Solar Panel Inspection Report

Generated on: 2025-07-23 16:33:03

Inspection Line: Smart Conveyor Automated System

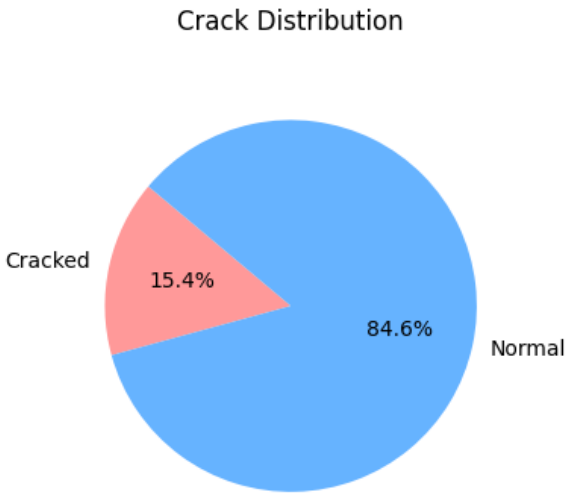
Inspector: Automated System

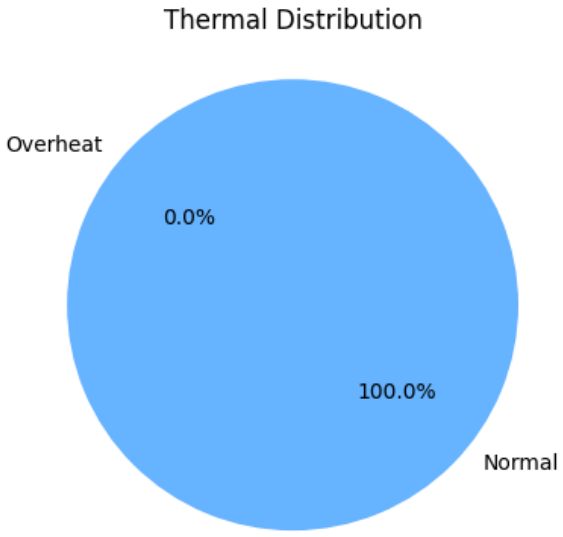
Total Panels: 3

Overall Summary

Average Crack Rate: 15.38%

Average Overheat Rate: 0.00%





Suggested Solution:

Serial Number: 1234567890005

Timestamp: 2025-07-22T16-17-03

Analysis of Solarboard Damage:

The YOLOv8 detection indicates a crack (confidence 0.64) in the solarboard. The relatively low confidence suggests the crack may be small or difficult to see in the images, warranting a closer visual inspection. The location of the crack (x=447, y=321 in image yolo_1234567890005_2_1753172241.jpg) should be noted and compared to subsequent images for propagation.

Several factors could have contributed to the crack in Solarboard 1234567890005:

Likely Causes and Estimated Faulty Parameter Values:

* **Excessive Lamination Pressure:** A crack is most frequently caused by the stress induced during the lamination process. A single small crack suggests localized high pressure rather than a global issue. This indicates that the lamination pressure might have exceeded the ideal range of 50-100 N/cm² at a specific point. Without further data, I cannot give an exact faulty value, but I estimate it to have briefly reached or exceeded 120 N/cm² in the region of the crack. This pressure point may have been caused by uneven pressure distribution from the laminator or imperfections in the laminate.

* **High Soldering Temperature:** Although less likely to cause a single small crack, it is possible that a localized high soldering temperature (above 270°C) near the crack location might have caused thermal stress leading to a fracture in the cell. This would need to be investigated with further analysis, comparing localized temperatures during soldering against the location of the crack.

* **Improper Handling:** The crack's size (9x23 pixels) also suggests that rough handling during manufacturing or transport could be responsible. A force exceeding 10N applied to a corner or edge could create such a fracture. This is possible, but less probable than a lamination issue due to the small size and location of the crack not being at an edge.

* **Cell Thinness:** If the cell thickness was closer to or below 150 ?m, the fragility of the cell could increase and make it susceptible to cracking from lower forces than otherwise expected. This should be verified by

analyzing manufacturing records for this specific cell and batch.

Unlikely Causes:

* **Cell Stringing Speed:** While excessively fast stringing can cause misalignment stresses, it's less likely to produce a single, small, localized crack.
* **Vacuum Level:** While a poor vacuum can lead to lamination problems, a single small crack is unlikely directly due to this. The effect would be more widespread.
* **Cooling Rate:** Rapid cooling typically results in broader, more diffuse cracking.
* **Temperature during lamination:** While high lamination temperatures are a factor, they are less likely to cause such a small crack compared to high pressure.

