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Technical Description

Dental Prosthetics

Skill 42

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.

The Technical Description consists of the following:

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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

Dental Prosthetics

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

A Dental Prosthetics technician is an associate professional typically working in and/or across dental practices, dental laboratories in hospitals, and dental manufacturers. They are experts in their specialist field, which is rapidly growing aided by need and demand, digitalisation, and material sciences.

Under the instructions and guidance of a fully qualified dentist or physician, the Dental Prosthetics technician's role is, in summary:

- To examine and evaluate patients' specific and broader needs for prosthetic interventions and to formulate specifications
- To interpret specifications to determine the type of prosthetic interventions required
- To design and make prosthetic devices
- To fit, test, and evaluate the function and quality of the devices
- To instruct patients in the care and use of the prosthetic devices
- To repair, modify, and maintain prosthetic devices as needs arise.

To fulfil their roles, the Dental Prosthetics technicians can design, produce, and repair a range of dental devices and instruments. This includes both digital equipment used by practices, hospitals, and manufacturers. They perform precise measurements, simulations, and fabrications based on patients' oral conditions and broader needs, and physicians' instructions to provide high quality dental prosthetic solutions. They work closely with dental practitioners and their teams to deliver personalized oral restoration services to patients.

The Dental Prosthetics technician's role relates directly to patients' oral health. The dental devices and instruments they create and repair help to restore chewing function, improve oral aesthetics, and enhance quality of life. Their training and development include deep and wide knowledge of human anatomy, material science, and dental technology, as well as procedural and contingent knowledge, and interpersonal and communication skills. They must master the techniques of fabricating and repairing dental devices. Practical experience in dental laboratories is essential for building experience of operational procedures and varying patient conditions, thus enabling the provision of better personalized oral restoration services, and minimising risk. Continuous professional development and guidance enables them to build and sustain their professional expertise in this fast-moving field.

The link between oral diseases and chronic conditions such as cardiovascular diseases and diabetes has become increasingly recognized, with advancements in technology and social development highlighting the connection between oral health and overall health. This recognition has driven rapid growth in the dental prosthetics industry. As awareness of oral health and restoration grows, along with rising demand for treatment across the world, the need and demand for highly aware and skilled dental prosthetics technicians will rapidly expand.

1.1.3 Number of Competitors per team

Dental Prosthetics is a single Competitor skill competition.

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1.1.4 Age limit of Competitors

The Competitors must not be older than 25 years in the year of the Competition.

1.2 The relevance and significance of this document

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

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

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

1.3 Associated documents

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

- WSI – Code of Ethics and Conduct
- WSI – Competition Rules
- WSI – WorldSkills Occupational Standards framework
- WSI – WorldSkills Assessment Strategy
- WSI online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations
- WorldSkills Standards and Assessment Guide (skill-specific)

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2 The WorldSkills Occupational Standards (WSOS)

2.1 General notes on the WSOS

The WSOS specifies the knowledge, understanding, skills, and capabilities that underpin international best practice in technical and vocational performance. These are both specific to an occupational role and also transversal. Together they should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

The skill competition is intended to reflect international best practice as described by the WSOS, to the extent that it can. The Standard 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 Standard 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. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

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

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, if this does not distort the weightings assigned by the Standards.

2.2 WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	**10**
	The individual needs to know and understand: • Health, safety, hygiene, and oral medicine technology • Environmental protection legislation, regulations, and documentation including accident reporting • Regulations regarding the confidentiality and security of dental diagnosis and treatment • The features of safe working environments: workspace, facilities, equipment/tools, training, and support • The importance of sustainability and environmentally friendly work practices • The importance of protective equipment and clothing	

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Section		Relative importance (%)
	• The importance of maintaining one's own occupational health • The procedures for the prevention of infectious disease • The purpose, safe use, care, and storage of materials and equipment • The specialist/technical terminology associated with the work role and sector • The roles and requirements of related professions • The value of building and maintaining productive working relationships • Principles and techniques of effective teamwork • The importance of managing one's own continuing professional development.	
	The individual shall be able to: • Follow health, safety, and hygiene standards, rules, and regulations • Use personal protective equipment: gloves, masks, safety goggles, and clothing • Maintain personal health to prevent occupational disease conditions due to exposure to dust, chemicals, and noise • Keep up-to-date with, and follow safe working practices, including emergency procedures • Take appropriate hygiene precautions to prevent infection • Select, store safely, and use chemicals and materials economically to enhance sustainability in accordance with regulations • Maintain safe and secure storage of equipment and tools in accordance with regulations • Discard waste ecologically • Plan, schedule, and prioritize/re-prioritize work to be efficient • Work as part of a team and lead as appropriate • Keep up to date with new practices and regulations	
2	**Communication and interpersonal skills**	**5**
	The individual needs to know and understand: • Principles of communication • Principles of human interactivity • The impact of one's own work on others and the importance of collaboration with colleagues/other professionals • The importance of inclusivity • Techniques and ways to communicate with patients who have disabilities such as hearing loss and dementia • The importance of swiftly resolving misunderstandings and conflicting demands.	

