

TECHNICAL DESCRIPTION

AIRCRAFT MAINTENANCE



worldskills
international

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WorldSkills International, by a resolution of the Technical 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:

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1. **INTRODUCTION**

1.1 **Name and description of skill**

1.1.1 The name of the skill is

[Aircraft Maintenance](#)

1.1.2 Description of skill

The Aircraft Maintenance Technician (AMT) works mainly in an AMO (Aircraft Maintenance Organisation) inspecting, servicing, troubleshooting, removing, installing and repairing Aircraft Systems. Upon finishing their task the AMT must certify their maintenance carried out on the aeronautical product with the understanding that a licensed practitioner has the signing authority to release the aircraft for service.

The theoretical and practical training of the AMT is concerned with the airframe, engine and propeller which include the mechanical, hydraulic, pneumatic, avionic and electrical equipment in an aircraft.

1.2 **Scope of application**

1.2.1 Every Expert and Competitor must know this Technical Description.

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

1.3 **Associated documents**

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

- WSI - Competition Rules
- WSI - Online resources as indicated in this document
- Host Country - Health and Safety regulations

2. **COMPETENCY AND SCOPE OF WORK**

The Competition is a demonstration and assessment of the competencies associated with this skill. The Test Project consists of practical work only.

2.1 **Competency specification**

[Perform a simple sheet metal repair scheme](#)

Competitors shall know and understand:

- [How to interpret drawings](#)

Competitors shall be able to:

- [Bend sheet metal with a high degree of accuracy](#)
- [Layout fastener and install solid rivets in accordance with the supplied drawings](#)
- [Form a hat section and channel and fit as required to make the assembly shown in the drawing in accordance with Standard Practices \(AC 43 – 13\)](#)

Rig a Flight Control

Competitors shall know and understand:

- How to interpret drawings

Competitors shall be able to:

- Correctly set flight control cable tension with the ailerons centred (using a rigging pin).
- Correctly and safely set all flight control travels limits

Perform Aircraft Daily Inspection

Competitors shall be able to:

- Perform a Daily Inspection (D.I.) on a helicopter to determine whether or not the helicopter is safe for flight or if further inspection is required as per the defect report and daily inspection checklist.
- Complete corresponding paperwork to reflect the status of the completed D.I.

Removal and installation of an Aircraft component simulated in a covered module

Competitors shall be able to:

Able to remove and install a component in a simulator

Blending a compressor blade

Competitors shall be able to:

- Blend out a compressor wheel blade of a Rolls Royce 250 C20 engine and corresponding compressor wheel blade
- Carry out work in accordance with the appropriate manufacturer's maintenance manual

Gas Turbine Boroscope Inspection

Competitors shall be able to:

- Use a boroscope to inspect and report defects found inside a gas turbine engine without removing any components from the engine

Electrical wiring troubleshooting

Competitors shall know and understand:

- The use of the Standard Wiring Practices Manual

Competitors shall be able to:

- Fabricate, install and terminate wire loom as per wiring diagram
- Troubleshoot faults in a wiring harness and correctly
- Report any defects found

General

Competitors shall know and understand:

- The correct use of reference manuals i.e. AC 43 – 13 Aircraft Standards Manual
- Following procedure as per instructions in Aircraft Maintenance Manuals

2.2 Theoretical knowledge

2.2.1 Theoretical knowledge is required but not tested explicitly.

2.2.2 Knowledge of rules and regulations is not examined.

2.3 Practical work

The Competitor must be able to carry out the following tasks:

- Assembly – Sheet metal repair as per supplied drawing
- Rigging – Use of supplied module
- Daily Inspection – Visual Inspection of an Helicopter prior to flight
- Removal and installation – component in simulator
- Blending of a Compressor Blade
- Gas Turbine Hot Section Inspection using a boroscope.
- Fabricate wire loom and Troubleshoot an electrical wiring defect

3. THE TEST PROJECT

3.1 Format / structure of the Test Project

Series of standalone modules

3.2 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 finalised at the Competition
- Be accompanied by proof of function/ proof of construction/ completion in the set time etc – as appropriate to this skill category.

