

# TECHNICAL DESCRIPTION

## JEWELLERY



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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

Jewellery

1.1.2 Description of skill

Jewellers create uniquely beautiful and durable jewellery out of precious metals for different types of customers. Jewellers work economically whilst maintaining a high level of detail and quality. They are well organised and have plenty of initiative. Using the correct equipment and maintaining work safety and sustainability is important.

### **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**

#### Workshop management

A Competitor shall have the knowledge and understanding of:

- Logistical requirements to enable the manufacturing of a Test Project.
- Procedures for checking serviceability of personal tools and equipment
- Procedures for storage of jewellery items

The Competitor shall be able to:

- Assess the separate tasks and operations necessary to the manufacture or repair of jewellery components and assembly of finished jewellery pieces.
- Interpret a workshop drawing of jewellery components or complete jewellery piece, including side views, cross-sections and sketches of details, and determine the following:
  - Time necessary to complete the project
  - Materials to be prepared
  - Equipment required

#### Manufacture of precious metal alloys

A Competitor shall have the knowledge and understanding of:

- Precious metal alloy content and its properties.

The Competitor shall be able to:

- Calculate the proportions and quantities of fine precious metals and base metals required for a predetermined quantity of any recognised precious metal alloy.
- Cast precious metal alloy ingots and bars with a minimum of residual impurities, ready to be milled/rolled in preparation for the manufacture of jewellery components.

#### Preparation of precious metal alloys for the manufacture of jewellery components

A Competitor shall have the knowledge and understanding of:

- Precious metal types, applications and properties
- Common jewellery design feature and their construction
- Common metal finishes and their application
- Metal preparation and fabrication techniques to suit different design requirements

The Competitor shall be able to:

- Prepare flat plate to a pre-determined sheet thickness using manual or electrically powered rolling mills.\*
- Prepare square wire to a pre-determined dimension using manual or electrically powered rolling mills.\*
- Prepare square or round wire to a pre-determined diameter/gauge using drawing bank and drawing plates.
- Manufacture *Chenier*/tube to a pre-determined diameter/gauge, from metal sheet of an appropriate size/thickness using drawing bank and drawing plates and precious metal solder.

#### Manufacture of simple jewellery components

A Competitor shall have the knowledge and understanding of:

- Jewellery components
- Techniques and methods for forming, constructing and finishing components

The Competitor shall be able to:

- Cut or saw precious metal sheet or wire to a required set of dimensions.
- Cut or saw decorative detail such as Ajour saw piercing
- Shape or bend precious metal sheet or wire to pre-determined shape as per a workshop drawing.
- Hammer, emboss, shape or dome precious metal sheet of an appropriate thickness into low relief, as per a workshop drawing, using appropriate doming and shaping tools.

#### Manufacture of complex components and complete jewellery pieces using solder joins

A Competitor shall have the knowledge and understanding of:

- Jewellery components
- Techniques and methods for forming, constructing and finishing components

The Competitor shall be able to:

- Manufacture complex jewellery components (such as settings and mechanisms) by uniting two or more simple jewellery components using appropriate precious metal solders and by correct use of soldering torches.
- Knowledge of under railing and gallery techniques
- Manufacture complete jewellery pieces by adjusting and uniting two or more simple or complex jewellery components using appropriate precious metal solders and by correct use of soldering.
- Manufacture precious settings for precious gemstones, and should have necessary knowledge of gem-setting techniques.
- Manufacture mechanisms such as articulations, hinges, clasps and pressure snaps.
- Perform techniques such as riveting and screw threading

### Surface finish

A Competitor shall have the knowledge and understanding of:

- Typical finishing and polishing methods and techniques
- Effect of different types and grades of polishing media on the surface finish
- Procedures, tools and techniques to gain the optimum finish
- Common surface imperfections/defects and the appropriate techniques to repair them

The Competitor shall be able to:

- Produce an non reflective surface finish as appropriate to be passed onto a jewellery polisher or gem-setter
- Correctly use ASA 800 sandpaper (American Standard) or equivalent.

