SCNC
SKILLS CANADA
NATIONAL COMPETITION

OCMT
OLYMPIADES CANADIENNES
DES MÉTIERS ET
DES TECHNOLOGIES

Skills Compétences Canada
Edmonton2018

TEST PROJECT DAY 1 / PROJET D'ÉPREUVE JOUR 1

INDUSTRIAL CONTROL

CONTRÔLE INDUSTRIEL

POST - SECONDARY /
NIVEAUX POSTSECONDAIRE

SkillsCompétences Canada
Edmonton2018

TABLE OF CONTENT

1. INTRODUCTION

1.1 General

With this challenge, we will assess your abilities in the following criteria:

a) Ability to analyze technical data.
b) Quality of wiring.
c) Capacity to implement an automatic process.
d) Troubleshooting techniques.
e) Abilities for error detection.

1.2 Step A: Installation of Electrical Raceways and Components as per specifications

Part of all process type projects is the installation of the raceways and components that function as inputs and outputs. We will assess the quality of your installation, interpretation of site drawings, and precision of equipment placement.

1.3 Step B: Wiring an automated process within a panel

As a technician, you should have the ability to completely wire a system and make the necessary modifications. We will assess the quality of your manual work, the organization of components, and the use of materials provided.

1.4 Step C: Programming the automated process

You are provided with a function, and you must program the automated process with your PLC and the provided VFD. The system must be functional, and adhere to the instructions.

1.5 Step D: Commissioning, Start-up and Troubleshooting

Your ability to validate the safety of your installation prior to power up and/or detect and solve problems will be assessed.

2. Conductors

2.1 Size and use

1. Power connections must be 14 AWG gauge.
2. Control conductors must be 16 AWG gauge.
3. Ground conductors must be 18 AWG gauge.
4. Any exceptions to paragraphs 1, 2 & 3 will be specifically mentioned on the drawings.

2.2 Colour Code

The following colour code must be used to distinguish circuits:

1.	Single phase	Identified Conductor	→ White
		Line	→ Red
2.	Three phases	Line	→ Red, Black, Blue
3.	DC Control		→ Blue
4.	Bonding/Grounding		→ Green
5.	Input/output	18/2 Cable	→ White
			→ Black
		18/3 Cable	→ Red
			→ Black
			→ White
6.	Motor Connections	14/4 Cable	→ Red
			→ Black
			→ White
			→ Green

3. General Description

3.1 Process Description

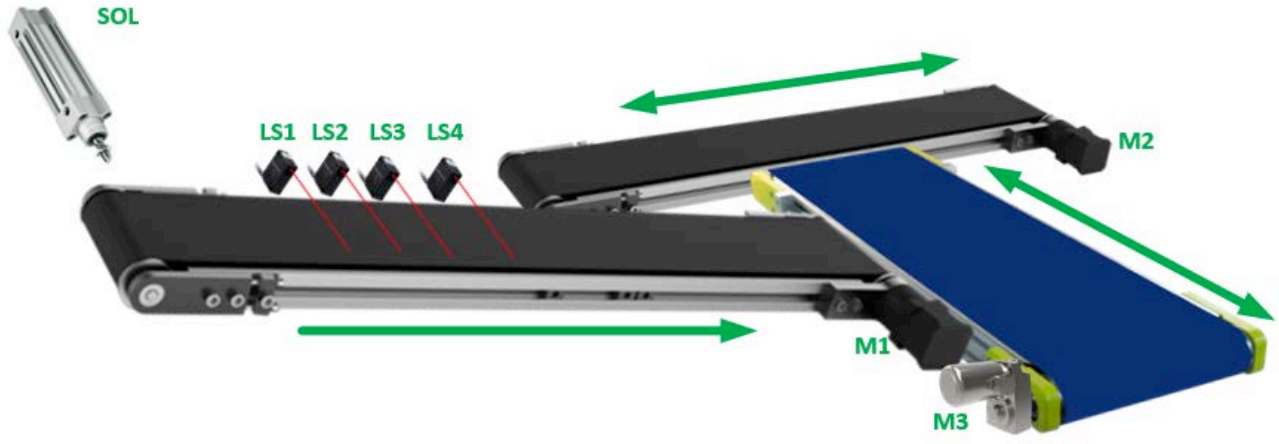
Edmonton International Airport (EIA) is the primary air passenger and air cargo facility for the Province of Alberta's capital city, Edmonton. Additionally, it is a hub facility for Northern Alberta and Northern Canada providing regularly scheduled nonstop flights to over fifty communities in Canada, the United States, Latin America and Europe. It is Canada's largest major airport by total land area, and 5th busiest airport by passenger traffic. The Trade 19 project represents that portion of automated process for sorting and transporting passenger luggage within EIA.