3.3 Test Project development

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

Time	Activity
At the previous Competition	Experts are nominated to develop the Test Project for the next Competition.
Every 4 months between Competitions	Experts developing the Test Project are required to post their Test Project on the Discussion Forum for all Experts to review.
6 months before the Competition	The Test Project is developed.
4 months before the Competition	Experts vote to select the Test Project.
3 months before the Competition	The Test Project is circulated.
At the Competition	All Experts ensure the validity of the Test Project. Evaluation questions pertaining to the any of the modules are changed to constitute the 30% change.

3.3.1 Who develops the Test Project / modules The Test Project / modules are developed by:

Nominated Experts.

The Experts will be nominated at the end of the previous Competition. All Experts can put forward an idea and then the nominated Experts will choose and develop modules that are relevant to Aircraft Maintenance.

3.3.2 How and where is the Test Project / modules developed

Jointly on the Discussion Forum.

The nominated Experts will initially be allowed to start developing the modules on their own. However, every 4 months the module, under development, will be posted on the Discussion Forum for all members to review and post their feedback.

3.3.3 When is the Test Project developed The Test Project is developed:

By 6 months before the current Competition

3.4 Test Project marking scheme

Each Test Project must be accompanied by a marking scheme proposal based on the assessment criteria defined in Section 5.

3.4.1 The marking scheme proposal is developed by the person(s) developing the Test Project. The detailed and final marking scheme is developed and agreed by all Experts at the Competition.

3.4.2 Marking schemes should be entered into the CIS prior to the Competition.

3.5 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.

3.6 Test Project selection

The Test Project is selected as follows:

By vote of Experts on the Discussion Forum 4 months prior to the Competition.

This will be done in conjunction with the feedback from all Experts on new modules that are being developed as well as existing modules.

3.7 Test Project circulation

The Test Project is circulated via WorldSkills International website as follows:

3 months before the current Competition

3.8 Test Project coordination (preparation for Competition)

Coordination of the Test Project will be undertaken by:

The Chief Expert

The Chief Expert 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

3.9 Test Project change at the Competition

Not applicable for practical modules. All of the modules are objectively marked and comply with ICAO standards. Evaluation questions (written) pertaining to any of the modules can be changed and approved by the Chief Expert and Deputy Chief Expert. This will satisfy the 30% module change for the theoretical part.

3.10 Material or manufacturer specifications

Specific material or manufacturer specifications required by the Competitor to complete the Test Project modules will be supplied by the Competition Organiser. The Infrastructure List will be updated for the current Competition no later than 6 months prior to event.

4. **SKILL MANAGEMENT AND COMMUNICATION**

4.1 Discussion Forum

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

4.2 Competitor information

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

This information includes:

- Competition Rules
- Technical Descriptions
- Test Projects
- Other Competition-related information

4.3 Test Projects

Circulated Test Projects will be available from [worldskills.org](http://www.worldskills.org) (<http://www.worldskills.org/testprojects>) and the Competitor Centre (<http://www.worldskills.org/competitorcentre>).

4.4 Day-to-day management

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

5. **ASSESSMENT**

This section describes how the Experts will assess the Test Project / modules. It also specifies the assessment specifications and procedures and requirements for marking.

5.1 Assessment criteria

This section defines the assessment criteria and the number of marks (subjective and objective) awarded. The total number of marks for all assessment criteria must be 100.

Section	Criterion	Marks		
		Subjective (if applicable)	Objective	Total
A	Assembly Sheet Metal	0	20	20
B	Rigging Flight Controls	0	15	15
C	Daily Inspection of Aircraft	0	10	10
D	Removal and installation of Aircraft Component	0	20	20
E	Blending of Compressor Blade	0	10	10
F	Hot Section Inspection using boroscope	0	10	10
G	Fabricate and troubleshoot Electrical Wiring Circuit	0	15	15
Total =		0	100	100

5.2 Subjective marking

Not applicable

5.3 Skill assessment specification

A – Assembly

- Completion time
- Area clean-up
- Hat section dimensions ($\pm 0.025''$)
- 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

B – Completion of required rigging procedure

- Ailerons faired in neutral
- Cable tension within limits
- Lockwire as per Standard Practices (AC 43-13)
- Safety clips installed correctly as per Standard Practices (AC 43-13)
- Up travel stop set to $15^\circ \pm 1^\circ$
- Down travel stop set to $13^\circ \pm 1^\circ$
- Travel stops correctly safetied
- Area clean up
- No tension on rigging pin when ailerons faired in neutral position.

