

MANUFACTURING AND ENGINEERING TECHNOLOGY

製造與工程技術

Industrial Design Technology

工業設計技術



Technical Description 技術說明書

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.

國際技能競賽組織經競賽委員會決議並依組織章程、議事規則和競賽規則規定，已針對該職類之國際技能競賽採用以下最低規範。

The Technical Description consists of the following:

技術說明書中包括以下內容：

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3 The Assessment Strategy and Specification 評量策略與說明書	12
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2020 年 9 月 22 日起生效



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1 Introduction 職類介紹

1.1 Name and description of the skill competition

職類名稱與說明

1.1.1 The name of the skill competition is 本職類的名稱為

Industrial Design Technology 工業設計技術

1.1.2 Description of the associated work role(s) or occupation(s). 相關工作角色或職業之說明。

Industrial design technology is the creation of a product designed for mass consumption. It must succeed in both form (appearance) and function, and promote efficient manufacture. It must be technically feasible to produce, and meet a genuine need in the marketplace, at an acceptable price.

工業設計技術是專門用來創造大眾消費產品，須兼具外形（外觀）和功能，且能促進有效製造，亦須在生產上具備技術可行性，符合市場的真正需求並且價格能讓眾人接受。

To fulfil the role of an industrial design technician, knowledge, skills, and qualities are required in each of the following broad areas:

為實現工業設計技術人員的角色，須具備以下廣大領域的知識、技能和品質：

- market research, graphic and wider communication skills
- 市場研究、繪圖及更多元的溝通技能
- design and development processes
- 設計與開發流程
- engineering practice, product analysis, and materials science/engineering
- 工程實踐、產品分析和材料科學／工程

In modern, successful economies, industrial design follows a thinking process, which can be summarized as follows:

在現代、成功的經濟制度中，工業設計遵循的思考過程可總結為下列幾項：

- Inspiration: understand; observe; perspective/orientation
- 靈感：瞭解；觀察；觀點／定位
- ideation: develop ideas; prototype; test
- 構想：發展想法；原型；測試
- implementation: “story telling” (create value proposition); pilot; create the business model.
- 執行：「說故事」（創造價值主張）；試驗性生產；創造商業模式

In start-ups and small companies, industrial design technicians may themselves cover all steps in this process. In larger organizations, they may support and contribute to either each phase of the process, or one or two phases only. For industrial design in larger organizations, teamwork is advantageous, to capitalize on a range of perspectives, attitudes, knowledge and skills.

在新創和小型公司中，工業設計技術人員可能要掌握此流程的所有步驟，在大型組織中，他們可能只要支援流程中的各個階段或一到兩個階段並做出貢獻即可，在大型組織中的工業設計，團隊合作是優勢，能運用各式各樣的觀點、意見、知識和技能。

Industrial design technology combines two disciplines: design, and engineering, in order to innovate, with success as measured by the customer’s response and the producer’s viability and profit. It is essentially disruptive to current ways of doing and making things. This means that the industrial designer must stay constantly alert to new materials, technologies, markets, and consumer demand and benefit.

工業設計技術結合兩大原則：以設計和工程追求創新，並根據顧客的反應及產品的可行性和利潤衡量成功與否，這與現行的做法和製造方式有著本質上的顛覆性差別，這表示工業設計師必須隨時留意新材料、技術、市場和消費者需求與利益的動向。

In summary: the sequence of steps, starting with market research, ideas development, and design, before physically making and testing, often many times, distinguishes industrial design from craft-based design. This is a very important difference to the process of the craft-based designer, whose creativity is embedded in the act of making. Good industrial design technicians respect the importance of inspiration and ideation as a separate set of activities, before testing, improvement and manufacture.

總而言之，在進入實際製造和測試前，從市場研究、構想發展到設計的一連串步驟常常需要反覆多次，這是工業設計和工藝設計最大的區別，對工藝設計師的流程來說是一個非常顯著的差異性，因為他們會在製作過程中融入創造力，而優秀的工業設計技術人員則會單獨將靈感和構想視為測試、改良和製造前的重要步驟。

1.1.3 Number of Competitors per team 該職類的參賽選手人數

Industrial Design Technology is a single Competitor skill competition.

工業設計技術是一項單人競賽。

1.1.4 Age limit of Competitors 參賽選手的年齡限制

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

參賽時，選手年齡不得超過 25 歲。

1.2 The relevance and significance of this document

本文件的相關性與重要性

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.

本文件包含本項技能競賽的標準以及競賽管理之評分原則、方法和程序。

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

每位裁判和選手都必須熟悉並瞭解本技術說明書。

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

若因技術說明書所使用的語言不同而導致衝突，請以英文版本為準。

1.3 Associated documents 相關文件

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

於本技術說明書內容僅涵蓋特定職類之資訊，因此必須與以下文件併用：

- WSI – Code of Ethics and Conduct 倫理規範與行為守則
- WSI – Competition Rules 競賽規則
- WSI – WorldSkills Occupational Standards framework 國際職業標準架構
- WSI – WorldSkills Assessment Strategy 評量策略
- WSI online resources as indicated in this document 線上資源（如本文件所示）
- WorldSkills Health, Safety, and Environment Policy and Regulations. 健康安全與環境政策與規章

2 The WorldSkills Occupational Standards (WSOS) 國際職業標準

2.1 General notes on the WSOS 一般注意事項

The WSOS 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/WSOS).

