

Drive & Control profile

Innovative Rexroth slide-in photovoltaic module mounting system reduces material costs, speeds installation time for Bosch Solar Energy project



Bosch Rexroth's simple and effective slide-in mounting technology for micromorph thin-film solar module installation—including a base frame, plastic insert and rubber-coated stops—contains far fewer parts and cuts installation time in half compared to traditional installation systems.

Solar panel installation at a Bosch automotive facility includes innovative slide-in mounting technology from Rexroth—which can reduce panel installation time by up to 50 percent.

Bosch Solar Energy (San Mateo, CA www.bosch-solarenergy.com) manufactures crystalline silicon and micromorph thin-film solar modules for customers throughout the world. The Bosch Proving Ground, an automotive testing facility in Flat

Rock, MI, proved to be an ideal geographic location to install 50kW worth of the company's ground-mount photovoltaic technologies. To speed up the installation, the company used an innovative slide-in mounting system featuring aluminum structural

Challenge:

Provide a mounting system for quick and easy installation of micromorph thin-film solar modules at Robert Bosch Corporation automotive proving grounds facility

Rexroth Solution:

Innovative slide-in panel mounts made from Rexroth aluminum structural framing, plus framing accessories

Benefits:

- Reduced installation times, decreased by an estimated 50 percent by using slide-in mounting system vs. traditional bracket system
- Reduced material costs, decreased by an estimated 40 percent, since installation brackets and clamps are no longer required
- Complete mounting unit securely encloses modules
- Aluminum framing is rugged and weather-resistant for more durability and a cleaner look



Rexroth's slide-in PV module mounting system securely encloses each module.

framing from another member of the Bosch Group, Bosch Rexroth Corporation (Hoffman Estates, IL www.boschrexroth-us.com).

The Proving Ground, a controlled environment used for evaluating Bosch automotive technologies installed on cars, trucks, motorcycles and other vehicles, features a 1.4-mile test track loop with a three-lane banked turn and a 25-acre vehicle dynamics pad with a hydroplaning surface. The campus offers plenty of space with few interfering tree lines. In addition, the facility receives a large amount of sunlight throughout the year and has a significant amount of open space available for a large number of solar modules.

“Generally speaking, solar panels are mounted on rooftops or on the ground. However, if they are mounted on top of buildings, there are space constraints with structures on the roof, like HVAC units and skylights. The Proving Ground had plenty of land

to use and the facility is in an ideal spot,” said Helen Nigg, director of sales for Bosch Solar Energy.

The solar installation, which encompasses nearly 20,000 square feet, includes one array of Bosch



The framing system is easy to install. Once the initial framing is in place, the PV modules are simply slid into place. The end result is quicker installation with a durable frame that's rugged and weather-resistant.

crystalline silicon modules and two arrays of Bosch micromorph thin-film solar modules. A subsidy from Michigan utility provider DTE Energy partially funded the project, which marks the beginning of Bosch's North American alternative energy efforts.

The first thin-film array—arranged in a 10,670 square foot area—includes two rows of 189 modules each measuring about 51 inches by 43 inches. The modules consist of thin photovoltaic film placed between two pieces of glass. The second thin-film array, using about 5,800 square feet, contains 96 thin-film modules in two rows. The crystalline silicon array—about 3,000 square feet—contains two rows of modules that each measure about 65 inches by 39 inches.

While crystalline silicon has traditionally been used in photovoltaic technology and can easily convert sunlight to energy, thin-film modules are less costly to produce and can provide excellent energy yields in low

light. Both solar technologies were used in the installation to facilitate real-time data collection on the performance and efficiency of each type of solar technology in various sunlight and cloud cover conditions. Based on this data, Bosch Solar Energy can best determine which technology would be most suited for a client's particular location or application.

To help reduce installation time on the project, Bosch Solar Energy opted to use an innovative slide-in module mounting system made with Rexroth aluminum structural framing and designed specifically for installing micromorph thin-film solar modules.

Rexroth's [aluminum structural framing](#) portfolio contains over 120 different lightweight and load-bearing profiles that can be easily configured for diverse applications ranging from lean manufacturing workstations to architectural framing for sustainable residential housing. The aluminum profiles can be assembled into any arrangement required without having to use specialized tools. The framing is adaptable for each solar installation based on the physical environment and space limitations with no need for complex engineering.

"One of the benefits of using extruded aluminum profiles is that we can tailor the shape and dimensions of them to meet a customer's requirements. As soon as we understood the needs of Bosch Solar Energy Group, we were able to design a particular aluminum profile product to meet the specifications of the micromorph thin-film solar modules," said Kurt Greissing, product manager for Bosch Rexroth.



The solar array, featuring Bosch Solar Energy technology on Bosch Rexroth aluminum framing, at the Bosch Proving Grounds.

Rexroth's solar panel mounting system features variable track lengths, bracket spacing and insert dimensions. The aluminum profiles used for the mounting system range from 30 mm x 50 mm to 45 x 90 mm. Together with the slide-in track, the system forms a complete unit that securely encloses the modules. The module structure is also perfectly matched to the Rexroth system; Bosch Solar Energy's micromorph thin-film solar modules can withstand force up to 2,400 Pascal in this mounting system, corresponding to 770 pounds of weight acting on the module.

"The entire system is tested, proven and reliable," said Greissing. "Not only is the framing easy to install, but once it's in place a team of two people simply slide the glass into the sleeve, like stuffing an envelope, and another team of two people tighten the brackets. The system cuts installation time in half to 15 seconds

per module, meaning twice as many modules can be installed in the same amount of time using Rexroth's slide-in technology versus conventional four-point clamping."

Traditionally, solar panels were installed by bolting clamps into the aluminum frame and tightening them to hold the solar panel to the frame. Since installation brackets and clamps are no longer required, material costs are also reduced by about 40 percent.

Another component of the innovative Rexroth system is a small, thin C-shaped plastic insert placed over the edge of the glass. The plastic protects the glass from coming into direct contact with the aluminum frame; it also facilitates smooth installation into the C-channel of the mounting profile and can be customized to accommodate solar modules of various thicknesses. Rexroth also developed rubber-coated

stops that are bolted to the underside of the aluminum frame where the glass rests when it is installed.

Greissinger added that Rexroth aluminum structural framing is rugged and weather-resistant, which not only contributes to the durability of each installation but also helps aesthetically, because it continues to look clean and neat over time without additional painting or other maintenance.

The crystalline silicon modules, which come pre-assembled into aluminum frames, did not require the same customized slide-in system as the micromorph thin-film modules. However, Bosch Solar Energy used off-the-shelf Rexroth aluminum framing for that array.

The installation is expected to generate 63,400 kW hours a year, or up to 15 percent of the testing facility's energy needs.

"Since the facility has relatively low energy requirements, the ability to generate 15 percent of their energy requirements from the installation is pretty significant," said Nigg.

Bosch Rexroth and Bosch Solar Energy are now exploring further development of this unique integrated mounting system. Because of the drastically reduced installation times, the system has been used to install thousands of Bosch Solar modules around the world. The Bosch Proving Grounds has thus become a proving ground for Bosch solar technologies, as well.

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