C – Daily Inspection

- All process steps have been followed satisfactorily
- Proper use of appropriate maintenance manual
- Procedure followed to inspect the Helicopter (Expert observes procedure)
- Accuracy of the written defects
- Paperwork correctly completed

D – Removal and installation of Aircraft Component

- Correct removal and installation of hydraulic hoses
- Correct removal and installation of control rods
- Correct removal and installation of bell crank
- Correct removal and installation of torque tube assembly
- Correct adjustment of all controls for reinstalled items including freedom of movement

E – Blend Compressor Blade

- Blend Compressor Blade iaw manufacture's MM

F – Gas Turbine Hot Section Inspection using a Boroscope

- All process steps have been followed in accordance with the manufacturer's MM
- Hot Section Inspection defect report filled out correctly

G – Troubleshoot and Electrical Wiring defect

- Install and terminate wires to terminal block and switched on lamp
- Operational check of lighting circuit
- Trouble electrical wiring defects

5.4 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 program 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.

6. SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country Health & Safety documentation for Host Country 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 safety equipment when inspecting, checking or working with a Competitor's project.

7. **MATERIALS & EQUIPMENT**

7.1 **Infrastructure List**

The Infrastructure List details all equipment, materials and facilities provided by the Host Country.

The Infrastructure List is online (<http://www.worldskills.org/infrastructure/>).

The Infrastructure List specifies the items & quantities requested by the Experts for the next Competition. The Competition Organiser will progressively update the Infrastructure List specifying the actual quantity, type, brand/model of the items. Competition Organiser supplied items are shown in a separate column.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts must advise the Technical Director 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.

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.

7.2 **Materials, equipment and tools supplied by Competitors in their toolbox**

- Safety glasses
- Hearing protection
- Safety coveralls
- Safety footwear
- Basic hand tools

Example of typical basic hand toolbox
1/4" drive socket set that has the following items: <ul style="list-style-type: none"> ○ fine tooth ratchet ○ 3" and 6" extension ○ standard and deep 12 point sockets ○ 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8", 7/16", 1/2", 9/16" ○ universal joint ○ adapter 1/4" – 3/8"
3/8" drive socket set that has the following items: <ul style="list-style-type: none"> ○ fine tooth ratchet ○ 3" and 6" extension ○ standard 12 point sockets ○ 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 13/16", 7/8", 1" ○ deep 12 point sockets ○ 3/8", 7/16", 1/2", 7/8", and 1" ○ deep 6 point socket, 7/8" ○ universal joint ○ speed handle ○ adapter 3/8" – 1/2" ○ adapter 1/2" – 3/8"
Set ignition combination wrenches <ul style="list-style-type: none"> ○ 5/32", 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8", 13/32", 7/16"
set of combination wrenches <ul style="list-style-type: none"> ○ 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 7/8", 1"
set of open end wrenches <ul style="list-style-type: none"> ○ 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 7/8", 1"

Example of typical basic hand toolbox
set pin punches <ul style="list-style-type: none"> ○ 3/32", 1/8", 5/32", 3/16", and 3/8"
set of screwdrivers <ul style="list-style-type: none"> ○ stubby slotted ○ stubby #2 phillips ○ #1 phillips ○ #2 phillips ○ 4" slotted ○ 8" slotted
Other items <ul style="list-style-type: none"> ○ set hex keys (allen wrenches) from .050" to 5/16" ○ centre punch ○ line up punch ○ 1/4" cold chisel ○ soft faced hammer ○ ball peen hammer, 10 ounce ○ pliers, duck bill ○ pliers, needle nose ○ diagonal cutters 5" to 7" ○ pliers, slip joint 8" ○ metal ruler 6" ○ feeler gauge set

