

Technical Description

Concrete Construction Work

Construction and Building Technology



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

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Stefan Praschl
Chair Competitions Committee



Michael Fung
Vice Chair Competitions Committee

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1 INTRODUCTION

1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

1.1.1 The name of the skill competition is

Concrete Construction Work

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

A Concrete Construction Worker 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 Concrete Construction Worker has a continuing responsibility to work professionally in order to meet the requirements of the customer and thus maintain and grow the business.

Concrete Construction Work is closely associated with other parts of the construction industry, and with the many products that support it, normally for commercial purposes.

The Concrete Construction Worker works internally and externally, including on the homes of customers and on building sites, in all weather conditions and on small and major projects. He or she will interpret drawings, set out and measure, construct, and finish to a high standard.

Work organization and self-management, communication and interpersonal skills, problem solving, innovation and creativity, working accurately are the universal attributes of the outstanding construction practitioner. The Concrete Construction Worker works in a team. Each team member takes on a high degree of personal responsibility and autonomy.

From working safely and tidily with resilience and endurance through to exceptional planning and scheduling, concentration, precision, accuracy and attention to detail to achieve an excellent finish, every step in the process matters and mistakes are largely irreversible and very costly.

With the international mobility of people, the construction practitioner faces rapidly expanding opportunities and challenges. For the talented Concrete Construction Worker 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 concrete and formwork is therefore likely to expand.

1.1.3 Number of Competitors per team

Concrete Construction Work is a team skill with two Competitors per team.

1.1.4 Age limit of Competitors

The Competitors must not be older than 22 years in the year of the Competition.

1.2 THE RELEVANCE AND SIGNIFICANCE OF THIS DOCUMENT

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

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

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

1.3 ASSOCIATED DOCUMENTS

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

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

2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

2.1 GENERAL NOTES ON THE WSSS

The WSSS specifies the knowledge, understanding and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSSS).

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

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

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

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards Specification. This is often referred to as the “weighting”. The sum of all the percentage marks is 100.

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

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

2.2 WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	Work organization and management	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Health and safety legislation, obligations, and documentation • The situations when personal protective equipment must be used • The purposes, uses, care, maintenance, and storage of all tools and equipment together with their safety implications • The purposes, uses, care and storage of materials • Sustainability measures applying to the use of 'green' materials and recycling • The ways in which working practices can minimize wastage and help to manage costs • The principles of work flow and measurement • The significance of planning, accuracy, checking, and attention to detail in all working practices 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Follow health and safety standards, rules, and regulations • Identify and use the appropriate personal protective equipment including safety footwear, ear, and eye protection • Select, use, clean, maintain, and store all tools and equipment safely • Select, use and store all materials safely • Safely working at heights • Plan the work area to maximize efficiency and maintain the discipline of regular tidying • Measure accurately • Work efficiently and check progress and outcomes regularly • Establish and consistently maintain high quality standards and working processes • Set up and make secure construction sites by means of locks and signage and implement anti-theft measures • Proactively engage in continuous professional development to maintain current knowledge of technology and working practices 	

2	Communication and interpersonal skills	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The significance of establishing and maintaining confidence with colleagues and clients • The roles and requirements of architects and other related professions • The value of building and maintaining productive working relationships • The importance of swiftly resolving misunderstandings and conflicting demands • The criteria for being understandable within teams and to non-specialists • The principles of self-awareness and awareness of others • The basic rules of communication 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Interpret customer requirements and manage customer expectations positively • Recognize the needs of architects and other related professions • Introduce architects and related trades and professions to support customer requirements • Use comments and questions to help solve problems • Formulate technical questions and expound problems • Offer suggestions for solving technical problems • React to colleagues' ideas and suggestions constructively and help make decisions on them • Describe complex technical matters to non-specialists 	
3	Interpretation of drawings	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The essential information that must be included in construction drawings • Principles, symbols, and protocols used in construction drawings • The importance of checking for missing information or errors, anticipating problems and resolving in advance of the 'setting out' process and construction • The role and use of geometry in construction processes • Mathematical principles, processes and problem solving • The standardized representation of structural components in outline and in section and dimensioning (determination of heights from set measuring points) 	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Prepare simple site measurement drawings • Prepare the materials requirements, taking into account increased requirement due to compression, wastage, breakage, etc. • Calculate formwork surfaces and materials requirement • Calculate formwork surfaces and materials requirement for face concrete formwork • Interpret, analyse, and understand construction plans (e.g. design plans, formwork plans, reinforcement plans, detail drawings, etc.), and material and parts lists • Relay information in plans to other professionals, work colleagues, and clients • Prepare sketches from the necessary perspectives, sections, and other representation formats 	
4	Setting out and measurement	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The importance of thinking ‘top down’ to ensure all features can be set out at the start of the project • The implications for the business/organization of not setting out correctly • The templates/building aids which may be helpful for construction • Calculations to assist in measurement and checking of project • Geometry principles and techniques to assist with the project 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Visualize and think through the project identifying potential challenges early and taking the necessary preventative action • Set out the locations, starting points and lines of projects according to plans and specifications • Accurately interpret the dimensions from the drawing and ensure the design is set out within a one mm standard tolerance • Check all horizontal and vertical angles • Produce any templates/building aids that may be helpful when constructing • Set out datum points of reference for the project • Carry out setting out work using the necessary surveying equipment (pocket rule, tape measure, distance meter, set square, level, etc.) • Set out and check angles • Create horizontal levels and measure heights using a spirit level, water level gauge, and optical devices • Set out and measure up formwork manually from plans • Measure predetermined structures, joints and materials for the subsequent face concrete surface (anchor holes, shuttering frames, board inserts, distribution, and alignment of formwork boards, etc.) 	

5	Construction of formworks and reinforcement	40
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The impact of Health, Safety, and Environment requirements and legislation on a project • How to use and apply tools, equipment, construction machinery, and working aids (e.g. instruments, measuring devices, etc.) in accordance with operating and handling instructions • How to use and handle manual tools such as hammers, saws, planes, etc., to work with materials such as wood, metal, and plastic • How to use and handle machinery such as drills, saws, sanders, etc., to work with materials such as wood, metal, and plastic, in compliance with safety guidelines • Scaffolding requirements • The individual formwork components such as form lining (plywood, frame elements, screed protection cover), formwork girders, formwork supports, bolts, formwork clamps, and bracing • The components (formwork girders, tubular steel props, supports, bracings, reinforcements, formwork anchors) and materials (wood, steel) for scaffolding • How to make formwork, including erection, bracing, forming recesses, and stripping formwork • Types of formwork, areas of use and usage methods for foundation formwork, wall formwork, column formwork, beam formwork, slab formwork, staircase moulds, formwork for face concrete, climbing formwork, sliding formwork, recesses, etc. • Strengthening steel and reinforcement, categories and types of strengthening steel plus their designations, categorizations, and delivery forms • Cutting steel and bending steel bars according to standard specifications • Concrete coverings • The various types of joint (expansion joints, settling joints, construction joints, and dummy joints), what they do and how they are made • Face concrete surface, in terms of porosity, colour consistency, smoothness, creation of construction joints, formwork element joints, formation of edges, impressions due to the attachment of formwork lining, anchor points, anchor hole separation, frame impression, formwork lining joints, formwork lining as a smooth or rough concrete surface (texture) 	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Work manually with materials such as wood, metal, and plastic (for separating, reshaping, connecting) • Measure, lay out and cut wood and work with it manually and using machinery • Make simple trestles, working platforms plus auxiliary equipment, set up protective nets and use them in compliance with the relevant regulations • Make and put together every type of formwork • Make supports and reinforcements (concrete pressure) • Make face concrete formwork • Make slits, apertures, openings, and recesses • Move anchors as directed • Make various joints in combination with the appropriate joint sealants (profiles, sealing strips, expansion joint tapes) • Cut to length, bend, interweave, lay, and anchor structural steel according to bending and reinforcement diagrams and in compliance with reinforcement directives (specifically those concerning bending, radius of curvature, end hooks, brackets, distributors, separators, joints, and connection reinforcements) • Prevent the following problems through correct construction: <ul style="list-style-type: none"> • Build-up of rust stains on vertical components and of traces of rust caused by reinforcement residues being left on the undersides of horizontal components • Mortar residues running down through unsealed construction joints on vertical components • Unclean edge formation due to damaged, misaligned, and unsuitable triangular or trapezoidal profiles • Offset of over 10 mm between formwork element joints and component connections • Heavy bleeding at formwork board and element joints and on component connections and anchor holes (e.g. core structure exposed as a result of cement paste leakage) • Very noticeable entrainment water effects • Differing surface qualities (colour/texture) due to inappropriately stored formwork • Use scaffolding appropriately and safely and apply health and safety requirements and legislation 	
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6	Filling of formworks and treatment	20
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The impact of health and safety requirements on a project • Concrete technology and concrete processing on the construction site (ordering, transporting to formwork, application and compression, after-treatment) • Concrete additives such as concrete liquefiers, plasticisers, sealants, anti-freeze, hardening accelerators, etc.), how to use them and their effect on the concrete • How to prevent problems • Additional measures to take when concreting in summer and winter • Pre-requisites for concrete application, such as the removal of contaminants from the formwork, pre-wetting, checking for stability, using sufficient separators, smoothing gauges, etc.) • The compression process according to the consistency of the concrete • The possibilities of processing the concrete surface by smoothing/removing/levelling and the tools required to do this • The need for after-treatment of the concrete (to counter drying-out, temperature differential, frost, leaching, vibrations) using covers, spray, humidification, use of after-treatment aids or by leaving fresh concrete in the formwork beyond the stripping times • Face concrete surfaces in terms of porosity, colour consistency, etc. 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Produce unreinforced and reinforced concrete (mix and transport formula concrete = site-mixed concrete) • Order ready-mixed concrete for the site and transport it using concrete pumps, crane buckets or conveyors • Apply means of separation before concreting depending on the formwork lining, using high pressure sprays, brushes, cloths, or mechanically • Apply concrete in the prepared formwork • Compress concrete using various compressors • Process concrete surfaces by smoothing/removing/levelling, using the tools required to do this • Carry out after-treatment of concrete using covers, spray, humidification, use of after-treatment aids or by leaving fresh concrete in the formwork beyond the stripping times • Prevent the following problems through correct construction: • Incorrect application and compression of concrete ("honeycombing", highly visible layers, etc.) 	

7	Removal of formworks and reprocessing	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The stripping times • The cleaning options depending on the formwork material, such as pressurized water, manual formwork cleaning • Health and safety issues and procedures relating hazardous cleaning material • Care and maintenance of system formwork (cleaning, maintenance, repairing damaged sections, working with separating agents) 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Strip formwork using tools (e.g. formwork bars) • Clean formwork using e.g. water, manual formwork cleaners • Use hazardous cleaners correctly and safely • Care for and maintain system formwork and replace damaged sections • Sort and store all required formwork parts ready for transportation 	
	Total	100

3 THE ASSESSMENT STRATEGY AND SPECIFICATION

3.1 GENERAL GUIDANCE

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

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

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

The Marking Scheme must follow the weightings within the Standards 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 independent designer for the development of the Marking Scheme and Test Project. Please see the Rules for further details.

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

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

4.2 ASSESSMENT CRITERIA

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

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). It is advisable not to specify either the Assessment Criteria, or the allocation of marks, or the assessment methods, within this Technical Description.

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

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

4.3 SUB CRITERIA

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

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

4.4 ASPECTS

Each Aspect defines, in detail, a single item to be assessed and marked together with the marks, or instructions for how the marks are to be awarded. Aspects are assessed either by measurement or judgement.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it.

The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the skill in the Standards Specification. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1)

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

4.5 ASSESSMENT AND MARKING

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by judgement, measurement, or both. The same marking team must assess and mark all competitors, in all circumstances. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (See 4.6.)

4.6 ASSESSMENT AND MARKING USING JUDGEMENT

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

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

Three Experts will judge each Aspect, with a fourth to coordinate the marking and acting as a judge to prevent compatriot marking.

4.7 ASSESSMENT AND MARKING USING MEASUREMENT

Three Experts will be used to assess each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect.

4.8 THE USE OF MEASUREMENT AND JUDGEMENT

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

4.9 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

(Assessment specification = Test Project + Marking Scheme).

1. Before the Competition: Test Project proposals + Marking Scheme proposals;
2. At the Competition (C-6 to C-3): Test Project and Marking Schemes are defined;
3. Start of Competition (C-3): Test Project + Marking Scheme fully defined = Assessment Specification fully defined.

The following criteria can be assessed:

- Dimensions;
- Flatness;
- Vertical accuracy;
- Horizontal accuracy;
- Safety;
- Technical correctness;
- Execution confirming to standards;
- Visual impression.

4.10 SKILL ASSESSMENT PROCEDURES

The Experts who attend the Competition will be divided into marking groups according to their WorldSkills experience, language, and culture to deal with each section of the marking criteria.

Groups of Experts assess the same aspects for all Competitors.

For assessment Experts use specific measurement points which are marked on the drawings. Measurement tools are used to take measurements at these points.

The Experts will be divided into marking groups to deal with each section of the marking criteria.

Each module/task/section will be completed on the assigned day so that progressive marking can take place.

The marking of modules will start when all Competitors have finished their module.

To ensure transparency, each Competitor is provided the same Mark Summary Form as used by the Experts.

A master set of marking tools provided by the Competition Organizer will be available during familiarization. All measurements are taken using the master set of measuring equipment.

As per the Competition Rules a majority vote (50% +1) is needed to:

- Change the marking scheme (within limits specified in the Technical Description);
- Change Competition sequence or content;
- Agree on a solution for disputes concerning marks awarded etc.
- The assessment information is not provided to the marking group until the all Competitors have completed the work that will be assessed.
- The panel of Experts will assist the Skill Management Team select the Experts for the judgement group. The selected Experts possess the suitable industry and competition experience to fulfil the role.
- Four Experts will be used in the Judgement Marking Group.

5 THE TEST PROJECT

5.1 GENERAL NOTES

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

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the skills in each section of the WSSS.

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

The Test Project will not cover areas outside the Standards Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work.

The Test Project will not assess knowledge of WorldSkills rules and regulations.

This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards Specification. Section 2.1 refers.

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

There is one Test Project assessed in stages.

5.3 TEST PROJECT DESIGN REQUIREMENTS

The Test Project will be a modern formwork system which has to be constructed according to the supplied drawings. The Test Project has to imply making a reinforcing cage. A part of the formwork will be reinforced and filled with concrete due to time constraints. It has to be designed in a way that it can be constructed in four days and that separate stages can be assessed. The formwork will only be removed on the outer side to expose the quality of the final concrete surface. An example for such a Test Project can be seen below:



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 or modules are developed by all Experts.

5.4.2 How and where is the Test Project or modules developed

The Test Project or modules are developed jointly on the Discussion Forum.

5.4.3 When is the Test Project developed

The Test Project is developed six months before the current Competition.

TIME	MILESTONE
C-6 months	The Test Project is developed
C-3 months	The Test Project is circulated on the website
At the Competition	30% change is made to the Test Project

5.5 TEST PROJECT VALIDATION

The Test Project will be validated by building a prototype based on the discussion of the Experts in the Discussion Forum.

5.6 TEST PROJECT SELECTION

The Test Project is selected by vote of Experts on the Discussion Forum.

5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

Three months before the current Competition.

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

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

5.9 TEST PROJECT CHANGE AT THE COMPETITION

The Test Project requires a 30% change at the Competition.

All Experts agree on these changes on C-4.

The drawings of the selected Test Project will include possible changes. This is due to the fact that the material for the formwork must be prepared by the supplier in advance.

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.

All information about the supplied materials can be viewed and downloaded from the website of the formwork sponsor (www.doka.com) at any time.

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
- WorldSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

6.3 TEST PROJECTS [AND MARKING SCHEMES]

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

6.4 DAY-TO-DAY MANAGEMENT

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

7 SKILL-SPECIFIC SAFETY REQUIREMENTS

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

Due to the fact that Concrete Construction Worker works with heavy materials and electrical machines the following PPE has to be supplied by the Competitor

- Helmet;
- Safety shoes S3;
- Safety glasses;
- Gloves;
- Ear protection;
- Dust mask.

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 Director of Skills Competitions of any increases in space and/or equipment.

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

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

8.2 COMPETITOR'S TOOLBOX

The maximum external size of the toolbox is 2.4m³ (2.4m x 1.0m x 1.0 m = 2.4m³). This size should not include the outside packing used to transport the toolbox.

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

This is a suggested list of tools for Competitors to bring to the competition.

50 % of all electric tools should be provided by the Competition Organizer so it can be ensured that every Competitor has the same fair conditions and no Competitor has an advantage. The other 50% of all electric tools are included in the Competitor toolbox.

To be included in the Competitor toolbox supplied by the Competitor

DESCRIPTION	QUANTITY	PHOTO
Alu lath	no limit	
Mortar pan or shovel with handle	2	

DESCRIPTION	QUANTITY	PHOTO
Large compass	1	
<u>Square 90°</u>	2	
Hand operated circular saw	1	
Finishing Trowel	no limit	
Carpenter's hammer	no limit	
Hatchet	1	
Lump hammer	2	
Carpenter's pliers	2	
Steel fixer's nippers - steel fixer's pincers	4	
Bolt cutter	2	

DESCRIPTION	QUANTITY	PHOTO
(Hand operated) bar-bender	1	
Binding Hook	no limit	
Ratchet with socket	no limit	
(Open jaw) spanner	no limit	
Ring spanner	no limit	
Screwdriver	no limit	
Chisel	no limit	
Watering-can	1	
Toolbox	no limit	
Hacksaw	2	
Bow saw	1	

DESCRIPTION	QUANTITY	PHOTO
Hand saw	2	
Keyhole saw	2	
Scraper	no limit	
Crowbar	1	
Claw bar	1	
Patter, float	no limit	
White-wash brush	no limit	
Round brush	no limit	
Trowels	no limit	
Shovels	2	

DESCRIPTION	QUANTITY	PHOTO
Wire brush	no limit	
Screw clamp	no limit	
Plane	no limit	
Twist drill	no limit	
Mason drill and twist bit for wood	no limit	
Goggles - eye protection	4	
Safety shoes	2	
Ear protection	4	
Level with staff	no limit	
Spirit level	no limit	

DESCRIPTION	QUANTITY	PHOTO
Plumb line	no limit	
Measuring tape	no limit	
Line	no limit	
Measuring rod	no limit	
Carpenter's square	2	
Angle empty	2	
Folding rule	no limit	
Measuring tools	no limit	
Marking out string	2	
Pencil	no limit	

DESCRIPTION	QUANTITY	PHOTO
Tape	no limit	
Rake	2	
Brush	no limit	
Bucket	2	
File	no limit	
Sandpaper	no limit	
Triangle Cutter	2	
Calculator	1	
Sealing tape	no limit	
Silicone	no limit	

The Workshop Manager is to be provided with a list of proposed electric tools of a high standard to be included in the Infrastructure List – one per team. Such as below.

To be included in the Infrastructure List

- Electric jigsaw;
- Electric drill;
- Battery screwdriver with bits;
- Impact thrill;
- Electric handsaw;
- Electric cutter (steel bars) manual/electric bender;
- Rotation Laser;
- Sealing Tape;
- Nail pack;
- Screw pack

8.4 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS

Not applicable.

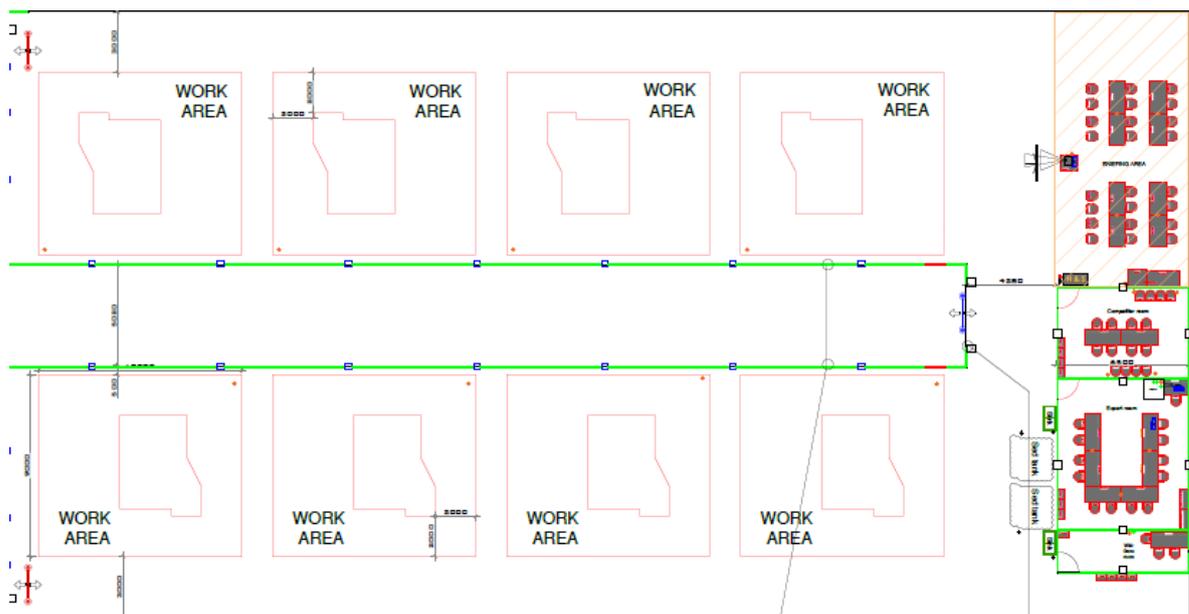
8.5 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

Tools using compressed air, electric sander, Electrical wire tie.

8.6 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

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

Example workshop layout:



9 SKILL-SPECIFIC RULES

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, internet access, procedures and work flow, and documentation management and distribution.

TOPIC/TASK	SKILL-SPECIFIC RULE
Use of technology – USB, memory sticks	<ul style="list-style-type: none"> Competitors, Experts, and Interpreters are not allowed to bring memory sticks into the workshop. The Chief and Deputy Chief Expert is exempt from this rule.
Use of technology – personal laptops, tablets and mobile phones	<ul style="list-style-type: none"> Competitors, Experts, and Interpreters are not allowed to bring personal laptops, tablets or mobile phones into the workshop. The Chief and Deputy Chief Expert is exempt from this rule.
Use of technology – personal photo and video taking devices	<ul style="list-style-type: none"> Competitors, Experts, and Interpreters are allowed to use personal photo and video taking devices in the workshop from C1 until C+1.
Templates, aids, etc.	<ul style="list-style-type: none"> Competitors are not permitted to bring or use templates/patterns and prepared parts.
Drawings, recording information	<ul style="list-style-type: none"> Competitors, Experts, and Interpreters are not permitted to bring drawings or prepared information into the workshop.
Equipment failure	<ul style="list-style-type: none"> If equipment or tools which are brought by the Competitor fail, there no extra time will be allowed.
Health, Safety, and Environment	<ul style="list-style-type: none"> Refer to the WorldSkills Health, Safety, and Environment policy and guidelines document.

10 VISITOR AND MEDIA ENGAGEMENT

The following ideas are intended to maximize visitor and media engagement for this skill competition:

- Try a trade;
- Display screens;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- Competitor profiles;
- Career opportunities;
- Videos of huge realized projects (in Russia) using formwork construction;
- Presenting products for daily use which are produced by using formwork construction;
- Workshop area with master classes for visitors.

11 SUSTAINABILITY

This skill competition will focus on the sustainable practices below:

- All materials used can be recycled or reused (formwork);
- The Doka formwork will be handed back to the sponsor;
- The system formwork supplied by Doka and tools can be as a gift for college. (Five full equipment workplaces are very good for secondary vocational education);
- Competitors and Experts should use tools to facilitate measurement. (Simplify the measurement process);
- Fix attention Experts and Competitors on the measurements accuracy;
- Economical use of resources (Pay attention to Experts and Competitors to the over-use of resources);
- Separate storage materials (different materials do not mix, every time materials ready to use);
- Planning ergonomics workshops;
- Make sustainability-show area for visitors;
- Print posters and advertisement about outlook sustainability. Pin them to the walls. Now is no advertisement;
- Action "Take away TP" for visitors when they can choose test project and take it away after Competition.

12 REFERENCES FOR INDUSTRY CONSULTATION

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

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

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

This WSSS (Section 2) appears to most closely relate to *Cement Masons and Concrete Finishers*: <https://www.onetonline.org/link/summary/47-2051.00>

and *Concrete Placers, Concrete Finishers and Related Workers*: <http://data.europa.eu/esco/isco/C7114>.

These links also enable adjacent occupations to be explored.

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

ORGANIZATION	CONTACT NAME
Doka Group	Adolf Bosch, Head of Product Management, Central Europe
Doka GmbH	Volker Penk, Regional Product Manager Latin America
Larsen and Toubro Limited	J Raguraman, Senior Manager, Skills Training