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Section		Relative importance (%)
	The individual shall be able to: • Establish and maintain interpersonal relations • Work and interact with others including teams • Communicate using a full range of techniques for speaking, writing, active listening, and body language • Use digital communication systems and tools • Compile reports and complete documentation • Seek, accept and, as appropriate, build on feedback and constructive criticism.	
3	**Consultation and design**	**30**
	The individual needs to know and understand: • The natural sciences, social sciences, and medical sciences relevant to oral medical health and treatment • The relationship between oral and systemic diseases • Theories underpinning the restoration of dental health and function • The structure, development, physiology, and pathology of teeth • Anatomical structures, functional activity patterns, and clinical applications of the oral cavity, skull, face, and neck regions • The causes or origins of dental diseases and conditions • The mechanisms, symptoms, diagnosis, prevention, and treatment methods for dental defects, dental arch defects, and maxillofacial defects and deformities • The role of artificial devices in restoring, improving, reconstructing, or correcting congenital deformities, acquired defects, or abnormalities in the oral or maxillofacial systems • The role of dental prosthetics in promoting patients' physical and mental health • Concepts underpinning aesthetics and medical aesthetics • Aesthetics, colour theory, and sculpting art • Aesthetic parameters • Dental aesthetics, their application in prosthetics, and simulation techniques • The use of artificial devices to remedy defects in the oral and maxillofacial areas to rebuild physiological functions • Classifications and characteristics of prosthetics such as crowns, bridges, dentures, and implants • The applications, indications, and the contra-indications of various dental prosthetics • The design process • Digital technology applications • The use of basic software such as email, Word, Excel, File Explorer, and image editing • The operating procedures and key considerations for traditional and digital impression techniques and model production	

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Section		Relative importance (%)
	• The importance of the dimensions and shape of models in matching oral impressions to provide accurate data for prosthetic design and fabrication • The importance of models accurately replicating the morphology and position of the teeth and surrounding tissues that need restoration • Fundamentals of 3D scanning (data alignment, registration, and matching), basic knowledge of accuracy, and precision in data scanning.	
	The individual shall be able to: • Work within the guidance and instructions of dentists and physicians while contributing to the optimization of treatment • Engage patients as appropriate and help to them to establish productive relationships, maintain confidence, and gain a deeper and broader understanding of the need for prosthetic treatment • Translate specialist and technical terminology clearly and accurately for patients/related professionals • Question, interpret, and determine the specific requirements of patients, dentists, and physicians, including any budget constraints • Provide advice and guidance on products and solutions for patients, dentists, and physicians • Recognize the boundaries of own expertise in dealing with patients' problems and refer to colleagues and professionals as appropriate • Prepare cost estimates for patients, dentists, and physicians • Examine and measure patients to determine their precise prosthetic needs and to identify factors that could affect the fit of the restoration • Produce restorations in accordance with specifications and prescriptions • Interpret specifications and prescriptions to determine the type of products to be fabricated, and the materials and tools required • Design the shapes and sizes of prosthetics using CAD or other technology, considering factors such as anatomical structures, dental arches, and occlusal relationships, ensuring good fit with adjacent teeth and gums • Make or receive casts or impressions of patients' mouth and/or teeth for use in fabrication.	
4	**Manufacture dental prosthetics**	**30**
	The individual needs to know and understand: • The range and applications of equipment: casting; porcelain, resin, and digital processing; intraoral and model scanners, 3D printers, CNC milling machines, and other auxiliary devices	

