

Technical Description

# Aircraft Maintenance

Transportation and Logistics



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.

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Stefan Praschl  
Chair of the Competitions Committee



Michael Fung  
Vice Chair of the Competitions Committee

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# 1 INTRODUCTION

## 1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

### 1.1.1 The name of the skill competition is

Aircraft Maintenance

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

An aircraft maintenance technician works in the commercial and public service sectors, performing a range of processes on aeronautical products. The aircraft maintenance technician has a critical responsibility to work professionally to ensure the safety of customers and maintain the reputation of the team or organization.

The aircraft maintenance technician normally works in an aircraft hangar. However, there are times when working outdoors is required. They may work for large and small organizations and occasionally directly for individual customers. They will undertake a number of processes including inspection, servicing, modifying, troubleshooting, removal, installation, rigging, testing, and repairing. An aircraft maintenance technician may specialize by working on particular aeronautical products such as helicopters and UAVs (Unmanned Aeronautical Vehicles), and tilt wing aircraft. Whether they specialize, organizing work, self-management, communication, interpersonal skills and problem-solving are all key attributes required by a maintenance technician. They must have the ability to work safely and rigorously, adhering to industry regulations and manufacturers' instructions. These universal traits are the benchmark of an outstanding aircraft maintenance technician.

In a mobile labour market, the aircraft maintenance technician may work in teams, or alone, or in both from time to time. Whatever the structure of the work, the trained and experienced aircraft maintenance technician takes on a high level of personal responsibility and autonomy. From safeguarding the safety of the customer through scrupulous attention to safe working, to undertaking complex repairs, every process matters and mistakes can be life threatening. The aircraft maintenance technician is one of the last lines of defence to ensure the safety of the aircraft before flight.

As a part of a global industry the aircraft maintenance technician faces rapidly expanding opportunities and challenges (including maintaining drones and space vehicles). For the talented aircraft maintenance technician there are many commercial and international opportunities; however, these carry with them the need to understand and work with different regulations and technological advancements. The diversity of skills associated with aircraft maintenance is therefore likely to expand.

### 1.1.3 Number of Competitors per team

Aircraft Maintenance is a single Competitor skill competition.

### 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 – Competition Rules
- WSI – WorldSkills Standards Specification framework
- WSI – WorldSkills Assessment Strategy
- WSI Online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations

## 2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

### 2.1 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](http://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 only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

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. This is often referred to as the “weighting”. 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.



