

# **QUALITY CONTROL FOR METAL CASTING PRODUCT**

Dallen Huang

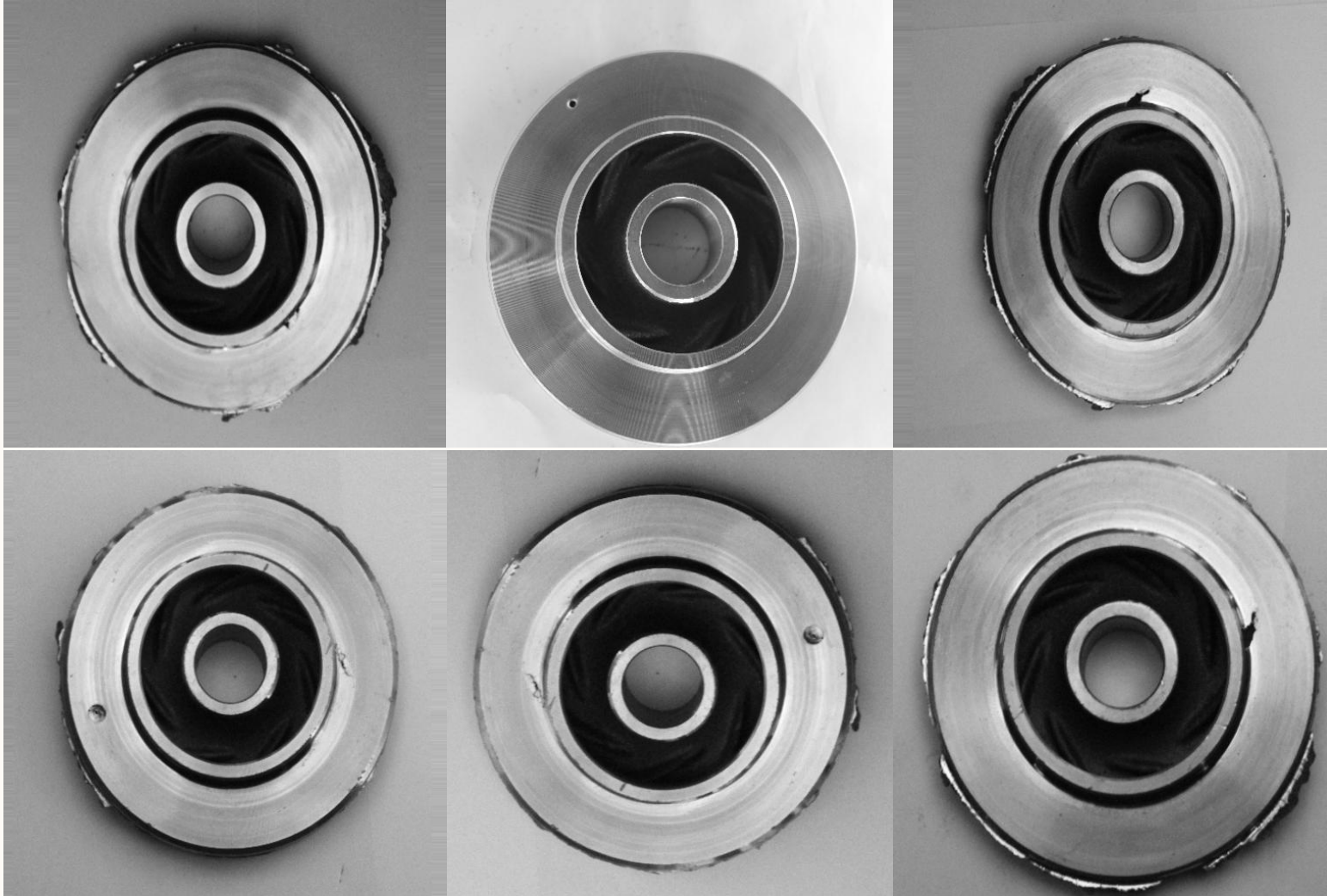
Springboard

# The Product

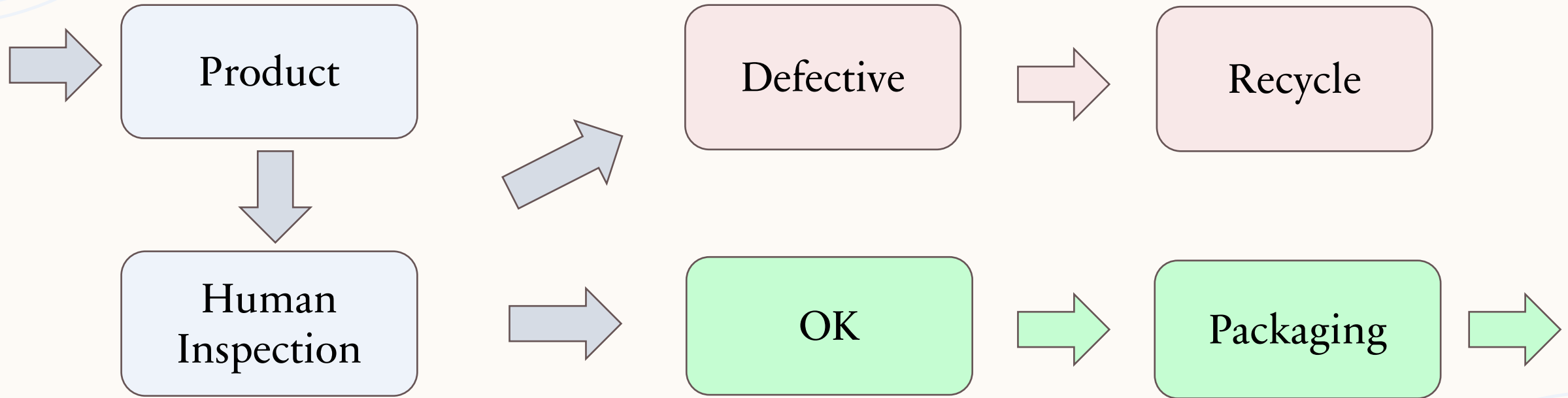
- **Name:** Submersible Pump Impeller
- **Material:** Stainless Steel
- **Manufacturing Processing:** Casting
- **Types of Defective:** Blow holes, Pinholes, Burr, Shrinkage defects, Mold material defects, Pouring metal defects, Metallurgical defects