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Section		Relative importance (%)
	• The characteristics of metal alloys, ceramic, and resin materials and their applications and processing methods in different prosthetics • The key stages of prosthetic fabrication in traditional and digital ways: bending, forming, shaping, 3D scanning, designing, printing, • or CNC milling to conform to prescribed contours • The principles of manufacturing, usage, mechanical and physical properties, and biocompatibility of instruments and materials • Common problems which can occur during the manufacturing process • The problem-solving process.	
	The individual shall be able to: • Identify issues with clinical models and liaise with dentists and physicians to find solutions • Use traditional and digital impression taking methods, model production, and material handling • Process and handle a range of materials according to the design requirements of the prosthetic such as casting and sintering metal alloys, sintering and layering ceramic materials, and light-curing resin materials • Use digital technology such as CAD design (customized prosthetic shapes, sizes, and fittings according to oral anatomy, dental arch, and occlusion) for prosthetics and the operation of digital equipment • Use 3D scanners, CAD design software, and 3D printers or CNC milling machines • Ensure accurate material ratios and compliance with processing requirements • Follow standard procedures, maintain correct process control, and ensure stable quality of prosthetics in laboratories or other manufacturing locations • Repair, modify, and maintain prosthetic and supportive devices, according to specifications • Perform quality inspections, identify problems, and resolve them such as by making adjustments • Ensure the prosthetics meet both biological and aesthetic criteria, including appearance • Maintain prosthetic equipment to ensure optimum performance • Complete documentation.	
5	**Fit dental prosthetics**	**15**
	The individual needs to know and understand: • The importance of checking that prosthetics meet their specifications • The quality assurance process • The cost of adjustment(s)	

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Section		Relative importance (%)
	• The importance of feedback from patients, dentists, and physicians as part of the continuous improvement process • Techniques for helping patients to use and care for their prosthetics • The different reactions of patients to using prosthetics • The importance of data protection for patients' records.	
	The individual shall be able to: • Fit appliances and devices to patient's impressions and/or models • Observe patients and quickly identify any problems that need attention or referral • Test and evaluate each prosthetic, identifying any need for improvements • Make adjustments for proper fit, function, and comfort, repeating the process as necessary • Discuss any issues arising with dentists and physicians • Explain and show patients how to use and care for prosthetic devices • Complete documentation.	
6	**Maintain, upgrade, and repair prosthetics**	**10**
	The individual needs to know and understand: • The normal useful life of each prosthetic solution, based on their composition and use • The ways in which patients' needs and characteristics may change, and the impact of these changes on the quality and usefulness of each prosthetic • Positive ways in which prosthetics may be repaired, rebuilt, or modified • The cost benefit of repairs or modifications compared with creating new prosthetic solutions.	
	The individual shall be able to: • Review and evaluate the prosthetics of existing users proactively or according to identified need • Identify when the need for prosthetics has diminished, or the patient has different needs • Discuss the changing circumstances with patients, dentists, and physicians • Appraise the options for repair, modification, removal, or replacement with patients, dentists, and physicians • Remove prosthetics where appropriate to undertake repairs or modifications prior to refitting • Effect repairs or modifications while prosthetics are in situ, where it is either necessary or appropriate • Complete repairs, modifications, or replacements as soon as reasonably possible for the wellbeing of the patient.	

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Section		Relative importance (%)
	Total	**100**

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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. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

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

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

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4 Assessment Design and Practice

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 standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

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

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more Independent Test Project Designer(s) with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Competition Rules for further details.

Experts and Independent Test Project Designers are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

4.2 Assessment Criteria

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

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the 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 Assessment Criteria, the allocation of marks, and the assessment methods, should not be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment**

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methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub 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) specifies 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, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by Measurement or by 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 Standards. 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 refers.)

		CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
STANDARDS SPECIFICATION SECTION		A	B	C	D	E	F	G	H			
	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				2.50	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

SAMPLE OF TABLE FROM CIS

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. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

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). This is documented in the Standards and Assessment Guide.
- 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, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

4.7 Assessment and marking using Measurement

Normally three Experts will be used to assess each Aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. 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. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

4.8 The use of Measurement and Judgement

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

4.9 Skill assessment strategy and procedures

WorldSkills is committed to continuous improvement including reviewing past limitations and building on good practice. The following skill assessment strategy and procedures for this skill competition take this into account and explain how the marking process will be managed.

Marking Scheme design will begin with the broad allocation of marks referenced to WSOS weightings, according to the scope of each module and the requirement to match those weightings. The Marking Scheme and modules will then be designed in detail and completed together. This will ensure that:

- There is a full match between the Marking Scheme and the WSOS;
- There is consistency of approach and standards across the modules;
- The results of assessment will authentically reflect the quality of the Competitor relative to their work role in detail and overall.