## 2.2 WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	<b>Work organization and management</b>	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The Company Maintenance Policy Manual (MPM)</li> <li>• ATA chapters or equivalent</li> <li>• Health and safety legislation, obligations and documentation</li> <li>• Approved manuals, data from manufacturers and government</li> <li>• Situations when personal protective equipment (PPE) must be used, to include: safety footwear, eye and hearing protection, gloves, and respirators</li> <li>• Situations when electro-static dissipative equipment must be utilized to prevent system damage</li> <li>• The purposes, uses, care, maintenance and storage of hand, power and machine tools/equipment together with their safety implications</li> <li>• The purposes, uses, care and safe storage of materials</li> <li>• Sustainability measures with respect to the use of environmentally friendly materials, minimization of waste, and recycling materials</li> <li>• Principles of work flow, time management, and cost analysis</li> <li>• The importance of researching, planning, accuracy, checking, and attention to detail in all working practices</li> <li>• The significance of certifying the completion of a task to an international airworthy standard</li> <li>• The role of the certifying technician or engineer as the signing authority to release the aircraft for service</li> <li>• The importance of working within a team to accomplish a task within a timely and economical manner</li> <li>• The broader importance of working as a team</li> <li>• Individual roles and responsibilities within a team setting</li> <li>• Strength and weaknesses of team members and how to best organize the team to properly utilize all resources that are available</li> </ul>	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Consistently and diligently follow health and safety standards, rules and regulations</li> <li>• Identify and use the appropriate personal protective equipment including safety footwear, ear and eye protection</li> <li>• Select, use, clean, maintain and store all tools and equipment safely</li> <li>• Select, use and store all materials safely</li> <li>• Plan the work area to maximize efficiency</li> <li>• Maintain the discipline of keeping the work area clean and tidy</li> <li>• Measure accurately and check regularly</li> <li>• Consistently and diligently follow regulated processes and procedures to an international airworthy standard using the latest revision of approved manuals and data</li> <li>• Recognize the boundaries of own authority</li> <li>• Work to the requirements of the industry 'Human Factors' qualifications regarding the recruitment/employment of technicians</li> <li>• Establish and consistently maintain high quality standards and working processes under pressure</li> <li>• Plan the workflow within a team environment to give the best chance for a safe, successful completion of the task within a given time period</li> <li>• Organize and carry out a set of tasks within a team environment</li> </ul>	
<b>2</b>	<b>Communication and interpersonal skills</b>	<b>5</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The significance of establishing and maintaining customer confidence</li> <li>• The roles and requirements of related colleagues</li> <li>• The value of building and maintaining productive working relationships</li> <li>• The importance of having/developing an Industry accepted attitude, aptitude and ability: "Triple A" success</li> <li>• Interpersonal techniques of effective team work</li> <li>• The importance of swiftly resolving misunderstandings and conflicting demands</li> <li>• Human factors</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Interpret customer requirements and manage customer expectations positively</li> <li>• Make recommendations which meet/exceed the customers' requirements and budget</li> <li>• Produce time estimate for customers or supervisors</li> <li>• Contribute positively to a team e.g. in order to maintain safety</li> <li>• Undertake investigative discussions e.g. to resolve technical problems</li> <li>• Keep colleagues regularly informed/updated on planned maintenance procedures and negotiate timings to minimize negative impact on work/productivity levels</li> <li>• Reflect positively and constructively to feedback on own performance</li> <li>• Recognize the needs of support organizations e.g. logistical supplier, engineering authority and manufacturers' technical support</li> </ul>	