# The Defective Products



# Current Quality Inspection Process



# The Problem

**Time-Intensive  
Inspections**



**Delayed  
Order**

**High Demand on  
Human Resources**



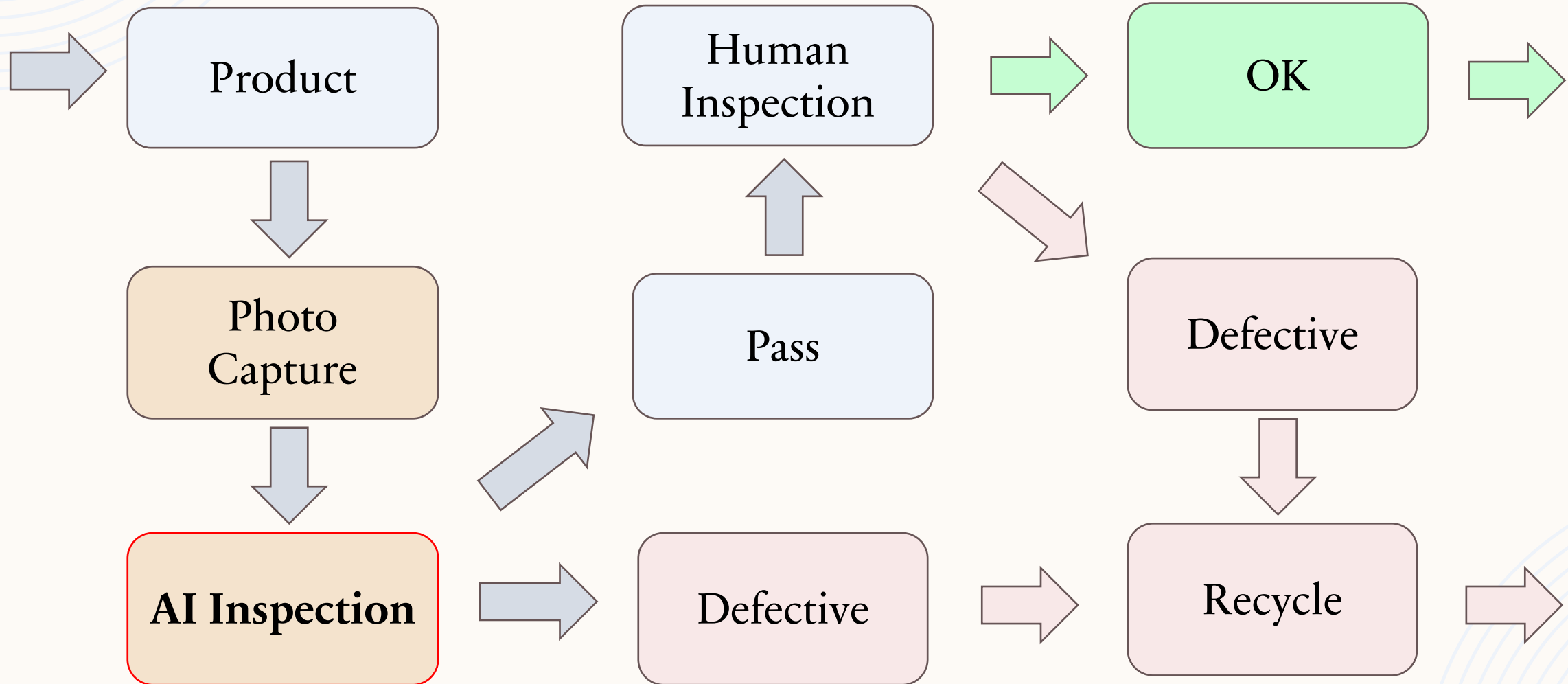
**Increased  
Operational Costs**

**Inconsistent  
Inspection Standards**



**Potential Quality  
Issues**

# The Solution



# Step 1 : Set up Photo Capture Station

- **Continuous Lighting Source:**

Utilization of dual Tungsten Light Bulbs for **consistent** and **uniform** illumination.

- **Temperature Regulation:**

Deployment of an Infrared Thermometer to ensure product temperatures are maintained between **12°C** and **35°C**.

- **Efficient Product Handling:**

Integration of a Conveyor Belt System for precise and automated transportation of products to the designated inspection area.

# Step 2 : Implement AI-Powered Inspection

- **Developing the AI Model:**

Training a **Neural Networks model** to integrate with Quality Control Software for advanced inspection capabilities.

- **Data Integration and Pipeline Creation:**

Establishing a pipeline for seamless transfer and processing of image data into the neural network model.

- **Automated Product Handling and Sorting:**

Utilizing AI model outputs to direct the automated transportation and sorting of products in the inspection area.



