

AI-Based Defect Discrimination and False Defect Identification for Photomask Inspection

Overview

HTL Co. India Pvt. Ltd. has developed an advanced AI-based Defect Discrimination and False Defect Identification solution to improve efficiency and accuracy in photomask inspection processes. The solution intelligently analyzes inspection outputs to distinguish true defects from pseudo defects, significantly reducing manual inspection effort while maintaining extremely high accuracy.

Client Challenge

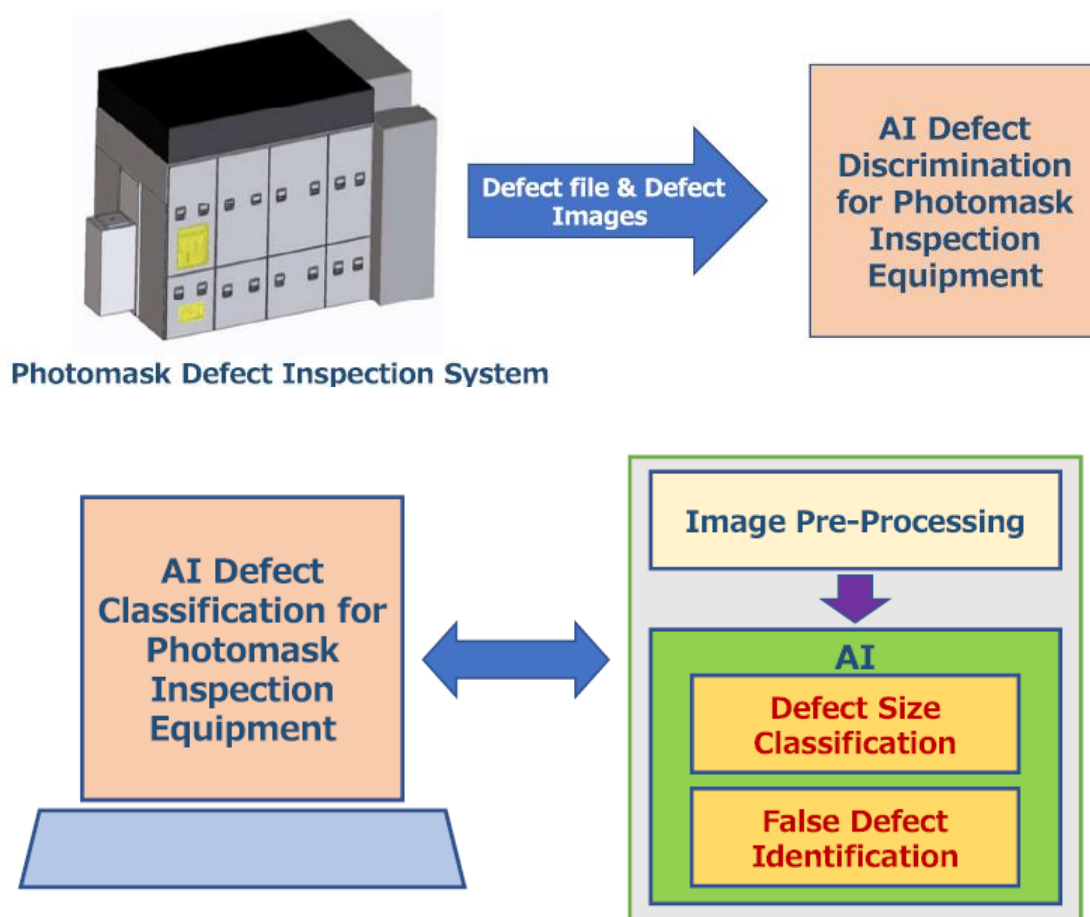
Photomask inspection tools generate large volumes of defect data, many of which are pseudo defects. Manual review is time-consuming and affected by optical and mechanical variations. The customer required an automated, objective approach to defect classification.

HTL Solution

HTL designed an AI-driven defect discrimination framework that processes reference and defect images to automatically classify defects, identify false defects, and rank defect criticality.

Solution Architecture & Workflow

The following block diagram illustrates the AI-based defect discrimination and false defect identification workflow implemented by HTL.



Key Solution Highlights

- AI-based discrimination between true and pseudo defects
- Multi-stage defect size and type classification
- CNN-based learning using reference and defect images

- False defect probability ranking (Rank A–D)
- Reduced operator subjectivity

Business Impact

- Significant reduction in manual defect review effort
- First trial accuracy: 99.88%
- Second trial accuracy: 100%
- Improved inspection throughput

Technology Stack

Programming Languages: C++, Python

AI / ML: Convolutional Neural Networks (CNN)

Image Processing: Sub-pixel alignment

Platforms: Photomask inspection systems

Engagement Model

Developed through close collaboration between HTL India's software and AI teams and domain experts.

Conclusion

HTL's AI-based defect discrimination solution transforms inspection workflows by reducing false defect handling and improving accuracy.