3	Problem solving, innovation, and creativity	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The common types of problem which can occur within the work process</li> <li>• Conduct all activities in a manner to ensure an international airworthy standard is achieved</li> <li>• Diagnostic approaches to problem solving</li> <li>• The importance of following the latest revision of the manufacturer's maintenance manual and documentation during the problem-solving processes</li> <li>• Trends and developments in the industry including new materials, methods and technology</li> <li>• Collaboration in a team environment to develop a course of action to complete task(s) safely and in an airworthy, timely, and cost-effective manner</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Check work regularly to minimize problems at a later stage</li> <li>• Challenge incorrect information to prevent problems</li> <li>• Recognize and understand problems swiftly and follow a self-managed process for resolving them using the latest revision of the manufacturer's maintenance manual and documentation</li> <li>• Undertake fault diagnosis discussions with pilots to determine the underlying causes of technical problems</li> <li>• Persist in resolving complex problems</li> <li>• Recognize opportunities to contribute ideas to improve the product and overall level of customer satisfaction</li> <li>• Take ideas forward to management</li> <li>• Try new methods and embrace change</li> <li>• Exploit the potential of new technologies</li> <li>• Interpret and apply maintenance procedures</li> <li>• Encourage the checking and verification of one's own work, as well as co-workers working in a team environment, to an international airworthy standard</li> </ul>	
4	Initial Scheduled Aircraft Acceptance Maintenance Check	12
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA chapter(s) 05, 12 20, 51, 60 or equivalent</li> <li>• The Maintenance Policy Manual (MPM)</li> <li>• The Manufacturers Maintenance Manual, documentation including airworthiness directives, service bulletins, etc.</li> <li>• Maintenance Task Cards</li> <li>• Airworthiness responsibilities</li> </ul>	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Interpret and apply the appropriate maintenance manual and supporting approved documents, including task cards, that supports the scheduled acceptance inspection process</li> <li>• Accurately determine if an aircraft is safe for flight or if further inspection is required as per the Initial Inspection Checklist</li> <li>• Open and close a range of inspection panels</li> <li>• Operate systems as required to verify serviceability</li> <li>• Accurately complete corresponding documentation to reflect the status of the completed Initial Acceptance Check</li> <li>• Clearly and accurately document any defects and refer to the Technical Controller for his/her attention</li> <li>• Complete all tasks strictly adhering to the international airworthy standard</li> </ul>	
<b>5</b>	<b>Aircraft structure repair (non-ferrous)</b>	<b>18</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA chapter 51 or equivalent</li> <li>• Manufacturers' structural repair manuals or equivalent</li> <li>• Engineering drawings and documentation</li> <li>• Different types of metal and their characteristics</li> <li>• Formulae for calculating bends and rivet lengths</li> <li>• Types of rivet and their purposes</li> <li>• Precision measuring instruments</li> <li>• Structural repair techniques</li> <li>• Damage reporting procedure</li> <li>• Implication of working with other technical entities (technical support, company approval process, etc.) with respect to effective communication and time delays</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Recognize the need for a repair and obtain an approved repair scheme</li> <li>• Interpret manufacturer's engineering drawings for a range of complex repairs including but not limited to: channel insert repair, Lobster Back Bend, OGEE (curved bend), flush patch, longeron splice, and Joggled</li> <li>• Prepare a written damage report</li> <li>• Accurately calculate the dimensions for flat layout</li> <li>• Form a complex section and/or channel and fit as required to repair an assembly in accordance with Standard Practices (AC 43-13)</li> <li>• Bend sheet metal with a high degree of accuracy with corners rounded, smooth and nick free</li> <li>• Select suitable fastener type (solid rivet, blind rivet, hi-lok, etc.)</li> <li>• Layout fastener accurately determine the rivet length and install solid/blind rivets in accordance with the supplied engineering drawings</li> <li>• Evaluate completed repair and report any defects and inconsistencies to the Technical Controller</li> <li>• Certify work carried out in accordance with an airworthy standard</li> </ul>	