The Test Project is organized in four (4) modules to be completed in four days. The modules may be of different durations, and have different values in marks, according to the WorldSkills Occupational Standards.

When each module has been completed by the Competitor, Experts will form marking teams of three, or four for supervision, to assess and mark outcomes. One leading Expert is identified for

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each module, based on their particular expertise. This will support compliance with assessment procedures.

Below is an example of marking aspects.

- Scanning steps, sequence, and time
- Completeness of scanning results
- Occlusal accuracy
- Scanning time
- Order creation
- Crown morphology
- Bridge morphology
- Contact relations
- Occlusal relations
- Aesthetic coordination
- Emergence profile (abutment)
- Margin position (abutment)
- Design time
- Design accuracy
- Dental arch morphology
- Occlusal requirements
- Gingival morphology
- Base plate edges and shape
- Completeness of scanning (intraoral digital scanner)
- Processing of intraoral scan data
- Data registration and integration effectiveness
- Stain and glaze shade accuracy
- Prescription adherence

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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 applied knowledge, skills, and behaviours set out in each section of the WSOS.

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Standards 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 or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. 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. Section 2.1 refers.

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.

Most Test Projects and Marking Schemes are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Designer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

Please refer to the current version of the Competition Rules for further details.

5.2 Format/structure of the Test Project

The Test Project is a series of four (4) standalone modules.

5.3 Test Project design requirements

Test Projects should reflect the purposes, structures, processes, and outcomes of the occupational role they are based on. They should aim to be a small-scale version of that role. Before focusing on practicalities, SMTs should show how the Test Project design will provide full, balanced, and authentic opportunities for assessment and marking across the Standards, as set out in Section 5.1.

Module 1: Scan to print appliance (4 hours)

Digital workflow from 3D digital scanning to designing and 3D printing of dental appliance (e.g. splints, surgical guides, etc.)

Tasks

- Perform 3D digital scanning with an intraoral scanner
- Design appliance using CAD software
- Prepare STL for additive manufacturing (3D printing)

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• Post-process printed object (cleaning, curing, and polishing)

Module 2: Digital Wax-up (2 hours)

Digital Wax-up using dental CAD design software. Match design to physical study model.

Tasks

• Digital Wax-up using CAD software
• Anatomy matching

Module 3: Digital denture (6 hours)

Designing and manufacturing complete or partial removable dentures using digital workflows

Tasks

• Design appliance using CAD software
• Prepare STL for additive manufacturing (3D printing)
• Post-process printed object (cleaning, curing, and polishing)

Module 4 Part 1: Full zirconia restoration-CAD/CAM design and milling (6 hours)

Designing and manufacturing full-contour zirconia crowns or bridges using digital workflows

Tasks

• Perform 3D digital scanning with a desktop scanner
• Design appliance using CAD software
• Prepare STL for milling
• Post-process milled object (cutting from disk, sprue removal, sintering)

Module 4 Part 2: Full zirconia restoration-finishing (4 hours)

Fitting and finishing full-contour zirconia crowns or bridges using traditional workflows

Tasks

• Check fit, contacts, and occlusion
• Apply stain and glaze
• Match required shade

5.4 Test Project coordination and 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 Test Project coordination (preparation for Competition)

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

5.4.2 Who develops the Test Project/modules

The Test Project/modules are developed by an Independent Test Project Designer (ITPD) in collaboration with the Skill Competition Manager.

5.4.3 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

5.5 Test Project initial review and verification

Time	Action
Fifteen (15) months prior to the Competition	The ITPD is identified and a Confidentiality Agreement between WSI and the ITPD is organized.
Three (3) months prior to the Competition	Generic Competitor pre-competition information is circulated via the WorldSkills website, without any technical or detailed information.
No later than two (2) months prior to the Competition	The Test Project documents are sent to the WorldSkills International Skills Competitions Administration Manager.
At the Competition on C-4	The Test Project/modules are presented to Experts.
At the Competition on C-2	The Test Project/modules are presented to Competitors.

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations.

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer (ITPD) is expected to identify one or more independent expert(s), and trusted individuals initially to review the Independent Test Project Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.

5.6 Test Project validation

The Skill Competition Manager coordinates the validation of the Test Project/modules and will ensure that it can be completed within the material, equipment, knowledge, and time constraints of Competitors.

