Future Skills

TEST PROJECT

Industry 4.0

Task B

worldskills Kazan 2019

CONTENTS

INTRODUCTION TO TEST PROJECT

This Test Project proposal consists of the following documentation/files:

1. CP-L-WSK_iDrill_20190718_V15.1_Day1_Task1_2.zap15_1	(TIA Portal project for the CP-Lab iDrilling Station, prepared for the Task A and Task B)
2. CP-AM-iDrill_Siemens_v1.03_20180702.projectarchive	(Original CODESYS project for the iDrilling Station)
3. CP Factory - CP Lab iDrilling Electrical Schematic.pdf	(Electrical Schematics of the CP-Lab iDrilling Station)
4. CP Factory - CP Lab iDrilling Manual A003.pdf	(User Manual of the CP-Lab iDrilling Station)
5. WSK2019_Task_B_Documentation.docx	The template file for documenting Task specific requirements

INTRODUCTION

The Test Project Task B represents following scenario:

- After identification of the functionalities of the existing machine, two technicians discuss the possible improvements and upgrading steps

Task B: Software project design and development

The Task is based on the insertion of some HW components, their integration into existing PLC program (main PLC) and further developments of HMI GUI.

The 1st part of the Task B: The first step in retrofitting of an I3.0 to I4.0 machine is the integration of a RFID Reader/Writer. The module has to be functional to exchange the information with RFID Tag of the carrier of the material (which has to be treated). To ensure the RFID Tag is positioned right above the RFID Reader/Writer, an integration of a Stopper is needed. It has to physically stop the carrier on the specific place, to place the RFID Tag right above the RFID Reader/Writer. Four (4) sequential inductive switches as an additional way of the identification of the carrier and the material, have to also be integrated into the system.

The appropriate PLC variables, related to three (3) above-mentioned HW sets, have to be assigned.

The 2nd part of the Task B: The very first main PLC “TIA Portal” project upgrade is to control the machine updated that way to integrate physically embedded RFID Reader/Writer. The appropriate control block with almost completed functionality of the RFID Reader/Writer is already integrated. Data exchange and enabling have to be performed. Information read from the RFID may be found in already developed part of the HMI: GUI menu Setup/Stopper.

During the production system development, the HMI GUI programmer left a Tab/Menu "WSK2019" empty for further developments. Some active elements/options are presented.

The HMI GUI Screen "WSK2019" has to provide manual control of some of the functionalities of the machine. Therefore, the GUI has to contain the following:

1. Control elements to:
   - **Reset** (Resetting the System to the starting state)
   - **Setup** (Going to Manual working mode)
   - **Cycle End** (Ending of the Manual working mode)
   - move **Stopper Up**
   - move **Stopper Down**
   - move **Conveyor** to the **Right** and **Right slow**
   - move **Conveyor** to the **Left** and **Left slow**
   - **Enable/Disable** of the **RFID** Reader/Writer
   - Choosing the Drilling Program 1, 2 or 3, with the appropriate **button to start** the execution of the chosen Drilling Program
     - *Drilling Program **1***: Drill on the left;
     - *Drilling Program **2***: Drill on the right;
     - *Drilling Program **3***: Drill on both sides

2. Display the:
   - **Conveyor** moving to the **Right** (if it is active)
   - **Conveyor** moving to the **Left** (if it is active)
   - Actual state of the **Stopper Up**
   - Actual state of the **Stopper Down**
   - **Ready** (System is ready to drill)

- **Busy** (System is in the execution/drilling mode)
- **Initial Position** (System is referenced)
- **Returned Value** (Feedback of the System to the execution of a drilling operation: Error, Done).

To be sure the RFID Writer function is operational, technicians have to write the following info to the RFID Tag:

- "Carrier ID = 1" and
- "State code = 3"

and to read out the same info.

Exported “TIA Portal” project to the working USB stick will be permanently stored to the company’s server.

INSTRUCTIONS TO THE COMPETITOR

Each Task the Competition Teams will get a USB stick with two folders:

- **Competition documents**, containing all software files, Test Project Task descriptions, explanations and other important documents
- **Competition results**, containing the Documenting template to document Task specific requirements

The Competitors will use their own PCs to handle the above-mentioned files.

The Competitors should work in team. By the specific tasks they should Split themselves to the “Task worker” and the „Documentary worker“: One works on a task, the other make snapshots, creates the documentation.

EQUIPMENT, MACHINERY, INSTALLATIONS, AND MATERIALS REQUIRED

There is no any equipment or material is required that is not listed in the Infrastructure List

ITEM	QUANTITY	MATERIAL	DESCRIPTION	NOTES

MARKING SCHEME

TASK	CRITERIA	ASSESSMENTS		
		BY JUDGEMENT	BY MEASUREMENT	TOTAL
A	*Analysing of the existing hardware, Hardware Set-up, PLC/HMI Programming*	*2*	*13*	*15*
B	Retrofit from I3.0 to I4.0	1	14	15
C	*Data Security 1*	*0*	*13*	*13*
D	*Data Security 2*	*0*	*7*	*7*
E	*Smart Maintenance*	*2*	*27*	*29*
F	*Production, Optimization, Evaluation, Reporting*	*6*	*14*	*20*
Total =		13	87	100