

Use Case: Defect Detection in Manufacturing

1. Problem Statement:

Manufacturing defects in products lead to financial losses, customer dissatisfaction, and safety risks. Traditional manual inspection is time-consuming, error-prone, and inconsistent. A more efficient, automated solution is needed.

2. Proposed Solution:

Implement a Computer Vision-based defect detection system using deep learning techniques. The system will:

- Use high-resolution cameras to capture images of manufactured products.
- Apply Convolutional Neural Networks (CNNs) to analyze images and detect defects such as scratches, misalignments, or missing components.
- Automate quality control by integrating with robotic systems to remove defective items from the production line.

3. Impact:

- ✓ Improved Accuracy: Detects defects with higher precision than manual inspection.
- ✓ Increased Efficiency: Reduces production downtime and speeds up the inspection process.
- ✓ Cost Reduction: Minimises waste and rework costs.
- ✓ Enhanced Safety: Reduces human errors and ensures better product quality.

4. Ethical and Legal Considerations:

- Data Privacy: Ensure that image data collected is stored securely and not misused.
- Bias & Fairness: Train models on diverse datasets to prevent bias in defect detection.
- Workforce Impact: Automation may replace human inspectors, so companies should offer reskilling programs.
- Regulatory Compliance: Follow industry standards and legal requirements for AI-driven quality control.