

HERE COMES THE SUN

Meeting the Urgent Demand for Solar Laminates

As a leading global manufacturer of flexible solar modules, Energy Conversion Devices, Inc. (ECD) had to rapidly expand its manufacturing capacity to respond to growing demand for renewable energy.

ECD manufactures *UNI-SOLAR*® brand products, which are photovoltaic (PV) solar laminates that produce up to 20 percent more power when compared to glass-based solar panels with the same rating. Resembling a strip of blue plastic, *UNI-SOLAR* laminates are thin, flexible, and about one-tenth the weight of glass panels.

Demand for solar power products is increasing at a yearly rate of about 25 percent, and demand for photovoltaic products, in particular, is increasing at more than 40 percent, according to the Solar Energy Industries Association. A photovoltaic solar cell utilizes a semiconductor diode to convert light into direct current (DC).

ECD has been using Swagelok® fluid system components for more than 20 years, but with the latest expansion, the company asked Swagelok for more. Swagelok not only supplied components, but also fabricated 14 unique fluid system assemblies, some more than 30 feet (9.41 m) in length, including gas mixing cabinets, gas panels, and flow splitters.

The quality of the design work and drawings, the reliability and aesthetics of the assemblies, as well as the service provided through ECD's local Swagelok sales and service center, H.E. Lennon, all contributed to a successful collaboration.

Manufacturing UNI-SOLAR

In the manufacture of photovoltaic solar laminates, the most critical processes entail deposition technologies. In a closed chamber, gases or solids are deposited on a substrate and built up layer-by-layer, some layers only a few hundred angstroms thick.

In the manufacture of *UNI-SOLAR* products, deposition occurs in three steps, with two steps depositing solids and one depositing gases.

In the gas deposition step, nine discrete layers of blended gases are deposited on a 0.005 inch (0.13 mm) stainless steel substrate inside a vacuum-sealed chamber about 100 yards (91.44 m) long. The fluid system assemblies that Swagelok fabricated regulate the gases for this process, ensuring that they are properly mixed, with no impurities.

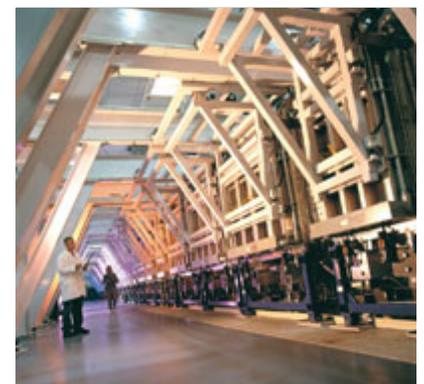
"Our manufacturing process is complex, robust and continuous, and it depends heavily on the integrity of the gas mixing cabinets. The process cannot tolerate contamination or foreign gases," explained Gary DiDio, *UNI-SOLAR* plant manager.

Design and Fabrication of the Assemblies

Swagelok matched the design of the 14 assemblies to existing assemblies on *UNI-SOLAR* production lines. The designs were presented to ECD in a computer modeling program that enables three-dimensional visualization of the assemblies before they are fabricated.



Uni Solar® brand solar laminates start with a .005 inch (0.13 mm) stainless steel substrate.



Swagelok products and assemblies are used in *UNI-SOLAR* production lines.



While closely following ECD's specifications for the assemblies, the Swagelok team's solution improved aesthetics, as well as accuracy in fabrication, and ease in maintenance. Swagelok reduced the number of welds, contained wiring in neat channels, and designed tubing runs in parallel configurations.

The configurations utilize many Swagelok components, including DP series diaphragm-sealed valves, Micro-Fit® weld fittings, VCR® glands, and more than 700 feet (213.36 m) of electropolished tubing.

Clifton Brown, ECD design engineer, appreciated Swagelok's attention to detail, including the design modifications, which will become a part of *UNI-SOLAR* specifications in the future.

Brown toured Swagelok's Order Fulfillment Center in Solon, Ohio, while the assemblies were being fabricated.

"We really appreciated the tour and the opportunity to view the assemblies while the work was still in progress. Swagelok did a tremendous job of understanding our needs and providing us with an enhanced product," Brown said.

"Swagelok has done a lot to get us to where we are today, and they will only make us better in the future."

