worldskills

Technical Description

Manufacturing Team Challenge

WorldSkills International, by a resolution of the Competitions Committee and in accordance with the Constitution, the Standing Orders, and the Competition Rules, has adopted the following minimum requirements for this skill for the WorldSkills Competition.

The Technical Description consists of the following:

1 Introduction

1.1 Name and description of the skill competition

1.1.1 The name of the skill competition is

Manufacturing Team Challenge

1.1.2 Description of the associated work role(s) or occupation(s)

The skill competition of Manufacturing Team Challenge is based on the design, manufacture assembly and testing of equipment by teams of complementary specialists. In either large or small manufacturing operations there is a strong demand for several specialists to come together to design, manufacture, assemble, and test new or improved equipment either as a one-off item or as the prototype for mass production. Technicians skilled in project management, computer-aided design, programming, machining, welding, electrical/electronic, and fitting can combine to form efficient and effective teams covering design through to commissioning.

While each specialism has value, each team member requires additional attributes. The capacity to work within and contribute to a team is vital, requiring both self-understanding and interpersonal skills. Team members also need the ability to think beyond their own specialisms and the boundaries of each skill, in order to make the most of the teams' combined efforts. This skill has exceptional value as an exemplar of modern manufacturing practices. Whatever the size or sector of the manufacturing organization, continuous improvement and innovation are key to its survival and prosperity. These features do not happen in isolation, but through the combined efforts of high level, insightful specialists.

Where diverse manufacturing teams are most successful, this will also be due to the inclusion within the team of both broad and specific financial and organizational skills. The teams will strictly control time and cost while seeking at all times to go beyond the client's expectations for quality. Whatever their specialism, members of successful manufacturing teams have the opportunity to generate the skills normally associated with accelerated promotion and management development.

1.1.3 Number of Competitors per team

Manufacturing Team Challenge is a team skill with three Competitors per team.

1.1.4 Age limit of Competitors

The Competitors must not be older than 25 years in the year of the Competition.

1.2 The relevance and significance of this document

This document contains information about the standards required to compete in this skill competition, and the assessment principles, methods, and procedures that govern the competition.

Every Expert and Competitor must know and understand this Technical Description.

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

1.3 Associated documents

Since this Technical Description contains only skill-specific information it must be used in association with the following:

- WSI – Code of Ethics and Conduct
- WSI – Competition Rules
- WSI – WorldSkills Occupational Standards framework
- WSI – WorldSkills Assessment Strategy
- WSI online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations
- WorldSkills Standards and Assessment Guide (skill-specific)

2 The WorldSkills Occupational Standards (WSOS)

2.1 General notes on the WSOS

The WSOS specifies the knowledge, understanding, skills, and capabilities that underpin international best practice in technical and vocational performance. These are both specific to an occupational role and also transversal. Together they should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

The skill competition is intended to reflect international best practice as described by the WSOS, to the extent that it can. The Standard 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 only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Standard 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. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

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

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, if this does not distort the weightings assigned by the Standards.

2.2 WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	**5**
	The individual needs to know and understand: • Manufacturing • 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 of team working and their applications • Personal skills, strengths and needs relative the roles, responsibilities, and duties of others individually and collectively • The parameters within which activities need to be scheduled	

Section		Relative importance (%)
	The individual shall be able to: • 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 • Manufacture components and assembly to meet cost constraints and record manufacturing costs and budgets • Maximize material utilization in order to reduce waste	
2	**Communication and interpersonal skills**	**5**
	The individual needs to know and understand: • The range and purposes of documentation in both paper based and electronic forms • The technical language associated with the skill and technology • The standards required for routine and exception reporting in oral, written, and electronic form • The required standards for communicating with clients, team members and others • The purposes and techniques for maintaining and presenting records, including financial records	
	The individual shall be able to: • 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 • Explain complex technical principles and applications to non-experts • 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	**Design and realization**	**10**
	The individual needs to know and understand: • The principles and applications of project design • The nature and formats of project specifications	

Section		Relative importance (%)
	• The bases on which the manufactured item will be appraised • Design parameters including: • Options appraisal • Selection of materials and work processes • Prototype development • Manufacture • Refinement • Commissioning • Principles and methods for work organization, control and management	
	The individual shall be able to: • Read and interrogate briefs or specifications for manufactured items • Identify and resolve areas of uncertainty within the briefs or specifications • Generate designs for the manufacture of a functioning item within given timescales • Generate innovative solutions to design challenges • Prepare and implement documentation for work management and control • Complete the design stage within the required limits of cost and time • Use of engineering measurement tools including rules, verniers, micrometres and digital measuring tools	
4	**Drawing**	**10**
	The individual needs to know and understand: • How to interpret drawings that conform to ISO standards • How to create drawings that conform to ISO standards • The principles and uses of 2D and 3D modelling software	
	The individual shall be able to: • Create drawings to ISO standards • Create and modify 2D and 3D models • Interpret, construct, and modify engineering CAD drawings to work with 3D modelling • Complete drawing activities within the planned timetable and to suit the project's overall requirements	
5	**Component manufacture using workshop machinery and equipment**	**30**

