Mastering complex PV projects creatively

In the world of photovoltaics, it is often unique challenges that showcase a company's innovative capabilities. Two recent projects demonstrate how smart planning, adaptable components and the strategic use of alternative mounting techniques can successfully deliver PV systems when traditional solutions fall short.

In a non-representative survey conducted during a specialist webinar, more than half of the solar installers reported that they had declined orders due to overly complicated planning or the lack of suitable fastening solutions.

The examples presented here demonstrate that complex PV projects can be handled efficiently and effectively through close collaboration between manufacturers, solar installers, structural engineers and clients, making possible what initially seemed impossible. The fact that both projects avoided conventional scaffolding in favor of helicopters and aerial platforms adds an extra layer of interest to these implementation insights.

High-altitude innovation: stadium roof PV system

Kybunpark is FC St. Gallen' football stadium in Winkeln, Switzerland, situated at 652 meters above sea level, making it the highest stadium in Swiss professional football.

Since 2015, a PV system on the grandstand roof has supplied electricity to around 145 households, and expansion was planned for 2024. However, the roof was not structurally designed to support additional loads, ruling out a traditional photovoltaic mounting solution and making the project both challenging and complex.

Additionally, the system had to be designed to withstand significant snow loads of 2.8 kN/m² due to its high-altitude location. Wind loads were also notably higher in Switzerland compared to Germany or Austria. The roof itself consisted of a steel structure with trapezoidal sheet metal roofing, including the rounded corner sections.

Using solar fasteners was not an option, nor was fastening within the deep bead, as this is where water flows. Penetrating the supporting structure or sub-roof in this area should be avoided to prevent potential water ingress.

The developers chose to fix the system directly to the roof substructure, meaning the connection passes through the roof covering and anchors into the supporting structure. This approach allows loads and forces to be transferred directly into the structural framework.

The adapters were mounted by the installers on each high crest of the trapezoidal sheet metal with the long self-drilling screw in the supporting structure in the I-beams. These screws are coated in the thread area, so that no extra pre-drilling and no corrosion protection is necessary.

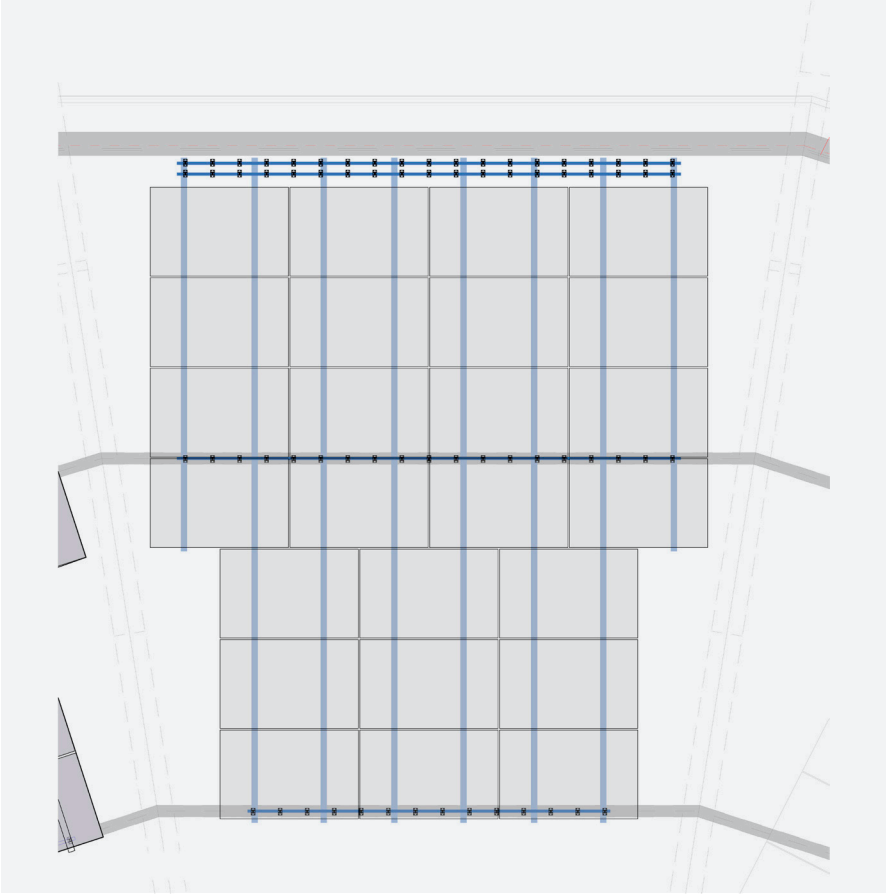
In addition, the fastener was secured to the trapezoidal sheet metal itself with four thread-forming self-tapping screws, including the EPDM seal, in order to ensure permanent contact pressure and secure sealing. Parallel to the purlin, the K2 SingleRail 50 mounting rail was then connected to the fasteners, to which a support rail was in turn applied.

