A Portable, Modular Roof for a Solar House

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Abstract

We designed and constructed a modular roof system for a 8’ x 12’ shed-sized, single room solar house. The house as well as the roof were built to be portable to make it easier for the entire structure to be moved to various locations for solar testing and data collection. Therefore the roof, consisting of small sections, can also be assembled and dissembled relatively easily.

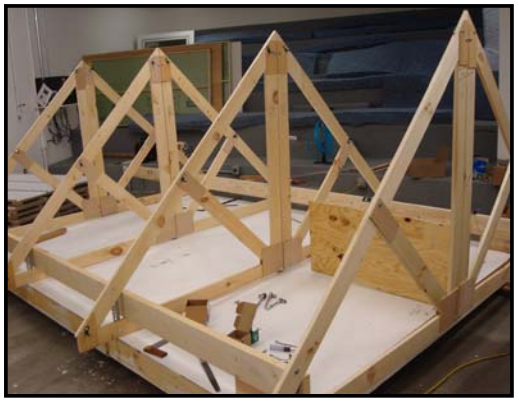
Introduction

In the past decade, the effects of global warming have become increasingly prominent in everyday life. In order to curb these effects, major societal changes need to be made in how we perceive and use energy resources. Relatively simple alterations can be made in building construction that can minimize conventional energy use. For example, maximizing solar energy use can reduce some of our dependence on fossil fuels.

The construction of this solar house will provide a realistic means of testing the efficiencies of building materials. This includes using windows that maximize solar gain and sustainable insulation that minimizes heat loss. In addition, the roof is angled to maximize the energy from the sun and will eventually have a retractable awning to best utilize the sun’s energy.

Future Improvements

A 1.5’ retractable awning will be added onto the South side of the roof to allow sunlight into the house during the winter and prevent sunlight from hitting the windows in the summer.



Triangular Trusses are Assembled

Angle the roof at 43 degrees to maximize sunlight use

Awnings on North and South sides

Evenly spaced for maximum roof support

Support beam used to distribute roof weight more evenly

Roof Overhang

One 12’ roof section will extend over the front door of the house, acting as an awning over the front door.

Perforated Angle Iron

Keeps trusses standing upright

Prevents trusses from swaying

Gussets

Permanent

Used to secure wood beams

Bolts

Easily removed for disassembly

Roof Panels

Length of roof panels: 7.5 feet

Light and flexible

Snap together and slide apart to allow for quick and easy disassembly

Made of aluminum

Ridge Cap

Covers space by connecting the two sides of the roof

Prevents rain from entering attic area

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