

Smart Production Specialist



TRAINEE'S GUIDE

For Part #88-3300-0002

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INDUSTRY 4.0

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Smart Production Specialist Trainee's Guide

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For Part #88-3300-0002

October 2023

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1. Introduction

1.1. OVERVIEW

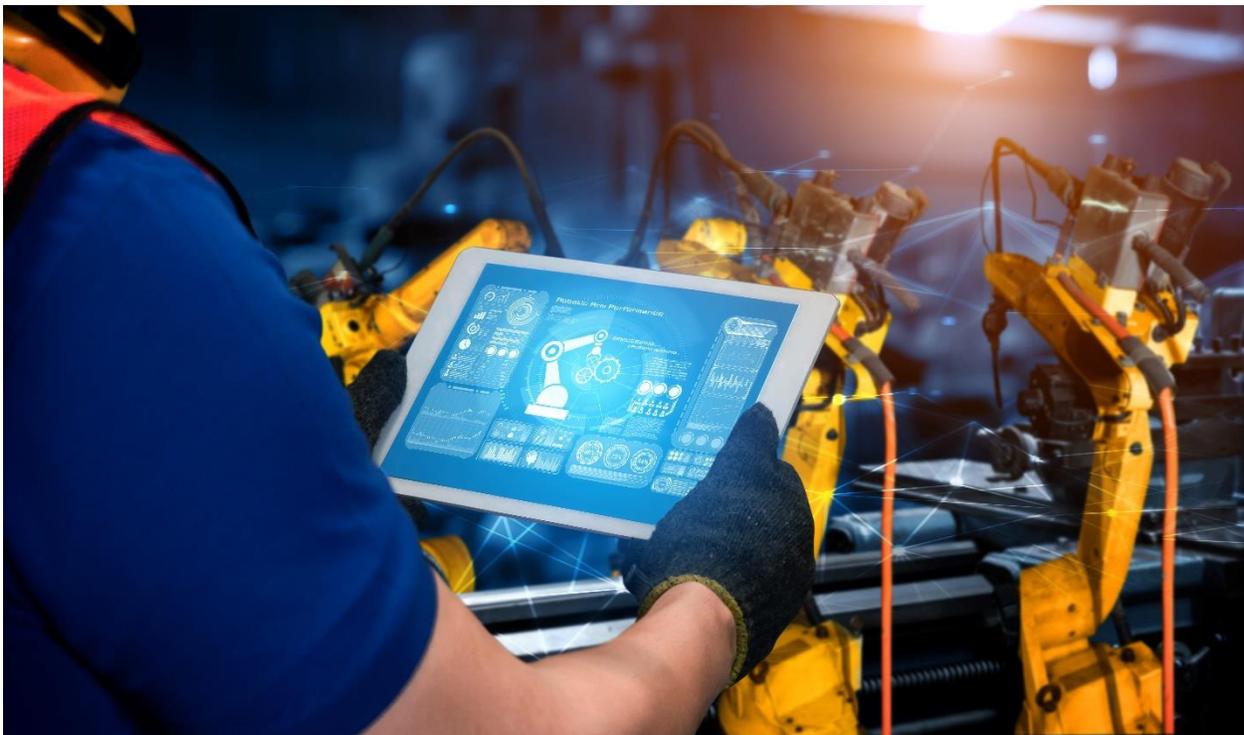
In this guide, you will demonstrate your aptitude for becoming a **smart production specialist** and be evaluated on the performance of tasks related to this profession.

Smart production specialists are professionals who are responsible for optimizing and managing production processes using advanced technologies and data-driven approaches. Their primary goal is to enhance efficiency, quality, and overall performance within a manufacturing or production environment. This role has become increasingly important as industries adopt Industry 4.0 principles, which involve the integration of digital technologies, automation, and data analytics into production processes.

1.2. PREREQUISITES

The following items must be completed in order to obtain Smart Production Specialist certification:

- The *Smart Devices for Industry 4.0* course
- Intelitek's PLC Technology courses
- The previous sections of this course: *Robotics, Automation, and Integration for Industry 4.0*.