7.3 Materials, equipment and tools supplied by Experts

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

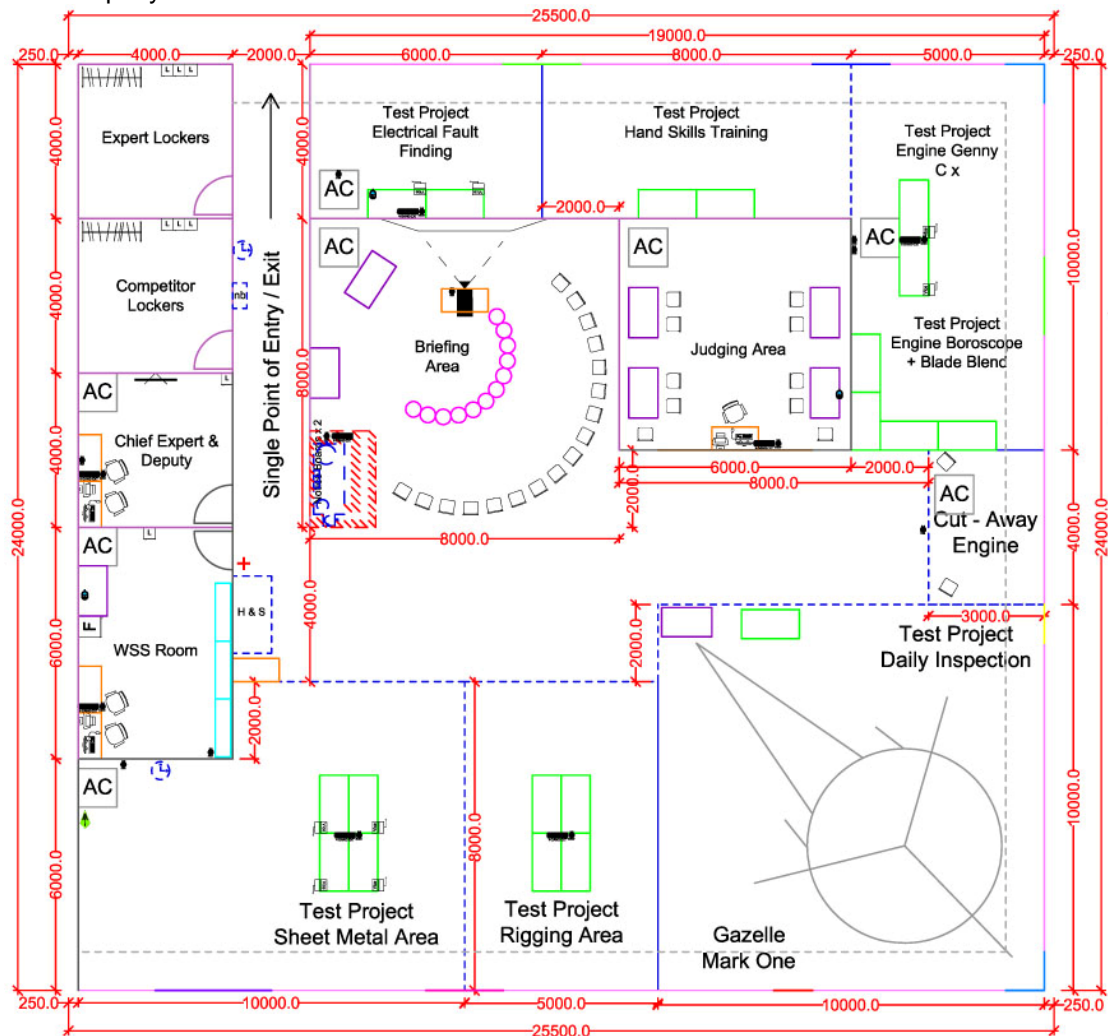
7.4 Materials & equipment prohibited in the skill area

- Storage device
- Programmable calculator
- Any CD, floppy disk, flash memory or any other recording equipment

7.5 Proposed workshop and workstation layouts

Workshop layouts from London are available at:
http://www.worldskills.org/index.php?option=com_halls&Itemid=540

Workshop layout:



8. MARKETING THE SKILL TO VISITORS AND MEDIA

8.1 Maximising visitor and media engagement

Following is a list of suggestions to maximise visitor and media engagement:

- 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.

8.2 Sustainability

- Recycling
- Use of 'green' materials