

# ENSURING QUALITY IN SOLAR



Image featuring  
**SolarMarq EL PRO** on a Quadpod setup

# SolarMarQ

## Engineering LLP

QUALITY TESTING OF SOLAR PANELS AT AFFORDABLE PRICES



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This document  
contains summarized  
information about



Products



Services

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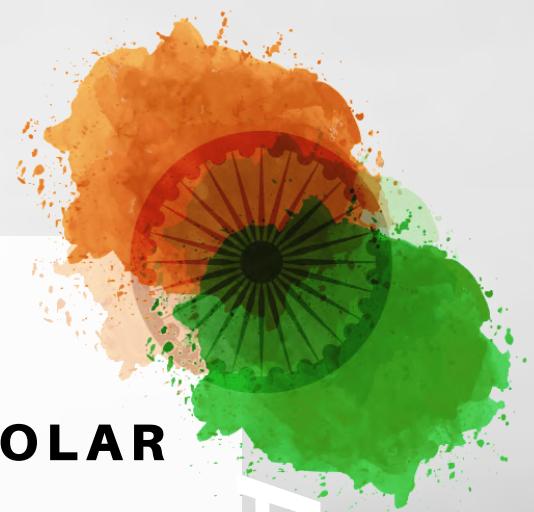
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MARQ**

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# COMPANY PROFILE



## A PASSIONATE STARTUP BY IIT BOMBAY ALUMNI ENSURING QUALITY IN SOLAR



SolarMarq Engineering LLP is founded by two PV Experts from IIT background, Rajiv Dubey and Shashwata Chattopadhyay, who are pioneers in solar power plant surveys in India. Driven by a strong sense of environmental duty, they leveraged their deep knowledge and expertise in photovoltaics, gained throughout their tenure as Ph.D. research scholars and ventured on a journey to revolutionize the solar sector through improved quality control for achieving enhanced long term performance.

SolarMarq Engineering LLP provides testing solutions for solar panels, which includes on-site I-V testing, EL imaging and IR thermography on the services side and portable EL Testers and DML testers on the products side.

Our team of experts have more than 8 years experience in testing solar panels as part of their M.Tech. – Ph.D. research work at IIT Bombay, and have initiated, led and actively participated in the All India Surveys of PV Module Reliability in 2013, 2014, and 2016 as part of the joint team from National Center for Photovoltaic Research & Education (NCPRE), IIT Bombay and National Institute of Solar Energy (NISE), New Delhi.

Established in May 2019, SolarMarq Engineering LLP is fully compliant with the government regulations, having registered under the GST regime. In this short period of time, our company has successfully completed on-site EL testing of 5000 panels (at 10 different MW scale power plants) and handheld IR Thermography of 4000 panels (at 2 different power plants). This is in addition to the approx. 2500 panels that have been tested in the All-India Surveys by the founding members (at more than 50 solar power plants), which brings the total solar panel testing experience close to 12,000 panels (and counting).

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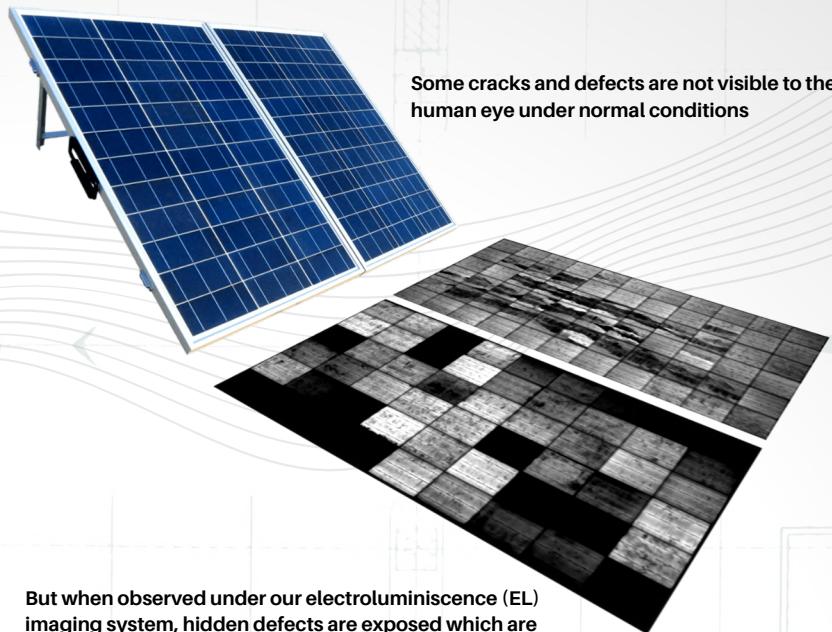


