Taka Solar

Request For Technical Assistance (Set!)

Taka plans to focus primarily on advancing the current fully functional prototype tubes to an improved design which is more cost-effective to mass manufacture and offers high reliability. Below are shown some early prototype tubes racked into a panel for sun tests:

Perfecting the tube design will involve many skillsets some of which are not standard in the current solar industry.

- Taka seeks experts in additive manufacturing who have tools which can process non-standard 3D printing materials. We will be using Thermoplastic Polyolefin elastomers with melting points lower than those for standard filaments.
- We plan to process several of our main concepts under vacuum. General availability of vacuum chambers and expertise in making specialized vacuum connectors which are robust up to at least 150 °C will be helpful.

- Precise motion control and automation expertise will help as Taka develops a robust manufacturing methodology involving the handling of relatively fragile solar cell assemblies and placing inside long and narrow glass tubes.
- Having produced the core elements, we need reliability tests suitable for solar certification. We particularly want to test our samples against:
    - Thermal cycling (+85 to -40 °C)
    - Long term UV soaking
    - Level 2 and above hail impact tests
- Taka also seeks to test the tubes on-sun and in solar simulators to verify energy production calculations.

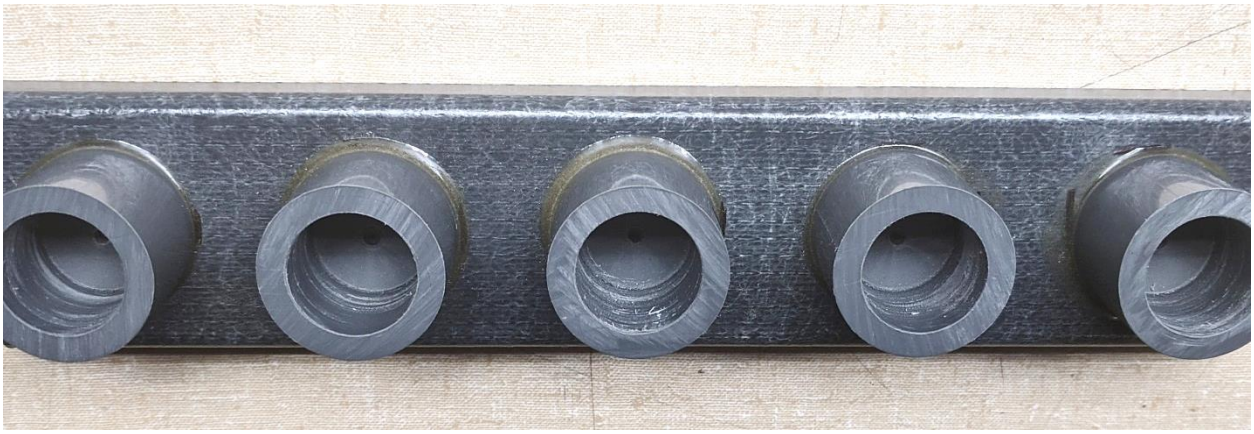
Taka has discussed doing many of these steps at Sandia's Manufacturing Science & Technology Center, but may need to perform other steps elsewhere.

Taka Solar

Request For Technical Assistance (Go!)

If Taka wins the Set! Prize voucher we plan to complete the tube design. We have already identified the main steps which would following winning Go! Taka's main focus at that point will be on the structural supports which hold the solar tubes into finished panels. These "rails" and mounting feet are critical pieces for Taka to commercialize a product.

The first component to research is the rails. They require sockets to hold the tube ends into finished panels and will look something like this engineering model:



Taka has prototypes of the core pieces to make the rails but will need to integrate them fully. The current concept has multiple steps. Taka seeks input on several:

- Determine the exact cutout pattern in sheet steel strips which best connects to the tube ends both electrically and mechanically.
- Injection mold Santoprene thermoplastic around sheet steel pieces to fully protect on all sides and form the sockets for the tubes. Strict geometry constraints make this difficult for many manufacturers.
- Produce >2-meter structural C-channel of fiber reinforced plastic (FRP) with coating rated for at least 25 years under sunlight.

The second component to develop is Taka's patented mounting foot which looks like this:

The foot is expected to consist of multiple injection molded plastic pieces using material rated for outdoor use along with powder coated steel tubing holding them together. This presents low technical risk, but production costs are key. Finding a manufacturing partner which can reach our cost targets is critical.

The final manufacturing step for Taka's system is the pressing together of a finished panel where two rails hold a group of tubes. This requires a relatively precise fixture with controllable force, as well as accurate dispensing of the adhesive which provides the seal. Integrating with machines to handle the components efficiently will be needed for mass production.

Both Sandia and Greentown Labs have facilities which can help with one or more of these tasks, but we also hope to work directly with industry in anticipation of moving into production in the near future. Companies which do sheet steel patterning or injection molding would make ideal strategic partners.