<b>6</b>	<b>Composite structure inspection</b>	<b>12</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA chapter 51 or equivalent</li> <li>• Engineering drawings</li> <li>• Manufacturers structural repair manual or equivalent</li> <li>• Manufacturers inspection criteria (visual, hammer/tap test, eddy current, etc.)</li> <li>• Different types of composite materials and their characteristics</li> <li>• Different types of composite repairs and their advantages and disadvantages</li> <li>• Implications of cost, time, material supply, and facility requirements of a given repair</li> <li>• Precision measuring instruments</li> <li>• Repair/fabrication techniques</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Recognize the need for a repair</li> <li>• Interpret manufacturer's maintenance documentation and engineering data</li> <li>• Identify defects using visual, hammer/tap test</li> <li>• Develop hand-written repair schemes from standard/typical approved repair data using manufacturer's documentation material data and industry standard practices (i.e. AC 43-13)</li> <li>• Utilize manufacturer's structural repair manual or equivalent</li> <li>• Choose from a variety of standard minor field repairs using manufacturer's approved data (panel edge potting, bonded/riveted metal patch, adhesive injection into a void, fiberglass layup, etc.)</li> <li>• Select approved composite repair materials from available stock</li> <li>• Estimate the down time, manpower requirements, and material costs to fully comply with repair scheme</li> <li>• Assess the economic viability of a given repair with respect to complexity and aircraft down time</li> <li>• Indicate critical environmental variables for repair accomplishment</li> <li>• Communicate with the Technical Controller to obtain a final authority for the repair scheme</li> </ul>	
<b>7</b>	<b>Line Replacement Unit (LRU) Mechanical</b>	<b>18</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA chapter(s): 22, 24, 31, 34, 45, 46 or equivalent</li> <li>• Critical interaction of aircraft systems with respect to multiple faults</li> <li>• Effects of the computer hardware and software interaction with other aircraft systems</li> <li>• Correct procedures for removing, inspecting, installing and testing LRU components</li> <li>• Part/component procurement procedures in accordance with company MPM</li> <li>• Economic effects with respect to cost, time, and materials of component replacement</li> <li>• The importance of aircrew defect reporting</li> <li>• General troubleshooting techniques applicable to all mechanical LRU components</li> </ul>	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Interpret flow charts, graphs and maintenance manual procedures for mechanical, hardware and software component systems</li> <li>• Accurately use the “on board” aircraft system which features (binary readouts, LEDs, alpha-numeric display, fault codes) to analyse and troubleshoot the faulty aircraft system</li> <li>• Refit aircraft component using manufacturer’s procedures</li> <li>• Verify the airworthiness status using built-in test equipment (BITE)</li> <li>• Identify defective component(s) through system analysis</li> <li>• Economically assess the defect with respect to cost, time and materials</li> <li>• Repair a wide variety of aircraft systems by replacing major LRUs and electrical sub-components (relays, switches, circuit breakers, connectors, etc.)</li> <li>• Economically repair an aircraft system with respect to cost, time, and materials</li> <li>• Prepare action plans detailing the troubleshooting process, repair recommendations and additional operational checks to the Technical Controller for verification</li> </ul>	
<b>8</b>	<b>Line Replacement Unit (LRU) Electrical</b>	<b>15</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA Chapter(s): 22, 23, 24, 31, 34, 45, 46, or equivalent</li> <li>• The importance of communicating with other teams when troubleshooting affects multiple systems</li> <li>• Electrical safety with respect to power-on troubleshooting steps</li> <li>• Safe use of test equipment during testing procedures</li> <li>• Effects of Electro-Static Discharge (ESD) on sensitive components and how to reduce or eliminate potential damage</li> <li>• Effects of the computer hardware and software interaction with other aircraft systems</li> <li>• Correct procedures for removing, inspecting, installing and testing LRU components</li> <li>• Part/component procurement procedures in accordance with company MPM</li> <li>• Economic effects with respect to cost, time and materials of component replacement</li> <li>• The importance of aircrew defect reporting</li> <li>• General troubleshooting techniques applicable to all electrical LRU components</li> </ul>	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Interpret flow charts, graphs and maintenance manual procedures for electrical, hardware and software component systems</li> <li>• Accurately use the “on board” aircraft system which features (binary readouts, LEDs, alpha-numeric display, fault codes) to analyse and troubleshoot the faulty aircraft system</li> <li>• Refit aircraft component using manufacturer’s procedures</li> <li>• Troubleshoot utilizing electrical test equipment (i.e. digital multi-meter)</li> <li>• Verify the airworthiness status using built-in test equipment (BITE)</li> <li>• Identify defective component(s) through system analysis</li> <li>• Economically assess the defect with respect to cost, time and materials</li> <li>• Repair a variety of aircraft systems by replacing major LRU’s and electrical sub-components (relays, switches, circuit breakers, connectors, etc.)</li> <li>• Economically repair an aircraft system with respect to cost, time, and materials</li> <li>• Prepare action plans detailing the troubleshooting process, repair recommendations and additional operational checks to the Technical Controller for verification</li> </ul>	
<b>9</b>	<b>Certification and Return to Service procedure</b>	<b>10</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• ATA chapter(s) 05, 10, 11, 12, 24, 27 or equivalent</li> <li>• The impact of accurately recording completed reports</li> <li>• The effect and consequences on the aircraft systems when a scheduled inspection has been completed</li> <li>• Correct procedures for “Returning Aircraft to Service” including Minimum Equipment List (MEL)</li> <li>• Significance of the following certifying statements: <ul style="list-style-type: none"> <li>• “The maintenance described has been formed in accordance with the applicable standards of airworthiness”</li> <li>• “Aircraft is fit and safe for flight in conformance with its type design”</li> </ul> </li> <li>• The impact of defect deferrals on aircraft serviceability</li> <li>• Intended use of an aircraft Minimum Equipment List (MEL) or equivalent with respect to aircraft dispatch</li> <li>• Effects of repairs and modifications to the aircraft “empty weight and balance report” calculation as per manufacturer’s procedures</li> <li>• The organization of documents with respect to aircraft manufacturer maintenance documents including task cards</li> <li>• Certifying technician/engineer’s responsibilities for aircraft certification for return to service</li> <li>• How to determine if aircraft weight and balance report revisions are required and how to proceed if necessary</li> </ul>	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Evaluate work order packages and develop plans for aircraft certification</li> <li>• Interpret defect and rectification reports including task cards by following the maintenance manual procedures using the latest amendments</li> <li>• Ensure the aircraft is fit and safe to fly in accordance with its type design and determine all outstanding maintenance requirements to achieve an airworthy status</li> <li>• Prepare aircraft journey logbook entries (with maintenance summaries and maintenance release) for the work carried out in the work order packages that reflect the current state of the aircraft</li> <li>• Prepare acceptance reports for the incoming aircrews</li> </ul>	
	<b>Total</b>	<b>100</b>