Section		Relative importance (%)
	The individual needs to know and understand: • The specific safety principles and practices to be used with a range of workshop machinery/equipment and materials • The principles and applications of machining • The use of general machining equipment used in activities such as centre lathing and manual milling • The relationship between drawings and machining, including modifying the machining to meet specifications • The characteristics of metals and the potential impact on them of cutting tools and processes • The applications of machining to a range of metals and materials • The principles and applications of working with sheet metal • The processes required for bending and cutting sheet metal • The principles and applications of a range of welding types, including TIG (for steel and aluminium) and MAG (for steel) • The principles and applications for working with electronics and related equipment • The principles and uses of PCBs • The principles and applications of electronic programming software • The principles and applications of robotics and mechatronics • The principles of manual pipe bending	
	The individual shall be able to: • Safely operate workshop equipment such as lathes, mills, drill presses, sheet metal working equipment, welding equipment and welding holding equipment, pipe bending equipment and electronics bench equipment, such as a soldering iron and PSU • Apply safe working practices to all workshop equipment and processes. • Address the issues caused by temperature during machining, including the use of coolants • Manufacture components to industry finishes and tolerances and adjust manufacturing process to meet specifications • Bend and cut sheet metal components in accordance with drawings • Fit sheet metal components to an assembly • Weld a variety of materials • Use a range of welding types • Assemble and commission electronics from drawings • Design control circuits	
6	**Fitting and assembly**	**10**
	The individual needs to know and understand: • Principles and methods for manufacturing parts such as jigs, fixtures, adaptors and process attachments	

Section		Relative importance (%)
	• Principles and methods for assembly and fastening of manufactured parts such as jigs, fixtures, adaptors, and process attachments	
	The individual shall be able to: • Design a range of jigs, fixtures, and accessories • Manufacture jigs, fixtures, and accessories in accordance with drawings and specifications • Assemble and commission items in accordance with drawings and specifications • Assemble items using fasteners such as glues, screws, bolts, etc. • Complete the fitting activity within the planned timetable and to suit the project's overall requirements	
7	**Testing and commissioning**	**20**
	The individual needs to know and understand: • The criteria and methods for operating test runs • The scope and limits of the technologies and methods employed • Strategies for thinking creatively and generating innovation • The possibilities and options for making incremental and/or radical changes	
	The individual shall be able to: • Test run the assembled item • Review each part of the manufacturing and assembly process against established criteria, including quality, functionality, time, and cost • Modify, test, and appraise each part of the process, including: • Design • Tool paths • Assembly procedures • Jigs • Fixtures • Machining • Undertake a final test run to commission the item • Present the item to the client with explanations and responses to questions • Generate and present a portfolio including all essential documentation such as: • 2D mechanical drawings • Electronic solid models • Electrical drawings • Manufacturing plans • Design calculations • Manufacturing costs • Generate support documents such as:	

Section		Relative importance (%)
	• The Operating Manual • The Maintenance Manual	
8	**Additive Manufacturing**	**10**
	The individual needs to know and understand: • Principles and methods to design parts • Principles and methods to design parts in special software • Principles and methods to make postprocessing for 3D printers (FDM, SLS, DLP and SLM) • Principles and methods to design parts considering variety of materials used • Principles and methods to reduce production time keeping with quality in resistance and durability • Principles of part design for manufacture • Principles of machine settings and refinement for differing materials	
	The individual shall be able to: • Design parts in the special software (www.autodesk.com/solutions/generative-design) • Calculate the variety of materials used • Postprocess jobs of 3D printers • Start and control the process • Operate a 3D printer • Adjust and set up parameters for 3D printing; interpret drawings • Respond to engineering problems with a rapid prototype design • Design solutions given a variety of parameters; size, weight, durability, function and finish • Design assemblies for parts larger than the print area of the given machine, or for interconnecting, moving, interlocking or interacting pieces	
	Total	**100**

3 The Assessment Strategy and Specification

3.1 General guidance

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform.

Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: Measurement and Judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, to demonstrate their quality and conformity with the Standards.

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

4 The Marking Scheme

4.1 General guidance

This section describes the role and place of the Marking Scheme, how the Experts will assess Competitors' work as demonstrated through the Test Project, and the procedures and requirements for marking.

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

By reflecting the weightings in the Standards, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill competition and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together.

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards, if there is no practicable alternative.

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more Independent Test Project Designer(s) with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Competition Rules for further details.

Experts and Independent Test Project Designers are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

4.2 Assessment Criteria

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived before, or in conjunction with, the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards; in others they may be different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme as a whole must reflect the weightings in the Standards.

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the Criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). **The Assessment Criteria, the allocation of marks, and the assessment methods, should not be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment**

methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub Criteria.

The marks allocated to each Criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each Aspect within that Assessment Criterion.

4.3 Sub Criteria

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. Each marking form (Sub Criterion) contains Aspects to be assessed and marked by Measurement or Judgement, or both Measurement and Judgement.

Each marking form (Sub Criterion) specifies both the day on which it will be marked, and the identity of the marking team.

4.4 Aspects

Each Aspect defines, in detail, a single item to be assessed and marked, together with the marks, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by Measurement or by Judgement.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it. The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1 refers.)

		CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
STANDARDS SPECIFICATION SECTION		A	B	C	D	E	F	G	H			
	1	5.00								5.00	5.00	0.00
	2		2.00					7.50		9.50	10.00	0.50
	3								11.00	11.00	10.00	1.00
	4			5.00						5.00	5.00	0.00
	5				10.00	10.00	10.00			30.00	30.00	0.00
	6		8.00	5.00				2.50	9.00	24.50	25.00	0.50
	7			10.00				5.00		15.00	15.00	0.00
TOTAL MARKS		5.00	10.00	20.00	10.00	10.00	10.00	15.00	20.00	100.00	100.00	2.00

4.5 Assessment and marking

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by Judgement, Measurement, or both. The same marking team must assess and mark all Competitors. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

4.6 Assessment and marking using Judgement

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, Judgement must be conducted using:

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts, or separate guidance notes). This is documented in the Standards and Assessment Guide.
- the 0-3 scale to indicate:
  - 0: performance below industry standard
  - 1: performance meets industry standard
  - 2: performance meets and, in specific respects, exceeds industry standard
  - 3: performance wholly exceeds industry standard and is judged as excellent

Three Experts will judge each Aspect, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

4.7 Assessment and marking using Measurement

Normally three Experts will be used to assess each Aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

4.8 The use of Measurement and Judgement

Decisions regarding the choice of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.