### Health and safety

A Competitor shall have the knowledge, understanding and compliance of:

- Operation and maintenance of machines and tools.
- Risks in the use of natural and propane gas, oxygen, electricity, acids and chemical products.

The Competitor shall be able to:

- Apply correct health and safety requirements and procedures.
- Use appropriate protective equipment and clothing as required.
- Refer to Host Country's health and safety regulations

## **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**

- Making a piece of jewellery or several components in accordance with a technical drawing. Refer to Appendices for example of the drawings from WSC2011.
- Applying jewellery skills and manufacturing techniques
- Manufacturing to the project specifications
- Using only the material supplied

## **3. THE TEST PROJECT**

### **3.1 Format / structure of the Test Project**

Test Project with separately assessed sub-projects or components.

### **3.2 Test Project design requirements**

Drawing must be available in at least JPG or PDF. For drawing projections refer to ISO 128, either first or third angle projection. Projections shall be on one sheet of A4 paper, scale 1:1, per module. If necessary, cross-sections and three dimensional representations may also be included.

In each module a minimum of four, and a maximum of ten dimensions, must be clearly identified on the drawing for marking purposes.

Test Project proposals must include a full materials list.

**The material list will be voted and finalised on the forum 9 months prior to the 2013 Competition.**

Marking forms - Objective Marking, Subjective Marking and Mark Summary.  
If selected a completed 1:1 prototype in metal must also accompany the Proposal.

### 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.

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

All Experts

3.3.2 How and where is the Test Project / modules developed

Independently

3.3.3 When is the Test Project developed  
The Test Project is developed according to the following timeline.

Time	Activity
Before the previous Competition	Test Project proposals are developed and brought to the previous Competition. Five Test Project proposals are selected.
Immediately after the previous Competition	The five selected Test Project proposals are circulated on the WSI website
9 months before the Competition	The material list will be finalised on the forum
At the Competition	One Test Project is selected by random draw from the five circulated proposals. 30% change is made to the selected Test Project

### 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

By presenting an example of the completed Test Project proposal in metal

### 3.6 Test Project selection

The Test Project is selected as follows:

- For 2013: Five Test Projects have been selected at WSC2011 to be drawn at the Competition before undergoing 30% changes.

- For 2015: On the Skill Discussion Forum  
Up to 3 months before the Competition, Experts will upload Test Project proposals (using WorldSkills Test Project proposal templates and format, including photographs of a completed sample of each module and 3D files if applicable) onto the Jewellery forum. One month before the Competition Experts will select 3 projects by Discussion Forum poll. See Competition Rule Appendix 7 for eligibility to vote.

#### **At the current Competition**

On arrival at the Competition, the Test Project for the Competition is selected by random draw from the three selected Test Project proposals before undergoing 30% changes

### **3.7 Test Project circulation**

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

Submitted to the Technical Director at the previous Competition for immediate circulation.

### **3.8 Test Project coordination (preparation for Competition)**

Coordination of the Test Project will be undertaken by:

The Chief Expert, Deputy Chief Expert and the nominated Expert from the Member country/region who's Test Project is selected.

### **3.9 Test Project change at the Competition**

The selected Test Project must be changed by a minimum of 30% at the Competition.

Any of the following alterations may be made to the selected Test Project at the Competition site in order to eliminate the possibility of any Competitor bringing ready-made components for evaluation.

- Enlargement/reduction of **≤30%**, in a given XYZ axis, to the size of components or to the size of stone for which a setting is conceived, in the selected Test Project drawing.
- Enlargement/reduction of **≤30%** to the number of times a specific technical element is repeated (ex. Number of holes) in the selected Test Project drawing.
- Alteration of the shape of the stone for which a setting is conceived, maintaining its volume within **≤30%** of that defined in the selected Test Project drawing.
- Any alterations, including combinations of the above, which maintain the technical elements to be completed in the selected Test Project, and respect the general aesthetics, and which do not require an enlargement or reduction of the amount of metal to be provided, in excess of **30%**.