WSOS 詳細闡述在技術及職業表現上，支持國際最佳實務所需具備之知識、理解力和特定技能，WSOS 應反映代表產業與企業相關工作角色或職業的全球共識（www.worldskills.org/WSOS）。

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

技能競賽旨在盡其所能地反映出 WSOS 所描述的國際最佳實務，因此，該標準是針對技能競賽的必要訓練與準備作業之指南。

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.

在技能競賽中，對知識與理解力的評分係透過評量表現來實現，僅在出現不可抗力原因時，才會進行單獨的知識與理解力測驗。

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

該標準可分為多個加入編號和標題的明確項目。

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.

每個項目所分配的總分百分比，代表該項目在標準中的相對重要性，這通常被稱為「權重」，所有的百分比的總和為 100。權重決定評分方案中的分數配比。

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

評分方案將透過試題僅針對標準規範所列之技能進行評量，並在技能競賽的限制範圍內，盡可能全面地反映標準之內容。

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, provided that this does not distort the weightings assigned by the Standards.

評分方案會在實際可行的最大範圍內遵循標準之配分，只要不歪曲標準所訂定之權重，即可容許最多百分之五的變動。

2.2 WorldSkills Occupational Standards 國際職業標準

Section	項目	相對重要性(%)	Relative importance (%)
1	Work organization and management	工作組織及管理	5

The individual needs to know and understand:

每位選手必須熟悉和瞭解：

- The role and responsibilities of the industrial design technician, and how it differs from craft-based design, creativity, and production
- 工業設計技術人員的角色和責任，以及和工藝設計、創造力與生產之間有何不同
- Principles and practices for safe working practice across different work settings
- 安全工作實務在不同工作環境中的原則與實踐
- Principles and methods for
- 原則和方法
- organizing own time efficiently and effectively
- 高效且有效地組織自己的時間
- setting and reaching goals for self and own areas of responsibility
- 設定並達到自己負責領域的目標
- scheduling and organizing work assignments
- 安排並組織工作任務的時間
- establishing priorities and rescheduling
- 建立優先事項並重新規劃時間
- Good practice in generating and maintaining records
- 產生並維持紀錄的良好做法
- Ethical principles for safeguarding and maintaining clients' and organizations' security and proper business advantage
- 保護並維護顧客和組織的安全及適當的商業優勢之倫理道德原則
- The norms and expectations for best practice in one's role.
- 對於角色最佳實務的規範和期望

The individual shall be able to: 每位選手必須能夠：

- Apply safe working methods personally and for others
- 針對個人和他人應用安全工作方法
- Select and keep to efficient and effective work methods and habits
- 選擇並維持高效且有效地工作方法和習慣
- Estimate time requirements for each phase of the design process, and create timelines
- 預估設計流程中各個階段的需求時間並制定時間表
- Select and use appropriate planning and management tools
- 選擇並使用適當的規劃和管理工具
- Maintain orderly and secure work areas
- 維持井然有序且安全的工作區域
- Maintain work records as required and helpful
- 依規定維護工作紀錄，使自己能從中受惠
- Minimize distractions that impact on own effectiveness and efficiency
- 將對自身效率和有效性的專注力影響降至最低
- Respond positively to formal and informal opportunities to learn and

update knowledge and expertise.

- 積極回應正式和非正式的機會，從中學習並取得最新專業知識和技術。
-

Section	Relative importance (%)
2 Market research and ideas formation	15

The individual needs to know and understand: 每位選手必須熟悉和瞭解：

- Their organization's 其組織的
 - Brand 品牌
 - position in the market 市場定位
 - range and nature of products and services 產品和服務的系列與種類
 - business strategies and plans 商業策略和計畫
- The sources of design commissions and requirements
- 設計任務和需求的來源
- Principles and methods for researching
- 研究的原則和方法
 - Customer satisfaction
 - 顧客滿意度
 - Market opportunities
 - 市場機會
- Principles, methods and ethics for obtaining information by
- 獲取資訊的原則、方法和倫理
 - Observation 觀察
 - Feedback 回饋
 - Surveys 調查
 - Analysis 分析
 - Secondary (indirect) sources 第二手（非直接）資料
- Principles and techniques for drawing conclusions from data and inputs:
- 從數據和輸入資料中取得結論的原則與技術
 - Inductive reasoning (combining information in order to generalize)
 - 歸納推理（結合資訊以推斷）
 - Deductive reasoning (applying general rules to situations).
 - 演繹推理（針對情況應用一般規則）

The individual shall be able to 每位選手必須能夠

- Receive and mentally process information and requests
- 接收和集中精神處理資訊和需求
- Participate in new market research and product planning
- 參與新的市場研究和產品規劃
- Review the relationship of potential new products to the organization's product range and plans
- 檢視潛在新產品和組織的產品系列和計畫之間的關係
- Review and select alternative methods for obtaining market intelligence
- 檢視並選擇獲取市場情報的替代方法
- Investigate the potential need and benefit of new products and product lines using suitable research methods
- 運用適當的研究方法調查潛在需求和新產品及產品系列的優勢
- Draw conclusions from the market research
- 從市場研究中取得結論
- Maintain records of the market research and thinking process.
- 維護市場研究和思考過程的紀錄

