

Management Sciences, Inc. (MSI) collaborated with Sandia National Laboratories after winning the Ready! contest to locate a team of scientists to assist MSI in advancing the Solar Guardian photovoltaic connector after winning the Set! contest.

After winning the Set! contest, the Solar Guardian's team objectives are to:

- Built a high-fidelity prototype development using additive manufacturing and 3D printing.
- Test and validate separation and disconnect pressure of a Solar Guardian connector prototype.
- Test and validate secondary arc-gap quench capabilities of the Solar Guardian connector prototype.
- Perform tomography testing to confirm interior results of pressure and quench testing.
- Stretch Goal: Perform life-cycle testing of the Solar Guardian connector prototype.

### **Support by Oak Ridge National Laboratories**

The Solar Guardian team requests Oak Ridge National Laboratories (ORNL) scientists:

- Consult with Sandia National Laboratories (SNL) to analyze design of the Solar Guardian to inform the length and geometry needed to 3-D print high-fidelity prototypes with materials to withstand 95 degrees C. The number of prototypes will be determined after discussions with labs.
- Send 3-D printed prototypes to SNL.

### **Support by Sandia National Laboratories**

The Solar Guardian team requests Sandia National Laboratories (SNL) scientists:

- Consult with ORNL to analyze design of the Solar Guardian to inform the length and geometry needed for ORNL to 3-D print high-fidelity prototypes with materials to withstand 95 degrees C.
- Receive 3-D printed prototypes from ORNL.
- Test and validate pressure required to separate the connector.
- Test and validate the proprietary substance for quenching the arc created at separation using their DC arc fault generation test bench.
- Consult and analyze high-fidelity packaging of the connector.
- Stretch Goal: Work with NREL to perform HALT (highly accelerated lifetime testing) or HASS (Highly Accelerated Stress Screen) testing for corrosion in environments by replicating conditions normally endured by solar arrays.

### **Support by National Renewable Energy Laboratory**

The Solar Guardian team requests National Renewable Energy Laboratory (NREL) scientists:

- Perform tomography on the tested prototypes to confirm SNL testing results.
- Stretch Goal: Provide life-cycle testing expertise and an environmental test chamber to be used in cooperation with SNL. Specifically, HALT or HASS testing for corrosion in environments by replicating conditions normally endured by solar arrays (high salt concentrations near coasts, dry / arid climates in the southwest, continuous high moisture levels with rain in the Midwest, and freezing / rapid temperature changes in northern states).