### **3.10 Material or manufacturer specifications**

A predetermined metal list will be developed from which all Test Project proposals are to be designed.

**The material list will be voted and finalised on the forum 9 months prior to the 2013 Competition.**

## **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	Similarity to drawing/Function	20	0	20
B	Sawing – ajour work	20	0	20
C	Soldering	20	0	20
D	Surface finish	10	0	10
E	Dimensions	0	20	20
F	Piece complete on time	0	10	10
	<b>Total =</b>	<b>70</b>	<b>30</b>	<b>100</b>

#### 5.2 Subjective marking

Scores are awarded on a scale of 1 to 10.

A demonstration of subjective marking will be performed before marking is commenced.



### 5.3 Skill assessment specification

**Criterion A:** For similarity to drawing, the Experts will subjectively assess the degree to which the Competitor's work reflects the general shapes and proportions described in the Test Project drawing(s). For function, the Experts will subjectively assess the degree to which any mechanisms or clasps in the Competitor's work function correctly.

**Criterion B:** The Experts will subjectively assess, shape's dimensions and internal surface finish of technical elements involving removal of metal (sawing, milling, drilling, filing etc) in the Competitor's work.

**Criterion C:** The Experts will subjectively assess the degree to which Competitors unite, by means of solder joints, components implicitly or specifically defined as touching in the Test Project drawing(s), without discoloration or incorrect application of solder.

**Criterion D:** The Experts will subjectively assess the degree to which the Competitor's work demonstrates a uniform, unpolished finish (equivalent to ASA 800 abrasive paper finish. Two 20 mm round flat sample piece of 18 kt gold will be displayed in the workshop area and clearly show the desired surface finish) without marks, scratches or discoloration on all surfaces not assessed for criterion B.

**Criterion E:** The Experts will objectively assess whether the Competitor's work respects clearly marked dimensions on the Test Project drawing, within defined tolerances.

**Criterion F:** The Experts will objectively assess whether the components and technical elements specified in the Test Project drawing(s) are present and connected to the others by means of at least one solder or mechanical joint, as specified in the technical project.

### 5.4 Skill assessment procedures

- The Experts that attend the Competition will be divided into marking groups to deal with each section of the marking criteria.
- If modular, every completed module/task/section will be marked on the same day in which it was completed.
- To ensure transparency, each Competitor is provided the same evaluation sheet as used by the Experts.
- Experts will maintain supervision of the Competitors during the Competition, but must not look at Competitors' work, or have any knowledge of progress until the module has been marked.
- At the end of each day of the Competition, the incomplete test pieces shall be collected, by the Workshop Supervisor, in opaque boxes, sealed and signed, marked with the Competitor's workstation number and country code, and locked in a safe or strong cabinet. The key or combination to the safe or strong cabinet should be kept only by a neutral person, nominated by the Experts.
- At the end of each day of the Competition, photographs may be taken of all Competitors' metal, by a neutral person nominated by the Experts, to assure that no parts may be replaced or added. These photographs shall be kept in a safe or strong cabinet.
- At the end of each Competition module the test pieces for marking shall be sealed in opaque envelopes, inscribed with the Competitor's name, workstation number and country code.
- For marking, the test pieces will be anonymously labelled by 2 neutral persons (including the Workshop supervisor) and will be marked without the Experts having any knowledge of the Competitors' identity.

## 6. SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country Health & Safety documentation for Host Country regulations.

- Competitors must wear transparent eye protection when required.
- Practical clothing that covers the body to knee e.g. Apron or coveralls.
- Enclosed footwear must be worn within the workshop area.

## 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. Items supplied by the Competition Organiser 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.

