

Mobile PV Test Lab

Flash Test your modules on-site !



Disclaimer

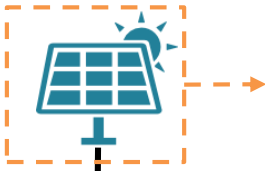
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What are the common reasons for Solar PV underperformance ?

Causes of Underperformance

PV Module-
Loss seen at aggregate level, need testing identify



Inverter-
Efficiency monitored through SCADA



Transformer -
Efficiency monitored through SCADA



Cables- Good OEM quality can limit losses

Evacuation



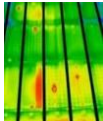
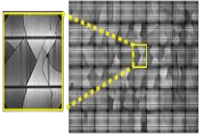
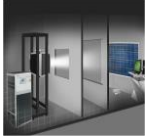
Module Type/Technology	Defect	Causes of defect	Stage of detection of defect	Instrument to detect the defect	Instrument available in Mobile Test Lab	
Poly/Mono	Micro crack	Manufacturing Defect	Before Installation	EL Tester	✓	
		Installation Issue				
	Snail Trail	Manufacturing Defect	Post Installation	Flash Tester/ Field IV tester	✓	
		Installation Issue				
	PID	Manufacturing Defect	After Commissioning (During O&M)	EL Tester / Flash Tester/ Field IV tester	✓	
		Faulty system design				
Bypass Diode Failure	Poor Soldering	IR Thermal Camera				✓
Hotspot	Cell crack	IR Thermal Camera				✓
Busbar/Finger Corrosion	Manufacturing Defect	Flash Tester				✓
Thin Film	Hotspot	Manufacturing Defect				IR Thermal Camera
	Active area Corrosion	Moisture ingress	Flash Tester	✓		
Poly/Mono/Thin Film	Power Degradation	Manufacturing Defect Plant Design	Flash Tester/ Field IV tester	✓		

The PV Mobile Lab has the expertise to detect all critical module faults

Key Tests Detailed



Major Tests
Performed



Flash Test

- Measures I-V characteristics of PV Module at STC conditions
- Key components: Flash Lamp, Flash generator, Electronics unit

EL Test

- Highlights Fault and Micro cracks for each cell
- Photo-emission measured by an infrared-sensitive camera

Infrared Imaging

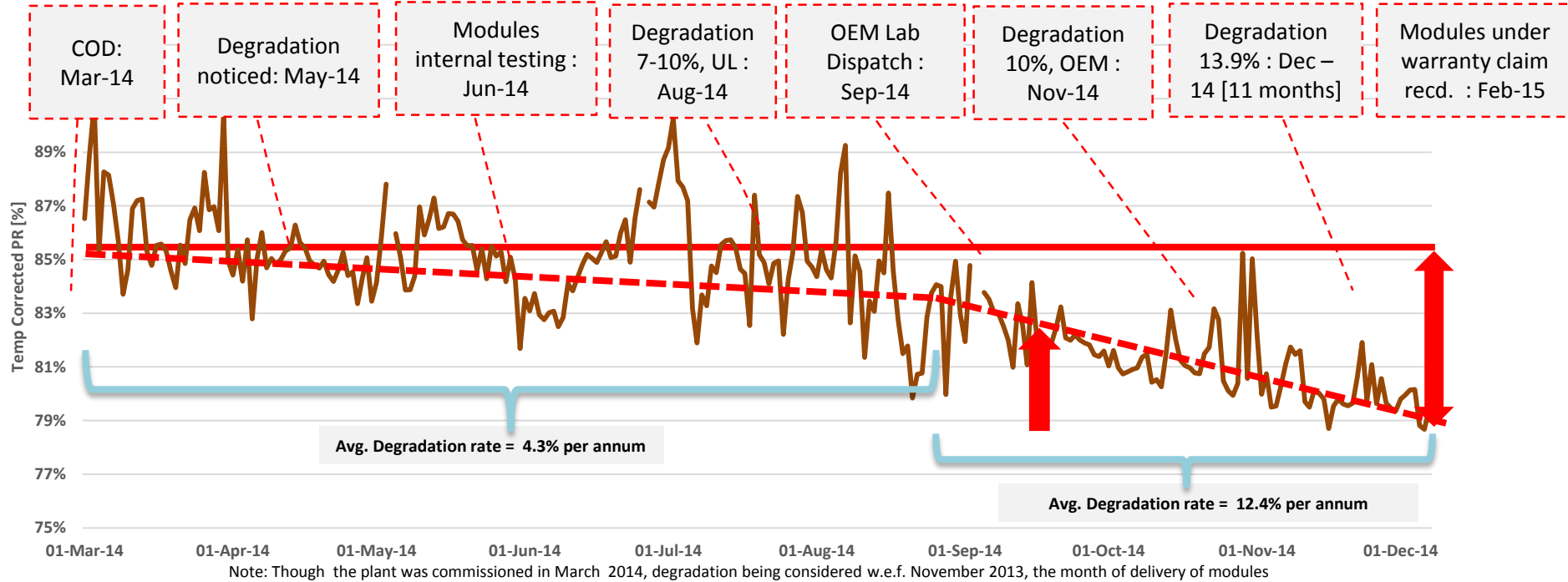
- Measures abnormal thermal behaviour of modules during DC parameter measurements
- Used to find hotspots in modules, find loose connections and do thermal analysis of CB, Inverter, Trafo, HT Panel etc.