4.9 Skill assessment strategy and procedures

WorldSkills is committed to continuous improvement including reviewing past limitations and building on good practice. The following skill assessment strategy and procedures for this skill competition take this into account and explain how the marking process will be managed.

Some Test Project marks are calculated by comparing team's build time and cost and compliance to project specifications. Marking is on the basis of product cost and will include such things as Competitors' work time, materials used, components used, any consulting fees

Some Test Project marks are calculated against performance criteria and graduated from best to worst or no performance, (benchmarking).

All other marks are by Measurement Marking or Judgement marking.

Required tolerances must be met for a result to be valid.

Each team member must make sure to record the time they start and finish each shift and book their machine activities around their schedule and that of other teams. Competitors not working must remain in a central position. Lunch time is an exception.

Main Test Project labour hours are costed at an hourly rate. This hourly rate is calculated in Euro's.

- Each Competitor's work time: EUR 30.00 per person per hour;
- Consultant and training: EUR 60.00 per hour.

- Each team member will have a maximum seven hours per day to complete their assigned tasks. This is two days for a three-person team.
- Drawings selected by experts at the start of the competition and an adaptation to the project in the sections of additive manufacture, programming and either a lathe or manual milling machine will be undertaken during the competition and the working time is costed.

Though not costed, equipment must be booked for use, to accommodate all teams present. The minimum time for booking each machine is 15 minutes, and 15-minute intervals thereafter.

Note: After using a machine, the machine must be cleaned, i.e. swarf removed from working area of the machine. Each machine is inspected by an Expert after each team's use of that machine and a penalty of EUR 25.00 is applied if machine is not cleaned. If a machine is considered not cleaned, Experts are called to inspect that machine – three Experts must agree. Their decision is final.

There may be other forms of assessment for sub-categories of the main Test Project such as cycle time where applicable which may also translate to cost per product item made and inclusion of specific items of documentation.

Multiple awards may be made.

Raw materials

Each team will provide weight of raw materials used and also cost of raw material using cost per kilogramme listed below.

The list of raw material details including weight and cost is to be presented in spreadsheet format and to be included in section A of portfolio.

Cost must be verified by Experts to reflect commercial cost. The team must include a verifiable weblink on the costing spreadsheet for experts to verify the item costs, where they are not included in the standard costing table below. For costs not included on the spreadsheet experts will find a cost for the item and apply this at 3 times the cost to the teams raw material cost.

Cost for raw materials to be applied:

Length and sheet material

- Mild sheet – EUR 7.00/kg
- Aluminium – EUR 10.00/kg
- Brass – EUR 37.00/kg
- Stainless steel – EUR 28.00/kg
- Plastic – EUR 10.00/kg

Electronic components.

- PCB – EUR 0.25/cm²
- Batteries Pb, NiCd, NiMh etc. - EUR 0.25/Wh
- Batteries Lithium – EUR 0.75/Wh
- Resistors and diodes EUR 0.005 per item
- Capacitors non-electrolytic EUR 0.01 per item
- Capacitors electrolytic EUR 0.15 per item
- Relays EUR 2.00 per item
- Transistors EUR 0.50 per item
- Motors; Motors are costed as 0.5 EUR per Watt

Mechanical components

- Setscrews, Bolts, and screws:

Each is costed using the following formula: the size x length in mm/500.

An M6 by 25 mm setscrew, is 6 x 25/500 is EUR 0.03 per item

An M8 by 75 mm bolt, is 8 x 75/500. This is EUR 1.2 per item.

• Nuts

Nuts are costed using the following formula: nut size divided by 200.

An M6 nut would be 6/200 or EUR 0.03

An M8 nut would cost 8/200 or EUR 0.04.

• Washers

Washers are costed using the following formula: washer size x the outer diameter size divided by 4000.

An M6 washer with an outer diameter of 20mm, would be 6x20/4000. This is EUR 0.03 per item

An M8 repair washer with an outside diameter of 50mm would be, 8 x 50/4000. This is EUR 0.10 per item.

• Lead screw

Leadscrew is costed using the following formula: screw diameter/2 Euro per meter.

A lead screw with an outer diameter of 8mm would cost EUR 4.00 per meter.

• Extrusion and profiles

Extrusions and profiles are costed using the following formula: 2 x the base cost for the material they are constructed from.

For Aluminium extrusion this would be EUR 20.00 per kilo.

• Coated materials

Coated materials, such as anodised aluminium is costed using the following formula: 1.25 x the base cost for the material they are constructed from.

For anodized Aluminium this would be EUR 12.50 per kilo.

For anodized Aluminium extrusion this would be EUR 25.00 per kilo

Programming

Each team is free to program in whatever method they deem fit for the task.

The use of all IDE programming methods are allowed. Any Libraries are permitted to be downloaded before the competition by the expert for that team. Libraries must be submitted on USB or a web link to experts so that a check may be performed of validity. Libraries must be either, OEM and available from the manufacturer or reseller, or part of the programming software.