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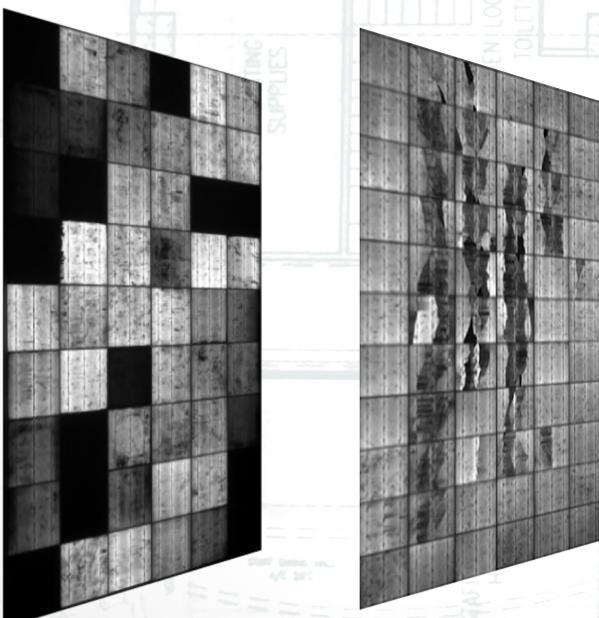
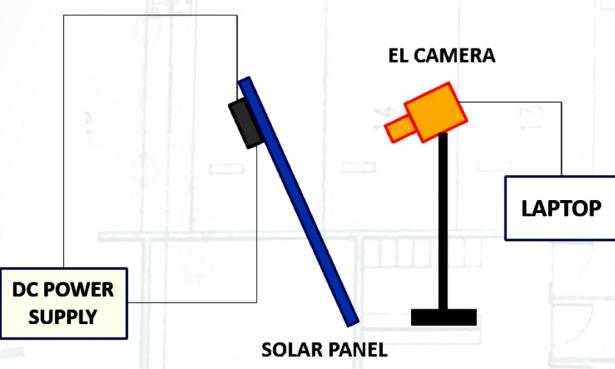
# HOW EL IMAGING WORKS

EL images are like X-ray images of the solar panels indicating internal defects



Some cracks and defects are not visible to the human eye under normal conditions

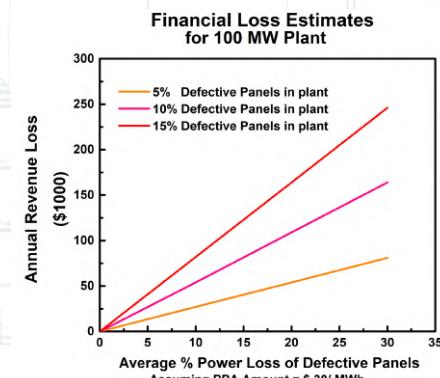
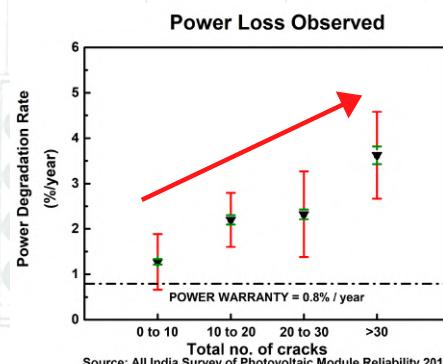
**BASIC SCHEMATIC DIAGRAM OF USING SOLARMARQ EL PRO FOR TESTING SOLAR PANELS**



Potential Induced Degradation (PID) affected Panel

Panel with cell cracks

But when observed under our electroluminescence (EL) imaging system, hidden defects are exposed which are typically responsible for lower outputs from the panels



In the absence of on-site I-V testing, EL images can identify solar panels for warranty claims

## Defects detected in **EL images**

- Crack in solar cells
- Potential Induced Degradation (PID)
- Interconnect breakages
- Shunts and inactive areas in solar cells

**SolarMarQ Services are IEC TS 60904-13 compliant**

# WHEN TO PERFORM EL INSPECTION



SolarMarq can help inspect panel shipments on the site for quality assurance & insurance claims



Panels can sustain damages during transportation



Our EL imaging solutions provide assurance of quality and panel health during installation



Even post installation of panels, our products and services can confirm the efficiency of the panels

## BEFORE INSTALLATION AT SITE

To confirm the quality of the shipped product. Its easy to discard defective panels and ask for replacements, as panels are not yet installed on the structure.

