



TECHNICAL DESCRIPTION **JOINERY**



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:

1 INTRODUCTION	2
2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)	3
3 THE ASSESSMENT STRATEGY AND SPECIFICATION	9
4 THE MARKING SCHEME	10
5 THE TEST PROJECT	17
6 SKILL MANAGEMENT AND COMMUNICATION	24
7 SKILL-SPECIFIC SAFETY REQUIREMENTS	25
8 MATERIALS AND EQUIPMENT	25
9 VISITOR AND MEDIA ENGAGEMENT	29
10 SUSTAINABILITY	30

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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

Joinery

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

A joiner generally works on commercial and residential projects. There is a direct relationship between the nature and quality of the product required and the payment made by the customer. Therefore the joiner has a continuing responsibility to work professionally in order to meet the requirements of the customer and thus maintain and grow the business. Joinery is closely associated with cabinet making and carpentry plus other parts of the construction industry and with the many products that support it, normally for commercial purposes.

The joiner is usually based in a workshop because the formation of various joints requires specialist machinery, but sometimes undertakes installations in the homes of customers and on building sites. He or she will produce and interpret drawings, set out and measure, cut, form joints, assemble, install and finish to a high standard. The joiner usually produces items such as interior and exterior doors, windows, stairs, tables and bookshelves.

Work organization and self-management, communication and interpersonal skills, problem solving, innovation and creativity, working precisely and accurately are the universal attributes of the outstanding joiner. Whether the joiner is working alone or in a team the individual takes on a high level of personal responsibility and autonomy. From working safely through to exceptional planning and organizing, accuracy, concentration and attention to detail to achieve an excellent finish, every step in the process matters. Mistakes are largely irreversible and very costly.

With the international mobility of people, the joiner faces rapidly expanding opportunities and challenges. For the talented joiner there are many commercial and international opportunities; however these carry with them the need to understand and work with diverse cultures and trends. The diversity of skills associated with joinery is therefore likely to expand.

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 (when available)
- WSI – Online resources as indicated in this document
- Host Country – Health and Safety 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).

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

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

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

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

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

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



2.2 WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	Work organization and management	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Health and safety legislation, obligations and regulations which control the work process • The principles of working safely with electrical equipment or tools • Emergency procedures and reporting processes for accident, first-aid and fire • The situations when personal protective equipment (PPE) must be used • The uses, care, maintenance and safety of tools, machines and equipment • Care and safety of materials during storage • The significance of keeping a clean and tidy work area • Ways in which working practices can minimize wastage and help to manage/control the costs of the manufacturing process • Sustainability measures applying to the use of 'green' materials and recycling • The time normally required for key joinery processes • Principles and measures to carry out work in harmony • The significance of planning, accuracy, checking and attention to detail in all working practices • The role of the individual in maintaining a successful business • The value of managing own continuing professional development 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Follow health and safety standards, rules and regulations • Maintain a safe working environment • Identify and use the appropriate personal protective equipment including safety footwear, ear and eye and dust protection • Select, use, clean, maintain and store all hand and powered tools and equipment safely • Select, use and store all materials safely • Plan the work area to maximize efficiency and maintain the discipline of regular tidying and cleaning • Measure accurately and avoid wastage • Work efficiently and check progress and outcomes regularly to avoid financial penalties • Critically evaluate own work 	



2	Communication and interpersonal skills	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The importance of establishing and maintaining customer confidence and trust • Non-verbal communication • The negotiation process • The roles and requirements of architects and related trades and the most effective methods of communication • The value of building and maintaining productive working relationships with colleagues and managers • The importance of swiftly resolving mis-understandings and conflicting demands • Progress reporting methods 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Gain trust of customer, interpret requirements and manage expectations positively • Visualize and translate customer wishes, giving advice and making recommendations/providing options which meet/improve their design and budgetary requirements • Positively support and lead decision-making assertively • Liaise with suppliers to negotiate prices and place orders • Produce a cost and time estimates for customers • Introduce architects and related trades to support customer requirements • Recognize, respect and adapt to the changing needs of architects and related trades • Integrate, facilitate communication and work positively within a team situation e.g. on a building sited • Clearly communicate with colleagues where drawings, variations to the documents and work restrictions are required • Follow instructions, meet deadlines and report on progress in the appropriate format 	
3	Problem solving, innovation and creativity	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The common types of problem which can occur within the work process e.g. walls being out of alignment • Diagnostic approaches to problem solving • The challenges of restoration projects • Trends and developments in the industry 	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Check work regularly, particularly for accuracy/standard, to minimize problems at a later stage • Recognize and understand problems swiftly and follow a self-managed process for resolving • Challenge incorrect information to prevent problems • Develop creative solutions to challenges when working on restoration projects • Recognize opportunities to contribute ideas to improve the product and overall level of customer satisfaction • Keep up to date with changes in the industry • Demonstrate a willingness to try new methods and embrace change 	
4	Produce a working drawing	20
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The essential information that must be included in a working drawing • The ISO standards which must be followed • Geometry and trigonometry • The significance of an accurate working drawing as a basis for accurate joinery • The importance of checking the working drawing for missing information or errors and pro-actively taking corrective action 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Check the location of the finished product and environmental conditions e.g. humidity levels • Check the type and level of the floor area/walls • Accurately measure and record the size/shape of the area in which the completed product will be installed e.g. customer's kitchen • Produce lines which are: straight, crisp, accurate, meet clearly at intersections and are of a consistent thickness and correct weight • Produce a range of line types including: object, fresh, hidden and break • Produce joint details which are accurate and correctly proportioned • Ensure that all measurements meet specification • Identify drawing errors or items that require clarification • Determine and check quantities of materials required for construction 	
5	Preparing materials	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Different types of material and their process of manufacture to include: hardwood (elm, beech, ash, oak, mahogany, maple) softwood (spruce, redwood, Douglas fir) and timber-based manufactured boards (chipboard, block and, lamin board, plywood) and other panels for heat conservation and noise reduction • Characteristics of timber, timber-based manufactured boards and materials to include: durability, weight, workability, compatibility with other materials, ability to take preservatives and finishes • The range of faults found within wood and their causes • Eco-consciousness and the significance of using environmentally friendly material 	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Thoroughly inspect the material when purchasing to identify any defects to include: knots, shakes, splits, cupping, bowing, rot, pith, stain, sap ducts, twist, worm infestation, case hardening • Saw to material list and leave for specified time for the drying process • Plane to achieve 'squareness' and thickness • Saw panels to final specification required and attach edging with glue as necessary • Select, order and purchase additional materials e.g. 'door furniture' glass, plastic and adhesives 	
6	Forming interior joints	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Different types of joint to include: mortice-and-tenon, dovetail, biscuit, lap and spline • The need for close fitting joints to form a good surface area for gluing • The importance of not fitting joints too tight, requiring excessive force during assembly 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Accurately produce mortices by hand and using a variety of machines e.g. hollow chisel morticer • Produce mortices which are parallel and free from cutter or chisel marks • Produce mortices and haunches to the correct size in the drawing • Produce tenons by hand and machine e.g. traditional tenon saws, Japanese pull saws, band saw, powered hand router and mitre saw • Produce tenons that are parallel and free from undulations • Produce well-fitting mortice and tenon joints which fit together with a 'push fit' • Check and confirm internal joint geometry conforms with the working drawing including: length of tenon and depth of mortice • Fit metal/brass locks 	
7	Assembly	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The need for perfect fitting joints to make the connection • Different types of glue and their purpose • Reactions of some woods to glue and negative impacts • Properties of any metals used e.g. screws • Cost of mistakes 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Undertake a trial assembly to check it fits together, with no gaps, and conforms to the working drawing/ taking any necessary corrective action • Sand the inside, select and prepare the glue • Prepare the edging for protection e.g. wood, plastic; apply the glue evenly and attach the edging, ensuring there are no 'twists' and that it is 'square' • Use filling where necessary/appropriate and ensure joints are complete and well finished 	



8	Finishing	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• Types of sanding paper, for the wood and varnishing• The reasons for different treatments e.g. hard wood requires water in advance as it does not absorb stain and oak/walnut/cherry have a chemical reaction with metals	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Complete the product to the drawing specifications• Determine the quality standard required by customer/trades for further processes e.g. for staining, painting, lacquering/polishing or oiling• Produce a smooth surface, curves, moulds and edges through sanding by machine and hand• Control flush and the regulation of the edge during sanding• Check the quality of the surface e.g. free from glue and any defects or chips	
9	Installing	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• Different techniques of fixing• Range of glues and their preparations• Condensation and preventative actions	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Check quality and completeness of all components• Plan and schedule transportation and check all tools and machines are in good working order and available/are on site• Check the location of the installation e.g. for water pipes and wiring and liaise with plumbers and electricians/other trades for advice and support• Check with customer where there changes may be necessary to the positioning/fixing and discuss options• Protect installation area as necessary e.g. floor coverings• Take care not to damage any flooring or wall finishes/contents• Work around the needs of customers to avoid disturbance/disruption to services as much as possible e.g. drilling on concrete• Maintain security of the premises/work area• Present the installation to meet customer and related trades needs and expectations	



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 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 judgment. These are referred to as **objective** and **subjective**, respectively. 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 agreed by the Experts and 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 external designer for the development of the Marking Scheme and Test Project.

In addition, Experts are encouraged 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 the complete and approved 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 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).

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 of assessment 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) has a specified day on which it will be marked.

Each marking form (Sub Criterion) contains either objective or subjective Aspects to be marked. Some Sub Criteria have both objective and subjective aspects, in which case there is a marking form for each.

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 objectively or subjectively and appear on the appropriate marking form.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it and a reference to the section of the skill as set out in the Standards Specification.

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
STANDARD SPECIFICATION SECTIONS											
TOTAL MARKS PER CRITERION											100

SAMPLE OF TABLE FROM CIS



4.5 SUBJECTIVE MARKING

Subjective marking uses the 10 point scale below. To apply the scale with rigour and consistency, subjective marking should be conducted using:

- benchmarks (criteria) to guide judgment against each Aspect
- the scale to indicate:
 - 0: non attempt;
 - 1-4: below industry standard;
 - 5-8: at or above industry standard;
 - 9-10: excellence.

4.6 OBJECTIVE MARKING

A minimum of three experts will be used to judge each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. Where they are used, partial marks will be clearly defined within the Aspect.

4.7 THE USE OF OBJECTIVE AND SUBJECTIVE ASSESSMENT

The final deployment of objective or subjective assessment will be agreed when the Marking Scheme and Test Project are finalized. The table below is advisory only for the development of the Test Project and Marking Scheme.

SECTION	CRITERION	MARKS		
		Subjective	Objective	Total
A	Drawing – setting out	3	2	5
B	Internal joints	20	0	20
C	External joints	0	25	25
D	Finish and appearance	14	6	20
E	Conformity	0	5	5
F	Measurement	0	20	20
G	Material	0	5	5
Total		37	63	100



4.8 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

Breakdown of marking criteria

SECTION	CRITERION	MARKS				Total
		Flat Module		3D Module		
		Subjective	Objective	Subjective	Objective	
A	Drawing – setting out	3	2	0	0	5
B	Internal joints	10	0	10	0	20
C	External joints	0	12.5	0	12.5	25
D	Finish and appearance	7	3	7	3	20
E	Conformity	0	2.5	0	2.5	5
F	Measurement	0	7.5	0	12.5	20
G	Material	0	2.5	0	2.5	5
Total		20	30	17	33	100

A: Drawing/Setting out

This marking aspect checks the Competitor's ability to set out the project. A drawing/set-out is only required in the flat module and not in the 3D module. The marking criteria will include:

- Line work;
- Joint details;
- Measurements.

Line work: Subjective Marking

Points to consider when marking (note; CAD drawing full size is available to have alongside for clarity and reference) are as follows:

- Lines are consistent;
- Line types are present: object lines, hidden lines, break lines, etc.;
- Lines have the correct line weights;
- Neatness;
- Lines may extend from edge of layout in order to transfer angles, sizes, location of joints and other details to the work piece, but no more than 50 mm and must be neat and distinct from object lines.



Joint Details: Subjective Marking

Points to consider when marking are as follows:

- Joint geometry and proportions are shown accurately.

Measurements: Objective Marking

Points to consider when marking are as follows:

- Measurements within 1mm 100%;
- Measurements over 1mm and up to and including 2mm 50%;
- Measurements over 2mm 0%.

B: Interior Joints

This marking aspect checks the Competitor's ability to form accurately fitting joint surfaces by hand and machine as shown on the competition project drawing. Each joint is apportioned a mark according to its complexity.

All Competitors must identify each piece of material submitted for marking with their bench number only. After marking, Experts will identify which internal joints have been marked with a stamp or coloured marker.

Points to consider when marking are as follows:

- Joints assemble so the internal surfaces of the joint are in close contact, but not so tight as to require excessive force to assemble them.
- Tenons are parallel;
- Mortises are parallel;
- Tenon shoulders are not undercut;
- The internal joint geometry conforms with the drawing – including length of tenon and depth of mortise;
- Surfaces have clean even sheared or cut grain without irregularities;
- No silicone, wax or other foreign material is permitted in internal joints – just wood.

C: Exterior Joints: Objective Marking

This marking aspect checks the Competitor's ability to produce an assembled project with good strong joints and no gaps.

Points to consider when marking are as follows:

- Inspect for gaps on the external joint;
- The joint is made according to the drawing;

The joint is complete.

TOLERANCE	POINTS
Within 0.15mm	100%
Up to and including 0.3mm	50%
Over 0.3mm	0%

Note:

- Any filling or piecing in gaps = 0%;
- Use of silicone, wax or other foreign material in internal joints = 0%.



D: Finish and Appearance

This marking aspect determines the Competitor's ability to produce a project with a good visual and architectural appearance. The marking criteria will include:

- Twist of component;
- Surface finish of the component;
- Edge finish of the component;
- Squareness of the component;
- Fit of any panels;
- Alignment of components;
- Others may be added or some of the above subtracted depending on the nature of the project.

Twist and squareness: Objective marking

TOLERANCE	POINTS
Within 1mm	100%
Up to and including 2mm	70%
Up to and including 3mm	40%
Over 3mm	0

E: Conformity

This marking aspect determines the Competitor's ability to build the project exactly as described in the drawing. Penalties can be as follows but the final list will be determined by the CE, DCE and the marking panel during the Competition.

Points to consider when marking are as follows:

- Missing panel;
- Missing frame component;
- Other non-conformities e.g. a repair;
- To a maximum loss of five points.

F: Measurement

This aspect of the marking criteria determines the dimensional accuracy of the completed project, and will be marked as follows:

Primary dimensions:

- Measurements within 1mm 100%
- Measurements up to and including 2mm 50%
- Measurements over 2mm 0%

Secondary dimensions:

- Measurements within 1mm 100%;
- Measurements over 1mm 0%.



G: Material

This aspect of marking allows for the penalizing of points for the replacement of non-usable components.

The penalties are as follows:

- Replacement of the first piece - two mark deduction;
- Replacement of subsequent pieces - one mark deduction;
- To a maximum loss of five points.

4.9 SKILL ASSESSMENT PROCEDURES

- The Experts that attend the Competition will be divided into marking groups to assess each section of the marking criteria. When dividing the Experts, consideration will be given to the composition of the module development groups;
- The Chief and Deputy Chief Expert will train Experts on each area of the marking scheme so they know what to look for when assessing the Competitors' work;
- The Chief Expert will discuss how each section of the marking criteria will be assessed prior to adjudication to ensure conformity and consistency;
- All Experts must meet one of the following criteria:
 - A practicing wood trade worker;
 - A practicing wood trade educator;
 - Hold a wood trade qualification.



5 THE TEST PROJECT

5.1 GENERAL NOTES

Sections three and four 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 and balanced 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.

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 0 refers.

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

All section sizes to be produced from standard sawn sections. For example, 250 40 rough size is 240x32 maximum dressed.

5.3 TEST PROJECT DESIGN REQUIREMENTS

The Test Project consists of two modules. Each module will come from a different group of Experts - 2D (flat) or 3D.

The Expert groups will be selected by ballot by the Technical Director nine months prior to the Competition.

The flat project is to have a maximum size of one square metre OR 0.15 cubic metres. The 3D project may have a larger volume than the flat module. For example, 750 x .500 x .400 is equal to 0.15m³.

In general, the modules must require the Competitor to display a range of hand and machine skills.

Each module must be designed to enable the least competent Competitors to achieve some good results, whilst also allowing the most skilled Competitors to demonstrate their ability without achieving 100%.

All Test Projects proposals must be in two languages, one in the language of the designer's country/region and the other in English. For English speaking Members, the other language must be German or French.

There must be at least a minimum of four different types of joints used in each module. For example, open mortise and tenon, wedged mortise and tenon, double mortise and tenon, dovetail...etc.

Dowels and biscuits may be used for no more than 10% of the joints in the module.



Suggested Design Guideline - one joint = about one hour work. At most nine joints for a nine hour module.

Each module is limited to three profile shapes. These profiles include Chamfers (45 degree only), rebates and grooves. For clarification, each module is limited to no more than three shapes in total. For example, if a module has two chamfers it may only have one other profile – a groove or a rebate. Rebate and groove tooling that would have been used on the selected project has to be the same on the 30% change project for tooling at the competition and Competitor router bits.

All joints to be formed using any or all of the following: by hand, portable router, mitre saw, mortise machine, band saw. (Please note that tenoners have been removed from the Infrastructure List.)

Project proposals must be submitted in a computer assisted drawing format to ISO-standards.

All Test Project proposals submitted by Members have to include the following details and must be accompanied by:

1. Front cover;
2. Table of contents;
3. Working instructions;
4. Working drawings to scale full size (1:1);
5. Section details;
6. Exploded details of complex joints;
7. Detailed marking criteria in CIS format;
8. Marking criteria for the Competitors showing divisions A-G and B-G for the 3D project. (There is no drawing required for the 3D project;
9. Elevation showing joints for marking;
10. Elevations showing measurements for marking;
11. Materials list for the Workshop Manager to prepare the materials;
12. Elevations showing project materials;
13. Provide a photograph to show that the project has been made

Competitors can bring any material they want like MDF, Ply, and Solid timber
Sheet material 1.5m², Timber different than the projects, 0.05m².

5.4 TEST PROJECT DEVELOPMENT

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

5.4.1 Who develops the Test Project or modules

The Test Project/modules are developed by two independent groups of Experts.

The 2D module comprises a design that must be completed in eleven hours. Included in this 11 hours is drawing set-out that will take approximately one hour to complete. It is important to remember that when designing a flat project the Competitor will have approximately ten hours to build the project after the drawing set-out is complete. The 3D module must be completed in eleven hours and has no requirement for a drawing.



5.4.2 How and where is the Test Project or modules developed

Each group must work independently of the other on the Discussion Forum in private/closed groups using the following criteria:

In the case of project selection in two closed groups on the Discussion Forum the Chief Expert and Deputy Chief Expert will moderate one group each. Neither the Chief Expert nor the Deputy Chief Expert will have access to the other group.

5.4.3 When is the Test Project developed

Before the Competition by each Expert and then posted to the relevant closed group in the Joinery Discussion Forum.

The Test Project is developed according to the following timeline:

TIME	ACTIVITY
<p>Between nine (9) months and seven (7) months prior to the Competition</p>	<ul style="list-style-type: none"> • Experts are divided into two module development groups • The Chief Expert organizes two closed Discussion Forums, one for each group. • Returning Experts will change groups after each competition • The Chief Expert will select which group (flat or 3D) a new Expert will be placed into • A timetable with the exact deadline dates for Test Project development must be placed on the Discussion Forum at this time • Experts to design project of their designated group only
<p>Between four (4) months and two (2) months prior to the Competition</p>	<ul style="list-style-type: none"> • All 3D and flat projects are put on the Discussion Forum • Experts discuss the proposed projects of their designated 3D or flat projects and ensure they are compliant with 5.3 in the Technical Description • Experts of the non-compliant proposed modules have the opportunity to make their proposed module compliant and re-submit it. • All 3D and flat Test Projects on the Discussion Forum are for all Experts and Competitors to see and practise on if the Competitor wants to • Voting one week, Between the 9th and 8th week before competition • Who can vote: Chief, Deputy Chief, Experts with a Test Project proposal and all new Experts



TIME	ACTIVITY
Eight (8) weeks prior to the Competition	<ul style="list-style-type: none">• All eligible Experts vote for one 3D or one Flat project in their respective closed forums.• The Technical Director posts the selected 3D and Flat Test Projects on the open Discussion Forum for all Experts to view.• The selected Test Project modules and material lists are given to the Workshop Manager.• Competitor can see and practise the 3D and flat voted projects at his time
Starts seven (7) weeks prior to the Competition	<ul style="list-style-type: none">• The Experts in each closed group (3D and Flat) prepare a proposal for a 30% change. 30 % change proposals CANNOT change the material lists. Experts are not to share their 30% change proposals with their Competitor.• At this time, the official CIS spreadsheet is prepared and translations are made into the three official languages. Once this is complete, translations may be prepared in each Competitor's chosen language. <p>Note: The 30% change is 30% Minimum and 100% Max</p>



TIME	ACTIVITY
At the Competition – First day of preparation	<ul style="list-style-type: none">• A vote of the Chief, Deputy Chief, and Experts with a 30% min change project and all new Experts is conducted for the 30% change for both the 3D and flat project• Proposals for the 30% change are accepted in their entirety and will not be modified to include other proposal ideas• At this time the CIS is modified to account for the 30% change• Experts are not to share their 30% change proposals with their Competitor• Proposals will be presented to Experts prior to the competition on day C-4• All proposals must be complete and follow the 13 steps outlined in 3.3.8 of the Technical Description. If the proposal is not compliant, it will not be considered for the vote• Experts that are currently in the Flat forum will develop a 30% change proposal for the Flat project and Experts currently in the 3D forum will develop a 30% change proposal for the 3D project. Returning Experts who did not already present a proposal in their respective closed forum, may present a 30% change proposal• Drawings will not be modified at the competition site. Experts to ensure that are precise and complete• A 3, 2, 1, vote will be held to choose one Flat and one 3D 30% change proposals on day C-4. (These are the actual projects that will be built at the competition). To be eligible to vote you are either a new Expert or existing Expert that has presented a 30% change and Chief and Deputy Chief.

5.5 TEST PROJECT VALIDATION

For a Test Project module to be compliant must meet the following requirements:

- It meets all the requirements listed in the Technical Description;
- Both the 3D and the Flat modules are able to be built in the eleven hour time requirement. Included in the eleven hours for the flat module is a drawing set-out that will take approximately one hour to complete.
- The Test Project modules must be built under the supervision of the designing Expert by a person of similar competence to that of a Competitor.



5.6 TEST PROJECT SELECTION

Only compliant modules are eligible for selection.

The Test Project is selected by a vote of eligible Experts in each closed group on the Discussion Forum three months prior to the Competition. The Technical Director will advise which Experts are eligible to vote.

The Technical Director monitors the vote by the eligible Experts and posts the selected modules in each of the flat and 3D modules on the open forum for all Experts to view.

5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

Modules are circulated to all Experts on the WorldSkills website three months prior to the Competition.

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

Coordination of the Test Project will be undertaken by the Chief Expert and Deputy Chief Expert who will lead each closed project selection group on the Joinery Discussion Forum.

5.9 TEST PROJECT CHANGE AT THE COMPETITION

Three months before the Competition the Experts in each group (3D and Flat) prepare proposals for 30% change. Experts from the Flat closed forum work on a 30% proposal for the Flat module and Experts from the 3D closed forum work on a 30% proposal for the 3D module. Changes to proposals must work within the materials already identified on the Infrastructure List. At the Competition, a vote is made for the 30% change for both the 3D and flat modules.

Proposals for the 30% change are accepted in their entirety and will not be modified to include other proposal ideas.



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 located in the Expert Centre.

Materials used for the project modules may be hardwood, manufactured panel products or combinations of these. Dressed material is to be supplied 0.5mm oversize, moisture content should be between 10% and 13% and considered of high quality by the Workshop Manager. Special consideration should be given to materials which exhibit a high degree of "green, enviro-friendly, and eco-consciousness". Samples of materials should be forwarded to all Experts and Competitors six months prior to the competition.

The Workshop Manager will have at their disposal a professional/competent machinist to monitor the shapers during the Competition. This will be at a preferred coverage rate of one professional to two shapers and a maximum of one professional to three shapers. A student or apprentice is not suitable for this role.

All shapers will have manual hold down devices that apply pressure in two directions, down to the bed of the machine and horizontal to the shaper fence.

To reduce the cost of tooling, shaper heads (cutters) will be limited to the following profiles:

- A – Chamfers at 45 degrees
- B – Rebates
- C – Grooves

A master rule is used to check all Competitors measuring devices against. If the Competitor's rule does not match, measurements will be made with the Competitor's measuring device during measurement evaluation on the Competitor's Test Project.



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 Chief Expert (or an Expert nominated by the Chief Expert) 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).

This information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- Infrastructure List
- Health and Safety documentation
- Other Competition-related information

6.3 TEST PROJECTS [AND MARKING SCHEMES]

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

6.4 DAY-TO-DAY MANAGEMENT

The day-to-day management of the skill during the Competition 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 finalized at the Competition by agreement of the Experts. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).



7 SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country/Region Health and Safety documentation for Host Country/Region regulations.

- All Competitors must use safety glasses when using any hand, power or machine tools or equipment likely to create chips or fragments that may injure the eyes;
- A first-aid kit and eye wash station must be available throughout the Competition;
- Experts will use the appropriate personal safety equipment when inspecting, checking or working in the machinery work area and Competitors' work areas;
- All Competitors must use respiratory protection when using any hand or power equipment which creates dust;
- All machines will use the necessary safety guards, tooling, suction devices, auxiliary equipment and extraction system that meet the machine manufacturer's specifications;
- The Workshop Manager will be responsible for tooling and tooling changes on machinery. The Workshop Manager is not allowed to adjust any machinery for a Competitor but is required to provide supervision;
- The lighting level at bench height is to be a minimum of 500 lux;
- The competition site requires a smooth, flat and level floor. This floor must not have large cracks, gaps, irregularities or other tripping hazards.



8 MATERIALS AND EQUIPMENT

8.1 INFRASTRUCTURE LIST

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

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

The Infrastructure List specifies the items and quantities requested by the 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 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.



8.2 MATERIALS, EQUIPMENT AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX

The Competitor may bring the following tools to the Competition. The list is a suggestion only and is not limited. However, only two bench-mounted static power tools are allowed.

- Electric powered routers, which may be bench mounted, with the necessary safety guards;
- Portable compound mitre saw that may have sliding mechanism that is depth adjustable, having suitable rear guarding so as to protect other Competitors, the public and Experts from dust and flying materials;
- The only stationary machines allowed in a Competitor's area are a bench mounted router and a drop saw on a stand (mitre saw). All other power tools must be hand-held;
- Hand-held routers;
- Sander;
- No premade jigs or holding devices for power tools to form joint to be used in the Competition;
- Set of drawing instruments;
- Awls;
- Planes;
- Chisels;
- Shaping tools;
- Rebate plane;
- Plough plane;
- Gauges;
- Squares;
- Mallet;
- Drill and bits;
- Hammer;
- Screwdrivers;
- Hand tool sharpening equipment;
- Trammel points;
- Portable vise;
- Abrasive paper with a maximum grit of 250;
- Portable lamp.
- At the competition time the committee may make other materials available to all Competitors if they are deemed necessary and/or suitable for the making of jigs and fixtures to safely hold small or complicated parts for machining.
- **Competitors are not permitted prefixed or assembled jigs, fixtures or templates.**
- **No premade jigs or holding devices to form joints to be used in the competition.**

Note: The maximum open height of the toolbox MUST not exceed 1.5 m. No other object in the Competitor's area is to exceed 1.5m in height.

- Clamps can be over 1500 but not the clamp stand;
- Supplied bench light, ducting pipe and frame and small flagpole can go over the 1500mm height;
- No extra lights on Competitors site, host country to supply roof light and one bench light per Competitor;
- If water, oil, wax etc. is used on a joint, the marking for a perfect joint will be 50% max;
- No excessive dust from any power tool (mitre saw, router, sander, etc.) may enter the area of another Competitor or the general shop space.

Upon arrival and unpacking of toolboxes, Competitors will show all tools and demonstrate all jigs and templates to the tool inspection team for validation prior to the commencement of the Competition.



8.3 MATERIALS, EQUIPMENT AND TOOLS SUPPLIED BY EXPERTS

See section 8.4.

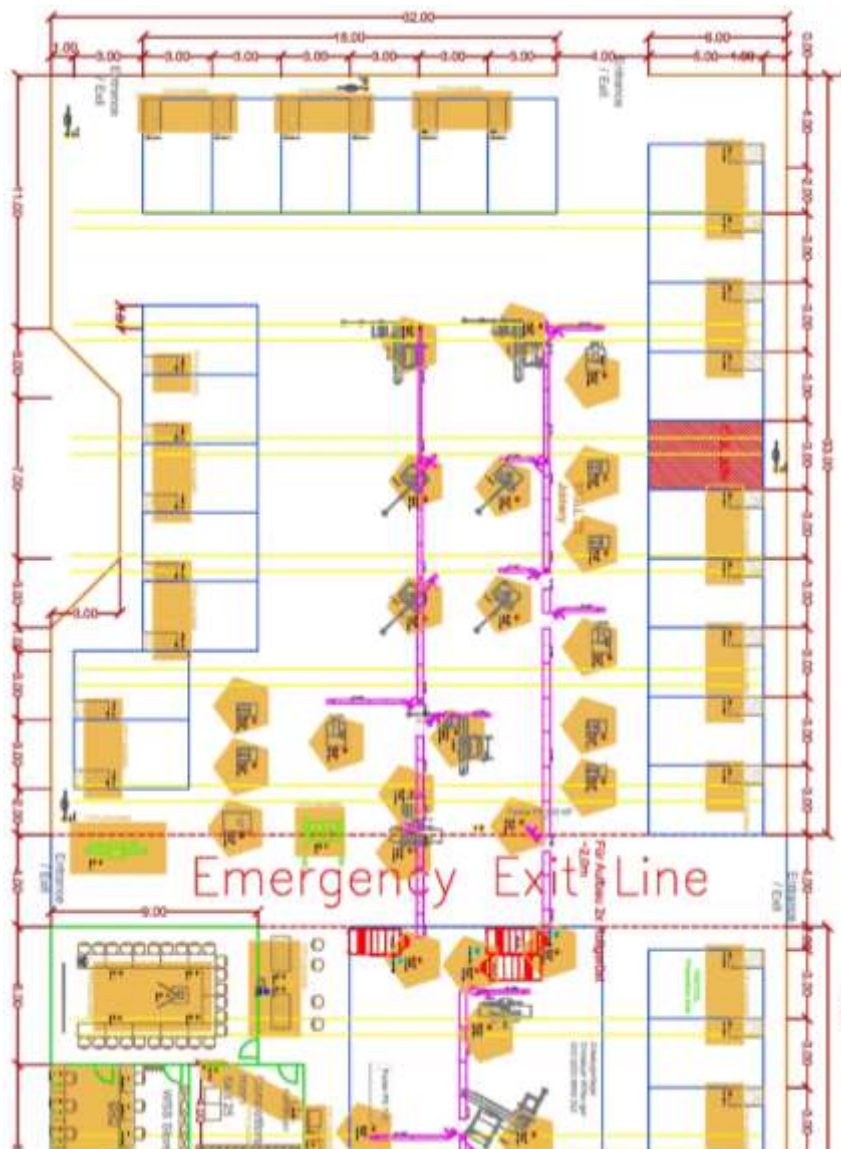
8.4 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

During the Competition, Competitors are prohibited from using mobile phones, cameras, personal music devices, radios and any other device deemed to be a distraction by the Chief Expert.

8.5 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

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

Example workshop layout:





9 VISITOR AND MEDIA ENGAGEMENT

The Joinery competition area will maximize visitor and media engagement by including the following in their competition area:

- Try a trade – An area where spectators and media try joinery related skills;
- Demonstration of a CNC router;
- Display screens – A screen that shows visuals of joinery projects, communicates career opportunity and Competitor profiles;
- Test Project descriptions – A posting of the Test Project drawing that is in public view;
Display of completed modules – Module one may be displayed at the completion of the assessment.



10 SUSTAINABILITY

Sustainability will be demonstrated in the Joinery Competition area as follows:

- Recycling bins will be provided for paper, cans and bottles;
- Use of recycled paper for printing of Competition documents;
- Wood used in the Competition projects is harvested from sustainable sources.