Actionable Recommendations:

1. **Thorough Visual Inspection:** Conduct a detailed visual inspection of the solarboard to confirm the extent and nature of the crack. This will give more evidence for confirming the most likely culprit.

2. **Review Lamination Process Data:** Analyze the lamination pressure data from the specific batch and timeframe of production, looking for spikes or inconsistencies at the suspected point of pressure. Inspect the laminator rollers for damage or unevenness.

3. **Check Soldering Profile:** Examine the soldering temperature profile for the affected cell string. Look for any outliers or deviations from the ideal range.

4. **Material Analysis:** Consider micro-examination of the cracked area to check for any material defects or micro-fractures present prior to lamination.

5. **Review Handling Procedures:** Evaluate the handling procedures throughout the manufacturing and shipping processes to identify areas where improvement can prevent damage. Ensure that all handling guidelines are being followed.

6. **Cell Thickness Verification:** Verify the cell thickness used in this specific board against the design and

manufacturing specifications.

7. **Preventative Measures:** Implement stricter quality control measures and monitoring of the identified potential risk factors, particularly lamination pressure. Calibration and maintenance of the lamination equipment should be performed at regular intervals.

By addressing these recommendations, you will be able to pinpoint the cause of the crack and implement preventative measures to prevent future occurrences. The focus should be on the analysis of the lamination process data and a careful visual inspection to confirm the type and size of the crack to determine the most likely cause.

Panel Serial: 1234567890036

Model Name: Solar min QL

Timestamp: 2025-07-22T16-47-00

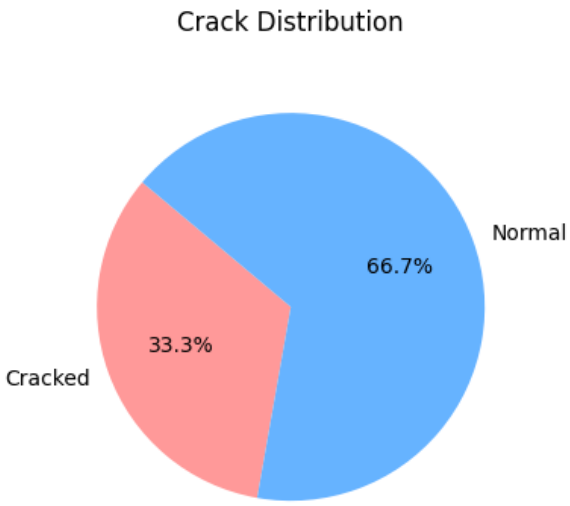
Vision Scan Summary

Scan Duration: 2025-06-29T15-20-46 to 2025-07-22T16-47-00

Total Scans: 3

Cracked Count: 1

Crack Rate: 33.33%



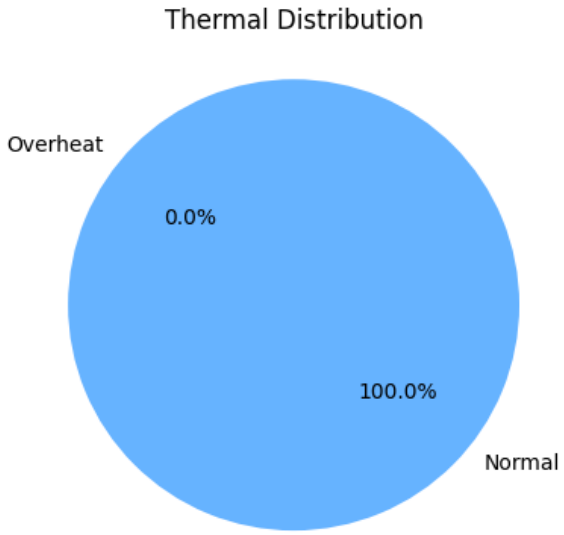
Thermal Sensor Summary

Scan Duration: 2025-06-27T14-51-02 to 2025-07-22T16-47-00

Total Data Points: 512

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



[No image available]

Panel Serial: 1234567890012

Model Name: Solar max30000

Timestamp: 2025-07-22T15-22-43

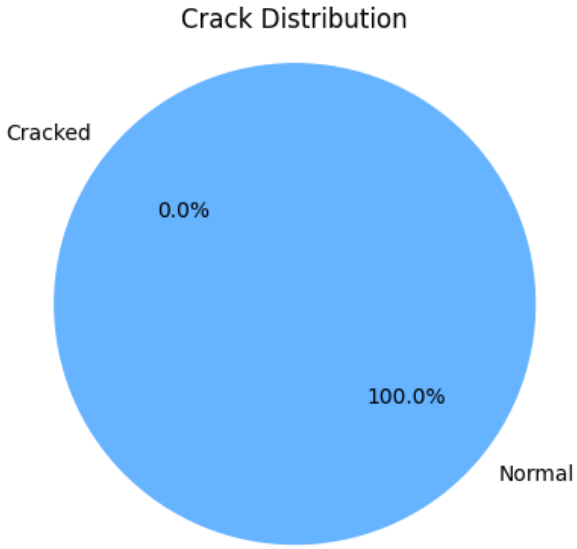
Vision Scan Summary

Scan Duration: 2025-06-28T17-17-07 to 2025-07-22T15-22-43

Total Scans: 5

Cracked Count: 0

Crack Rate: 0.00%



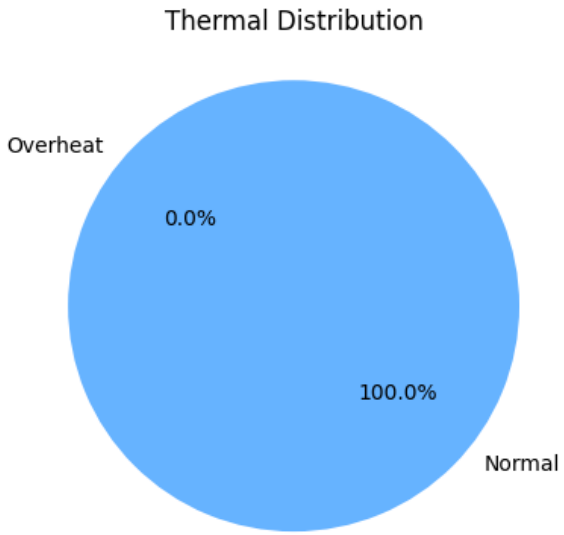
Thermal Sensor Summary

Scan Duration: 2025-07-22T15-22-43 to 2025-07-22T15-22-43

Total Data Points: 256

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



[No image available]

Panel Serial: 1234567890005

Model Name: Solar max30000

Timestamp: 2025-07-22T16-17-03

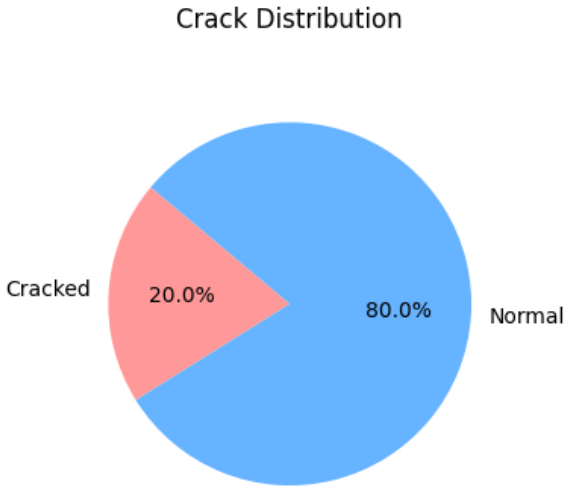
Vision Scan Summary

Scan Duration: 2025-06-29T17-17-07 to 2025-07-22T16-17-03

Total Scans: 5

Cracked Count: 1

Crack Rate: 20.00%



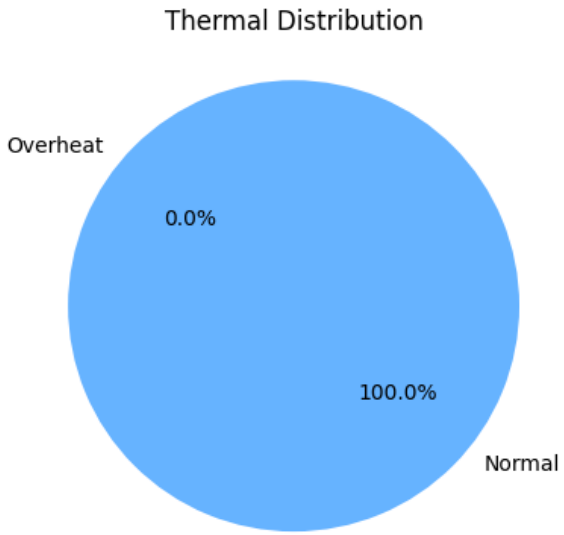
Thermal Sensor Summary

Scan Duration: 2025-07-22T16-17-03 to 2025-07-22T16-17-03

Total Data Points: 384

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



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