



# AI VISION INSPECTION TO ELIMINATE MANUAL CHECKS

Developed for P&G Product Verification Workflow



## P&G PROJECT CONTEXT

### INDUSTRY INTRODUCTION

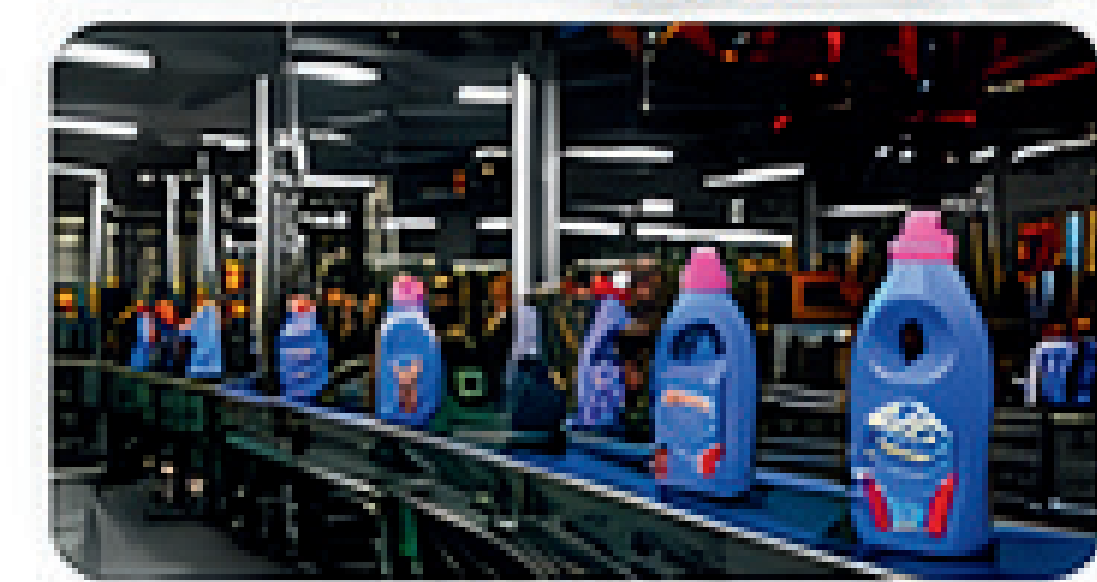
Manufacturers are adopting AI vision systems to improve product quality and reduce reliance on manual inspection.

### COMPANY PROBLEM

The company's manual TAMU inspections for contamination, deformation and artwork defects are time-consuming and can result in missed defects and product loss.

### PROJECT GOAL

Develop a low-cost, scalable AI vision prototype that automates 2–3 TAMU checks with over 99.5% accuracy and reduces manual inspections by at least 80%.



## 01 PROBLEM & PROJECT BACKGROUND

Our team is developing a YOLO-based web inspection-support application for P&G's product-verification workflow. The application analyses images of detergent containers to detect and localise visual defects, such as scratches, artwork errors and structural damage. Current inspections rely on manual sampling and visual judgement, which can be time-consuming and inconsistent, as different inspectors may classify the same defect differently. By applying computer vision to company-specific data, the project aims to support more objective, consistent and efficient defect classification, including PASS/FAIL and TAMU decision-making.