In order to bridge the enormous spans of around 4 metres, the K2 SolidRail XL was chosen, which is a solid aluminium rail with a high load-bearing capacity that can span up to 7 metres.

To address the structural limitations, the developers mounted the system directly into the roof substructure using K2 SpliceFoot adapters and specially engineered self-drilling screws. This solution enabled direct load transfer while maintaining waterproof integrity through the polyisobutylene sealing layer. Widely used in bitumen roof installations, the system is particularly popular in regions such as Scandinavia, where this roofing type is common. Its underside is coated with a polyisobutylene layer, ensuring a durable, waterproof and secure seal.

In the illustration, the previous solar system is recognizable by the grey module fields, the blue areas represent the fields that should be added

Thanks to the chosen installation method, the roof covering is not excessively stressed. Instead, the load is distributed evenly along the crests and securely anchored into them, ensuring a more balanced and stable load transfer.



Modul Block

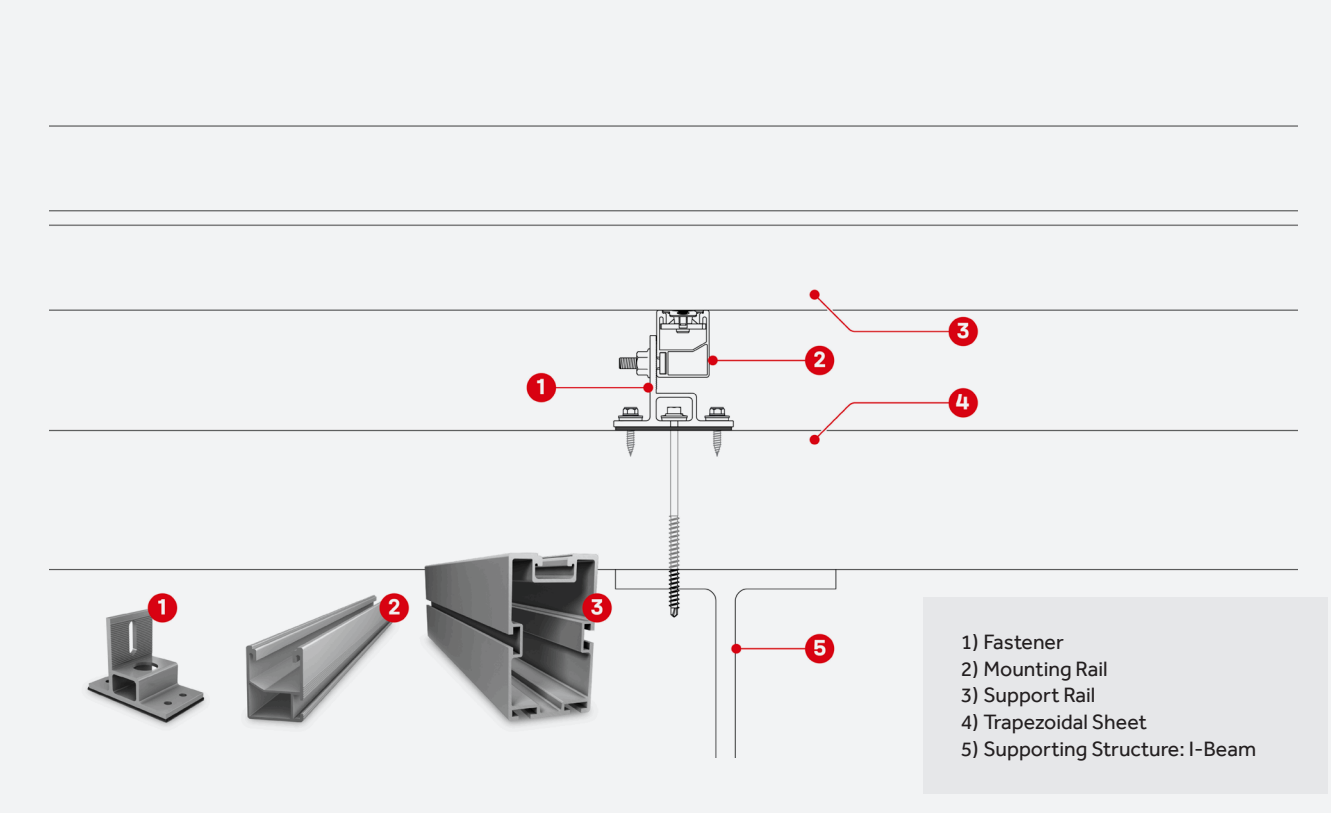
Solar technology takes off

A helicopter team was commissioned to transport the components to the stadium roof, as using a mobile crane was not feasible and a stationary crane would have been prohibitively expensive.