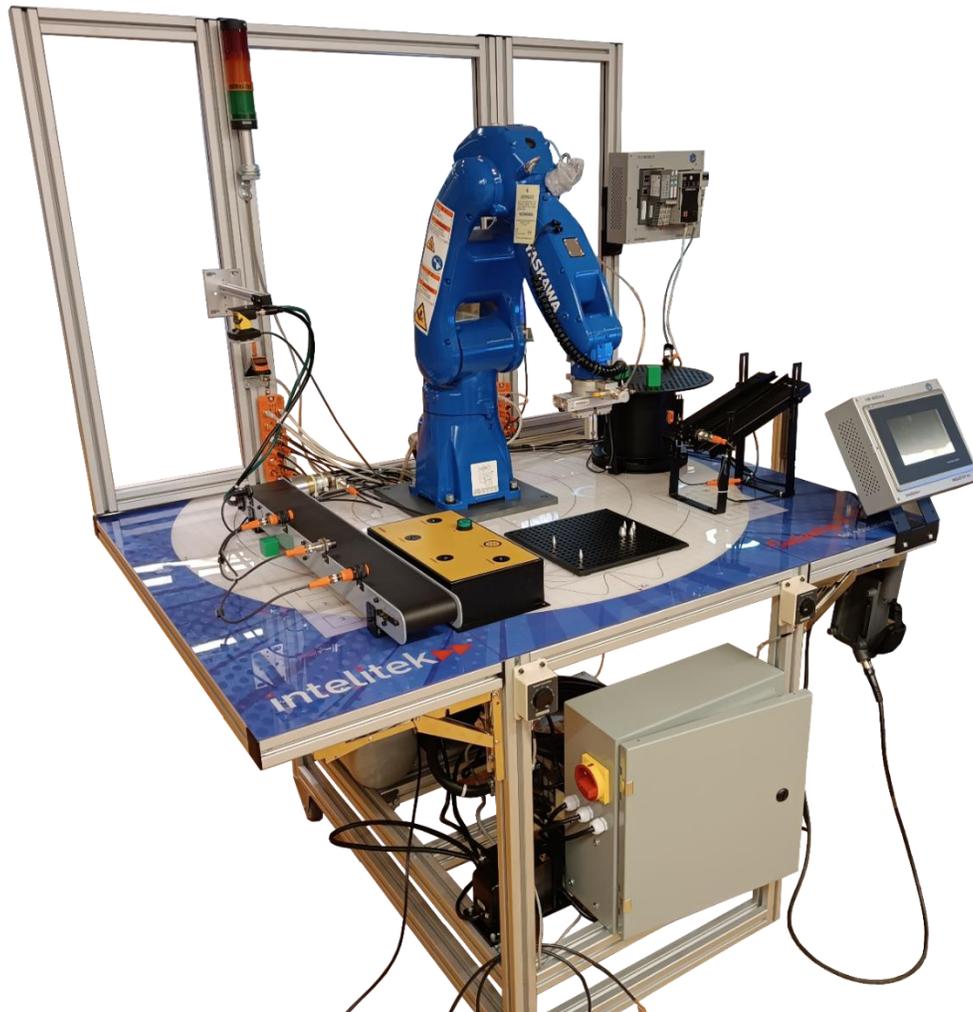


2. SmartCart Setup

2.1. INITIAL SETUP

Before proceeding with the sections below, ensure that the SmartCart 4.0 is set up for production. Ensure the following:

- The SmartCart is prepared for the Chocolate Box Project (see Activity 7-1).
 - The relevant projects have been downloaded to the PLC and HMI.
 - The robot controller and machine vision sensor contain the relevant jobs.
- The rotary table and gravity feeder are fully stocked with the required parts (i.e., boxes, lids, and colored cubes).
- The SmartCart IO-Link devices are set up for remote and Bluetooth monitoring.



3. Running Production Orders

3.1. OVERVIEW

In this section, you will perform a pre-production walkaround and execute production orders. Perform the instructions given. Your evaluator will introduce faults into the system and will assess you according to the directions given in the *Smart Production Specialist Evaluation Guide* and the *Smart Production Specialist Evaluation Checklist*.

3.2. WALK-AROUND AND EXECUTING BASIC PRODUCTION RUNS

In this subsection, you will prepare the system for production and initiate production runs. Perform the following:

1. Perform a pre-production walk-around of the equipment. Include the following visual inspections:
 - All required equipment is in the proper position, calibrated, and ready for use.
 - Check for any signs of damage, wear, or malfunction that might hinder the production process. Ensure that all components are properly fixtured.
 - Ensure that all safety mechanisms, such as emergency stop buttons, are functioning, and that the laser safety scanner is operating.
 - Verify that all necessary raw materials are available and properly organized in the storage areas (palletizing rack, rotary table, and gravity feeder).
 - Check for environmental conditions that might affect the production process, such as irregular temperature, humidity, and lighting.
 - Ensure that the production area is set up according to the planned workflow. This includes verifying the arrangement of the robot, conveyor, camera, and storage areas.
 - Verify that all utility connections – electricity and pneumatic air supply - are functioning as required.
 - Confirm that all Ethernet, power, and IO-link cables are properly connected to the relevant devices.
2. Aim to discover abnormalities in the system using four senses of observation: smell, sound, sight, and feel.
3. Initialize all equipment. Ensure the following:
 - All controllers, IO-Link masters, sensors, and other devices are powered on and running the relevant programs.
 - Visualization tools (HMI and Moneo screens) are running.
 - Networked devices are connected to visualization tools: The HMI and Moneo software are running and displaying sensor values.