Section 項目	Relative importance (%) 相對重要性(%)
3 The design process 設計流程	15

The individual needs to know and understand: 每位選手必須熟悉和瞭解：

- Design as a process for creating and developing concepts and specifications, through strategic problem-solving
- 設計可視為透過策略性問題解決方式創作和發展概念與規格的過程
- Principles of design
- 設計原則
- Design processes and steps for mass consumption products and services
- 大眾消費產品和服務的設計流程與步驟
- Constraints and opportunities as they relate to the client and organization
- 與顧客和組織有關的限制和機會
- Principles for visual and physical realization
- 實現視覺化和實體化的原則
- The available techniques, methods, tools, and aids to support design and development
- 以適用的技術、方法、工具及輔助工具支持設計與開發
- The impacts of innovation on design and the design process for mass consumption.
- 創新對大眾消費的設計與設計流程的影響

The individual shall be able to: 每位選手必須能夠：

- Conduct research into trends in design
- 進行設計趨勢的研究
- Conceive or receive a design idea
- 構想出或接收設計理念
- Through market research and consultation, create, realize, and evaluate design concepts for manufacturing
- 透過市場研究和諮詢，創造、實現及評估製造的設計概念
- Evaluate the feasibility of design ideas, relative to
- 評估設計理念的可行性，與下列有關
 - Appearance 外觀
 - Safety 安全性
 - Function, 功能，
 - Serviceability 可用性
 - Budget 預算
 - Production methods and costs 生產方法與成本
 - Market characteristics 市場特色
- Modify and refine design ideas, based on the above factors
- 根據以上要素，修改並精進設計理念
- Complete the design process within the parameters of the business or commission.
- 在商業或任務參數內完成設計流程

Section 項目	Relative importance (%) 相對重要性(%)
4 Drawing, illustration, and graphics 繪圖、圖解和製圖	20

The individual needs to know and understand: 每位選手必須熟悉和瞭解：

- The essential characteristics of visualization for industrial design, including colour, visual materials' properties, composition, and typography
- 工業設計視覺化的基本特色，包含顏色、視覺材料的特性、構圖和文字排版
- Principles, purposes, and techniques for sketching within the industrial design process
- 在工業設計流程中繪製草圖的原則、目的和技術
- The range of equipment and tools used to support sketching
- 用於支持繪製草圖的設備和工具系列
- The creative process for industrial design
- 工業設計的創造流程
- The range of graphics equipment and tools that support the representation of the design idea
- 用於支持表現設計理念的製圖設備和工具系列
- Principles and methods for generating desired impressions and impact on viewers
- 產生期望形象並影響觀看者的原則和方法
- The range and sequence of information required for design documentation for mass consumption
- 大眾消費設計文件所需的一系列資訊
- The relationship of design documentation to the whole development process
- 設計文件與整體開發流程之間的關係
- The available choices for IT hardware and software
- IT 硬體和軟體的可用選擇
- International design documentation systems.
- 國際設計文件系統

The individual shall be able to: 每位選手必須能夠：

- Explore ways of articulating design ideas visually
- 探索在視覺上清楚表達設計理念的方法
- Prepare sketches, iteratively, exploring options and results
- 準備草圖，反覆探索選項和結果
- implement decisions regarding colour, visual materials' properties, and composition
- 執行與顏色、視覺化材料特性和構圖有關的決定
- Create 創造
 - detailed drawings 詳細繪圖
 - illustrations 圖解
 - artwork or blueprints 插圖和設計圖
- use drafting instruments and tools 使用製圖器具和工具
- use CAD software 使用 CAD 軟體
- draft, lay out, and specify technical devices, plants and equipment
- 起草、制定計畫並明確說明技術性裝置、機器和設備
- update sketches, drawings, and documentation as development proceeds

Section 項目	Relative importance (%) 相對重要性(%)
4 Drawing, illustration, and graphics 繪圖、圖解和製圖	20

- 根據發展進度更新草圖、繪圖和文件
- maintain document control throughout the design process.
- 維持整個設計流程中的文件控制

Section 項目	Relative importance (%) 相對重要性(%)
5 Materials science and engineering 材料科學與工程	15

The individual needs to know and understand: 每位選手必須熟悉和瞭解：

- The practical application of engineering science and technology
- 工程科學和技術的實際應用
- The principles, techniques, procedures and equipment relevant to design and production
- 設計與生產的相關原則、技術、程序和設備
- Machines and tools, including their design, uses, repair, and maintenance
- 機器和工具，包含其設計、使用、維修和維護
- Raw materials
- 原料
- Production processes, quality control, and costs
- 生產流程、品質管控和成本
- Circuit boards, processors, chips, electronic equipment, hardware and software
- 電路板、處理器、晶片、電子設備、硬體和軟體
- Applied mathematics
- 應用數學
- Physical principles, properties, laws, interrelationships, and applications for
- 物理原則、特性、定律、相互關係及應用
 - Fluids 流體
 - Materials, 材料，
 - Atmospheric dynamics 大氣動力學
 - Mechanics 機械力學
 - Electrics 電學
- Atomic and sub-atomic structures and processes
- 原子和次原子結構與流程
- Properties of materials
- 材料的特性
- Trends in materials and their applications
- 材料的趨勢及應用
- Methods for identifying, testing, and selecting materials
- 確認、測試和挑選材料的方法
- Developments in the digitalizing of industrial processes.
- 數位化工業流程的發展