## AFTER INSTALLATION AT SITE

To confirm the installation has been done properly. Most cracks are generated during installation due to mal-handling.

## EVENT BASED

Whenever a PV string is generating less power, the panels need to be checked. EL can serve as a good alternative to I-V measurement.



Our testing reports can be used to validate insurance claims, asset valuation, and quality assurance

## WHO CAN BENEFIT

Module Manufacturers | EPC | Power Plant O&M  
Quality Assurance Testers | Module R&D and Testing Labs

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# PRODUCTS

## EL PRO

PORTABLE EL TESTER



DYNAMIC MECHANICAL LOADING

## DML TOOL



## MINI MODULE EL TESTER

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- Fast and easy EL image acquisition in field and lab
- 24 MP CMOS based EL Camera
- Exposure Time: 1 - 20 sec per snap
- Includes DC Power Supply for biasing panels
- Suitable for Crystalline Silicon and CdTe solar panels
- Software for image capture, processing and analysis of defects

INCLUDED IN THE SETUP



24 Mega Pixel modified CMOS EL Camera



Tripod / Quadpod Stand



DC Power Supply Unit



Focus Lamp



DC + AC cables



Carrying Case



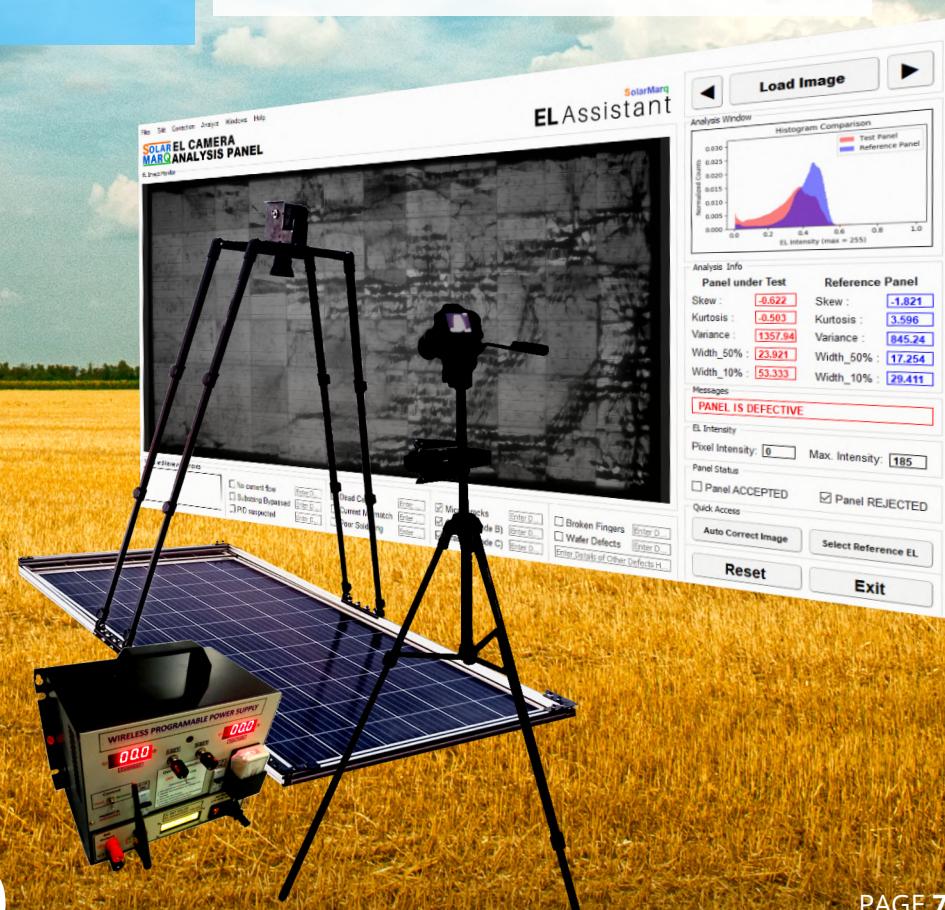
Filter



EL Assistant Software



Dedicated Laptop





# MINI MODULE

EL TESTER

- Fast and easy indoor EL image acquisition
- One fixed optimized 5MP NIR Camera
- Max Module Size: 400 x 300 MM
- Exposure Time: 1 - 6 sec per snap
- Provision for Dual display
- Acquisition time for a complete module: Less than 20 sec
- Design expandable to 400 Watt