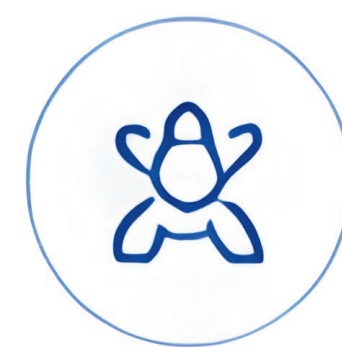
Manual checks  
are inconsistent



Time-consuming  
and labour-intensive



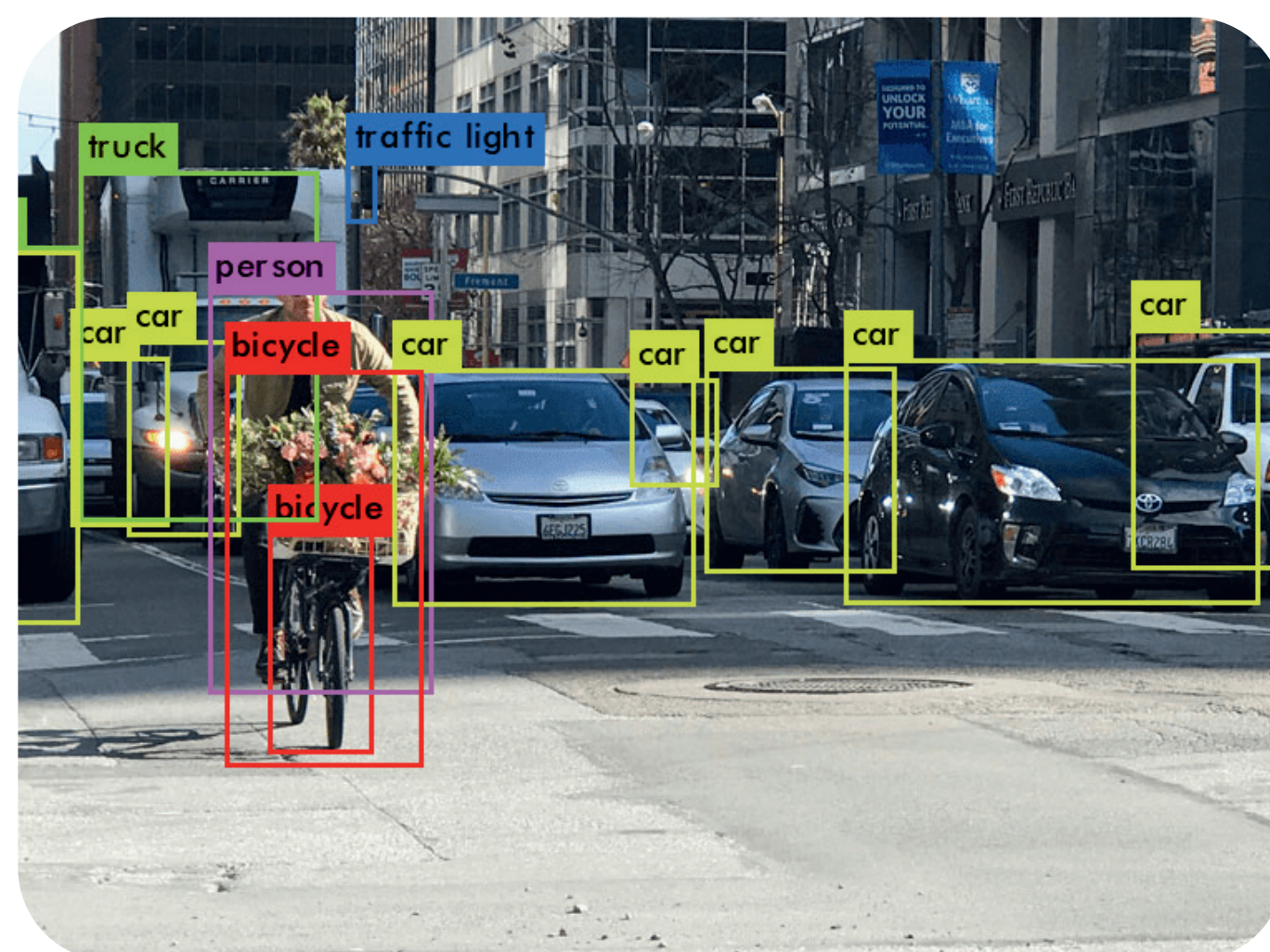
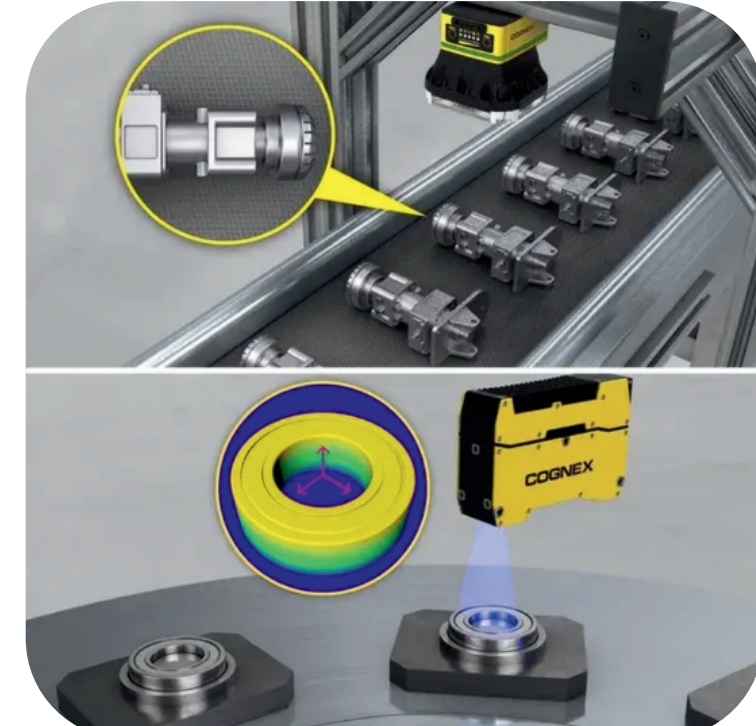
Limited defect  
localisation info