The individual shall be able to: 每位選手必須能夠：

- Consult with engineers and/or other knowledge sources to plan tests and prototypes
- 與工程師和／或其他知識來源交換意見，以計畫測試和原型
- Select and specify machines and tools for prototyping
- 選擇並具體說明用於原型的機械和工具
- Identify and apply relevant procedures and regulations to the testing and prototyping process
- 確認並應用測試和原型流程的相關程序和規範
- Determine the purposes, range and scope of tests and prototypes
- 決定測試和原型的目的、類別和範圍

Section 項目	Relative importance (%) 相對重要性(%)
5 Materials science and engineering 材料科學與工程	15
<ul style="list-style-type: none"> Put in place measures to ensure the validity of information and data collected 制定測量方法，確保資訊和數據的有效性 Conduct tests and prototyping 進行測試和原型製作 Collect planned information and data for analysis 從分析中收集計畫的資訊和數據 Review the implications of the analysis for 檢視分析中的含意 <ul style="list-style-type: none"> The manufacturing process, and outcomes, and 製造流程和結果，以及 the selection and use of materials. 材料的挑選和使用 	

Section 項目	Relative importance (%) 相對重要性(%)
6 The development process 發展流程	20

The individual needs to know and understand: 每位選手必須熟悉和瞭解：

- The technical standards governing the design idea and purpose
- 規範設計理念與目的的技術標準
- Ergonomics for the purpose of fitting users' needs and characteristics
- 符合使用者需求與特色的人體工學目的
- Manufacturing processes and available options for given items
- 製造流程與適用規定品項的選擇
- The impacts of manufacturing and assembly on the function and appearance of given items
- 製造和組裝對規定品項的功能和外觀之影響
- The impact of materials and manufacture on the mass and weight of given items
- 材料與製造對規定品項的質量和重量之影響
- Principles, methods and techniques for collecting test data
- 收集測試數據的原則、方法和技術
- The options for use of testing and analytical products, methods, techniques and tools.
- 測試與分析產品、方法、技術和工具的使用選擇

The individual shall be able to: 每位選手必須能夠：

- Research production specifications, costs, production materials, and manufacturing methods
- 研究生產規格、成本、生產材料和製造方法
- Provide cost estimates and itemized production requirements
- 提供成本預估並詳細列舉生產規定
- Build models, patterns, or templates
- 建立模型、模式或範本
- Fabricate models or samples in a range of materials, using hand and power tools
- 使用手動和電動工具將各種材料製作成模型或樣品
- Monitor processes, materials, and surroundings to detect or assess problems
- 監看流程、材料和週遭事物以發現或評估問題
- Collect and process information by compiling, categorizing, calculating, and verifying information and data
- 透過編輯、分類、計算並證明資訊和數據等方式收集並處理資訊
- Select and use suitable and robust testing equipment, tools, methods, and techniques
- 選擇並使用合適且耐用的測試設備、工具、方法和技術
- Analyse and evaluate information to determine compliance with standards
- 分析和評估資訊以確定是否遵循標準
- Estimate or quantify sizes, numbers, or amounts, of items relevant to production
- 估算或量化與生產相關的品項之尺寸、數量或總額
- Determine time, costs, resources, or materials needed for production

Section 項目	Relative importance (%) 相對重要性(%)
6 The development process 發展流程	20
<ul style="list-style-type: none"> • 確認生產所需之時間、成本、資源或材料 • Present designs and reports to clients or managers for approval • 向客戶或經理展示設計並報告以取得認可 • Raise and discuss the needs for and benefits of modification • 提升並討論修改的需求及好處 • Techniques for optimizing manufacture and distribution • 最佳化製造與分配的技術 • Review, adapt, and provide documentation, detailed instructions/specifications, or drawings, for fabrication, construction, assembly, modification, maintenance and use. • 檢視、改寫並提供製造、建構、組裝、修改、維護和使用的文件、詳細說明／規格或繪圖 	

Section	Relative importance (%)
7 Implementation	10
<p>The individual needs to know and understand: 每位選手必須熟悉和瞭解：</p> <ul style="list-style-type: none"> Principles and methods for showing, promoting, and selling products or services 展示、宣傳和銷售產品或服務的原則和方法 The organization's 組織的 Marketing strategy and tactics 行銷策略和戰術 Product demonstration 產品展示 Sales techniques 銷售技巧 Sales control systems. 銷售管控系統。 	
<p>The individual shall be able to: 每位選手必須能夠：</p> <ul style="list-style-type: none"> Develop industrial standards and regulatory guidelines 制定工業標準和管理指導方針 Check the relationship of the product to the organization's business strategy and plan 檢查產品與組織業務策略和計畫之間的關係 Develop promotional strategies or plans for the product 制定產品推廣策略或計畫 Develop artistic or design concepts for decoration, exhibition, or commercial purposes 發展以裝飾、展覽或商業為目的之藝術或設計理念 Design graphic material for use as ornamentation, illustration, advertising, and packaging 作為裝飾、圖解、廣告和包裝使用的設計製圖材料 Present evaluation reports, including 提出評估報告，包含 <ul style="list-style-type: none"> Handling and safety 處理方式和安全性 Market appeal 市場吸引力 Production efficiency 產品效率 Distribution. 分配 Use 使用 Maintenance. 維護。 	
Total 總分	100

3 The Assessment Strategy and Specification

評量策略與說明書

3.1 General guidance 總則

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

評量由 WorldSkills 評量策略所管理，WorldSkills 評量和評分必須遵守該策略制定的原則與技巧。

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).