List of all materials and components provided by the team

For each used purchased item not priced previously a current catalogue price (without discounts or goods and services taxes applied) must be provided. Only a link to a website including the price given on the spreadsheet is acceptable. A Hyperlink to the website that clearly shows the price will be accepted. Experts will give a small allowance for fluctuations in exchange rates and economies.

A list of purchased items, raw materials, and their costs is to be presented in spreadsheet format.

Note: Currency conversion rates to Euro from wherever the item is purchased in any currency is fixed at first Monday of April in the competition year, and will be taken from http://www.xe.com/.]

Assessment and marking are an intense process that depends upon skilful leadership, management, and scrutiny.

Time-keeping system

Machines are to be allocated in 15 minutes increments. Standard machine booking sheets to be used during competition are provided.

Working hours are calculated to the accuracy of the handwritten time-keeping system.

Time keeping is handwritten by the Experts using standard timesheets provided at the competition.

The time keeping is done with 3-minute tolerances.

The minimum increment for consultant is 15minutes.

The total hours used by the whole team will be calculated for the working time.

If one team member is working, the hours are costed for the whole team.

After a machine usage, the Competitor must clean it. This is done during booked time. An Expert or Experts will check the cleanliness before the Competitor can leave the machine. A working time penalty as previously specified is applied for any machine not correctly cleaned. Standard machine cleanliness applicable during competition is provided before the competition via the forum.

Material Cost

For the main Test Project, raw materials such as steel and aluminium in pipe, sheet, and bar form are costed on a price per kilogram rate. Other standard components are costed at a per item rate, or by formula given in this section. Any change to these formula or costs will be decided after each competition and will only effect the next cycle.

Specific extrusion and profile is priced as per this section.

Pre competition video

A video will be provided by each team on Familiarization Day as specified in the brief. This video will be displayed to the public during the competition. The specific requirements of this video will be detailed in the brief.

Toolbox check

The Competitors' toolbox will be checked during Familiarization Day. Any items on the prohibited materials list or modified before competition will attract a penalty or be removed.

Documentation

Portfolio A is to be submitted during Familiarization Day, during toolbox check. This is required on USB in PDF format.

A list of Jigs, Fixtures and Lodgments should be provided as required on paper to aid the toolbox check.

Portfolio B is to be provided at the start of familiarization. Experts will use this to check materials brought by the team are cut to the required 20 mm oversize during the toolbox check. Paper copies printed on coloured paper and clearly marked 'Draft' are required.

During the toolbox check any additional materials and tools brought by the teams for manufacturing their Test Projects needs to be spread on the floor or workbenches, including Jigs, Fixtures and Lodgments.

All portfolio documents are to be in English unless otherwise specified in the brief.

A full set of drawings must be available prior to the toolbox check and should be referenced to materials, parts etc. (e.g. a number).

Drawings for submission and manufacturing reference during competition need to be printed out in colour paper, no white, and clearly marked Draft.

Jigs, Fixtures, and Lodgments

Jigs must be listed and numbered with three, minimum, clear pictures of the Jig, Fixture or Lodgment in Portfolio A. This will be checked during the toolbox check. Any Jig, Lodgment or Fixture not coloured or marked red, not clearly pictured and identified by name and/or number matching that in Portfolio A will be removed and cannot be used in the competition.

Security/safety

Each team's toolboxes are checked prior to competition start. If any suspect items are identified during the toolbox check, the compatriot Expert is to be informed immediately. At no time should an Expert dismantle any components. The compatriot Expert and a team member must be present during this process.

Material size

All material brought to the competition, (does not include items ordered through the competition manager) is to be cut in lengths at least 20 mm larger than the drawing size if purchased by length, and 20 mm oversize in two axis if supplied as sheet. To ensure this, five random parts are measured during the toolbox check and compared with the drawing in the team's portfolio. Experts will retain the set of drawings supplied at familiarization for reference and is compared throughout the competition to ensure same the dimensions are used in the final drawings.

Machine usage in the main project design

To demonstrate the team's ability to conduct a wide range of projects in an engineering workshop environment at least one component must be made by competitors using the equipment as follows:

1 component or part thereof must be made by turning or manual milling;

1 Component or part thereof must be welded using MIG or TIG;

1 Component or part thereof must be cut using the Bandsaw or chop saw;

1 component or part thereof must be drilled with a pillar drill ;

1 component or part thereof must be cut using the guillotine;

1 component or part thereof must be bent using the box and pan;

1 component or part thereof must be manufactured using a 3D printer, Vacuum former or Pipe bender.

Teams may create all other components by what ever means and with whatever equipment they choose from the infrastructure list, or tools/equipment they bring to the competition.

Materials

Materials will be supplied by the competition organizer. Teams and their experts will be able to order standard materials such as metals, plastics, fixings, mechanical components, motors, and electronic components by sending a full spreadsheet of each item required to the competition manager.

This will be supplied at the competition upon your arrival. Materials are supplied as given by the manufacturer and will not be cut down in any way. E.g., if you order 800 mm of 50 x 5 mm flat bar, a meter will be supplied. If the minimum order for a resistor is 10 and you order 3, 10 will be supplied.

The Skill Competition Manager will give a final date for this on the WorldSkills Discussion Forum in good time, but would normally be six (6) months prior to the competition, but is subject to change with each cycle as it will follow the Competition Organizers for that cycles' requirements.

In addition, each team will be able to bring up to 10kg of additional material, tools, and equipment. This will be weighed and scored according to the CIS scoring system. Whereby the lightest will receive full marks, the heaviest zero. All other teams will score proportionally between.