Affects decision  
consistency

## 02 LITERATURE OR MARKET REVIEW

Existing inspection methods, including manual checks, rule-based vision and image classification, can be limited by inconsistency, inflexibility or the lack of defect-location information. May require specialised hardware, licensing and vendor-specific integration. This project therefore focuses on a customised YOLO object-detection model that can identify and localise defects using company-specific images.



## 03 PROPOSED SOLUTION

The application uses company-specific data records to support objective, data-driven defect classification. By standardising inspection results and identifying trends in defects, the system can support earlier intervention, reduce waste and improve quality-control consistency. The approach also demonstrates how computer vision can modernise existing manufacturing workflows without requiring immediate replacement of legacy hardware.

- ✓ Objective defect detection
- ✓ Faster inspection workflow
- ✓ Consistent decision-making
- ✓ Data-driven quality control
- ✓ Scalability with low cost
- ✓ Privacy with local host



Upload  
Images



Annotate  
& Label



Train  
Model



Test Model  
Performance



Repeat the  
Workflow Cycle

## 04 DESIGN AND IMPLEMENTATION

The project is being developed as a responsive web-based inspection-support application that enables image and dataset upload, bounding-box annotation, defect-class management, model training and result monitoring with export functions. The system is designed for easy deployment on company infrastructure and future scalability.