Energy Analyser Test

- Measures power quality of CB, Inverter, CT, PT, & HT panel
- Measures both AC and DC power, to monitor inverter efficiency and detect power quality issues

Offering all major tests required for maximising generation

Sample PV module underperformance scenario



Total Degradation of modules during 1st year of warranty period \approx 13 - 15% w.r.t. name plate rating

PV Mobile Lab Capabilities



Mobile Lab

PV modules account for ~ 70% of the capex for a Solar PV plant, and underperformance of the modules can be the single largest reason why an asset owner's (lenders) financial model and actual cash flows may not match. Early detection can lead to immediate control of losses or redressal. The role of the PV testing lab is critical across the life cycle of the Solar PV plant, right from construction to the end of life.



USPs

- On-site testing, no transportation involved - Reducing the risk of damage during transportation
- Reduced lead time for test analysis and report submission – Immediate Reports
- The Owner can witness the test at site and can be used for higher sampling rate - Transparency
- Compatible with all type of technologies (mono-Si, poly-Si, Amorphous silicon (a-Si, CIS, CIGS), CdTe, HIT & High Efficiency) – All in One
- NABL Accreditation for 3rd Party testing (In Progress)
- Provisional Patent No. 201721017370

India's first Mobile Solar PV Testing Lab !

Immediate Performance Impact



Improved
Results

- ♀ Reduced time for detection of underperformance
- ♀ Faster response rate
- ♀ Potential report submission within 3 days as compared to 30 days in conventional Lab testing

- ♀ Reduces the risk of module breakage during handling and transportation
- ♀ Can be done at multiple stages on-site
- ♀ Reduced transportation and handling charges



Reduced
Risk &
Costs



Quality
Player

- ♀ Investment made to ensure quality for Mahindra Susten – EPC and O&M stages
- ♀ Built to ISO/IEC 17025: 2005 standards, to be certified by NABL

Reduced damage, risk and gain significant performance impact

Thank you

For questions

Sandeep Jadhav

Head, O&M

jadhav.sandeep@mahindra.com

Ruhi Gupta

Manager, BD & Strategy, O&M

gupta.ruhi@mahindra.com

Abhay Tilwankar

Head, Performance Analytics, O&M

tilwankar.abhay@mahindra.com

Satish Pandey

Manager, Analytics, O&M

PANDEY.SATISH@mahindra.com

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