

WORLDSKILLS STANDARD SPECIFICATION

Skill 04

Mechatronics





THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

GENERAL NOTES ON THE WSSS

The WSSS specifies the knowledge, understanding and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSSS).

The skill competition is intended to reflect international best practice as described by the WSSS, and to the extent that it is able to. The Standards Specification is therefore a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding.

The Standards Specification is divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards Specification. The sum of all the percentage marks is 100.

The Marking Scheme and Test Project will assess only those skills that are set out in the Standards Specification. They will reflect the Standards Specification as comprehensively as possible within the constraints of the skill competition.

The Marking Scheme and Test Project will follow the allocation of marks within the Standards Specification to the extent practically possible. A variation of five percent is allowed, provided that this does not distort the weightings assigned by the Standards Specification.

WORLDSKILLS STANDARDS SPECIFICATION

SECTION	RELATIVE IMPORTANCE (%)
1	10
Work organization and management	
The individual needs to know and understand: <ul style="list-style-type: none">• Principles and applications of safe working generally and in relation to mechatronics• The purposes, uses, care and maintenance of all equipment and materials, together with their safety implications• Environmental and safety principles and their application to good housekeeping in the work environment• Principles and methods for work organization, control and management• Principles of team working and their applications• The personal skills, strengths and needs that relate to the roles, responsibilities and duties of others individually and collectively• The parameters within which activities need to be scheduled	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Prepare and maintain a safe, tidy and efficient work area • Prepare self for the tasks in hand, including full regard to health and safety • Schedule work to maximize efficiency and minimize disruption • Select and use all equipment and materials safely and in compliance with manufacturers' instructions • Apply or exceed the health and safety standards applying to the environment, equipment and materials • Restore the work area to an appropriate state and condition • Contribute to team performance both broadly and specifically • Give and take feedback and support 	
2	Communication and interpersonal skills	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The range and purposes of documentation in both paper and electronic forms • The technical language associated with the skill • The standards required for routine and exception reporting in oral, written and electronic form • The required standards for communication with clients, team members and others • The purposes and techniques for generating, maintaining and presenting records 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Read, interpret and extract technical data and instructions from documentation in any available format • Communicate by oral, written and electronic means to ensure clarity, effectiveness and efficiency • Use a standard range of communication technologies • Discuss complex technical principles and applications with others • Complete reports and respond to issues and questions arising • Respond to clients' needs face to face and indirectly • Arrange to gather information and prepare documentation as required by the client 	



3	Developing mechatronics systems	20
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Principles and applications for <ul style="list-style-type: none"> • Designing, assembling and commissioning a mechatronics system • The components and functions of hydraulics systems • The components and functions of electrical and electronic systems • The components and applications of drives • The components and applications of industrial robotics systems • The components and functions of PLC systems • Principles and applications of design and assembly of mechanical systems including pneumatic and/or hydraulic systems, their standards and their documentation • Principles and applications for incorporating industrial robots within the system 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Carry out systems design for given industrial applications • Identify and resolve areas of uncertainty within the briefs or specifications • Optimize the design within the parameters of the specification • Assemble machines according to documentation • Connect wires and tubes according to industry standards • Incorporate industrial robots within systems as required • Install, set up and adjust as required the mechanical, electrical and sensor systems • Commission machines with the use of auxiliary equipment and a PLC, using their standards and documentation 	
4	Using industrial controllers	20
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The functions, structures and operating principles of PLCs • The functions and structures of industrial controllers (PLCs) • The configuration of the industrial controller • The methods by which software programs relate to the actions of machinery 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Connect PLCs to mechatronics systems • Make the necessary configurations of industrial controllers • Configure all aspects of PLCs as required, together with the associated control circuitry for correct operation 	
5	Software programming	20
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • How to program using standard industrial software • How a software program relates to the action of machinery and systems 	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Write programs to control a machine• Visualize the process and operation using software• Program PLCs, including digital and analogue signal processing and industrial field buses	
6	Circuit design	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• The principles and applications for circuit design• Methods for designing and assembling electrical circuits in machine and controller systems	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Design pneumatic, hydraulic and electrical circuits• Design the circuits using modern software tools	
7	Analysis, commissioning and maintenance	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• Criteria and methods for testing equipment and systems• Analytical techniques for fault finding• Techniques and options for making repairs• Strategies for problem solving• Principles and techniques for generating creative and innovative solutions• Principles and applications of Total Productive Maintenance (TPM)	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Test run individual modules and assembled systems• Review each part of the assembly process against established criteria• Find faults in a mechatronic system using appropriate analytical techniques• Repair components in efficiently• Optimize the operation of the machinery through analysis and problem solving• Optimize the operation of each module of the mechatronics system• Optimize the operation of the mechatronic system as a whole• Present the assembly to the client and respond to questions	