裁判評量實踐是國際技能競賽的核心，因此，它也是持續專業發展和審查的主體，評量的專業知識增長代表著國際技能競賽所採用的主要評量工具之未來用途和方向：評分方案、試題和競賽資訊系統（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.

國際技能競賽的評量分為兩大類：測量與判斷，針對這兩種評量類型，使用明確的基準來評估每個細項是品質保證的重要關鍵。

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.

評分方案必須遵循標準中的權重，而作為技能競賽評量工具的試題，也須遵循標準，競賽資訊系統（CIS）不僅能及時準確地記錄分數，且具備持續擴充監督、支援和提供回饋等能力。

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, in order to demonstrate their quality and conformity with the Standards.

簡言之，評分方案將引導試題設計的過程，隨後，透過反覆過程設計、制定並驗證評分方案和試題，確保最佳化兩者與標準之間的關係，為證明評分方案和試題的品質及符合標準的要求，兩者取得裁判同意後將一同提交 WSI 核准。

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.

在提交 WSI 核准前，請和 WSI 技能顧問密切討論評分方案和試題以確保其品質，並獲益於 CIS 功能的協助。

4 The Marking Scheme 評分方案

4.1 General guidance 總則

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.

本節說明評分方案的角色和位置、裁判如何透過試題以及評分程序和規定來評量選手展示的作品。

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.

評分方案是國際技能競賽的關鍵工具，因為它將評量與代表各項技能競賽的標準聯繫在一起，而各項技能競賽本身即是一種全球性的職業。評分方案旨在依據標準中的權重，為每個細項表現分配分數。

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.

評分方案藉由反映標準中的權重，為試題之設計設立參數。依技能性質及其評量需求之不同，較適合一開始就詳盡闡述評分方案，以作為設計試題的指南；或者也可以將評分方案的大綱作為試題初步設計的基礎，但在這之後，評分方案和試題應該同步發展。

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.

前述第 2.1 項明確指出，若無可行的替代方案，評分方案和試題可能在某種程度上偏離標準所訂定之權重。

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more independent people 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 Rules for further details.

秉持公正公平的原則，越來越多的評分方案和試題選擇由一位或多位具備相關專業的獨立人員共同設計與制定，在此情況下，裁判在競賽或該競賽模組開始前才能看到評分方案和試題，詳盡的最終版評分方案和試題若由裁判所設計，則在提交獨立單位確認並做出品質保證前，須獲得全體裁判評審團的核準，進一步的詳細內容，請參閱競賽規則。

Experts and Independent Assessors 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.

裁判與獨立評分人員必須在完成評分方案和試題前，提交審查、驗證和確認，同時也希望在整個設計與制定過程中，他們能與自己的技能顧問、審查者和驗證者合作，以確保評分方案和試題的品質，並充分利用 CIS 的功能。

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.

在所有情況下，評分方案初稿最慢必須在競賽前 8 週輸入 CIS，技能顧問須積極促進此流程。

4.2 Assessment Criteria 評分標準

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.

評分方案的主標題即為評分標準，這些主標題比試題還早出現或來自相關聯的試題，某些職類的評分標準可能與標準中的章節標題相似，其他職類則可能不盡相同，評分標準通常有 5 到 9 項，無論標題是否相符，整體評分方案必須反映標準中的權重。

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

評分標準由制定評分方案者（1人或以上）所建立，他們可以自行定義最適合試題評量與評分的標準，每一項評分標準皆以英文字母（A-I）定義。評分標準、配分和評分方法不應該在本技術說明書中進行說明，這是因為評分標準、配分和評分方法均取決於評分方案和試題的種類，而評分方案和試題則於本技術說明書公布後才做出決定。

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

由 CIS 產生的評分總表將包含評分標準及次評分標準清單。

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.

每項標準獲得的分數將由 CIS 計算，計算結果將成為該評分標準中每一細項的累計總分。

4.3 Sub Criteria 次評分標準

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.

每項評分標準可分為一個或多個次評分標準，每個次評分標準則為 WorldSkills 評分表的標題，每份評分表（次評分標準）包含經由測量或判斷方式評量和評分的細項，抑或是兩者兼具。

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

每份評分表（次評分標準）上都詳細指明評分日期和評分小組的身分。

4.4 Aspects 評分細項

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.

每一評分細項都詳細定義出待評量和評分的單項和該給予之分數，並作為給分指南詳細描述或說明之。評分細項一律採測量或判斷評分。

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.)

評分表上詳細列出每一個待評分的細項及配分。各評分細項獲得的分數總和必須落在標準中指定的分數範圍內。自競賽前 8 週（C-8）起，當評分方案通過審查後（請參閱本文第 4.1 項），

	CRITERIA								TOTAL MARKS PER SECTION	WSS 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	5.00	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	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	2.00

4.5 Assessment and marking 評量與評分

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.)

