

Trade Description for St-Gallen 2003
Trade 4 Mechatronics
June 2003

The International Vocational Training Organisation IVTO determine, by decision of the General Assembly and in accordance with the Constitution, the Standing Orders and the Competition Rules, the following minimum requirements for trade No. 4.

1. Name and description of the trade

1.1 The name of the trade is Mechatronics (D=Mechatronik, F=Mécatronique)

1.2. The theoretical and practical training of the mechatronics technician is concerned with the mechanical, hydraulic, pneumatic and electronic equipment in a manufacturing or assembly plant.

1.3 The mechatronics technician works mainly in manufacturing or assembly plant in the design, installation, commissioning and maintenance of software-driven, electronically-controlled equipment.

2. Scope of work at the IVTC

2.1

The competitors must be able to

- to solve logic problems
- to carry out system design
- to assemble a machine according to documentation
- to design a program for controlling a machine
- to connect a machine to its control system
- to commission the machine to carry out its correct function to solve a series of practical operational problems as set by the experts
- to document procedures carried out
- interpret appropriate forms of technical documentation (e.g. circuits, displacement-step diagram)
- design electrical and pneumatic circuits by hand or by using commercially available software

2.2

There will be two competitors per team. The experts were unanimous in its recommendation to keep the team of 2. The competition can include team and individual events. Eleven of the expert team recommend that competitors are not to exceed 22 years of age in the year of the competition. Nine supported the age of 25.

3. Practical Work

3.1. Design

The project is to be design using the industrial components in accordance with specifications. Optimisation may be included in the project.

3.2 Assembly and connection

The project is to be assembled using the industrial components in accordance with the instructions and documentation or own design.

The speed of assembly of known stations will not be a criteria. The assessment of the quality of assembly must reflect industrial standards and professional practice.

Connections are to be made according to instructions and documentation to ensure correct function of the machine. Any circuit diagrams necessary for successful completion of the project are to be included.

3.3 Commissioning

The machine must be made to function in accordance with the instructions, documentation and professional practices. No deliberate faults are to be introduced.

3.4 Troubleshooting

There may be a series of multiple problem troubleshooting sections which will draw on a prepared set of faults, preferably with computer-generated random selection immediately prior to their use.

WorldSkills Competition Trade Description for St-Gallen 2003 Trade 4 Mechatronics June 2003

3.5 Information Technology

Tasks must be included to test the competitors' ability to carry out system programming. Documentation produced by competitors and communication may also be included.

4. Theoretical knowledge

4.1 Mechanical design

An ability to understand and design mechanical systems. This must include a knowledge of pneumatic and hydraulic systems, their standards and their documentation.

4.2 Circuit design

The ability to understand and design electrical circuits in machine/controller systems.

4.3 Industrial controllers

An understanding of the configuration of the industrial controller and how a software program relates to a machine action.

4.4. Software programming

The ability to write programs to control machine and visualise the process and operation using softwares.

4.5. Analytical Techniques

They must master problem solving techniques.

5. Test project materials

A general description of the previous test work, including sample of competition schedule is to be made available.

5.1 Material

A number of programmable logic controllers per team as specified by the project team. Specifications are to be published at least 6 months before the competition.

5.2

Pre-competition on-site training to be a maximum of 8 hours.

5.3

The total time for the competition will be between 18 and 22 hours

5.4 Tools for competitors

Any commercially available tools may be used. This is subject to approval by the Safety Officer.

Competitors must supply their own tools
Competitors must bring all software required for the PLC they have selected.
It is the responsibility of their expert to check software compatibility. The team is responsible for the provision connectors, adapters, plugs, interfaces suitable for the host country.

6. Workshop installations

6.1

The work area should provide enough space to work in teams of two with the usual facilities for experts, material and tool storage.
The layout should be designed for public access and maintain equal exposure of visitors to each competing team. The competitors' area must be at least 1.5 metres from the visitor barrier.

6.2

A soundproof conference room for experts must be provided for up to 25 people and have photocopier facilities.

6.3

The competitors' work area dimension is to be a minimum of 5 x 3 metres (see appendix 1 for layout). Equipment store in addition to the competitors' work areas and administration section needs to be centrally located (dimensions 25 sq.m.).

6.4 Work station

WorldSkills Competition
Trade Description for St-Gallen 2003
Trade 4 Mechatronics
June 2003

Stand for equipment plus working surface

At least a Pentium PC with standard English operating system and printing facilities for each workstation

A further system must be provided for experts

6.5 Safety

Work clothes must comply with relevant codes. A first aid kit must be available throughout the competition. Work must be done according to general safety document.

7. Test project and marking

7.1

All documentation presented must be available in digital form.

7.2

There is to be a majority agreement (minimum = 50% + 1) to accept competition marking scale.

7.3

Selection of appropriate projects based on 7.2
The expert team may make modifications to the proposed project.

7.4.

Results may be displayed in the competition area.

7.5

All marking will be objective in accordance with the marking scale. Only Form 6 will be required for the submission of marks

Marking is designed to be entered after each section and a program has been written for computer calculation after time and task data has been entered.

A sample marking scale and instructions for juries from the Mechatronics previous competition are to be attached to the Trade Description.

7.7

Experts are to complete a Score Sheet for each section and team.

7.8 Rating

Item

Design	5 - 15
Assembly	10 - 15
Programming	30 - 35
Commissioning	15 - 20
Troubleshooting	20 - 30

Conversion from 100 to the 400 to 600 scale will be computerised.

Signed

09 –17-2001

The Expert Team Seoul 2001