Helicopters offer a highly practical solution for installing PV systems on roofs that are difficult to access or where moving heavy loads across the surface must be avoided. This method is both efficient and cost-effective, particularly in regions near ski resorts, where helicopter capacity is often readily available outside the winter season.

With two pilots, a team on the roof, and another on the ground, the operation achieved exceptionally short lifting times, just 1 to 1.5 minutes per load. Materials were delivered directly to their installation points, eliminating the need for additional transport across the roof. In such operations, the primary consideration is adhering to the helicopter's maximum load capacity, which must not be exceeded. This limitation demands precise logistics and thorough pre-planning. In this particular case, the entire helicopter operation was completed within a single morning.

The successful and efficient installation demonstrated that the project's demanding



Fastening the K2 SpliceFoot in the I-beam and screwing the mounting and support rails

requirements could be met, thanks to the use of robust mounting rails and the smart application of the K2 modular system.

Ultimately, a safe and structurally validated solution was achieved through a custom design, supporting 1,285 modules with a total output of 572 kWp. Since February 2025, the PV system has been generating over one million kilowatt-hours of solar energy annually.

A significant portion of this electricity is used directly on-site to power events at the stadium, while the remaining energy, including production from the original system, is fed into the city's power grid.

Doubly effective: solar power meets advertising

Combining advertising space with energy production was the goal of a unique installation designed for the façade of a commercial building. The standout feature: the PV system was not mounted directly onto the façade but instead installed on a steel framework surrounding a steel staircase, which needed to remain accessible for roof inspections.

This innovative solution involved a pre-assembled structure using K2 SolidRail Alpin mounting rails positioned vertically. The system was fastened to the square steel tubes of the suspended frame using custom-made L-brackets. These brackets were specifically engineered by a structural specialist to meet the required material thickness. They were anchored into the steel tubes using special steel dowels and secured against lifting with two hammerhead screws.

Since hammerhead screws are designed to prevent lifting but have limited capacity to resist vertical forces, an additional anti-slip device was attached to the rail. This device is a standard component typically used in the installation of the K2 WallPV CarrierRail and was employed here to further secure the modules against downward slippage.

Finally, the modules were inserted into the K2 InsertionRails, which had been pre-mounted on the support rails. These insertion rails offer a time-saving alternative to traditional module clamps.

The result is a visually seamless surface, minimally interrupted only by thermal expansion gaps. Aesthetics were particularly important to the client, as a large, prominently displayed advertising banner was integrated into the center of the PV system. With 128 modules installed, the customer now benefits

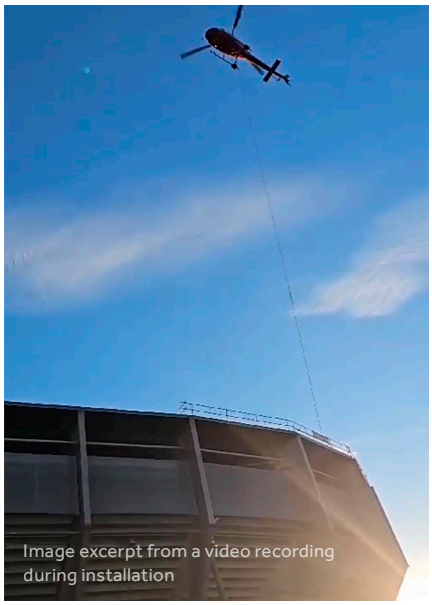
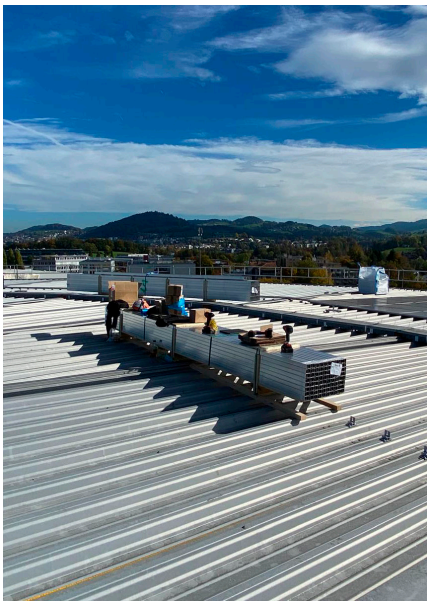


Image excerpt from a video recording during installation



At just over a minute per stroke, transporting the components from the floor to the processing site was very time-saving

When flexible components meet expert planning, even the most demanding conditions can be mastered safely, efficiently and sustainably.

The L-bracket was a custom-made product. The attachment to the square tubes was done with special steel dowels. Two hammerhead screws additionally secure against lifting

from additional electricity generation from the façade alongside the approximately 100 kWp system already in place on the roof.