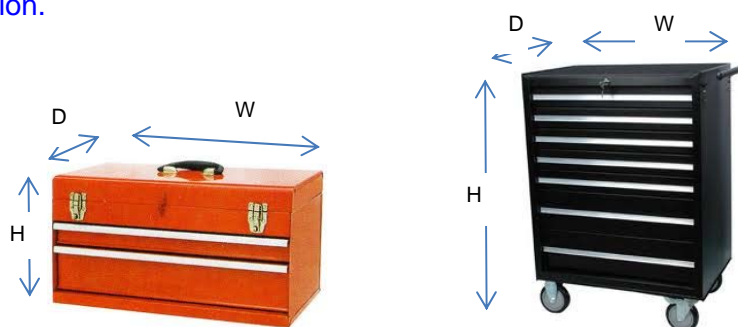
At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition.

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**

#### Toolbox Size

Toolboxes greater than 0.25m<sup>3</sup> will not be allowed within the workshop area during the competition.



The volume will be measured as Height (Floor to top of tool box) x width x depth. Wheels can be removed.

Non-consumable materials, equipment and tools to be supplied by the Competitor

Qty*	Description
1	Set of Hand files
1	Set of Needle-point files
1	Rounding hammer
1	Steel block
1	Saw frame
1	Set of Pliers
1	Marking tool
1	Square
1	Measuring rule
1	Compass, dividers
1	Bench pin
1	Soldering tweezers
1	Soldering torch
1	Soldering block
1	Clear protection glasses
1	Chisel/ scorpers/ graver
1	Scraper
1	Magnifying glass
1	Magnet

*Quantities specified are recommended as the minimum – Competitors may bring more than one. Additional tools not listed are permitted subject to a complete tool box inspection*

Consumable materials to be supplied by the Competitor

Qty	Description
1	Saw blades
1	Modelling clay
1	Soldering fluid/flux
1	Heat resistant paste
1	Set of sanding paper – assorted grit
1	Frazers/ milling cutters/ burrs
1	Drills assorted sizes
1	Plaster
1	Pumice-stone powder
1	Cleaning products (no acid)
1	0.25 mm binding wire (60 cm)
1	1 mm copper sheet (15 cm x15 cm)
1	600 Emery Paper (American Standard) or equivalent / 20 sheets

*Quantities specified are recommended as the minimum – Competitors may bring more than one. Additional Materials not listed are permitted subject to a complete tool box inspection*

NOTE: Acid will be supplied by the Competition Organiser and listed in the Infrastructure List. Competitors are not to use any other acid than that supplied. The brand and materials safety data sheet for the dry acid will be made available six months before the Competition.