Jigs, fixtures, and Lodgements used during the competition will also be weighed and added to the material and toolbox weight for final weight calculation in the toolbox weight marking.

Note: The purpose of this is to remove the need to ship toolboxes and materials. All materials and tools are supplied by the Competition Organizer, but it is recognized that last minute improvements or changes to the competition Test Project may necessitate extra materials or tools, therefore this is small enough for a team to bring in a team or Experts flight luggage.

Any additional materials brought are subject to the 20 mm per length and 20 mm in two axis oversize requirements.

Required 30% change

Prior to competition at C-4 or C-3 a 30% change to the main Test Project will be made by agreement between Experts. This change will be in two parts. 15% will be changes to the main Test Project that teams must adapt and conform to in their build.

A further 15% will be formed from an addition to the project that will be required to be designed and made by the team. This addition will be based on two different skills using the provided equipment.

Teams will be informed of these changes at the end of familiarization and will have one hour to discuss and plan the adaptations.

Progressive marking for all sections of the Competition.

Marking section	When
Main Test Project performance	C4
Main Test Project cost	C4
Portfolio – section A	C1, C2
Portfolio – section B	C2, C3, C4
Test Project addition	C3, C4

5 The Test Project

5.1 General notes

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary.

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the applied knowledge, skills, and behaviours set out in each section of the WSOS.

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Standards will be a key indicator of quality, as will be its relationship with actual work performance.

The Test Project will not cover areas outside the Standards or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards. Section 2.1 refers.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work. The Test Project will not assess knowledge of WorldSkills rules and regulations.

Most Test Projects and Marking Schemes are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Designer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

Please refer to the current version of the Competition Rules for further details.

5.2 Format/structure of the Test Project

The Test Project is a single Test Project assessed in stages.

5.3 Test Project design requirements

Test Projects should reflect the purposes, structures, processes, and outcomes of the occupational role they are based on. They should aim to be a small-scale version of that role. Before focusing on practicalities, SMTs should show how the Test Project design will provide full, balanced, and authentic opportunities for assessment and marking across the Standards, as set out in Section 5.1.

All Test Project proposals must fit with the following activities/guidelines:

Design

The task is to have all design work including process parts, jigs, and fixtures carried out in accordance with the instructions, specifications, drawings, parts, and samples provided by the Independent Test Project Designer.

Programme generation

Generate all programmes required for the automated sections of the task including those for any, robots, PCs, and PLCs.

Theme

All proposed Test Projects must have a social theme and aim to support or enhance the quality of life for a specific group, or groups of people.

The following categories are to be used as a guide for this, but any Test Project that enhances a groups life, or supports a social need will be considered:

- Ecological problems
- Sustainability Aids for disabilities, (e.g. equipment or prosthetics)
- Disaster relief or emergency equipment
- Recycling
- Green energy
- Cottage industry generation

The documentation required in portfolio A and B, as well as the test project itself will be made available by each competing WorldSkills member to be made given open-source for anyone to use to help with these problems. This pools the resources and efforts of the competitors and their supporting teams to further the social interests of mankind.

Manufacture

Make any parts nominated by the Experts as well as those needed for the working of those manufactured parts such as jigs, fixtures, adaptors, and process attachments to the required tolerances.

Assembly

Assemble the various components either manufactured previously or supplied as part of the task by outside sources using automated methods where nominated as part of the task.

Optimization

Revise the manufacturing and assembly process to optimize cycle times and reduce the process cost.

Documentation

Document the process including header page, index, and descriptive overview of the task, hard copy of any programmes, instructions for setting up and assembly, and any relevant drawings.

Main Test Project

The main Test Project involves the manufacture of a team's solution to a manufacturing challenge and would include skill areas such as design, planning, manufacturing, and documenting the manufacturing process. The manufacturing challenge will detail the Test Project brief and the evaluation procedure and is made freely available to MTC teams at least 20 months prior to the Competition.

Test Project addition

A 15% change to competition will be agreed during C-4 and C-3 by experts. The addition will require teams to design and make their own solution to an addition to be added to their project. Experts will agree an addition that can be made by all, without compromising the integrity of the Test project for any team.

Test Project changes

A 15% change to the main Test Project will be agreed by Experts. An example of this may be an additional requirement or change of requirement. Experts will agree changes that can be made by all, without compromising the integrity of the Test Project for any team.

Portfolio A

The portfolio will include the documentation involving the main Test Project and will include:

- Video to display to the public during competition that instructs the construction and use of the test project solution.
- Design calculations.
- Manufacture instructions for the product.
- List with cost of items used to manufacture the product of main project (raw materials, components).
- Forecasted manufacturing costs.
- Project documentation such as user and maintenance manuals.
- List of jigs provided by the team in toolbox.
- Some sections of portfolio documentation may be done prior to the Competition.

Portfolio B

- 3D assembly drawings.
- 2D mechanical drawings.
- Electrical/electronic diagrams.

Test Project addition

The following materials will be supplied to each team to design their Test Project adaptation from:

- 25 mm x 50 mm x 100 mm Aluminium flat bar
- Dia 50 mm x 250 mm Aluminium bar
- 1 x 1 kg of PLA and 1 kg of PET-G for FDM machine

At least two of the above materials must be used in the design and construction.

In addition, each team will receive a selection box containing M2-M6 nuts and setscrews to include lengths from 8 mm to 75 mm.

Experts proposing a project may bring extra materials, such as but not limited to, pulleys, drive belts and small motors, one set for each team.

5.4 Test Project coordination and development

The Test Project MUST be submitted using the templates provided by WorldSkills International (www.worldskills.org/expertcentre). Use the Word template for text documents and DWG template for drawings.

