

Drive & Control profile

Slide-in Rexroth aluminum framing system reduces solar installation time and costs



Project Frog worked with Bosch Solar Energy Group and Bosch Rexroth to co-design a standardized solar array and mounting system, which cuts installation time in half and matches the building's modern architectural style.

Solar panel installation at the new Hunters Point Community Center in San Francisco featuring custom Rexroth aluminum framing reduces installation time by 50 percent and costs by 40 percent, becoming part of a standard solution for industry leader, Project Frog.

Project Frog in San Francisco, CA (www.projectfrog.com) is a clean technology company that incorporates a sophisticated approach—including parametric design, precision fabrication, energy modeling, lean manufacturing and continuous monitoring—to create sustainable, efficient structures that reduce overall operating costs and

also meet stringent Leadership in Energy and Environmental Design (LEED) requirements.

Project Frog was chosen to create a 5,000-square-foot building in Hunters Point, an evolving neighborhood in the southeastern part of San Francisco. Formerly the site of a naval shipyard that includes more than 700 acres of

Challenge:

Create a slide-in racking system for the installation of micromorph thin-film solar modules at Hunters Point Community Center in San Francisco

Rexroth Solution:

Bosch Solar Energy used custom-engineered Rexroth aluminum structural framing, mounts and accessories to create a standard product offering that can be tailored for specific installation requirements

Results:

- Installation time reduced by 50 percent by using the slide-in system, compared with a traditional bracket system
- Equipment costs are reduced by 40 percent with the elimination of the bracket and clamps that are no longer required
- Mounting system is secured with just 21 penetration points on the membrane roof, drastically reducing the risk for leaks and improving overall energy efficiency of the building
- Aluminum framing is rugged and weather-resistant for more durability and an aesthetically pleasing look



The mounting points were integrated in the Project Frog roof, which allowed the solar array to follow the roofline and slope to the south, improving the power output of the system.

waterfront property, Hunters Point is currently undergoing significant re-development to transition into residential, commercial and recreational areas. The new building, located on the edge of the bay facing the majestic city skyline, is the area's community hub, serving as a convenient meeting space that can also be used for educational purposes.

Project Frog's solution is visually attractive with design features that reflect the character of a distinctive urban neighborhood. Thoughtful selection of colors, textures and other details of the building and surrounding landscape ensures connectivity to future development of the area. The building is also extremely energy efficient: Project Frog estimates that maximized heating, lighting and cooling efficiencies in the community

center will surpass California's Title 24 requirements for energy efficiency standards for nonresidential buildings by at least 54 percent.

As part of its strategy to improve energy efficiency, Project Frog turned to Bosch Solar Energy Group (www.bosch-solarenergy.com) to supply photovoltaic technology for the roof of the new community center. The rooftop array is comprised of 70 micromorph thin-film solar modules mounted and installed using the Bosch Solar Rack, a convenient slide-in mounting system developed jointly with the Bosch Rexroth Corporation (Charlotte, NC www.boschrexroth-us.com). Offered as a standard product, the slide-in Bosch Solar Rack is designed around Rexroth's broad line of [aluminum structural framing](#) components

and can be customized for a given installation.

"The Bosch Solar Energy thin-film solar modules, in conjunction with the Rexroth slide-in mounting system, were selected for the Project Frog building due to the unique combination of architectural aesthetics, structural integrity and high energy harvest," explained John Saussele, director of the Bosch Solar Energy Group. "This system is an example of outstanding engineering and collaboration between Bosch Solar Energy and Bosch Rexroth to achieve the optimal solution for Project Frog."

The black-glass appearance of the panels, combined with the low-profile racking system, proved to be an excellent match to the architecture

of the Project Frog building, while also providing a source of clean renewable energy.

“Bosch Solar Energy micromorph thin-film technology is ideal for the building due to the exceptional performance of thin film under the low light conditions that can occur during foggy days in the San Francisco Bay area,” said Saussele. According to Ash Notaney, vice president of supply chain for Project Frog, the array generates 25 percent of the energy required to operate the building over the course of a year.

Although crystalline silicon has traditionally been used in photovoltaic technology and can easily convert sunlight into energy, thin-film modules are less costly to produce, more flexible and lighter than crystalline silicon modules. Crystalline technology is more

suitable for applications requiring higher power density.

The panels are roughly three feet by four feet, and the frameless design of the modules was an excellent fit for the slide-in racking system, which was created with Rexroth’s bolt-together aluminum structural framing. Rexroth provides more than 120 different extruded aluminum profiles that can be easily combined for applications ranging from lean manufacturing workstations to architectural framing for sustainable residential housing. The aluminum profiles require no specialized tools to create virtually any structure desired. As a result, Rexroth’s framing system adapts easily for each solar installation based on the physical environment and space limitations.

Rexroth aluminum structural framing is weather-resistant, enabling it to

withstand the elements of Hunters Point, which overlooks the San Francisco Bay. Its rugged design contributes to the durability of each installation but also helps aesthetically; continuing to look clean and neat over time without requiring additional painting or other maintenance.

The Solar Rack mounting system features variable track lengths, bracket spacing and insert dimensions. “The inherent flexibility of the Bosch Rexroth system allowed for panel spacing adjustments to be made during the actual installation to accommodate for normal building tolerances, resulting in an aesthetically pleasing continuous array,” said Saussele.

The design of the Solar Rack mounting system resulted in a large rectangular array that fit perfectly to



Working with Rexroth’s engineering team, Project Frog increased the length of the racking profiles to span a larger distance and bear directly on the trusses, which allowed them to drastically reduce the number of roof penetrations to 21 locations.

the dimensions of the center rooftop of the building. The mounting points were integrated in the Project Frog roof, which allowed the solar array to follow the roofline and slope to the south, improving the power output of the system. "Because the building had a membrane roof, we designed the structure to hold the solar panels around stand-offs," said Steve Kirnig, district distribution manager for Bosch Rexroth.

"Typically, when photovoltaics are installed on a membrane roof of this size, there can be up to 200 places where the mounting system that holds the array penetrates the roof to secure the structure," said Notaney. Each of these penetration points must be manually cut and sealed and has the potential to leak, eventually reducing overall building efficiency. "Working with Rexroth's engineering team, we were able to increase the length of the racking profiles to span a larger distance and bear directly on our own trusses," said Notaney. "This allowed us to drastically reduce the number of roof penetrations to 21 locations."

According to Kirnig, some of the aluminum profiles were cut to length at the job site to speed up installation and ensure correct dimensions. "This helped the installation to go smoothly. We were able to make modifications

more efficiently," said Kirnig. Local Rexroth distributor Valin Corp. (Sunnyvale, CA www.valinonline.com) provided inventory that was needed on short notice; the parts could be picked up the same day as installation.

Once the framing system was in place, it took only two workers about one to two minutes to install each panel, including mounting the stops. Traditionally, solar panels are installed by bolting clamps in the aluminum frame and tightening them to hold the solar panel to the frame. Since installation and brackets are no longer required, material costs are also reduced by about 40 percent.

Working with Bosch Solar Energy Group and Rexroth resulted in significant time and cost savings for Project Frog. "Our strategic partnership with Bosch and Rexroth has proven successful as shown with this project," said Notaney. "We were able to co-design a standardized solar array and mounting system which efficiently connects with Frog structural components resulting in a cost savings of more than 40 percent and cut installation time in half, compared to a similar project. The repetitive nature of the Frog system means the savings to our customers will only continue to grow."

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