

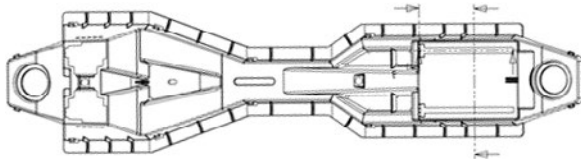
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Photovoltaic system for flat roofs

The new BauderSOLAR UK FD is a plastic base construction for almost every type of framed standard photovoltaic module and it is especially suitable for large flat roofs. BPO has developed and engineered the first concept up to ready-for-production parts.

BPO developed a 3D concept design that incorporates important requirements like installation, assembly, robustness and compact transportation. In order to calculate the effects of wind and snow loads simulations were used during the development. All separate plastic parts were analysed using injection moulding simulations, so an optimal manufacturability and high quality could be reached.

The system is installed with a plastic bayonet closure on a bottom plate. This bottom plate is welded watertight to the roof with a (plastic or bitumen) sleeve. The solar module is installed without using any tools and it is fixated with a new type of spring clip. The solar module is



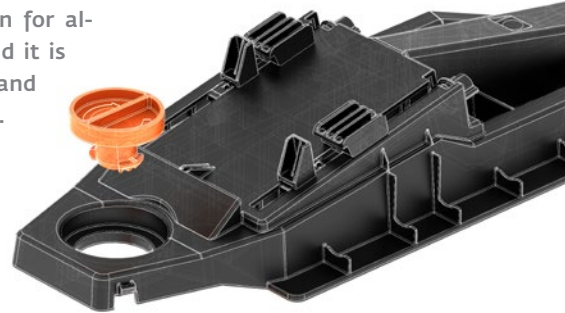
placed at an angle of 12° to use the solar rays and roof area most efficiently. The Paul Bauder

firm supplies not only the base construction but also the complete photovoltaic system, consisting of module, inverter, cables and cable gutter. The base construction has an optimal structure and rib pattern for the tough mechanical loads like wind pressure and suction forces. The structure and rib pattern were optimised in multiple iterations using calculations. Especially the influence of the long lifetime, temperature and UV degradation on the properties of the plastic were taken into account.

The separate parts are assembled using snap fits and clamping connections. All parts are thin walled and constructed for production using injection moulding. The main structure is made of polypropylene, the other parts are made of 30% glass fiber reinforced polyamide (Nylon).

The module, including pre-mounted components, is very compact (its stacking height is just 60 mm) and it can be stacked in a stable manner, this way as many base constructions as possible can fit in a single trailer.

This, combined with the quick installation on site, makes the BauderSOLAR UK FD system a very cost efficient solution.

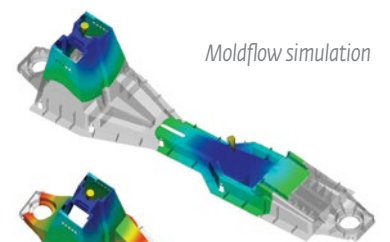


Installation with plastic bayonet closure



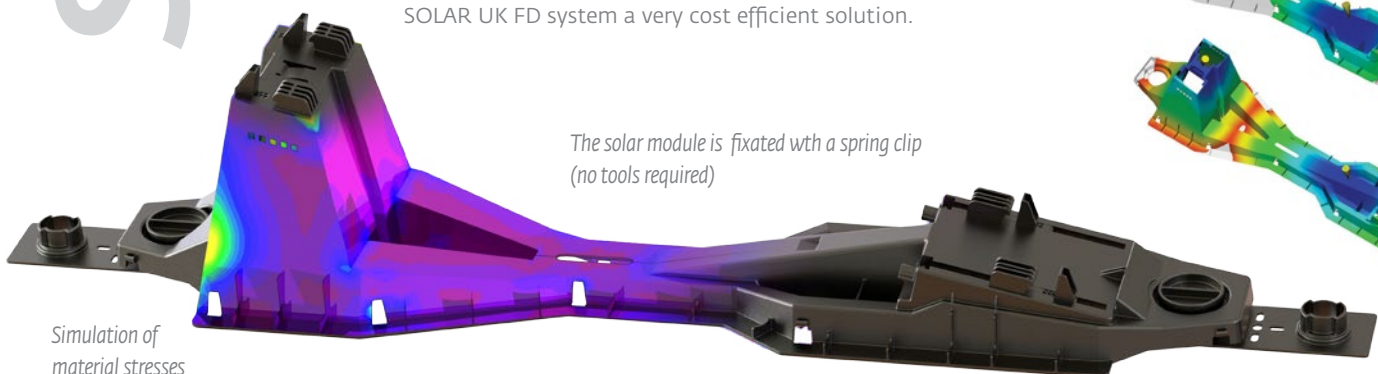
During the development several life-size prototypes were made to test the mechanism. BPO's 3D printer was used optimally for this purpose. The design of the assembled construction and of all separate parts was laid down in the technical documentation, consisting of technical drawings, bill of materials and proofing dimensions including their tolerances.