無論評量與評分採判斷、測量或兩者兼之的方式，每一個次要評分標準均由一個評分小組負責，同一個評分小組須對所有選手進行評量與評分。若此方式不可行（例如：某項動作必須所有選手在被監看的情況下同時進行），則可在取得競賽委員會管理小組核准後，制定第二層評量與評分。評分小組之組成必須確保在任何情況下均沒有同國評分之狀況。（請參閱第 4.6 項）

4.6 Assessment and marking using judgement 判斷評量與評分

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

判斷評分採用 0-3 分制量表，為明確且一致的使用量表，必須依下列方式做出判斷：

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts or separate guidance notes)
- 每一個評分細項（以文字、圖像、人工製品或獨立指南說明所示）基準（標準）之詳細指南
- the 0-3 scale to indicate: 0-3 分制量表指出：
 - 0: performance below industry standard 表現低於業界標準
 - 1: performance meets industry standard 表現符合業界標準
 - 2: performance meets and, in specific respects, exceeds industry standard 表現符合業界標準且在特定方面超越業界標準
 - 3: performance wholly exceeds industry standard and is judged as excellent 整體表現超越業界標準且判斷為傑出

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.

每一評分細項均由 3 位裁判負責判斷評分，通常會同時記錄下他們的分數。第 4 位裁判則負責調節和監督給分，確認分數的有效性，必要時，亦須擔任法官的角色，預防發生同國評分之情況。

4.7 Assessment and marking using measurement 測量評量與評分

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.

通常每一評分細項均由 3 位裁判負責，並由第 4 位裁判在旁監督，在某些情況下，評分小組可分為兩組（兩人一組），以進行雙重評分。除非另有說明，才能給予 0 分或最高分，當此情形適用時，給予部分分數之基準將明確定義在該評分細項中。為避免計算或傳送過程中出現錯誤，請務必使用 CIS 提供的多種自動計算選項。

4.8 The use of measurement and judgement 測量和判斷的使用方法

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.

關於標準和評分方式的選擇，將於競賽設計期間透過評分方案和試題來決定。

4.9 Skill assessment strategy 技能評量策略

WorldSkills is committed to continuous improvement. This particularly applies to assessment. The SMT is expected to learn from past and alternative practice and build on the validity and quality of assessment and marking.

WorldSkills 致力於持續不斷的提升，這特別適用於評量方面，SMT 期望能汲取過去的經驗，在有效和優質評量和評分的基礎上採用替代做法。

The final understanding on Measurement and Judgement Marking is available when the Marking Scheme and the Test Project are approved.

評分方案和試題經核准後，將提供測量和判斷評分的最終版。

The table contains approximate information and is used to develop the Marking Scheme and the Test Project.

下表包含大概的資訊，可用於制定評分方案和試題。

Criteria 標準		Judgement 判斷	Measurement 測量	Total 總分
A	Research and analytics of market situation 市場情勢的研究與分析	20	5	25
B	Sketch concept of the Ideas 構想的概念草圖	10	10	20
C	CAD Modelling and engineering process CAD 建模和工程流程	10	20	30
D	Project development and presentation 專案製作與簡報	20	5	25
Total 總分		60	40	100

4.10 Skill assessment procedures 技能評量程序

Assessment and marking are an intense process that depends upon skilful leadership, management, and scrutiny.

評量與評分是一個令人緊張的過程，需具備技能領導、管理和監督能力。

Three groups of Experts award marks according to two criteria in aspects for each module. Competitors are provided with necessary materials prior to the beginning of each stage of the competition. The Competitor shall independently check the availability of all materials and tasks, previously checked and signed by two Experts.

3 組裁判根據細項中的 2 個標準為每一個模組評分，選手在每個競賽階段前拿到必要的材料，應獨立檢查所有材料和試題之可用性，這些之前都經過 2 位裁判簽名確認。

5 The Test Project 試題

5.1 General notes 一般注意事項

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

試題的制定請見本文第 3 條和第 4 條，此處注意事項為補充說明。

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.

無論試題是單一實體、一系列獨立或相關的模組，都能作為 WSOS 各項目中闡述的應用知識、技能和行為之評量。

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.

試題的目的是在標準中，結合評分方案，提供完整、不偏不倚且可靠的評量與評分機會。試題、評分方案及標準之間的關係是品質的關鍵指標，如同三者與實作表現之間的關係。

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.

試題範圍既不涵蓋標準外的內容，亦不會影響標準內的分數平衡，本文第 2 條所指的情況除外。凡影響試題能否支持與標準有關的完整評量範圍之問題，本技術說明書都會註記，請參閱第 2.2 項。

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.

試題僅對知識和理解力在實作中的應用進行評量，而不會對 WorldSkills 規則與規範的知識進行評量。

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 Developer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

大部分的試題（和評分方案）現在都由裁判們獨立設計與制定，通常從競賽前 12 週（C-12）起，開始由技能競賽經理或獨立命題人員進行設計和制定，且須經過獨立審查、驗證和確認。（請參閱第 4.1 項）

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

以下提供資訊將以本技術說明書完成時的內容與保密規定為準。

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

請參閱現有的競賽規則版本以取得進一步的詳細資訊。

5.2 Format/structure of the Test Project 試題的格式／結構

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

試題／模組是一系列獨立評量的 4 個模組。

Module 模組	Description 說明	Module completion time 模組完成時間
1	Module 1 – Hot point 1: Research and analytics of market situation 模組 1 – 熱點 1：市場情勢的研究與分析	5 hours 5 小時
2	Module 2 – Hot point 2: Sketch concept of the Ideas 模組 2 – 熱點 2：構想的概念草圖	4 hours 4 小時
3	Module 3 – Hot point 3: CAD Modelling and engineering process 模組 3 – 熱點 3：CAD 建模和工程流程	8 hours 8 小時
4	Module 4 – Hot point 4: Project development and presentation 模組 4 – 熱點 4：專案製作與簡報	6 hours 6 小時

5.3 Test Project design requirements 試題設計規定

Module 1 – Hot point 1: Research and analytics of market situation

模組 1 – 熱點 1：市場情勢的研究與分析

In this module, the participant must conduct research and analysis of the current situation regarding the proposed area of product development. Provide statistical data and analytical offers of the modern supply and demand market, describe the average consumer of a product, his desires. Describe the problems of the production process of the product, isolate the positive and negative, analyze the use of materials and production technologies, identify the engineering faulty and collapsible units of the product and the necessary input data for the development of one's own idea for the product.