## FEATURES OF THE MODULE



5 Mega Pixel Optimized Integrated NIR Camera



Integrated Display



Provision for Customization as per order



Compact Light Tight Cabinet with handle



DC + AC cables



Integrated DC Power Supply Unit





## DYNAMIC MECHANICAL LOADING **DML** TOOL

- Static loading as per IEC standard and beyond (up to 8000 Pa)
- Dynamic loading as per IEC standard and beyond (up to 2500 Pa)
- Customizable for module sizes as per user requirement
- Front side of panel available for EL imaging / I-V Testing

**Up to 8000 Pa  
(Static) / 2500 Pa  
(Dynamic) LOADING**

**IEC 62782**  
COMPLIANT

### FEATURES OF THE SETUP



Panel Holder



Compressors



Control System



Digital Human Machine Interface (HMI)



Provision for customization on module sizes



Data Logging possible



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# S E R V I C E S

## ON-SITE PANEL TESTING & REPORT GENERATION BY EXPERTS



FLAGSHIP EQUIPMENT USED TO ENSURE QUALITY AND EFFICIENCY DURING TESTING



SERVICE PROVIDED BY EXPERTS WITH DOCTORAL KNOWLEDGE AND OVER 8 YEARS OF EXPERIENCE IN TESTING SOLAR PANELS



HIGHLY CREDIBLE AND PRECISE REPORT OF ON-SITE FINDINGS ANALYZED BY USING THE PROPRIETARY FAST (FAST ACCURATE SCIENTIFIC TESTING) ALGORITHM

### SERVICE CAPABILITIES

- ON-SITE I-V MEASUREMENT
- ON-SITE EL MEASUREMENT
- ON-SITE IR THERMOGRAPHY
- VISUAL INSPECTION

### ON-SITE SERVICE EXPERIENCE



#### • EL INSPECTION EXPERIENCE IN INDIA:

- 2000 PANELS IN ODISHA
- 1500 PANELS IN MAHARASHTRA
- 1000 PANELS IN TELANGANA
- 400 PANELS IN MADHYA PRADESH

#### • IR THERMOGRAPHY EXPERIENCE IN INDIA:

- 3300 PANELS IN RAJASTHAN
- 1000 PANELS IN MAHARASTHRA

All SolarMarq Services are IEC TS 60904-13 compliant





# STANDARD SERVICE PROCESS



## CONTACT

Reach out to us via email or phone call on the mentioned contact information, or drop a query by filling the contact form on our website, and we will get in touch with you.



## QUOTATION

We discuss your business requirements and understanding your need, we provide a personalized quotation for our product or service solutions as per the request and requirement.



## AGREEMENT

If you accept the quotation and wish to do business with us, we proceed to mutually arrive at an agreement that states the product/service delivery and payment terms.



## ON-SITE TESTING

In case of on-site testing service, Upon agreement, we initiate the service delivery from our side in confidence. Our experts reach the site of inspection as per the timeline discussed in the agreement and carry out the EL imaging based testing of the solar panels.



## EXPERT REPORT SUBMISSION

Post the inspection phase, the final expert analyzed report shall be released upon realizing 50% payment of the decided service agreement cost. The remaining payment can be completed within seven working days upon delivery of the report.



# INTERESTED IN SOLARMARQ?

WANT TO BUY OUR INNOVATIVE QUALITY PRODUCTS?  
WANT TO HIRE OUR BEST VALUE EXPERT TESTING SERVICES?



We provide our products and services at the most affordable prices ensuring best value for money in the industry



The domain expertise of our team in photovoltaics and their rich panel testing experience ensure you get the best value service in the industry



We always provide the best quality components in our products ensuring highest compliance with international standards



**CONTACT US**  
TO DISCUSS PRICING & YOUR QUERIES



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