5.7 Test Project circulation

The Test Project/modules are not circulated prior to the Competition. The Test Project/modules are presented to Experts on C-4 and to Competitors on C-2.

Generic Competitor pre-competition information is circulated three months prior to the Competition. No technical or detailed information on the Test Project/modules is shared.

5.8 Test Project change

Due to the Test Project being developed by an Independent Test Project Designer (ITPD) and is not circulated before the Competition, there is no change required to be made to the Test Project/ modules at the Competition. Exceptions are amendments to technical errors in the Test Project documents and according to infrastructure limitations.

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5.9 Test Project translation and use of Interpreters

The Test Project documentation and the Mark Summary Form for this skill competition are translated into the language of the Competitors' choice using an approved AI platform. It is the responsibility of the Technical Delegate to request the translation, and in which language, via the official process managed by WSI.

The Secretariat will manage the process. **Refer to Competition Rule 10.12.**

The following applies:

- Interpreters may be present during the Test Project briefing for Competitors.
- Interpreters are allowed to be used for communication as per **Competition Rule 6.13.**
- Interpreters and Experts are not allowed to review the translated documents prior to their release as per section **5.4.3**

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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 WorldSkills skill-specific Discussion Forum. (http://forums.worldskills.org). Skill related decisions and communication are only valid if they take place on the WorldSkills Discussion Forum. The Chief Expert (or an Expert Lead appointed by the Skill Management Team) will be the moderator for this Discussion Forum. Refer to the 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
- Mark Summary Form (where applicable)
- Test Projects (where applicable)
- 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 competition during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and the Expert Leads. The Skill Management Plan is progressively developed in the six (6) months prior to the Competition and finalized at the Competition. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

6.5 General best practice procedures

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

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Topic/task	Best practice procedure
Process and timing of the release of modules of an uncirculated Test Project	• The Test Project will be released in multiple modules to ensure a fair and structured competition process. • Each module will be provided to Competitors at predetermined times as outlined in the competition schedule. • The release of each module will be synchronized across all Competitors to maintain fairness and prevent unauthorized access to test materials. • The final module must be released with sufficient time for completion before the competition ends.
Translation of Test Project	• The Test Projects are translated using an AI tool, this translation process is managed by WSI. Competitors for whom a Member has requested a translation of the Test Project will receive the translated version together with the English original at the same time as all other Competitors.
Tools available for Interpreters	• Printed and digital dictionaries for technical and general language translation. • Internet-based translation tools to cross-reference terminology and ensure accuracy. • Electronic translation devices to assist in real-time language conversion. • Consultation with subject matter experts (if permitted) to verify industry-specific terminology.

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Topic/task	Best practice procedure
Who can tend to a Competitor and when?	Experts and Competition officials • They may interact with Competitors only to provide procedural guidance, clarify competition rules, or distribute modules. • They must not offer assistance related to technical skills or project execution. Interpreters • They may assist Competitors only with language-related clarifications and must not influence technical decisions. • Any interaction must be conducted within designated translation periods and locations. Medical and emergency personnel • They may tend to a Competitor immediately in case of illness or injury. Workshop Managers and skill competition staff • They may oversee the competition environment but must not provide any form of assistance related to the Test Project. Other Competitors and visitors • No direct assistance or communication is allowed between Competitors during the competition. • Visitors are not permitted to interact with Competitors in the skill competition area.

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7 Skill-specific safety requirements

7.1 Personal Protective Equipment

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

	Safety glasses with side protection	Laboratory gloves (nitrile or latex)	Laboratory coat (knee-length)	Safety shoes (chemically resistant, ant-static)	Sturdy shoes with closed toe and no heel and protective cap	Long trousers (no open ankles)
General PPE for safe areas and computer workstation					√	√
Working at the laboratory workstations	√	√	√	√		√

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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 Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager 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 for the upcoming WorldSkills 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 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. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

8.3 Competitors toolbox

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizer.

8.4 Materials, equipment, and tools supplied by Competitors

It is not applicable for Competitors to bring materials, equipment, and tools to the Competition.

However, Competitors are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

8.5 Materials, equipment, and tools supplied by Experts

Experts are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

Experts are responsible that Interpreters bring their own PPE.

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8.6 Materials and equipment prohibited in the skill area

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

8.7 Proposed workshop and workstation layouts

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

Example workshop layout

As this is a new skill competition there is no layout available from previous competitions.