The base construction parts are injection moulded by the firm HSV TMP. The first systems have already been installed to the full satisfaction of planners and installers. For more information please go to: www.bauder.de/de/photovoltaik.html



Moldflow simulation

The solar module is fixated with a spring clip (no tools required)



Simulation of material stresses



Drain covers for Squaro shower tray series

Villeroy & Boch Wellness produces and sells luxury shower trays and bath tubs made of Quaryl. The shower trays Squaro Super Flat and Squaro Infinity are both executed in a minimalistic, ultra-flat design with an integrated flush drain. BPO developed the drain cover for both systems in cooperation with Villeroy & Boch's R&D department.

Squaro Super Flat

The Squaro Super Flat is a large rectangular shower tray, fitted on both sides with a rectangular drain. A drain cover was developed for this shower tray, consisting of a stainless steel base and a plastic outer cover. Aesthetics, stiffness and manufacturability were the main focuspoints of the project. BPO developed a series of concepts for the connection between base and cover.



Squaro Super Flat drain cover section view

In the end a minimalistic concept was chosen that realises all required functions within the geometry of base and cover, without the need for any extra fasteners.

The plastic cover is fitted to the stainless steel base using a snap fit, keeping the geometry of the base simple and without the need for special production steps. The plastic parts completely cover the stainless steel, preventing the metal base from scratching and damaging the shower tray.

On the sides of the plastic cover small ridges are placed that are invisible to the user, centering the drain cover in the drain opening. To guarantee sufficient water flow the drain cover has arc-shaped cutouts at the sides, maximising the flow without compromising aesthetics.

The strength of the design has been optimised using finite element simulations. The effect of a static load on both parts and their mutual connection was calculated for multiple load positions. The optimal injection position and the optimal cooling geometry for the cover part were determined using injection moulding analyses. This way the part can be produced as straight and flat as possible and the final dimensions can be finely tuned using the process parameters.

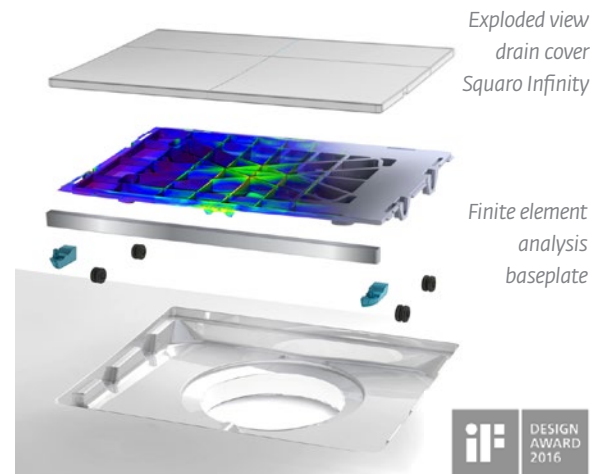
Squaro Infinity

The Squaro Infinity is a shower tray that can be made-to-measure up to an accuracy of a millimeter. Its drain cover is integrated flush with the tray, consisting of a cover, load bearing base, soft ridges for centering, a metal decorative strip and plastic support blocks for this metal strip.



Drain cover Squaro Infinity

BPO has developed several concepts for the assembly of all the parts. Important parameters in this particular development were robustness, invisibility, simplicity, easy assembly and fitment with other parts. Next to the engineering of the design BPO has optimised the plastic parts for minimal deflection, optimal water flow, manufacturability, required assembly force and tolerances.

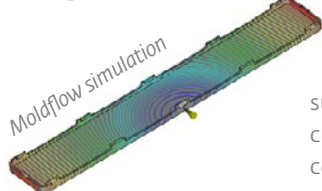
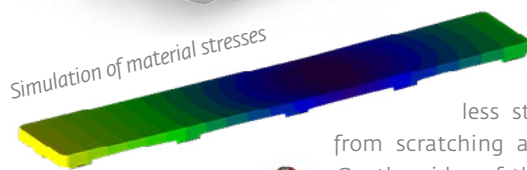
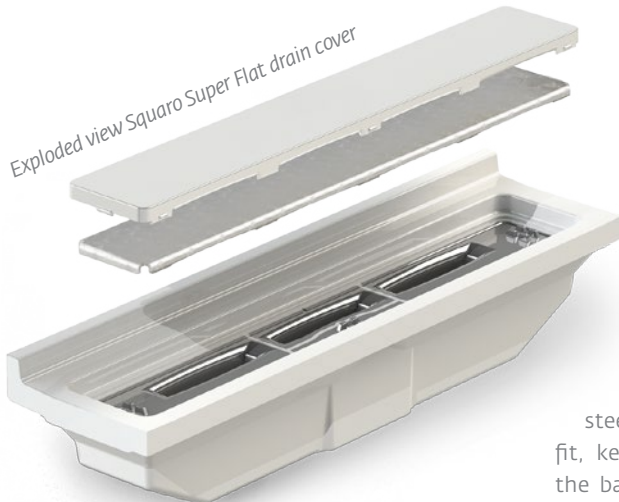


Exploded view drain cover Squaro Infinity

Finite element analysis baseplate



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Product photo Squaro Super Flat



Kunststoffen 2016

This autumn, BPO can again be found at the plastics fair "Kunststoffen" in Veldhoven, the Netherlands. The fair is planned for **28 & 29 september**. We cordially invite you to our booth (129).

Oscar Brocades Zaalberg, managing director BPO, will give a lecture on the topic: "Design for OEM or SME, characteristics and differences". The lecture is scheduled for Thursday afternoon.

For more information about the fair and/or the lecture, please visit: www.kunststoffbeurs.nl.