在此模組中，選手必須根據建議的產品開發區，針對當前情勢進行研究和分析，提出最新供應和需求市場的統計數據與分析報價，描述產品的一般消費者，即消費者的喜好，也必須描述產品生產流程的問題、區隔正面和負面問題、分析材料與生產技術的使用、確認產品的工程不完善處與可折疊單位，以及發展某人產品概念所需的輸入資料。

Module 2 – Hot point 2: Sketch concept of the Ideas

模組 2 – 熱點 2：構想的概念草圖

The Competitor should develop the concept of the object for the first briefing and present it using the sketches. The task contains only the technology that one would like to implement in the future in everyday life. The participant should analyse the information received and draw conclusions about the nature and possibility of using this technology in the future object, choose the segment of consumers for which they will design, choose the materials for the object and the colour palette, and determine the functionality.

選手應根據首次的簡要說明內容繪製物件的概念圖，並以草圖形式呈現之，試題僅包含人們想在未來日常生活中使用的技術，選手應分析接收到的資訊並取得關於在未來物件上使用該技術的本質與可能性之結論，選擇消費者群（設計物件的適用對象）、物件的材料和配色，並具體說明物件的功能。

The input data table is filled in at any time prior to the end of the module at the Competitor's discretion and attached to the magnetic board. Once the participant has understood his or her design task, they may begin sketching. Through the sketches in the first format, the Competitor establishes the shape of the future object and its colour scheme. Once the Competitor is happy with the shape of the future object, they draw a demo sketch. The demo sketch is distinguished by a more detailed drawing and the image size. For the sketch to be even more informative, one section is selected and "set apart", so that the thickness of the product and the internal space can be seen. The demonstration sketch also indicates the dimensions of the product.

在該模組競賽時間結束前，選手可自行決定完成輸入資料表的時間，並張貼於具有磁性的黑板上。選手在瞭解他或她的設計試題後，便可以開始繪製草圖，用第一版格式的草圖建立未來物件的外形與配色，如果選手滿意未來物件的外形，即可著手繪製示範草圖（Demo sketch），示範草圖的區別在於更多細部圖和圖像尺寸，為了讓示範草圖能提供更多資訊，可「單獨挑出」某一部分的剖面，以更清楚的方式呈現產品的厚度和內部空間，另外，示範草圖須標示出產品尺寸。

For a better understanding of the functionality of the object, scenario sketches of the proposed functions are made in the second format. The scenario sketch should demonstrate the moment of interaction or action of the object, for the purpose of which the Competitor may draw a person

(individual parts) in the script or indicate the movement with arrows (twisting, moving upwards, etc.). Additional text explanation is also allowed in the scenarios (but not instead of the scenario image itself).

為了更瞭解物件的功能性，將於第二版格式中製作建議功能的場景草圖。場景草圖應展示物件

互動或活動的瞬間，為此，選手可以在場景中繪製人物（個別部位），或以箭頭移動方向（旋轉、向上等等）作為指示，亦可在場景中加入額外的文字說明（但不能取代場景圖自身）。

An exploded-view drawing should be made for explanations on the selected material and design of the product in the second format. This exploded diagram is carried out along the coordinates inscribed along the axes in three directions (x, y, z). The parts and fixtures are spread out, however, the object does not lose its visual integrity. An explosion along a single axis, partial separation of parts or a loss of overall visual integrity cannot be considered an exploded view.

應在第二版格式中使用分裂視圖說明選擇的產品材料和設計。爆炸圖將沿著軸上刻寫座標的三個方向（x、y、z）前進，零件和連接件分布其中，但這並沒有犧牲掉物件的視覺完整性，而沿著單軸的爆炸、部分分離的零件，或喪失整體視覺完整性均不能被視為分裂視圖。

The parts should be accompanied with proper explanations for the selected material; the material should be named in an unambiguous manner (not "plastic" or "metal", but for example "polyurethane" or "steel"), and there should be proper explanations of why this exact material has been chosen (for example the cost, abrasion resistance, increased strength, tactile sensations, elasticity, ability to take a new form or return to the initial one, etc.). The explanations (in the case of a glue or weld joint, explanations should be close to the joint lines) about the reasons for choosing this particular method of connection (increased strength, complex configuration of parts, etc.) should be present on the exploded view next to the possible fasteners on the designed object (coupling elements, all kinds of fixing surfaces and their parts and accessories).