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9 Skill-specific rules

9.1 General notes

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 workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

9.2 Skill-specific rules

Topic/task	Skill-specific rules
Use of technology – USB, memory sticks	• Competitors and Experts are not allowed to bring memory sticks into the workshop. In situations where memory sticks are brought into the workshop these shall be collected by a member of the SMT who shall lock them away until end of the Competition. • The Skill Competition Manager, Chief Expert, and Interpreters are allowed to bring memory sticks into the workshop.
Use of technology – personal laptops, tablets, and mobile phones	• Competitors are not allowed to bring personal laptops, tablets, or mobile phones into the workshop. In situations where personal devices brought into the workshop these shall be stored in the personal lockers and released at the end of the day or during lunch time. • Skill Competition Manager, Chief Expert, Experts, and Interpreters are allowed to bring and use personal laptops, tablets, or mobile phones into the workshop.
Use of technology – personal photo and video taking devices	• Skill Competition Manager, Chief Expert, Competitors, Experts, and Interpreters are allowed to use personal photo and video taking devices in the workshop at the conclusion of the competition on C4 only.
Assessment	• Skill Competition Manager, Chief Expert, Competitors, Experts, and Interpreters are not permitted to take paper or digital copies of the Marking Scheme and Competitors reports out of the workshop until the competition has finished on C4.

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10 Expert knowledge and experience

10.1 Requirements

Experts appointed for this skill competition must have the following knowledge and experience for the appropriate occupation or work role as documented in **section 1.1.2**.

Professional background: Must possess a minimum of 5–7 years of practical experience in dental prosthetics within dental laboratories, hospitals, or industry settings.

Prosthetic device competence: Must demonstrate proven expertise in the design, fabrication, fitting, repair, and maintenance of a full range of dental prosthetic devices, including removable, fixed, and implant-supported restorations.

Digital dentistry skills: Must possess advanced proficiency in digital dental technologies, including CAD/CAM systems, 3D scanning, additive manufacturing, and digital workflows for prosthetic production.

Knowledge of dental materials: Must have in-depth knowledge of material sciences, including ceramics, polymers, composites, and metals, with clear understanding of their properties, applications, and limitations in prosthetics.

Clinical collaboration experience: Must demonstrate experience in working in close collaboration with dentists, surgeons, and multidisciplinary teams to accurately interpret prescriptions and deliver effective prosthetic solutions.

Human anatomy and oral health knowledge: Must possess advanced knowledge of craniofacial and oral anatomy, occlusion, and the links between oral health and systemic health conditions.

Standards of quality and precision: Must demonstrate the ability to evaluate prosthetic devices for accuracy, function, aesthetics, and patient-specific customization in accordance with the highest industry standards.

Training and mentorship ability: Must have experience in instructing or mentoring junior technicians, students, or peers, with the ability to communicate technical procedures and knowledge effectively.

Problem-solving and innovation: Must demonstrate the ability to identify, troubleshoot, and resolve technical challenges in prosthetic design, fabrication, or repair, and adapt to emerging technologies and innovations.

Commitment to continuing professional development: Must provide evidence of active engagement in professional development through certifications, workshops, publications, or involvement in professional associations relevant to dental prosthetics.

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11 Visitor and media engagement

11.1 Engagement methods

Following is a list of possible ways to maximize visitor and media engagement:

- Produce video content featuring interviews with Competitors, Experts, and industry professionals.
- Emphasize the key skills and unique features of the competition.
- Provide comprehensive information and materials for promotion and resource development.

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12 Sustainability

12.1 Sustainable practices

This skill competition will focus on the sustainable practices below:

- Appropriate disposal of chemicals
- Appropriate ventilation for laboratory processes
- Appropriate choice of sustainable materials where possible, such as water washable resins.

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13 References for industry consultation

13.1 General notes

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards 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 Occupational Standards 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/)

13.2 References

This WSOS is classified within ISCO-08 Unit Group 3214: Medical and dental prosthetics technicians and associated professionals (p.197)

In greater detail it relates to O*NET Junior version of 29-2091: Orthotists and Prosthetists https://www.onetonline.org/link/summary/29-2091

Also to ESCO 3214: its own version of ISCO 3214 https://data.europa.eu/esco/isco/C3214 and 3214.3: prosthetist-orthotist

Unfortunately no feedback was received from business and industry for WorldSkills Shanghai 2026.

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14 Appendix

14.1 Appendix information

Not applicable.

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