### 7.3 Materials, equipment and tools supplied by Experts

Not applicable

### 7.4 Materials & equipment prohibited in the skill area

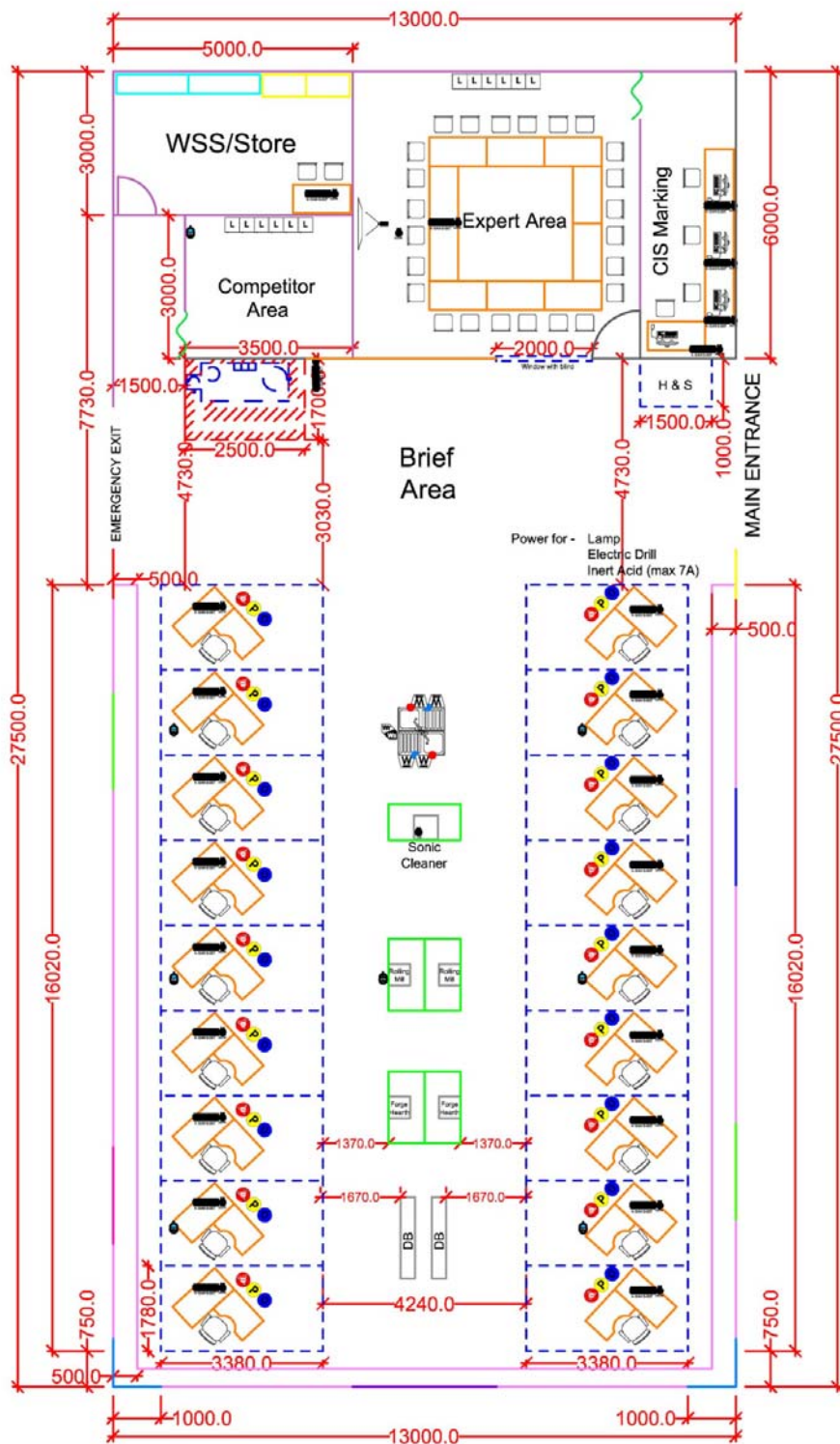
- Material used in the Test Project: au 750/00 (18kt) yellow or white gold and their solders.
- Tools pre-formed for the selected Test Project.
- Any yellow or white gold coloured metals.

## 7.5 Proposed workshop and workstation layouts

Workstations will be allocated by random draw at the start of the familiarisation period.

Workshop layouts from London are available at:  
[http://www.worldskills.org/index.php?option=com\\_halls&Itemid=540](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**

To maximise visitor and media engagement for Jewellery the following ideas will be considered:

- Try a trade (benches with tools for visitors to try basic Jewellery techniques)
- “Competitor Cam” – a fixed camera on each Competitor’s workstation with a central viewing monitor
- Test Project descriptions
- Enhanced understanding of Competitor activity
- Competitor profiles – interests, training and education, e.g. duration of training
- Career opportunities – may differ for each member country
- Daily reporting of Competition status – progressive marking would allow for increased spectator interest
- Precious metal art history – an educational brochure detailing the history of jewellery manufacture and how this aligns with current industry practice, in particular, techniques that the competitors are currently using
- Audio visual display explaining the project and category information for the general public

### **8.2 Sustainability**

- Recycling
- Use of ‘green’ materials
- Use of completed Test Projects after Competition
- Energy efficient lighting
- Pre-determined material list
- Pre-determined tool box sizes

## 9. APPENDIX

### 9.1 Sample technical drawings