# Step 3 : Human Inspection

- **Misclassification Analysis:**

1. Inspect and identify misclassified products in both 'defective' and 'ok' categories.
2. Separate non-defective items from the 'defective' area.
3. Collect defective products from the 'ok' area for further analysis.

- **Model Improvement through Feedback Loop:**

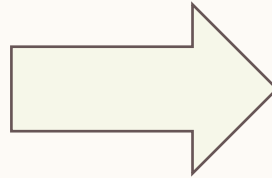
1. Reintegrate misclassified products into the training dataset.
2. Retrain the model with the updated dataset to enhance accuracy and reduce future misclassifications.

# Neural Networks Model Overview

- **Input:** 300\*300 Greyscale Images
- **Output:** Binary Classification Signals
  - 'ok': Product passes the quality check
  - 'defective' : Product fails due to defects.
- **Accuracy: 80.30% (2023/11/16)**
- **Loss: 0.65**
- **Maintenance: Improve model with new image data**

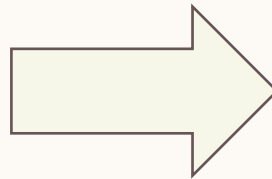
# Transforming Inspection

**Time-intensive**  
**Manual Operation**



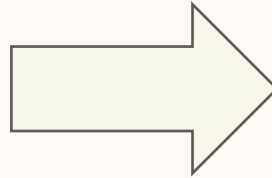
**Fast, Automatic**  
**90% AI-Powered**  
**Inspection**

**Heavy**  
**Human Resource Cost**



**One-Time investigation**  
with **Minimal**  
**Maintenance**

**Inconsistent**  
**Inspection Standards**



**Continually Enhance**  
**Accuracy Over Time**



# THANK YOU

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