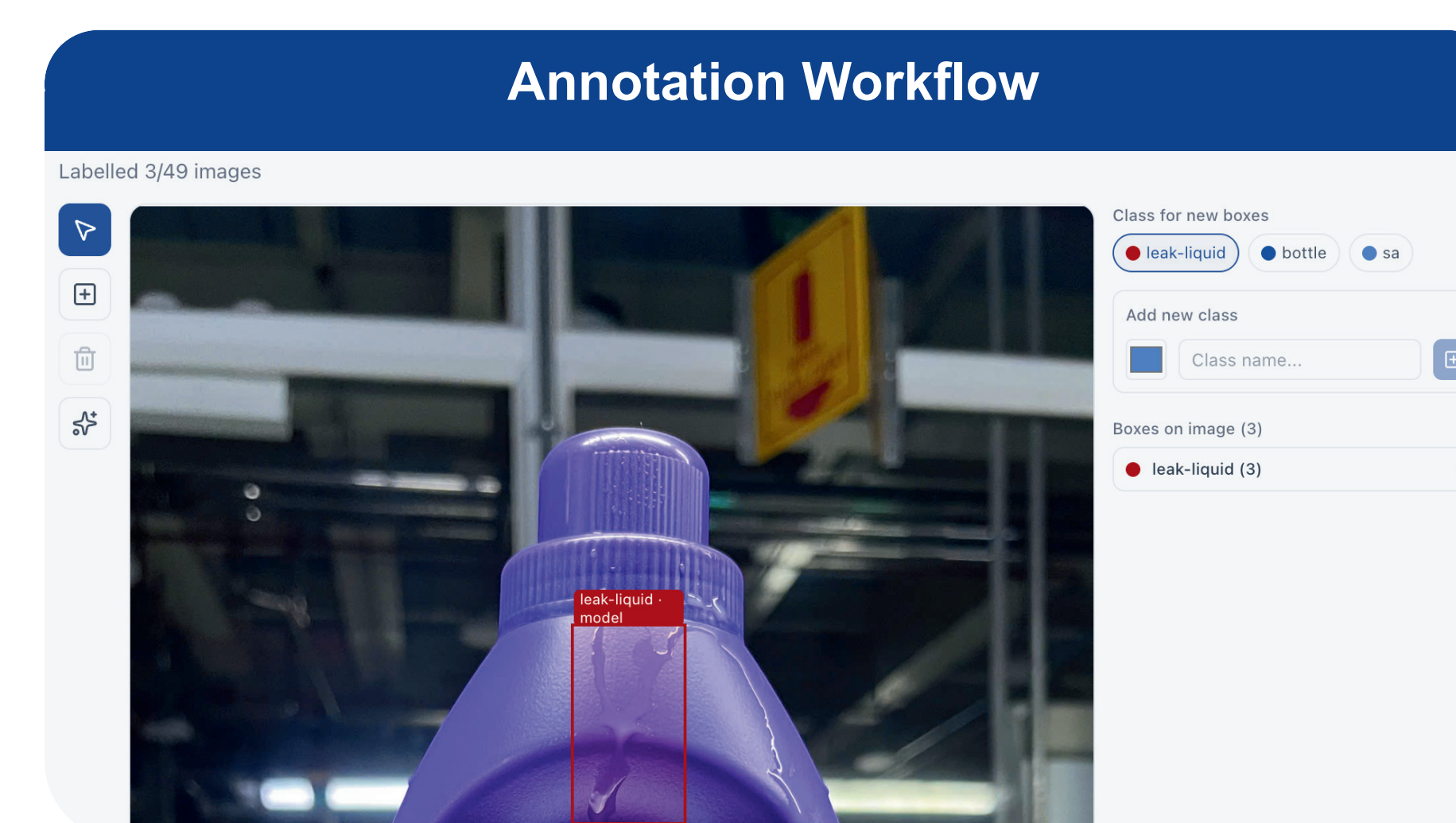
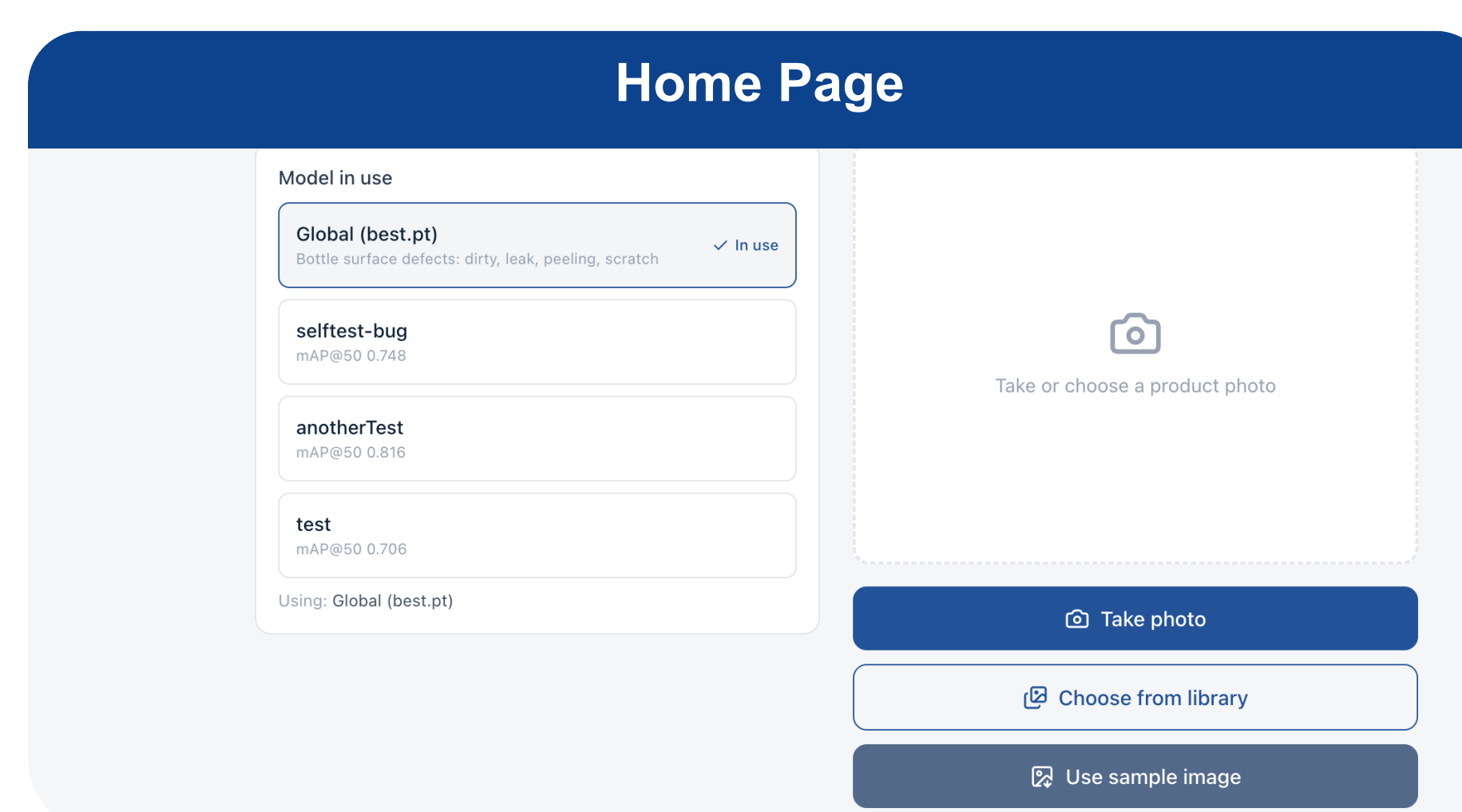