5.4.1 Test Project coordination (preparation for Competition)

Coordination of the Test Project/modules will be undertaken by the Skill Competition Manager.

5.4.2 Who develops the Test Project/modules

The Test Project/modules are developed independently by all Experts.

For 2026 the Test Project/modules will be developed by an Independent Test Project Designer.

5.4.3 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

Time	Action
Prior to the previous Competition	Experts develop and propose Test Project/modules for the main Test Project individually.
One (1) month prior to the previous Competition	All proposals that meet the design requirements are circulated on the WorldSkills website. The proposals should contain a proposed Marking Scheme showing allocation of marks.
At the previous Competition	The main Test Project proposals for the next Competition are presented by each Expert. The proposals should be in hard copy form with a copy for each Expert. The main Test Project is selected for the following Competition by a vote of Experts.
Three (3) months after the previous Competition	The complete specifications of the selected main Test Project are put on the WorldSkills Discussion Forum
Four (4) months after the previous Competition	The Marking Scheme is developed.
Eight (8) months after the previous Competition	The assessment procedures including assessment check lists and testing equipment is developed by the Skill Competition Manager.
Twelve (12) months prior to the Competition	The selected main Test Project is prepared as a detailed set of specifications and assessment criteria and procedures. It is referred to as the MTC Information Pack. This is supplied to the WorldSkills International Skills Competitions Administration Manager who circulates it on the WorldSkills website
At the Competition on C-4	The Experts propose surprise Test Projects. One is selected by vote of the Experts and given to the Competitors. The MTC main Test Project is selected for the following Competition. See section 5.7 Test Project selection
At the Competition on C2	The Test/Project modules are presented to the Competitors.

5.5 Test Project initial review and verification

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations.

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer (ITPD) is expected to identify one or more independent expert(s), and trusted individuals initially to review the Independent Test Project Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.

5.6 Test Project validation

The Skill Competition Manager coordinates the validation of the Test Project/modules and will ensure that it can be completed within the material, equipment, knowledge, and time constraints of Competitors.

5.7 Test Project circulation

The Test Project/modules are circulated 12 months prior to the Competition via the WorldSkills website.

5.8 Test Project change

Due to the Test Project being developed by one or more Experts, an Independent Test Project Designer must develop a 30% change as required by WorldSkills. This change is presented to the Experts and Competitors at the Competition on C-2.

15% of the change will be changes to the Test Project brief.

15% will form an additional requirement to be designed and completed during the competition.

Experts will select what forms each of these changes on C-4 or C-3. Experts will collaborate to design changes that will not prejudice any team's chances of completing, or winning, the competition.

5.9 Material or manufacturer specifications

Specific material and/or manufacturer specifications required to allow the Competitor to complete the Test Project will be supplied by the Competition Organizer and are available from www.worldskills.org/infrastructure located in the Expert Centre. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

All portfolio B drawings and schematics will be completed using Autodesk Fusion 360.

Programming software will be the discretion of each team to select and supply. This will be installed by the compatriot expert prior to Familiarization. This may be free software such as MPLAB, Arduino IDE, or purchased software such as Microej

6 Skill management and communication

6.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the WorldSkills skill-specific Discussion Forum. (http://forums.worldskills.org). Skill related decisions and communication are only valid if they take place on the WorldSkills Discussion Forum. The Chief Expert (or an Expert Lead appointed by the Skill Management Team) will be the moderator for this Discussion Forum. Refer to the Competition Rules for the timeline of communication and competition development requirements.

6.2 Competitor information

All information for registered Competitors is available from the Competitor Centre (www.worldskills.org/competitorcentre).

This information includes:

- Competition Rules
- Technical Descriptions
- Mark Summary Form (where applicable)
- Test Projects (where applicable)
- Infrastructure List
- WorldSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

6.3 Test Projects and Marking Schemes

Circulated Test Projects will be available from www.worldskills.org/testprojects and the Competitor Centre (www.worldskills.org/competitorcentre).

6.4 Day-to-day management

The day-to-day management of the skill competition during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and the Expert Leads. The Skill Management Plan is progressively developed in the six (6) months prior to the Competition and finalized at the Competition. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

6.5 General best practice procedures

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

Topic/task	Best practice procedure
The process for determining the 30% change.	• Each Expert will propose a 15% change to the Test Project. • Experts will discuss and highlight any points that may not suit their team's project. • Discussion will resolve a solution that suits all teams and does not derive solely from a single Expert. • The changes must not prejudice any team and should allow teams to make design changes while working. For example, additional requirements to drawings, drawings to be marked, extra items for LCD display or changes to programming requirements, extra test project function tests or adaptations to existing tests. • Each Expert will bring to C-4 a proposed additional project and Marking Scheme. • Experts will select the project by vote. • Each Expert will put the order of favour of the Test Projects. • The selected project will then by agreement of all, have the criteria altered to form a new Test Project on the most favourable theme. • At the end of Familiarization C-2 teams will have one hour to study the changes.
The process of and timing for the translation of the Test Project	The Interpreter translates between C-3 and C-2 at the time specified by the Skill Competition Manager. The translation is completed on the documents to be distributed to the Competitors. If translation is not completed, an extension may be granted, but each event listed in the Skill Management Plan must take precedence. (Time extension allowed after all events are over)
The tools that an Interpreter can use for the translation process such as dictionary, Internet, translation devices, etc.	There are no restrictions on the tools or software the Interpreter uses to translate. If the Interpreter translates on a personal laptop, the laptop cannot be taken out of the workshop area. It is stored with the Test Project and returned on C1 after the Test Project is distributed to Competitors.