The entire installation was carried out using a large lifting platform. Experience has shown that this is the most effective method for façade work, as conventional scaffolding often faces challenges due to securing points on the façade. In such cases, careful pre-planning is essential to ensure the smoothest possible installation process.

When neither scaffolding nor lifting platforms are practical options, the use of industrial façade climbers has recently proven to be a valuable solution for certain individual projects.

Clever solutions for complex challenges

Ultimately, the successful execution of challenging PV projects depends largely on effective budgeting. Proven systems stand out not only by demonstrating their reliability in well-established applications but also by providing safe and dependable options for flexible, innovative solutions.

In complex PV projects, success hinges on smart budgeting, proven systems, and expert collaboration. When flexible components meet expert planning, even the most demanding conditions can be mastered safely, efficiently and sustainably.

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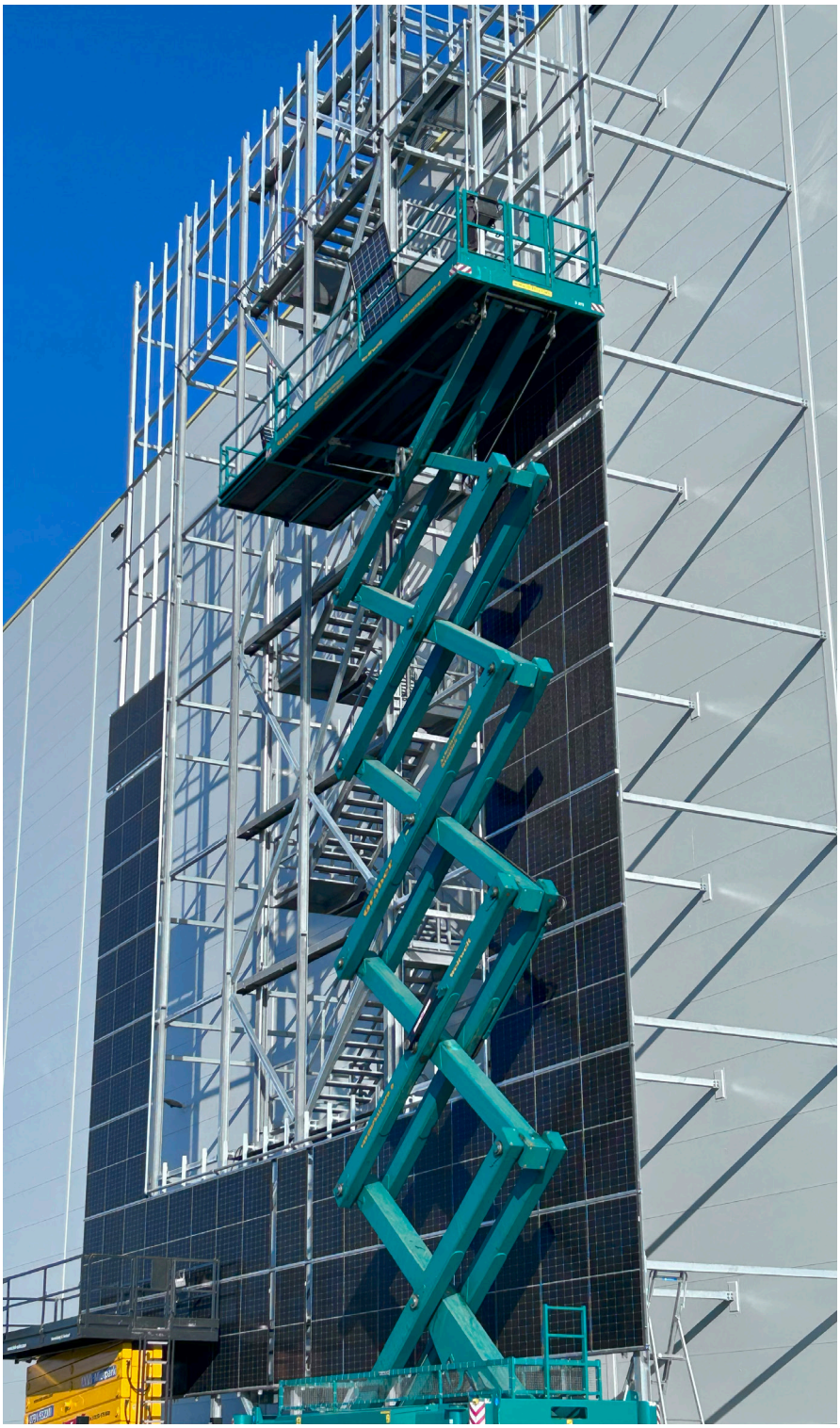

Due to its flexible application, a lifting platform is a tried-and-tested means of transporting components to their respective installation sites as quickly and cost-effectively as possible