3.2 Process Equipment Description

The system consists of the following components:

- Control panel equipped with:
  - Green (L1), Amber (L2) & Red (L3) stack lights
  - Emergency Stop push-pull button (PB1)
  - Green (PB2), Red (PB3) and Black (PB4) momentary push buttons
  - Maintained 3 positions selector switch (SS1 & SS2)
  - Green (L4), White (L5) and Red (L6) pilot lights
- Unidirectional Sorting Belt Conveyor, driven by the motor M1 (fed by K1 contactor)
- Bidirectional Distribution Belt Conveyor, driven by the motor M3 (fed by the VFD)
- Bidirectional Size Belt Conveyor, driven by the motor M2 (fed by K2 contactor)
- Optical sensors [replaced by limit switches for the purpose of this contest] (LS1 to LS4)
- A pneumatic actuator, driven by a solenoid (SOL)

3.3 – Process Diagram



4. Technical Details

4.1 Emergency Stop Circuit

The system is equipped with a general Emergency Stop push-pull button.

The Emergency Stop button mounted on the Control Panel Door will be used in conjunction with a 24Vdc relay (non-PLC) to create a Master Control Relay (MCR)/Emergency Stop Circuit. The 24Vdc relay will be equipped with both normally-open and normally-closed contacts, as required.

When the Emergency Stop button is depressed, The Master Control Relay/Emergency Stop Circuit will de-energize all of the PLC's outputs.

All of the PLC's outputs shall remain de-energized until the Emergency Stop button is reset (pulled).

The following tables are a recommended assignment of the inputs and outputs for your programmable control. As controllers vary in how they are connected and function, you must check your particular PLC to see if these assignments are suitable.

4.2 - Inputs

Input Detail	Symbol	Contact Type	PLC inputs Assignment
Master Control Relay / Emergency Stop Circuit	MCR	NO	In0
Green push button	PB2	NO	In1
Red push button	PB3	NC	In2
Black push button	PB4	NO	In3
3 positions Selector Switch 1 - Left Position	SS1_1	NO	In4
3 positions Selector Switch 1 - Right Position	SS1_3	NO	In5
3 positions Selector Switch 2 - Left Position	SS2_1	NO	In6
3 positions Selector Switch 2 - Right Position	SS2_3	NO	In7
Contactor K1 Overload	K1_OL	NO	In8
Contactor K2 Overload	K2_OL	NO	In9
VFD fault	VFD_FLT	NO	In10
Optical sensor 1	LS1	NC	In11
Optical sensor 2	LS2	NC	In12
Optical sensor 3	LS3	NC	In13
Optical sensor 4	LS4	NC	In14

4.3 Outputs

Output Detail	Symbol	PLC outputs Assignments
Green stack light	L1	Q0
Amber stack light	L2	Q1
Red stack light	L3	Q2
Green pilot light	L4	Q3
White pilot light	L5	Q4
Red pilot light	L6	Q5
Contactor K1	K1	Q6
Contactor K2 Forward	K2_F	Q7
Contactor K2 Reverse	K2_R	Q8
Solenoid	SOL	Q9
(Spare / not used)	-	Q10
VFD Digital Input 02 (Forward command)	VFD02	Q11
VFD Digital Input 03 (Reverse command)	VFD03	Q12