## 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 Specification. The Test Project is the assessment vehicle for the skill competition, and also follows the Standards Specification. The CIS enables the timely and accurate recording of marks, and has expanding supportive capacity.

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

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors in order 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 standards that represent the skill. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards Specification.

By reflecting the weightings in the Standards Specification, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill 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 Specification, if there is no practicable alternative.

The Marking Scheme and Test Project may be developed by one person, or several, or by all Experts. The detailed and final Marking Scheme and Test Project must be approved by the whole Expert Jury prior to submission for independent quality assurance. The exception to this process is for those skill competitions which use an independent designer for the development of the Marking Scheme and Test Project. Please see the Rules for further details.

Experts and independent designers are required to submit their Marking Schemes and Test Projects for comment and provisional approval well in advance of completion, in order to avoid disappointment or setbacks at a late stage. They are also advised to work with the CIS Team at this intermediate stage, in order to take full advantage of the possibilities of the CIS.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition using the CIS standard spreadsheet or other agreed methods.

### 4.2 ASSESSMENT CRITERIA

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived in conjunction with the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards Specification; in others they may be totally 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 Specification.

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define 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). It is advisable not to specify either the Assessment Criteria, or the allocation of marks, or the assessment methods, within this Technical Description.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment 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) specified 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, or instructions for how the marks are to be awarded. Aspects are assessed either by measurement or 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 skill in the Standards Specification. 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)

	CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
	A	B	C	D	E	F	G	H			
STANDARDS SPECIFICATION SECTION	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				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, in all circumstances. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (See 4.6.)

## 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)
- 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, with a fourth to coordinate the marking and acting as a judge to prevent compatriot marking.

## 4.7 ASSESSMENT AND MARKING USING MEASUREMENT

Three experts will be used to assess each aspect. 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.

## 4.8 THE USE OF MEASUREMENT AND JUDGEMENT

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

## 4.9 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

### A – Initial Scheduled Aircraft Acceptance Check

- Follow correct Aircraft inspection procedure;
- Follow Check List;
- Prepare Defect Report;
- AWD and Service Bulletins;
- Teamwork;
- Task Cards;
- Use of all documents;
- Completion of reporting;
- Returning aircraft back to service;
- Area Clean-up;
- Completion time

### B – Aircraft Structure Repair (non-ferrous)

- Proper use of PPE;
- Channel dimensions ( $\pm 0.025''$ );
- Grain direction;
- Bend radius;
- All edges smooth and nick free;
- All corners rounded to 0.125" radius;
- Fastener pitch;
- Edge distance;
- Fastener selection;
- Shop heads;
- Manufacturer heads;
- Surface finish/tooling damage;
- Repair carried out as per Standard Practices (AC 43-13);
- Area clean up;
- Completion time;

#### **C – Composite Structure Inspection**

- All process steps have been followed satisfactorily;
- Accuracy of the written defects;
- Paperwork correctly completed;
- Proper use of Composite Repair Manual;
- Correct implementation of Manufacturer's instructions and drawings;
- Correct use of Eddy current machine and/or Tap Test;
- Defect Reporting;
- Area clean up;
- Completion time

#### **D – Line Replacement Unit (LRU)**

- Use of Binary, and Logic Gates for troubleshooting;
- Use of "On Board" aircraft systems i.e. LED's, alphanumeric display;
- Interpreting Fault Codes;
- Use of Flow Charts;
- Correct procedure for removing and re-installing LRU;
- Correct "BITE" test;
- Correct use of approved documents;
- Defect reporting;
- Correct completion of document reports;
- Area clean up;
- Completion time;

#### **E – Certification and Return to Service Procedure**

- Accurately recording and reporting completed Inspection criteria;
- Use of certifying statements;
- Minimum Equipment List (MEL);
- Weight and Balance Report;
- Use of Work Order Package;
- Journey Logbook Entry;
- Area Clean Up;
- Completion Time.

