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Solar Absorber Made from PPS

Solar collectors with extruded PPS absorbers (© JKU Austria/H. Kicker)

As part of the "Scoop" EU project, a research consortium has developed a new kind of plastic solar collector. The project focused on the so-called absorber, which collects the energy contained in the sun's radiation. This component is subjected to high thermal loads – the absorber can reach temperatures of 160 to 170 °C. For this reason, polyphenylene sulfide (PPS) was selected as the absorber material. The researchers investigated a variety of PPS blends with different amounts of elastomer to find a material suitable for extrusion. A die that can produce three absorbers in parallel having an overall width of 1.8 m was developed for extrusion of twin-wall sheet.

To ensure that cracks do not form in the channel structure during handling and assembly, the twin-wall sheet must be flexible and impact-resistant. With this in mind, the PPS material was developed to provide improved ductility and impact resistance. For application as the absorber in a solar collector, the twin-wall sheet must be tempered after extrusion. Otherwise, the heating of the top surface of the twin-wall sheet from one side on exposure to the sun's radiation could cause unwanted deformation of the absorber.

The absorber twin-wall sheet is sealed with end caps at each end to permit circulation of the heat transfer medium. The end caps are made from injection molded glass fiber-filled PPS. The absorber and end caps are assembled in a fully automatic IR welding line by means of IR welding.

To demonstrate the project's results in actual practice, seven demonstration projects have been installed. In these, 34 townhouses in Oslo have each been fitted with 14 m² of plastic collectors.

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