

Portable Electro Luminescence Test Devise

Client: NCPRE IIT Bombay

Objective:

- EL imaging of the PV module installed in the field is essential for studying damages caused by stresses and optimizing power production by replacing damaged panels and claiming warranties.
- The aim was to develop a portable, user-friendly Electroluminescence (EL) testing kit to detect cracks, interconnect failures, bypassed strings, and other defects in solar panels. For use in solar farms, the lightweight kit with a camera should easily transfer between panels, utilizing the solar panel frame as a guide for efficient inspections across multiple panels.

Approach:

- Various sizes of solar panels are manufactured for different applications so the decision was made to design a tool that can be adjusted to test all variations of solar panels.
- The design approach involved mounting the camera on adjustable legs, allowing for effective image capture of both small and large solar panels.

Solution:

- I developed a modular setup using aluminium telescopic arms that can be quickly assembled, dismantled, and transported for on-site solar panel testing. The telescopic arms in the base structure allow for adaptation to various solar panel sizes, while the adjustable arm for the camera enables flexibility in the field of view, ensuring effective image capture for different testing scenarios.
- A structure equipped with a camera can be easily transferred between solar panels using grooved wheels attached to the base frame. The wheels utilize the solar panel frame as a guide, making it convenient to move the camera from one solar panel to another. Enabled warranty claims on 15,000 modules and improved power output.
- Fig. 1 (a) shows the photo of the setup. Fig. 2 (b) shows the EL image of the PV module captured using this tool.
- The EL image captured using this tool doesn't require a perspective transformation.

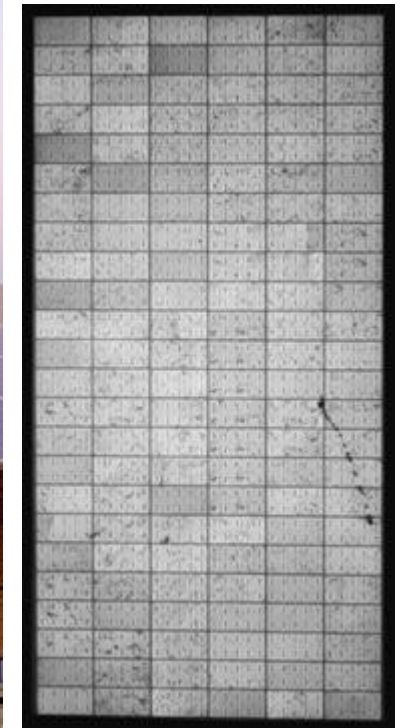
My Role (Freelancing Project):

- Conceptualized the design, created CAD models, and developed production drawings with GD&T while coordinating closely with the professor at IIT Bombay.
- Manufacturing from vendors and procurement of off-the-shelf parts.
- Assembly and Testing of the prototype.
- Supplied to IIT Bombay.

• Prototype 1, Fig. 1 (a) :



• Picture taken using the Product Fig 2 (b)



• Prototype 2:

