Solar Panel Inspection Report

Generated on: 2025-07-23 16:08:41

Inspection Line: Smart Conveyor Automated System

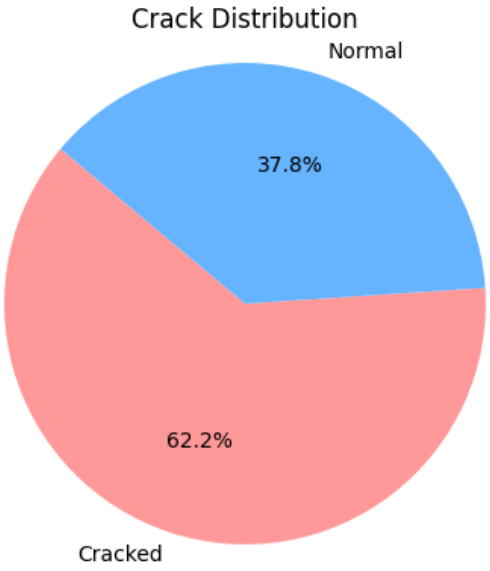
Inspector: Automated System

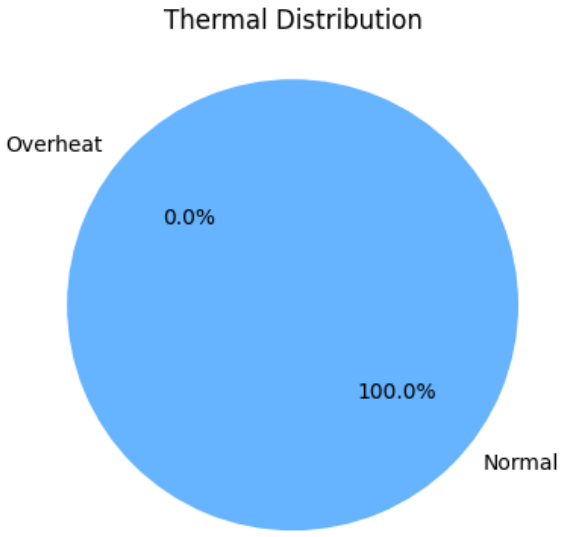
Total Panels: 3

Overall Summary

Average Crack Rate: 62.16%

Average Overheat Rate: 0.00%





Suggested Solution:

Serial Number: 1234567890012

Timestamp: 2025-07-22T18-28-55

Analysis of Solarboard Damage:

The YOLOv8 detection reveals a crack (22x14 pixels) detected with a confidence of 0.54 in one of the images. The relatively low confidence suggests the crack might be small or obscured, requiring visual inspection of the original images for confirmation and precise location. The size alone is insufficient to definitively determine the cause. However, we can analyze potential causes based on the available data and production parameters.

Likely Causes of Cracking:

Given the limited information, several possibilities exist, with varying probabilities:

1. **Excessive Lamination Pressure:** A crack in a relatively small area points towards localized stress. If the lamination pressure exceeded the recommended 100 N/cm² (possibly reaching >120 N/cm²), it could have caused localized stress leading to a crack at a weak point in the cell or the laminate. This is a strong possibility considering the small size of the crack.

2. **High Handling Force:** A drop or impact during handling, exceeding the 10N threshold, could result in corner cracking. The location of the crack (reported at x=92, y=445) needs to be correlated to the solar panel's physical layout. If it's near a corner, this becomes a more likely scenario. The image analysis is crucial here.

3. **Thermal Stress during Lamination or Cooling:** While a single small crack is less suggestive of widespread thermal damage, excessive lamination temperature (>160°C) or too rapid cooling (>5°C/min) could have contributed. This is less likely than excessive pressure or mishandling, but cannot be entirely ruled out without additional data.

4. **Defective Cell:** A pre-existing micro-crack in the solar cell itself could have been aggravated during the lamination process, regardless of the production parameter settings. This possibility highlights the need for rigorous quality control checks on individual cells *before* lamination.

Faulty Parameter Estimation (Speculative):

Without access to the original images and detailed manufacturing logs, precise parameter values are impossible to estimate. However, based on the crack size and location, we can speculate:

* **Lamination Pressure:** Potentially exceeded 100 N/cm², possibly reaching 110-120 N/cm² in the localized area of the crack.

* **Handling Force:** If the crack is located at a corner, a handling force exceeding 10N is probable.

Actionable Recommendations:

1. **Visual Inspection:** Manually inspect the original images at high resolution to precisely locate and characterize the crack. Note its location relative to cell boundaries, corners, and other features.

2. **Review Manufacturing Logs:** Obtain and thoroughly review production logs for serial number 1234567890012, paying particular attention to the lamination pressure, temperature, cooling rate, and handling procedures. Focus on data from the relevant timestamp (2025-07-22T18-28-55).

3. **Verify Cell Quality:** Inspect the quality of the solar cells used in this panel *before* lamination, focusing on potential micro-cracks and other defects.

4. **Adjust Production Parameters (if needed):** If the review of logs reveals parameter values outside the recommended ranges, adjust them accordingly to prevent future occurrences. This requires a thorough analysis of the full dataset covering the production batch to which this panel belongs.

5. **Improve Handling Procedures:** Re-evaluate and improve handling procedures to minimize risks of damage during transportation and assembly.

6. **Further Analysis:** If the crack remains unexplained after reviewing the data, consider more advanced analyses like thermal imaging of the solar panel to detect stress points and material defects.

This analysis provides a starting point. A complete and accurate diagnosis requires additional information from the manufacturing process and a visual inspection of the solar panel itself.

Panel Serial: 1234567890036

Model Name: unknown yet

Timestamp: 2025-07-22T18-28-55

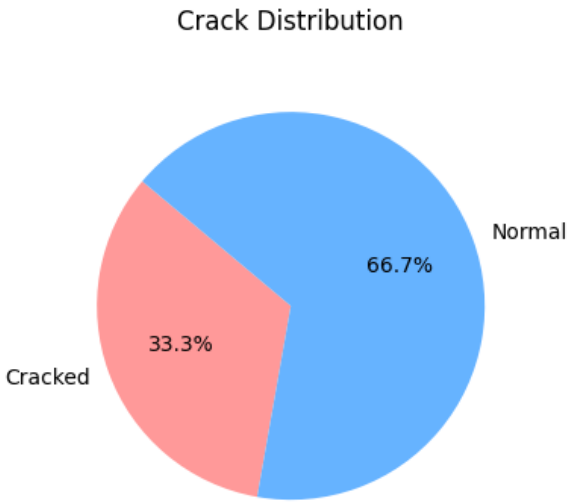
Vision Scan Summary

Scan Duration: 2025-07-22T15-14-21 to 2025-07-22T18-28-55

Total Scans: 9

Cracked Count: 3

Crack Rate: 33.33%



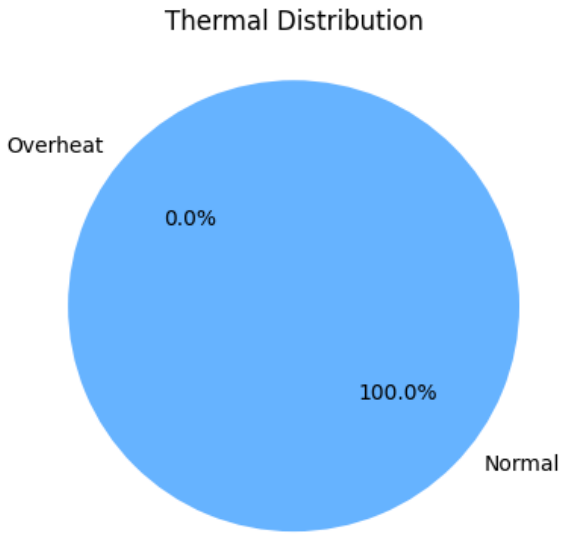
Thermal Sensor Summary

Scan Duration: 2025-07-22T14-51-02 to 2025-07-22T18-28-55

Total Data Points: 2176

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



[No image available]

Panel Serial: 1234567890012

Model Name: unknown yet

Timestamp: 2025-07-22T18-28-55

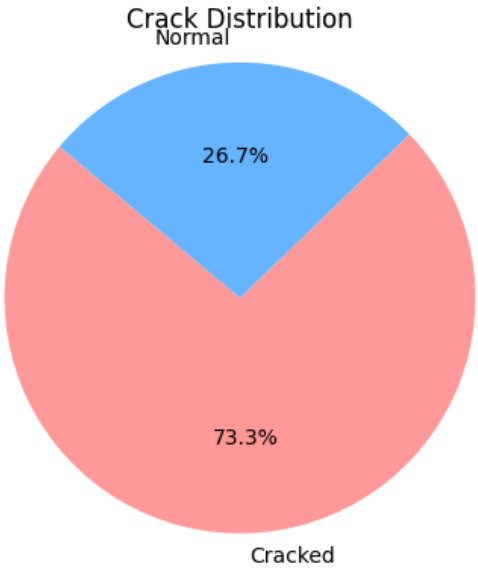
Vision Scan Summary

Scan Duration: 2025-07-17T16-25-21 to 2025-07-22T18-28-55

Total Scans: 15

Cracked Count: 11

Crack Rate: 73.33%



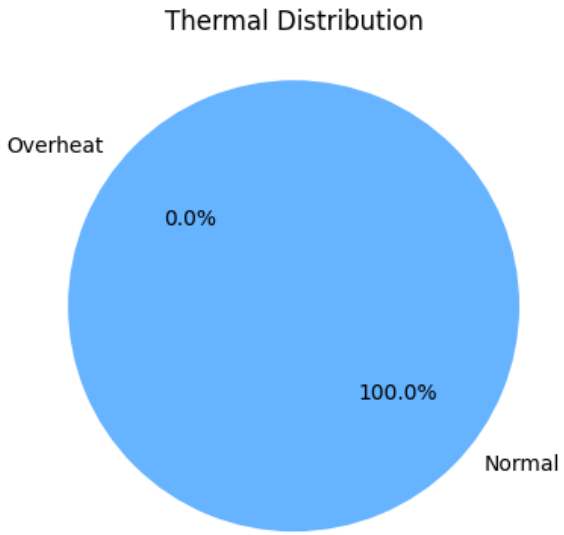
Thermal Sensor Summary

Scan Duration: 2025-07-22T11-56-45 to 2025-07-22T18-28-55

Total Data Points: 2880

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



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Panel Serial: 1234567890005

Model Name: Solar max30000

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

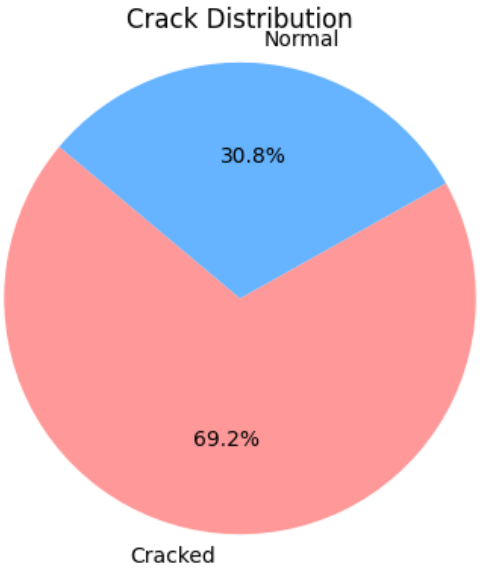
Vision Scan Summary

Scan Duration: 2025-07-21T14-41-33 to 2025-07-22T16-17-03

Total Scans: 13

Cracked Count: 9

Crack Rate: 69.23%



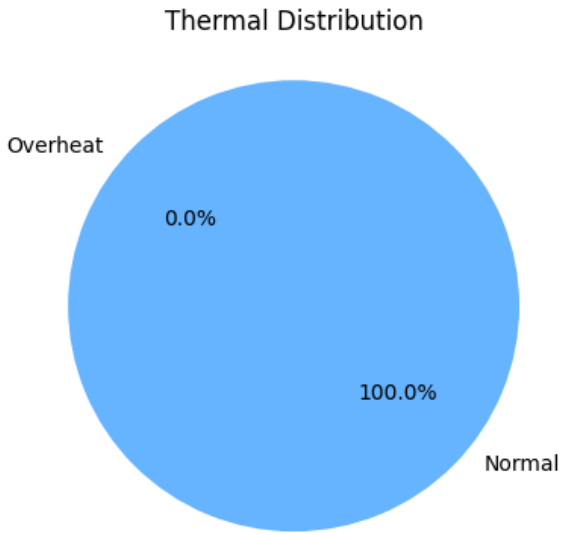
Thermal Sensor Summary

Scan Duration: 2025-07-22T11-51-48 to 2025-07-22T16-17-03

Total Data Points: 4224

Overheated Points (>38°C): 0

Overheat Rate: 0.00%



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