## **4.10 SKILL ASSESSMENT PROCEDURES**

- The Chief Expert will divide the Experts into teams for purpose of marking and setting up marking schedules. Consideration will be given to WorldSkills experience, language and culture;
- Each module/task/section will be completed on the assigned day so that progressive marking can take place;
- Marking is to be entered after each section has been completed, and a programme has been developed for computer calculation after time and task data has been entered;
- The Experts marking criteria and Competitor evaluation sheets, for each of the modules will be given to the Experts at the Competition.

## 5 THE TEST PROJECT

### 5.1 GENERAL NOTES

Sections 3 and 0 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 skills in each section of the WSSS.

The purpose of the Test Project is to provide full, balanced and authentic opportunities for assessment and marking across the Standards Specification, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme and Standards Specification 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 Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2.

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.

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 Specification. Section 2.1 refers.

### 5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

The format of the Test Project is a series of standalone modules.

### 5.3 TEST PROJECT DESIGN REQUIREMENTS

- Comply with current ICAO standards where applicable;
- Be modular;
- Be in accordance with the current Technical Description;
- Comply with WorldSkills requirements and numbering standard;
- Be accompanied by a marking scale that will be finalized at the Competition;
- Be accompanied by proof of function/proof of construction/completion in the set time etc. as appropriate to this skill competition.

### 5.4 TEST PROJECT DEVELOPMENT

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

#### 5.4.1 Who develops the Test Project or modules

The Test Project modules are developed by an Independent Designer.

#### 5.4.2 How and where is the Test Project or modules developed

The Test Project/modules are developed by the Independent Designer in consultation with the Skill Competition Manager (SCM).

#### 5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

TIME	ACTIVITY
At the previous Competition	Experts can review the MPM and put forward suggestions for possible Test Projects for the next competition through the SCM.
Twelve (12) months before the Competition	The Test Projects are under development.
Three (3) months before the Competition	The Test Projects are tested by the industry quality assurance to ensure the Test Projects meet WSI standards.
At the Competition	On C-5 all Test Projects will be available for translation.

## 5.5 TEST PROJECT VALIDATION

At the Competition all Experts ensure that:

- The sheet metal designs are accurate and complete;
- There are no installation requirements that cannot be completed;
- The tasks can be completed in the prescribed time of 22 hours;
- Proper function is achievable;
- The material/equipment list is accurate;
- Competitor instructions are kept to a minimum of text, and that they do not exceed the available space permitted on the approved instruction sheet for any one module.

## 5.6 TEST PROJECT SELECTION

Test Project possibilities are suggested by Experts as per MPM.

## 5.7 TEST PROJECT CIRCULATION

The Test Project is circulated as follows:

The Test Project is circulated at the Competition on C-5 for translation.



## 5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

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

The Skill Competition Manager is responsible for ensuring the following:

- The sheet metal designs are accurate and complete;
- There are no installation requirements that cannot be completed;
- The tasks can be completed in the prescribed time of 22 hours;
- Proper function is achievable;
- The material/equipment list is accurate;
- Competitor instructions are kept to a minimum of text, and that they do not exceed the available space permitted on the approved instruction sheet for any one module;
- The Test Project is complete in all aspects;
- Industry carries out a quality assurance check on all Test Projects.

## 5.9 TEST PROJECT CHANGE AT THE COMPETITION

Not applicable for practical modules. All modules are assessed using Measurement and Judgement marking and comply with ICAO standards.

## 5.10 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](http://www.worldskills.org/infrastructure) located in the Expert Centre.

Specific material or manufacturer specifications required by the Competitor to complete the Test Project modules will be supplied by the Competition Organizer. The Infrastructure List will be updated for the current Competition no later than six months prior to event.

## 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 skill specific Discussion Forum (<http://forums.worldskills.org>). Skill related decisions and communication are only valid if they take place on the forum. The Skill Competition Manager (or an Expert nominated by the Skill Competition Manager) will be the moderator for this Forum. Refer to 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](http://www.worldskills.org/competitorcentre)).

