



Icarus RT Solar Panel Heat Extractor

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Project Description

Icarus RT, Inc. (Icarus) is an advanced solar engineering firm developing a hybrid photovoltaic/thermal (PV/T) solar plus storage cogeneration system. The system extracts waste heat from the PV arrays, collects and stores the heat, and converts it into on-demand energy (i.e., after sunset). These patent-pending heat extractors snap on to the back of PV panels. The heated water is then stored and transferred to use as hot water or converted to power using the Organic Rankine Cycle (ORC). The result is both an increase in power and improved panel efficiency.

The heated water from the extractors is stored for on-demand use, creating a thermal battery. As a result, the Icarus thermal battery is charged while improving the performance of the PV array, rather than consuming energy from the PV system to charge as in the case of traditional battery systems. The stored hot water can be used to heat hot water supply or generate additional electricity by heating a cool organic fluid via a heat exchanger.

Icarus projects that cooling PV panels by 20° C will improve PV efficiency by 12%, resulting in an additional 20,000 kWh/year generated by a 100-kW array. This will reduce CO2 emissions by 14 MT/year. Improvement in panel efficiency will also reduce the number of panels installed and later recycled/disposed.

Design Criteria

- The heat extractor must be implementable to PV panels without modifying the panel itself to avoid safety hazards or void of warranty.
- Heat extractors must be of light weight (approximately 5 pounds) for ease of implementation in environments such as overhead solar arrays used in parking areas
- Heat extractor panel should be able cool the PV panel surface by at least 20° C.

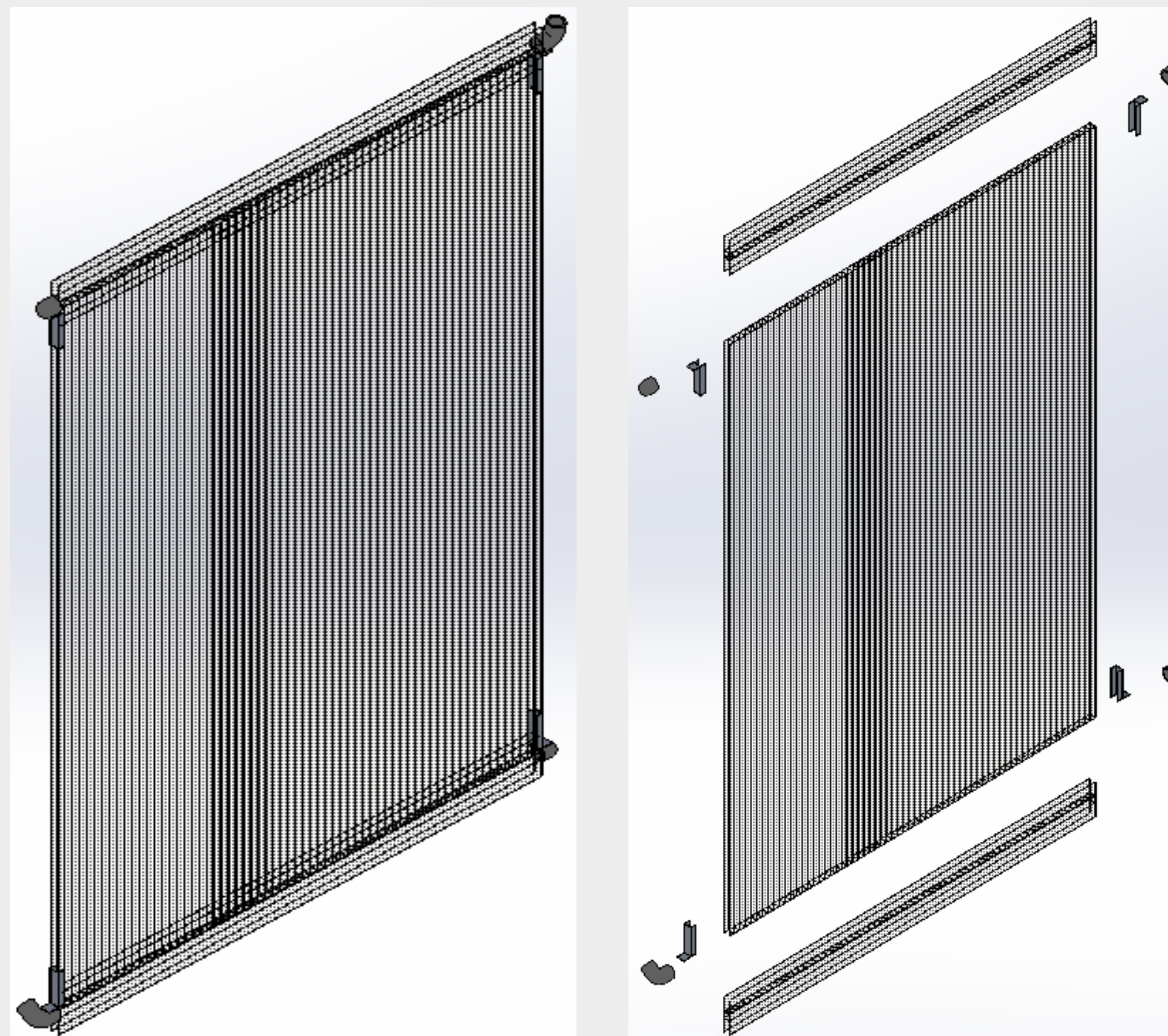
Fabrication Process



Close up view of heat extractor header assembly

- A panel was obtained and measured out to cover the back surface of the PV panel.
- Headers were installed at the top and bottom of the heat extractor panel to allow water to fill the channels of the panel.
- Fittings were installed to allow system plumbing
- Panel was tested to ensure functionality and placed onto the back of the PV panel to begin further testing of the overall system.
- The final design was the culmination of several months of work at Icarus, testing and re-visiting numerous designs and materials.

Final Design



Isometric View

Exploded View

Team Members



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