4. Initiate a production run. Ensure that the production cycle is monitored via the HMI and the Moneo graphics/analytics dashboard.
5. Inform your evaluator once the production run has been completed.
6. Initiate three more production runs with different orders, i.e., with varying combinations of chocolates (colored blocks). Ensure the following:
 - There is no machine downtime.
 - You have determined the necessary restock levels of the storage equipment to satisfy planned orders.
 - You have determined necessary restock levels using historical reject rates and current inventory levels. Do not overstock storage.
7. Inform your evaluator once the production runs have been completed.
8. Restock the storage equipment as necessary. Present the current status of the SmartCart to your evaluator.

3.3. REACTING TO A MALFUNCTION

In this subsection, you will re-initiate production after a fault causes production to stop. Perform the following:

3.3.1. First Fault

1. Initiate a production run. Ensure that it is completed successfully.
2. Your evaluator will intentionally cause a malfunction that will halt production. Wait until the evaluator has completed this.
3. Initiate a second production run and wait until production comes to a stop due to the malfunction.
4. Investigate the nature of the malfunction.
5. Identify the fault. Explain to your evaluator about how you discovered the fault.
6. Repair the malfunction.
7. Test the component that caused the fault. Ensure that it is operating properly.
8. Ensure that all sensors are in operation and that the HMI and Moneo dashboard are displaying accurate data.
9. Reinitialize system operation.
10. Inform your evaluator once production has been completed.

3.3.2. Second Fault

1. Your evaluator will intentionally cause another malfunction that will halt production. Wait until the evaluator has completed this.
2. Initiate a third production run and wait until production comes to a stop.
3. Investigate the nature of the malfunction.
4. Identify the fault. Explain to your evaluator about how you discovered the fault.
5. Repair the malfunction.
6. Test the component that caused the fault. Ensure that it is operating properly.
7. Ensure that all sensors are in operation and that the HMI and Moneo dashboard are displaying accurate data.
8. Reinitialize system operation.
9. On occasion, faults or other issues may need to be *escalated*. "Escalation" in this context means taking the issue to a higher level of authority or expertise for resolution when the immediate team or resources are unable to effectively address the problem. It involves bringing the issue to the attention of individuals or teams with more decision-making power, knowledge, or resources to handle the situation.

When do faults require escalation? Provide at least four examples/scenarios of when a fault requires escalation.

3.4. SLOWED PRODUCTION CYCLES

In this subsection, you will identify and correct faults in order to fix slowed production cycles. Perform the following:

3.4.1. First Fault

1. Initiate a production run. Ensure that it is completed successfully.
2. Your evaluator will intentionally cause production to slow. Wait until the evaluator has completed this, and then initiate a second production run.
3. Observe the production cycle. Investigate what is causing the slowdown of operation.
4. Identify the fault. Explain to your evaluator about how you discovered the fault.
5. Correct the fault.
6. Test the component that caused the fault. Ensure that it is operating properly.

- 7. Ensure that all sensors are in operation and that the HMI and Moneo dashboard are displaying accurate data.
- 8. Reinitialize system operation.
- 9. Inform your evaluator as soon as the full production cycle has been completed.

3.4.2. Second Fault

- 1. Initiate another production run.
- 2. Your evaluator will intentionally cause production to slow. Wait until the evaluator has completed this.
- 3. Observe the production cycle. Investigate what is causing the slowdown of operation.
- 4. Identify the fault. Explain to your evaluator about how you discovered the fault.
- 5. Correct the fault.
- 6. Test the component that caused the fault. Ensure that it is operating properly.
- 7. Ensure that all sensors are in operation and that the HMI and Moneo dashboard are displaying accurate data.
- 8. Reinitialize system operation.
- 9. Inform your evaluator as soon as the full production cycle has been completed.
- 10. What is the potential impact of slowed operation on the meeting of production requirements?

4. Maintenance

In this section, you will make observations and answer questions regarding system maintenance.

1. Observe the Moneo graphs and analytics dashboard, especially with regards to the RPM and pressure sensors. Is immediate maintenance required? Justify your answer.

2. Based on the historical data, determine if preventative maintenance is required, and justify your answer in the space below. For example, which dashboard values or data that would indicate that a machine requires maintenance?

3. If maintenance is required, initiate a work order by describing the required maintenance work in the space below.

5. Workflow Improvements

In this section, you will suggest workflow improvements and complete a Kaizen report. Perform the following:

1. Identify any workflow improvements and discuss them with your evaluator.
2. A Kaizen report is a document that summarizes the results and findings of a Kaizen event or activity. Kaizen is a Japanese term that means "continuous improvement," and it refers to the practice of making small, incremental changes to processes, systems, and practices in order to enhance efficiency, quality, and overall performance. A Kaizen template is provided on the course page.

Download, print, and complete the report. Present the report to your evaluator once it has been completed.