This information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- 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](http://www.worldskills.org/testprojects) and the Competitor Centre ([www.worldskills.org/competitorcentre](http://www.worldskills.org/competitorcentre)).

### 6.4 DAY-TO-DAY MANAGEMENT

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

## 7 SKILL-SPECIFIC SAFETY REQUIREMENTS

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

The following skill-specific safety requirements are to be adhered to by the Competitors and Experts.

- All Competitors must use safety glasses when using any hand, power, or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes;
- Experts will use the appropriate personal protective equipment when inspecting, checking, or working with a Competitor's project.

## 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](http://www.worldskills.org/infrastructure).

The Infrastructure List specifies the items and quantities requested by the Skill Competition Manager on behalf of the Experts for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Items supplied by the Competition Organizer are shown in a separate column.

At each Competition, the Skill Competition Manager must review, audit, and update the Infrastructure List in partnership with the Technical Observer in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any requests for increases in space and/or equipment.

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 COMPETITOR'S TOOLBOX

Toolboxes are NOT allowed to be brought to the competition as all necessary tools will be supplied.

### 8.3 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX

Competitors are not required to bring any tools.

### MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS

- Note pad;
- Pens, pencils;
- Safety glasses;
- Hearing protection;
- Safety footwear

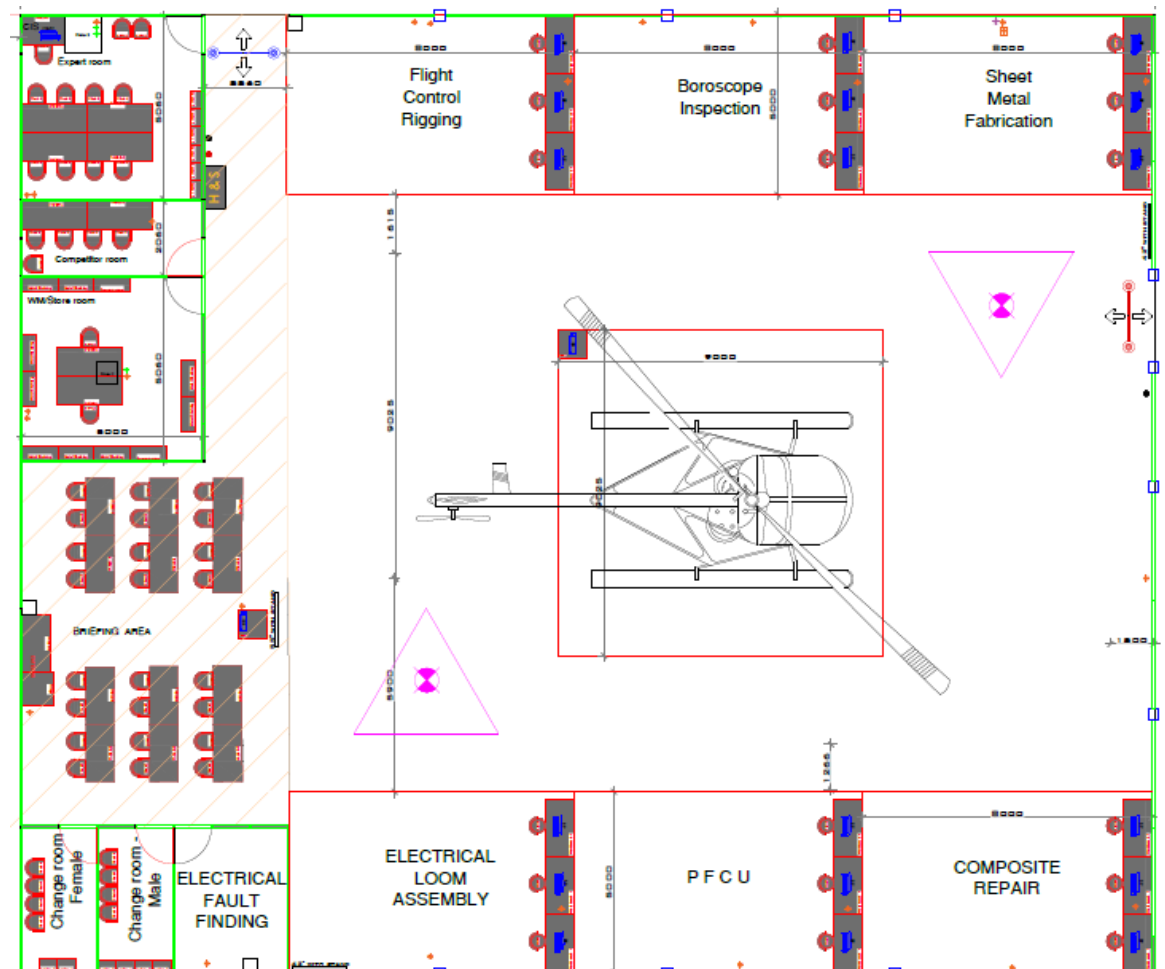
### 8.4 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