## 05 RESULTS AND EVALUATION

Key measures include per-class precision, recall and mAP

Final validation will confirm whether the required workflows—such as image upload, annotation, training, inspection, result export and role restrictions—can be completed reliably and reproduced by another team member.

| MODEL VERSION | PRECISION | RECALL | F1-SCORE | mAP50 | mAP50-95 |
|---------------|-----------|--------|----------|-------|----------|
| YOLOv8        | 0.275     | 0.291  | 0.179    | 0.046 | 0.283    |



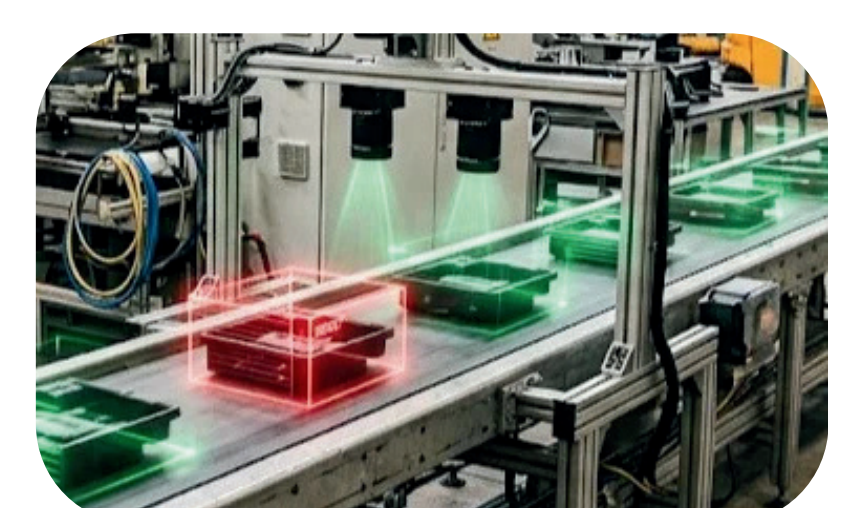
## 06 LIMITATIONS AND FUTURE IMPROVEMENT

### LIMITATIONS

- The availability of representative No Good/ Good samples
- Require further testing for system workflow and storage rules
- Manual training model process with Google Colab

### FUTURE IMPROVEMENT

- Collecting and reviewing a larger, more balanced dataset
- Enhancing the model performance with higher GPU compute units
- Automate the model training process with cloud service such as AWS
- Integrate to production inspection line



BUILDING A BETTER  
QUALITY FUTURE  
WITH AI INNOVATION



QUALITY  
YOU TRUST



INNOVATION  
YOU VALUE



IMPACT  
THAT MATTERS

