) from 2017-2022
  - Total installed cost: $96/m$_2$ at commercial scale (2019$)
  - Wind criteria: 35 mph maximum tracking / 94 mph survival in stow
  - Total optical error (slope basis):
    - 1.6 mrad w/ FEA predicted structural deflection
    - 2.5 mrad w/ Photogrammetry measured structural deflection

Baseline SunRing Prototype from Drop-C Project

Baseline SunRing	
Reflective area	27 m^2
Dimensions	8.46 x 3.21 m
Aspect ratio	2.6
Stow height	1.98 m
Mirror shape	Canted, flat
Foundation	3 x screw piles
Power	PV + battery
Control	Wireless

HelioCon Project

- 24-month contract with 2 phases
- Overall goals
  - Move large portion of SunRing assembly offsite
  - Redesign mirror array and realize predicted optical performance
  - Reduce uncertainty in-field works (construction → commissioning)
  - Create holistic cost model (capital costs – lifetime O&M) in today's dollars

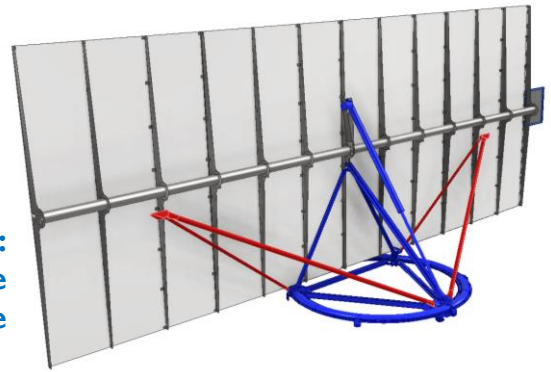
Project Focus Areas

SolarDynamics LLC
Concentrating on a new energy future

Task 1: Offsite Assembly

- Azimuth drive and lower support structure pre-assembled offsite
  - Access to lower labor rates
  - Characterization of azimuth drive done in controlled environment
  - Assembly folds down to minimize shipping costs

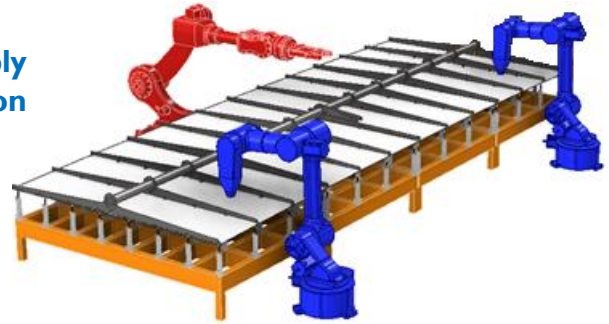
Pre-Assembles:
Blue – Main Lower Structure
Red – Outer Space Frame



Task 2: New Mirror Array Developed for Automated Assembly

- Develop automated assembly workstation for mirror array
  - Jig holds facets in ideal canted + focused position
  - Facets secured to torque tube to lock in optical shape
  - Adds 2-D focusing to SunRing at minimal cost
- Prototype to be built at SolarTAC facility (near Denver, CO)
  - SOFAST will be installed and used to tune jig to meet goal optical shape

Mirror Array Assembly Workstation



- Integration of workstation into automated assembly line

Task 3: In-field Works

- Detailed workplan for all in-field work to reduce uncertainty in cost and schedule
  - SunRing installation in field
  - Solar field roads
  - Conceptual design and cost for rig to install all foundation piles simultaneously
  - Commissioning (controls + tracking calibration)

Task 4: Holistic Heliostat Cost Model

- Update SunRing cost to current dollars
- Create cost model to capture all costs in heliostat lifecycle
  - Components, assembly, infrastructure, installation, commissioning, O&M
  - Will make publicly available