PHASE - V

COLLEGE CODE: 1133

COLLEGE NAME: VELAMMAL INSTITUTE OF TECHNOLOGY

DEPARTMENT: ELECTRONICS AND COMMMUNICATION ENGINEERINIG

STUDENT NM-ID: aut113323ecb60

ROLL NO: 113323106120

DATE: 07-05-2025

TECHNOLOGY-PROJECT NAME: QUALITY CONTROL IN MANUFACTURING

SUBMITTED BY,

NAME: YOKESH P

Phase 5: Project Demonstration & Documentation

Title: Quality Control in Manufacturing

Abstract:

The Quality Control in Manufacturing project aims to enhance product consistency and minimize defects through the application of standardized control measures, statistical quality tools, and real-time monitoring systems. In its final phase, the system incorporates automation-based inspection techniques, data analytics, and integration with Manufacturing Execution Systems (MES). This document provides a comprehensive report of the project's completion, covering the system demonstration, technical documentation, performance metrics, source code (if any), and testing reports. The project is designed to improve reliability, reduce human error, and ensure compliance with industrial quality standards. Screenshots, control charts, and sensor output snapshots will be included for a full understanding of the system's architecture and effectiveness.

1. Project Demonstration

Overview:

The Quality Control system will be demonstrated to stakeholders, showcasing its features, accuracy in defect detection, and real-time analysis. This demonstration highlights the use of inspection tools, statistical reports, and integration with process control systems.

Demonstration Details:

• System Walkthrough: A live walkthrough of the quality control interface, from sensor input or inspection data to defect logging and analysis.

• Defect Detection Accuracy: Demonstration of the system's ability to identify common defects in the manufacturing line.

• Real-Time Monitoring: Display of sensor data and machine output being analyzed in real time for compliance.

• Performance Metrics: Showcase of defect rate reduction, inspection time, and overall process efficiency improvements.

• Standards Compliance: Demonstration of how the system aligns with ISO and Six Sigma standards.

Outcome:

By the end of the demonstration, the system's capability to improve manufacturing quality, reduce rework, and streamline inspections will be presented to stakeholders.

2. Project Documentation

Overview:

Comprehensive documentation for the Quality Control system is provided to detail every aspect of the project. This includes system design, hardware/software modules (if applicable), and operational protocols.

Documentation Sections:

• System Architecture: Diagrams showing how inspection tools, sensors, and software components are integrated.

• Code Documentation: Explanation of automation scripts or software tools used for inspection and data analysis.

• User Guide: Instructions for operators and technicians on how to use the system and interpret quality reports.

• Administrator Guide: Guidelines for calibration, system maintenance, and troubleshooting.

• Testing Reports: Reports on detection accuracy, response time, and production line impact.

Outcome:

All technical and operational components of the system are fully documented to ensure smooth deployment and future scalability.

3. Feedback and Final Adjustments

Overview:

Feedback from supervisors, floor managers, and quality control teams will be collected to finalize the system.

Steps:

• Feedback Collection: Surveys and observational notes during trial runs of the system.

• Refinement: Adjustments based on usability feedback, false positives/negatives in defect detection, and report clarity.

• Final Testing: Post-adjustment testing to confirm resolution of all identified issues.

Outcome:

Refined system ready for implementation with optimized defect detection and user interface usability.

4. Final Project Report Submission

Overview:

The final report summarizes the goals, progress, achievements, and future outlook of the Quality Control in Manufacturing project.

Report Sections:

• Executive Summary: Objectives and overall project results.

• Phase Breakdown: Key developments in system setup, testing, and data analysis.

• Challenges & Solutions: Common manufacturing challenges tackled with quality control tools.

• Outcomes: Summary of quality improvements and cost savings achieved.

Outcome:

A full report capturing the project life cycle from concept to field deployment will be submitted for review.

5. Project Handover and Future Works

Overview:

Plans for maintaining and enhancing the quality control system.

Handover Details:

• Next Steps: Suggestions for predictive quality control, deeper MES integration, and advanced analytics.

Outcome:

The Quality Control system is officially handed over with documentation and proposals for continuous improvement.

SOURCE CODE:

```python
import random
import time

# Expected ranges
WEIGHT_RANGE = (95, 105)        # grams
TEMP_RANGE = (18, 22)           # °C

# Logs
product_log = []
defect_log = []

# Simulate weight and temperature reading
def get_weight():
    return round(random.uniform(90, 110), 2)

def get_temperature():
    return round(random.uniform(15, 25), 2)

# Inspection function
def inspect_products(n=8):
    for i in range(n):
        weight = get_weight()
        temp = get_temperature()
        status = "PASS"

        if not (WEIGHT_RANGE[0] <= weight <= WEIGHT_RANGE[1]):
            status = "FAIL (Weight)"
        if not (TEMP_RANGE[0] <= temp <= TEMP_RANGE[1]):
            status = "FAIL (Temp)" if status == "PASS" else "FAIL (Weight & Temp)"

```

```
        product_log.append({
            'Product': i + 1,
            'Weight (g)': weight,
            'Temperature (°C)': temp,
            'Status': status
        })

        if "FAIL" in status:
            defect_log.append(product_log[-1])

        print(f"Product {i+1}: Weight = {weight}g, Temp = {temp}°C => {status}")
        time.sleep(0.2)

# Run inspection
inspect_products()

# Optional: Display summary
print(f"\nTotal Products Checked: {len(product_log)}")
print(f"Defective Products: {len(defect_log)}")
```

OUTPUT:

```
PS C:\Users\BFL\python> & C:/Users/BFL/AppData/Local/Microsoft/WindowsApps/python3.13.exe c:/Users/BFL/python/ki
Product 1: Weight = 107.47g, Temp = 22.39°C => FAIL (Weight & Temp)
Product 2: Weight = 90.92g, Temp = 17.01°C => FAIL (Weight & Temp)
Product 3: Weight = 105.75g, Temp = 16.31°C => FAIL (Weight & Temp)
Product 4: Weight = 98.31g, Temp = 19.49°C => PASS
Product 5: Weight = 96.17g, Temp = 15.96°C => FAIL (Temp)
Product 6: Weight = 107.78g, Temp = 23.25°C => FAIL (Weight & Temp)
Product 7: Weight = 103.53g, Temp = 20.42°C => PASS
Product 8: Weight = 105.15g, Temp = 24.53°C => FAIL (Weight & Temp)

Total Products Checked: 8
Defective Products: 6
PS C:\Users\BFL\python>
```