

Thermoforming of PS sheets for the manufacture of cheap parabolic solar cookers

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Introduction

Parabolic solar cookers have great efficiency in solar cooking, because they concentrate the solar energy in the focus, below the pan. Because of Earth movement, it is necessary focus adjustments of the solar cooker.

Most parabolic solar cookers are made of sheet metal, and have the circular shape. Usually heavy, expensive and not portable. Have a long and difficult assembly time. There are two kinds of parabolic solar cookers: low and high focus. Low focus are safer, prevents sunlight from affecting the eyes. The pan stays near the parabola, the heat wraps around the pan, sheltered from the winds.

It is possible to use molded fiberglass to make solar cooker petals, but at higher costs, and the polyester resin has a strong odor, requiring the use of a protective mask and a hood exhaust system.

Another cheap possibility is the use of thermoforming 2-3 mm Polystyrene sheets (PS), heated and molded in a appropriated metallic mold. It is necessary to achieve the appropriated temperature of PS molding, about 150 Celsius degrees. After that, must be glued a very reflexive film in the petals, like Mylar adhesive. This is the intent of this article, to show how to make it.



.About the metallic molds to thermoforming PS sheets

We must be creative with what we have in local market. In south Brazil is available metallic satellite parabolic dish antennas, steel made, in four petals for a easier design. So, one of this petals will be the mold to thermoformig PS sheets.



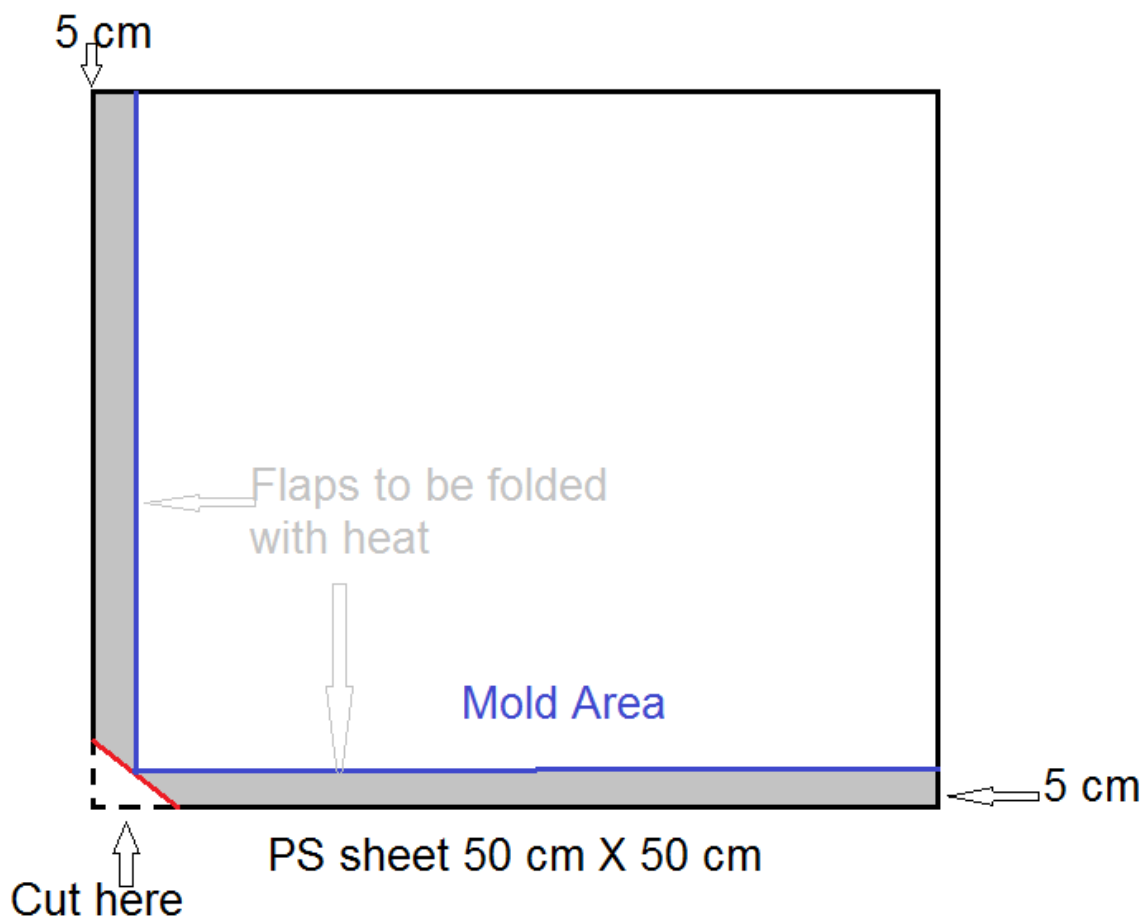
About heating of thermoforming mold

It is necessary to achieve 150 Celsius degrees to mold PS 2 mm sheets. Below the metallic petal mold, a heating system must be installed with resistances made with chromium nickel wire in the form of a zigzag. Also is necessary temperature measurement and control. It is important also to provide thermal insulation of heating resistances with glass wool.

Another important thing is preheating of the PS sheet, in a special home made oven, that can be done also with chromium nickel wire, frame made of wood or even double cardboard box. Important that cardboard can stand temperatures of 200 Celsius degrees. Electrical protection like fuses must be required for safety.

About procedures of thermoforming PS sheets

The size of each PS sheet to be thermoformed is 50 cm X 50 cm. We must have also two flaps to be folded with heat, with 5 cm each. The final petal size will be 45 cm X 45 cm. This two flaps must be joined to other petals of the parabolic solar cooker. It can be done with holes one each petal and bolts to join it.



Finally, each PP thermo molded sheet must be covered with reflexive adhesive, like Mylar or similar. It can be done in 6 cm strips, with care, avoiding bubbles and wrinkles in the surface.

Another information or customized consulting must be reported by email: elmo@malbanet.com.br