

Skills Canada National Competition

SCOPE DOCUMENT

SCOPE DOCUMENT	
Competition Year	2012
Competition location	Edmonton, AB
Trade Number	4
Trade Name	Mechatronics
Level	Post-Secondary

1. INTRODUCTION

1.1 Purpose of the Challenge.

- The goal is to provide competitors with the opportunity to demonstrate certain skills and knowledge that every technician must have in the field of Industrial Automation and Control Technology. These skills will be judged on a practical demonstration of abilities to complete the mechanical, electrical and pneumatic assembly of a modular system as well as creating and commissioning the controls based on a documented working sequence using a Programmable Logic Controller (PLC). Team of two participants.
- Open to Mechatronics, Industrial Automation & Robotics, Electronics, Electromechanical and Mechanical Technologies sectors.

1.2 Duration of contest.

12 hours (6 hours a day for 2 days)

1.3 Skills and Knowledge to be tested.

- General Electrical and Mechanical knowledge
- Interpret and use electronic, electrical or mechanical schematics.
- Render operational and modify sequential mechanism that have a PLC.
- Commissioning electrical, pneumatic and mechanical systems.
- Programming a PLC
- Skilful troubleshooting techniques
- Speed of execution
- System Optimization (increasing the system performance)
- Professional workmanship
- Know-how to look for information efficiently in industrial equipment documentation

2. CONTEST DESCRIPTION

2.1 List of documents produced and timeline for when competitors have access to the documents.

DOCUMENT	DATE OF DISTRIBUTION VIA WEBSITE
No other documents will be posted prior to the competition	

2.2 Tasks that may be performed during the contest

- Install mechanical modules with proper alignment
- Wire solenoid valves and proximity sensors according to schematics
- Pneumatic tubing for cylinders, valves terminals and service unit according to schematics
- Write a PLC program according to instructions
- Conduct maintenance task by replacing various components in the system
- Debug and troubleshoot the assembly to operate according to instructions
- Optimize the system performance
- Modify mechanical setup to support requirements

3. EQUIPMENT, MATERIAL, CLOTHING

3.1 Equipment and material provided by Skills/Compétences Canada

- Modular Processing Stations (MPS®): A model of a real product handling & production system from Festo Didactic.
- Pneumatic Tubing
- Wires
- Tie-wraps
- Compressed Air
- A 120 VAC power bar will be provided to each team complete with electrical power (15 amps).

3.2 Equipment and material provided by the competitor

- 2x PLCs with at least 16 Inputs / 16 Outputs **each** plus computer with the PLC programming software and other necessary cables and tools.
 - A power supply (120 VAC to 24VDC) rated at least 4.5 amps should be used to power **each** PLC and the MPS station.
 - All PLC inputs shall be sinking inputs. The sensors and buttons shall switch (source) +24VDC to each PLC input. Sensors are PNP type and shall source the current and the PLC input module will sink the current.

- All PLC outputs shall be sourcing outputs. The output shall switch (source) +24VDC to turn an individual load on. The load shall sink the current to 0VDC (Ground).
 - The PLC outputs should be at least 400 mA. All I/Os are 24VDC.
 - Each team would have their own table. Mounting the PLC on a back-plate is recommended.
 - 2x SysLink cable connectors (IEEE 488) should be connected to each PLC (4 in total)
 - Each would connect 8 I/Os to the PLC: One cable would connect from the PLC to the MPS station containing sensors and solenoid valves. The other cable would connect from the PLC to the control panel, which contains operator devices such as pushbuttons, switches and pilot lights.
 - Please see the last page of this document for the wiring details.
 - There are no restrictions on the wiring to the PLC but it is recommended to have the same wiring instruction that comes with the SysLink cables. The only wirings that are checked in the competition are the ones connected to the MPS station terminal.
 - These cables should be connected to the PLC before the competition.
 - Multimeter (VOM)
 - Set of Screwdrivers.
 - Set of Allen metric keys.
 - Set of Open ended metric wrenches Wire strippers and cutter
- Note: The computers used for programming the PLC could have any other software application and could contain any files. However, NO Internet connection would be allowed on any computer and NO PDA or Cell phone should be used during the competition.

3.3 Required clothing (provided by competitor)

- Competitors are to be dressed in a clean and appropriate manner. The Mechatronics contest recommends that you wear long pants, belt and socks.
- T-shirts and/or lab coats may be provided to competitors.

4. SAFETY REQUIREMENTS

- 4.1** At the discretion of the judges and technical chair any competitor can be removed from the competition site for not having the proper safety equipment and/or not acting in a safe manner.
- 4.2** Jewellery such as rings, bracelets and necklaces or any deemed unsafe by competition judges shall be removed*
- 4.3** Proper shop attire is to be worn (no loose straps, baggy sleeves etc.). Or any item deemed unsafe by competition judges.*
- 4.4** *Competition judges will have final authority on matters of safety.

4.5 List of required personal protective equipment provided by competitors

No PPE required

4.6 List of required personal protective equipment provided by Skills/Compétences
Canada

No PPE required

5. ASSESSMENT

5.1 Point breakdown

POINT BREAKDOWN
Commissioning and Operating 10%
Maintenance / Troubleshooting 20%
Optimization / programming 20%
Sliding Time (Fully functional system) 50%

6. ADDITIONAL INFORMATION

6.1 Consecutive translation

If consecutive translation is required on site, the Skills/Compétences Canada Provincial/Territorial offices must advise Skills/Compétences Canada National Secretariat a minimum of 1 month prior to the competition or this service might not be guaranteed.

6.2 Tie (No ties are allowed)

In case of a tie, the judges may prepare a supplementary task for gold, for other may subjectively reevaluate overall performance, (or vote).

6.3 Competition rules

Please refer to the competition rules for all general SCNC information.

7. NATIONAL TECHNICAL COMMITTEE MEMBERS

Region	Name	Email address
Quebec	Frederique Morel	frederique.morel@ca.festo.com
Nova Scotia	Kelly Tompkins	Kelly.tompkins@nsc.ca
Alberta	Neil Wenger	nwenger@nait.ca
Ontario	Ali Khoshamouz	khos@de.festo.com