


Heliostat System with Wireless Closed-Loop Control

THERMATA 	
PROGRAM:	SunShot CSP R&D 2012
TOPIC:	Advanced Collectors
LOCATION:	Pasadena, California
AWARD AMOUNT:	Up to \$1.0 million
PROJECT TERM:	2012–2014



Self-powered, factory-assembled heliostats use closed-loop control to lower the cost of a solar collector field. Tower-mounted cameras sense reflections from small "solar proxies" mounted on each mirror; these reflections are then used to determine the real-time aiming point. *Photo from Thermata*

CONTACTS

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Partnering Organizations:

- Sandia National Laboratories
- Tietronix Software, Inc.

For more information, visit the project page at: www.solar.energy.gov/sunshot/csp_sunshotrnd_thermata.html.

MOTIVATION

Open-loop sun tracking requires costly precision. Traditionally, large heliostats have been the best way to amortize the costs of that precision. Open-loop tracking also requires a stable heliostat pedestal and footings, high-precision motors and frames, encoders, frequent calibration and surveying, and a fair amount of parasitic power consumption with its attendant wiring, conduits, and trenching.

PROJECT DESCRIPTION

Thermata is developing and demonstrating the first practical heliostat to use closed-loop tracking that can optically sense and control the reflected sunlight beam at the target. The researchers are also characterizing the prototype heliostat system's ability to achieve high optical efficiency and deliver thermal energy more accurately to the receiver. The closed-loop tracking system eliminates expensive components like encoders, and its small size enables self-contained photovoltaic powering, eliminating wiring costs. Together, these benefits reduce the total installed cost of the heliostat field in a power tower concentrating solar power (CSP) project.

IMPACT

Using an innovative camera system and closed-loop control to accurately place the sun on any receiver target, Thermata's heliostat tracking system eliminates the need for precise, highly engineered heliostat structures. This technology enables cost reductions compared to the current state-of-the-art technology with radically smaller, lighter-weight mirror assemblies. In addition, reduced mechanical tolerance requirements and significant reductions in both installation and operations costs are expected.