7 Skill-specific safety requirements

7.1 Personal Protective Equipment

Refer to WorldSkills Health, Safety, and Environment Policy and Regulations for Host country or region regulations.

Task	Safety glasses with side protection	Welding mask	Dust Mask	Welding gloves	Cut protection (gloves without breakage)	Safety shoes with protective cap	Sturdy shoes with closed toe and heel
General PPE for safe areas							√
Competitors Workstation (box)	√					√	
Welding	√	√		√		√	
Milling/ Drilling	√					√	
Sheet Metal	√				√	√	
Lathe	√					√	
Grinding	√					√	
Saw	√				√	√	
3D Printer	√					√	

Task	Safety glasses with side protection	Welding mask	Dust Mask	Welding gloves	Cut protection (gloves without breakage)	Safety shoes with protective cap	Sturdy shoes with closed toe and heel
Vacuum Forming Machine	√					√	
Electronic soldering process	√		√			√	

8 Materials and equipment

8.1 Infrastructure List

The Infrastructure List details all equipment, materials, and facilities provided by the Competition Organizer.

The Infrastructure List is available at www.worldskills.org/infrastructure.

The Infrastructure List specifies the items and quantities requested by the Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any increases in space and/or equipment.

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition for the upcoming WorldSkills Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

8.2 Competitors toolbox

To minimize tools and materials shipped to the competition, toolbox weight is measured, and marks are awarded proportionally (the maximum of allocated mark is for the lightest toolbox). Measurement is done by weighing scales. Each team is asked to bring to any competition. This can be brought to the competition in the teams' flight luggage if so wished.

This weight does not include Jigs, Fixtures and Lodgments used to manufacture the product, which can be shipped in advance or brought by the team/expert in their flight luggage, however, the weight of Jigs, Fixtures and Lodgments will be added to this weight to calculate the toolbox weight. Materials ordered will not count in the toolbox weight.

8.3 Materials, equipment, and tools supplied by Competitors

Teams must submit a list of the items (materials and components) that they will bring to the Competition as well as those they have ordered and present these parts for inspection to the Experts prior to the commencement of the Competition Familiarization. The Expert will then determine what security/safety arrangements will apply for these items.

- Jigs, fixtures, formers, and clamping devices. (Jigs must be clearly identified by being painted in red colour and registered in a list included in the portfolio A).
- Anything else the team requires can be brought taking into consideration the following:
  - No items are to be brought to the Competition that could be ordered through the Competition Manager.
  - No tools that are supplied by the Competition Organizers can be brought to competition.
  - PPE does not count in the toolbox weight.

Standard tool items for the Test Project adaptation:

The competitors will not be able to use any item for the test project adaptation that is not supplied. I.e., they may not use additional tools or equipment they have brought with them.

The following items will be provided by the Competition Organizer:

- All tools for machining (fitting, lathe, mill);
- Holders of cutting tools for machining;
- Independent metrology and measuring tools for the dimensional measurement of parts/ components.
- Screwdriver set;
- Precision screwdriver set;
- Cordless drill driver;
- Mechanic tolls sets;
- Hand Tap (M3 – M12);
- Tap Wrench (M3-M12);
- Drill set (1,0 – 13.0 mm in 0.5 mm increments);
- Drills for Tap (M3-M12);
- Drill (16 and 20 mm);
- Spanner set;
- Hacksaw;
- Allen key set – metric;
- Snips;
- Hammer;
- Centre punch;
- Combination Square and angle gauge for Welding;
- Combination pliers (for Electronics and Mechanical);
- Soldering station to suit electronics;
- Dial Bore Gauge (10 – 35 mm) (accuracy 0,001 mm at least);
- External Digital Micrometres (0 – 100 mm) (accuracy 0,001 mm at least);
- Dial test indicator (accuracy 0,01 mm at least);
- Dial indicator (accuracy 0,001 mm at least);
- Magnetic hydraulic stand;
- Digital Calliper (0-200 mm) (accuracy 0,01 mm at least);
- Digital Depth Micrometre (0 mm - 150 mm) (accuracy 0,001 mm at least);
- Multimeter;
- Oscilloscope;
- Adjustable digital DC power supply precision, at least 30V 5A;
- All accessories and consumables for welding machine;

2 x 3D printers per team and all accessories and consumables.

Note:

1. More details in the Infrastructure List;

2. Tools and instruments similar or having the same function carried out by the Competitors, which is in the Infrastructure List, will not be allowed to use.

Competitors are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

8.4 Materials, equipment, and tools supplied by Experts

Experts are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

Experts are responsible that Interpreters bring their PPE.

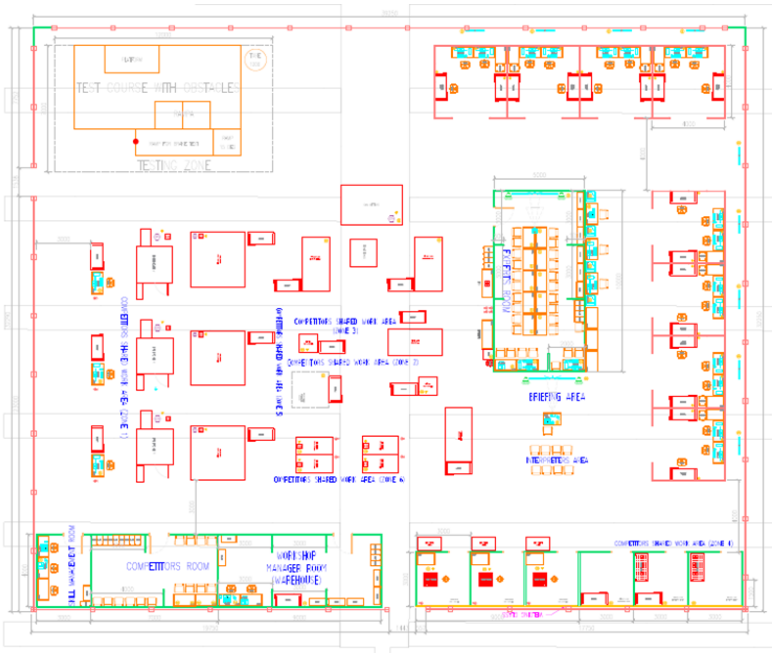
8.5 Materials and equipment prohibited in the skill area

