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# Quality inspection and defect detection

Automatically inspects completed machined parts using CMM and vision systems, detects defects against CAD specifications, and routes parts for rework or approval. This reduces manual inspection time and ensures consistent quality standards across all production runs.

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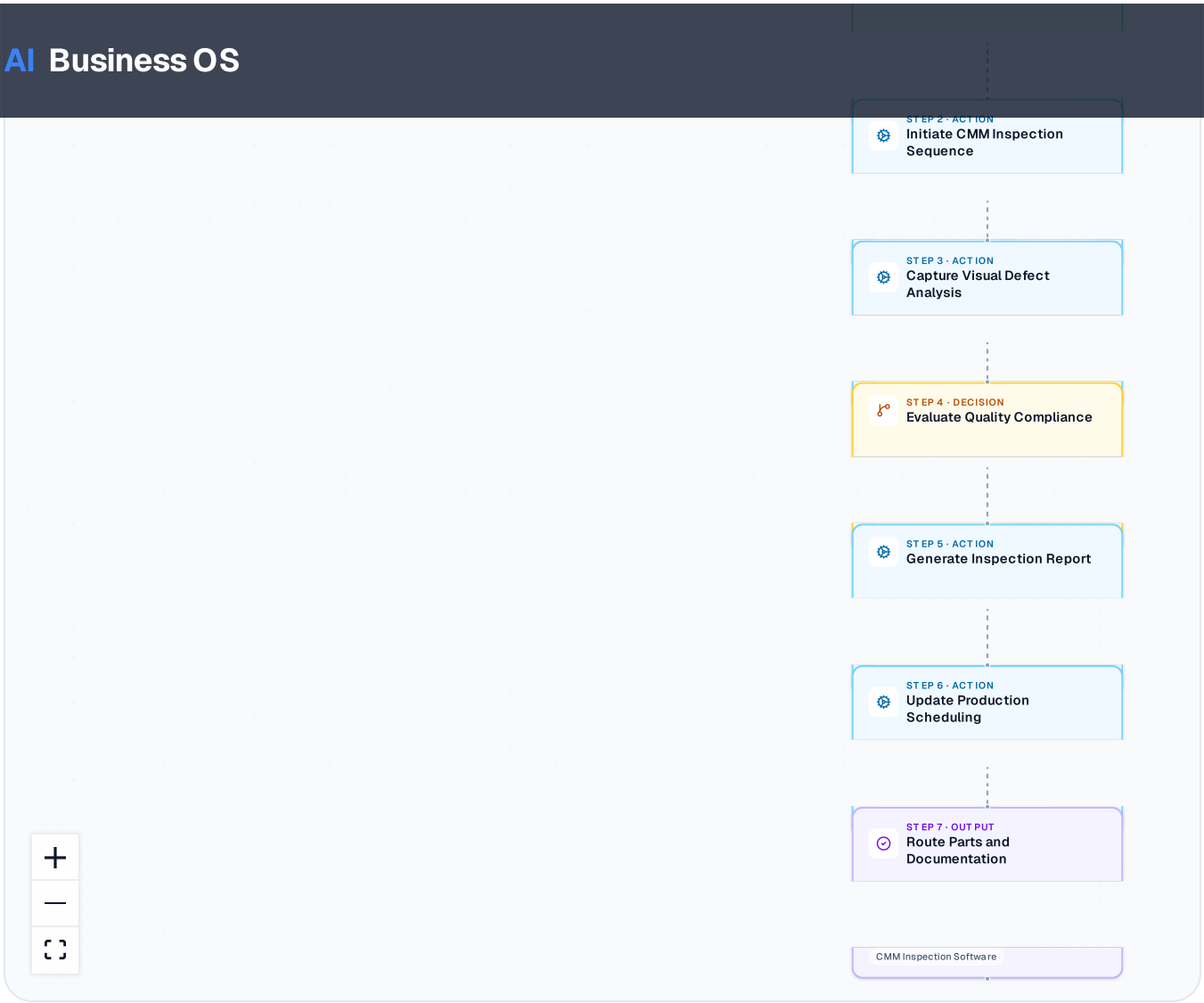
WORKFLOW TRIGGER

CNC machine completes part production cycle and signals completion to the AI operating system.

## Visual Flow

Each node represents an automated step. Connections show how data and decisions move through the workflow.




# Step-by-Step Breakdown

Detailed explanation of each automated stage in the workflow.

1

TRIGGER

## Part Production Completed

CNC machine finishes machining operation and automatically signals the AI system that a part is ready for quality inspection. The system retrieves the part specifications and tolerance requirements from the original CAD file.

FANUC CNC Controls | SolidWorks CAM

2

ACTION

## Initiate CMM Inspection Sequence

The automated CMM system loads the part and begins dimensional inspection based on the pre-programmed measurement routine. Critical dimensions, surface finishes, and geometric tolerances are measured against CAD specifications.

CMM Inspection Software | SolidWorks CAM

3

ACTION

## Capture Visual Defect Analysis

High-resolution cameras and vision systems scan the part surface for visual defects like scratches, burrs, or surface irregularities. AI algorithms compare the captured images against acceptable quality standards.

CMM Inspection Software

4

DECISION

## Evaluate Quality Compliance

The system analyzes all inspection data to determine if the part meets specifications. If all measurements are within tolerance and no visual defects are detected, the part passes; otherwise, it's flagged for rework or scrap.

CMM Inspection Software

5

ACTION

## Generate Inspection Report

A detailed quality report is automatically generated containing measurement results, visual inspection findings, and pass/fail status. The report is linked to the specific part serial number and production batch.

CMM Inspection Software

6

ACTION

## Update Production Scheduling

Failed parts trigger automatic rework orders in the production scheduling system, while passed parts are marked for packaging or next operation. CNC programming adjustments are suggested if patterns of defects are detected.

FANUC CNC Controls

Mastercam

7

OUTPUT

## Route Parts and Documentation

Approved parts are automatically routed to shipping or next production stage with digital certificates. Rejected parts are sent to rework queue with

specific corrective action instructions for operators.

CMM Inspection Software

## Outputs

- Digital quality inspection certificates
- Automated part routing decisions
- Defect pattern analysis reports

## Key Metrics

- First-pass quality rate percentage
- Average inspection cycle time
- Defect detection accuracy rate

## Tools & Integrations

- FANUC CNC Controls
- SolidWorks CAM
- CMM Inspection Software

- Mastercam

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