- Storage device;
- Programmable calculator;
- Any CD, floppy disk, flash memory, or any other recording equipment.
- Refer to section 9 for more information

## 8.5 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

Workshop layouts from previous competitions are available at [www.worldskills.org/sitelayout](http://www.worldskills.org/sitelayout).

Example workshop layout:



## 9 SKILL-SPECIFIC RULES

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 work flow, and documentation management and distribution.

TOPIC/TASK	SKILL-SPECIFIC RULE
Use of technology – USB, memory sticks	<ul style="list-style-type: none"> <li>Competitors, Experts, and Interpreters are not allowed to bring memory sticks into the workshop.</li> </ul>
Use of technology – personal laptops, tablets and mobile phones	<ul style="list-style-type: none"> <li>Competitors, Experts, and Interpreters are not allowed to bring personal laptops, tablets or mobile phones into the workshop.</li> </ul>
Use of technology – personal photo and video taking devices	<ul style="list-style-type: none"> <li>Competitors, Experts, and Interpreters are only allowed to use personal photo and video taking devices in the workshop at the conclusion of the competition.</li> <li>Experts are allowed to use a dedicated camera and memory device as required for the marking process. These must be approved by the Chief Expert.</li> </ul>
Templates, aids, etc.	<ul style="list-style-type: none"> <li>Competitors are not allowed to bring templates and aids to the Competition that may give them an unfair advantage.</li> </ul>
Drawings, recording information	<ul style="list-style-type: none"> <li>Competitors are not allowed to bring any prepared drawings or documented information to the Competition.</li> </ul>
Health, Safety, and Environment	<ul style="list-style-type: none"> <li>Refer to the WorldSkills Health, Safety, and Environment policy and guidelines document.</li> </ul>



## 10 VISITOR AND MEDIA ENGAGEMENT

The following list provides examples of how this skill competition may be more attractive for the media and visitors:

- Try a trade;
- Display screens;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- Competitor profiles;
- Career opportunities;
- Daily reporting of competition status - All results may be displayed in the Competition area as per previous Competitions. This will be of the progressive marking for all sections of the Competition and will display the current total aggregate result per country/region.

## 11 SUSTAINABILITY

This skill competition will focus on the sustainable practices below:

- Recycling;
- Use of 'green' materials.

## 12 REFERENCES FOR INDUSTRY CONSULTATION

WorldSkills is committed to ensuring that the WorldSkills Standards Specifications 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 Standards Specification 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/](http://www.onetonline.org/))

This WSSS (Section 2) appears most closely to relate to *Aircraft Mechanics and Service Technicians*:  
<https://www.onetonline.org/link/summary/49-3011.00>

and/or *Aircraft Maintenance Technician*: <http://data.europa.eu/esco/occupation/91373a70-79b6-47a2-aa50-07dfe20dd258>

Adjacent occupations can also be explored through these links.

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Standards Specification in place for WorldSkills Kazan 2019.

ORGANIZATION	CONTACT NAME
Pennant International Ltd	Alan Rampling, Training Specialist
Shock Trauma Air Rescue Service (STARS), Canada	Ryan Gillis, Aircraft Maintenance Engineer, Line Maintenance