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

8.6 Proposed workshop and workstation layouts

Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

Example workshop layout



9 Skill-specific rules

9.1 General notes

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

9.2 Skill-specific rules

Topic/task	skill-specific rule
Use of technology – USB, memory sticks	• Competitors are only allowed to use memory sticks provided by the Competition Organizer. • Memory sticks or any other portable memory devices provided by the Competition Organizer cannot be taken outside the workshop. • Memory sticks or other portable memory devices are managed by the Chief Expert and distributed at the Competitor's request. The Competitors return it to the Chief Expert at lunchtime and at the end of the day. • No personal memory sticks or portable memory devices are to be brought into the workshop. If they are brought in they must be locked in the personal locker until the end of the day.
Use of technology – personal laptops, tablets, and mobile phones	• Competitors are not allowed to bring personal laptops, tablets, or mobile phones into the workshop. In the event that Competitors do bring these to the competition, they shall be locked in the personal locker and shall not be taken to the workstation. Competitors may take them out of their lockers at lunchtime or at the end of the day. • Skill Competition Manager, Chief Expert, Experts, and Interpreters are allowed to use personal laptops, tablets, and mobile phones in assigned areas only. They can take them out of the workshop at lunch time and at the end of the day.
Use of technology – personal photo and video taking devices	• Competitors are not allowed to bring personal photo and video taking devices into the workshop. In the event that Competitors do bring these to the competition, they shall be locked in the personal locker and shall not be taken to the workstation. Competitors may take them out of their lockers at lunchtime or at the end of the day. • Skill Competition Manager, Chief Expert, Experts, and Interpreters are allowed to use personal photo and video taking devices in the workshop. They can take them out of the workshop at lunch time and at the end of the day.
Drawings, recording information	• It is prohibited to remove drawings, sketches, notes, or any other information related to the Test Project from the workshop without the permission of the Chief Expert.

Topic/task	skill-specific rule
	• All papers, notes, etc., used in the meeting room, must remain inside of this room until the end of the competition. Any exception must have the permission of Skill Competition Manager or Chief Expert.

10 Visitor and media engagement

10.1 Engagement methods

Following is a list of possible ways to maximize visitor and media engagement:

- Utilize MTC Media Liaison Person (previous Competitor is ideal) in the competition workshop to explain MTC concept and escort media into the workshop;
- Display screens with head cam showing live images;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- Site layout to enable public and media to get close to Competitors – have access bays;
- Display screen with Competitor profiles;
- Daily reporting of competition status including marks, costs and times;
- Active assessment involving timed and active tasks – use announcer to inform public of what is happening.

11 Sustainability

11.1 Sustainable practices

This skill competition will focus on the sustainable practices below:

- Selection of projects to be related to:
  - Ecological problems; such as ocean clean up, global warming or energy use reduction.
  - Sustainability, such as products constructed from recycled materials, or manufactured from organic materials.
  - Aids for disabilities, such as an electric wheelchair or 3D printable prosthetic limb.
  - Disaster relief or emergency equipment, such as emergency pumping equipment or portable rescue equipment.
  - Recycling, such as a method or new product for recyclable or even non-recyclable materials along with a sustainable treatment process.
  - Green energy such as a new type of generator using renewable forces, or a product that creates its own energy to complete its work.
  - Cottage industry generation, such as a product that could be made to create a new business in a developing nation, or a product that can bring a completely new business to a nation that currently does not exist.

It should be noted that any sustainable project that allows social enhancement to mankind, or a particular group within, should be considered.

The goal of all projects should be to provide open source products and the manufacturing details of new products that can aid those who have a need for it. Working with Charities, aid organizations and/or governments where social needs exist, to develop briefs, or find worthy product needs would be a high priority in this case.

Open sourcing the projects would be the highest level of sustainability, with the considerable time, resources and efforts of teams around the globe, being put to good use and not just used for a competition.

12 References for industry consultation

12.1 General notes

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

In parallel to this, WSI consults three international occupational classifications and databases:

- ISCO-08: (http://www.ilo.org/public/english/bureau/stat/isco/isco08/)
- ESCO: (https://ec.europa.eu/esco/portal/home)
- O*NET OnLine (www.onetonline.org/)

12.2 References

This WSOS (Section 2) appears to be a junior version of a Mechanical Engineer:
https://www.onetonline.org/link/summary/17-2141.00

and to relate to a Mechanical Engineering Technician:
http://data.europa.eu/esco/occupation/b31e404e-9af6-457d-a58a-208f612eeba3

Adjacent occupations can also be explored through these links.

ILO 311

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Lyon 2024.

Organization	Contact name
Ricoh UK Products Ltd,	Mark Smiths, Senior Design and Development Engineer

13 Appendix

13.1 Appendix information

Not applicable.