針對選擇的材料，其零件應伴隨適當的說明，材料應明確方式命名（舉例而言，不能使用「塑膠」或「金屬」，而是要用「聚氨酯」或「鋼」），並應該適當說明選擇該確切材料的原因（例如：成本、耐磨性、高強度、觸感、彈性、能產生新形式或能恢復原形等等）。說明（在黏著劑或焊接合的案例中，說明應靠近接合線）選擇該特殊連接法的原因（增加強度、零件的複雜配置等等）應以分裂視圖呈現，旁邊為設計物件上的可能連接件（連接器元素、各種連接件的表面、零件和配件）。

It is important to remember that there is no clear task regarding the aesthetic decoration of the sheets; it is assessed (judged) in terms of the Competitor's ability to present their ideas and in terms of their level of artistic skills. The list of sketches specified in the task is minimal, and the presence of all items on the list according to the task is assessed objectively. However, in order to more greatly describe the project and the artistic idea, it is allowed to draw more sketches or compile a sheet. The sheets are also evaluated in terms of the accuracy of the work. The sheets are attached to the magnetic board after execution. The initial idea of the project is judged within the same module.

記住重要的一點，試題中並沒有明確規定表格的藝術性裝飾，而是就選手提出構想的能力、藝術技能程度等方面進行評估（判斷），試題中規定的草圖清單是最基本的要求，根據試題展示所有清單上的品項則屬於客觀評分。但為了以更好的方式描述專案和藝術性構想，選手可以繪製更多的草圖或編輯表格，這些表格亦會就作品的正確性進行評估，完成的表格請張貼在具有磁性的黑板上，在相同模組中，專案是否具備獨創性構想屬於判斷評分。

The Competitor's ability to immediately determine the required parameters of the future object, choose the optimal design option for production and the selected price category. The operability of the object, safety of its use by a human, maintainability, and the potential for long-term operation is assessed on the basis of the materials and design of the object.

選手是否具備立即判定未來物件的必要參數、針對生產及所選價格類別選出最佳設計選項等能力，物件的操作性、使用者的安全性、可修護性及根據物件的材料和設計，是否能長期使用的可能性等等，都在評估的範圍內。

Module 3 – Hot point 3: CAD Modelling and engineering process

模組 3 – 熱點 3：CAD 建模和工程流程

The Competitor's task is to refine the project to produce a final version which is presented to the customer. The module will take 10 hours to complete. The first thing that the Competitor does when starting the module is to divide up his or her working time. Participants are handed out the time sheets.

選手的試題任務是精進專案以產出最終版本，並向顧客展示之。完成此模組須要 10 個小時。開始進行模組時，選手首先要做的是分配他或她的作業時間，他們會拿到一張時間表。

The participant fills the time sheet out independently, describing the expected stages of work and the time for their implementation. After filling in the table, the Competitor puts it onto the magnetic board as well. The more detailed the table is, the greater the understanding of the workflow by the Competitor and the easier it is for the Experts to assess the rationality of the participant's time distribution, speed of his or her work, and correspondence of his or her real work process to the intended one.

須獨立填寫時間表，敘述預計的工作階段和執行時間，完成後，一樣張貼在具有磁性的黑板上。表上的內容越詳盡，代表選手越清楚瞭解工作流程，裁判也更容易評估選手分配時間的合理性、作業速度，以及實際工作程序是否符合預期。

In this module, the Competitor's actions are recorded from the working screen facilitate the work of the Experts, and once the module has been completed, these are reviewed by the responsible experts for compliance with the work plans. The Competitors' sketches from the first module are also handed over to the Experts, who make three comments (one from each member of the marking team) regarding the project, which should be eliminated (or not eliminated, at the discretion of the Competitor) in the future. Initial comments recorded relate to the design and materials, then to maintainability and safety of operation; the following comments relate to functionality; the last comments relate to aesthetics of form and colour.

在此模組中，選手的動作將被記錄在工作畫面中，以方便裁判進行評量，選手完成模組後，將由負責的裁判檢視紀錄，確認選手是否遵循工作計畫，選手在模組 1 中的草圖也會交給裁判，並提出三個和專案有關的意見（評分小組中的每位成員）且在未來要排除掉（或不排除，由選手自行決定），最初的意見記錄與設計和材料有關，接著依序是可修護性、操作的安全性、功能性，以及最後的形式與色彩美感。

According to the terms of the competition, the comments should be made for each project; however, the nature of the comments is assessed separately by the experts. In the project presentation, it is necessary to say what the comments on the project were and how they were eliminated by the Competitor. During the performance of the module, it is possible to change the project an unlimited number of times and to apply the seal for restart. However, this will affect the Expert's assessment (judgement) of the work performance.

根據競賽規定，每個專案都必須給予意見，至於是什麼樣的意見，則由裁判單獨進行評估，在進行專案簡報時，須說明專案收到的意見內容及選手排除的方法，在進行模組的過程中，可不限次數修正專案，確認後再重新啟動，但這將影響裁判對工作執行過程的評估（判斷評分）。

The project may be corrected not only in terms of the comments made by the Experts, but also at the request of the Competitor. This will also affect the Expert assessment. The already corrected project is made in Fusion 360 when working with the three-dimensional model; when modelling, it is necessary to take into account the settings of the programmes and the modelling process specified in the task.

不僅可根據裁判的意見修正專案，亦可依照選手自己的要求進行修改，這也會影響到裁判的評估，在 Fusion 360 中處理的 3D 模型為已修正完畢的專案，建模時，則須將試題中明確規定的程式設定和建模程序列入考慮。

When modelling, one should clearly monitor the accuracy of assignment of the selected material to the parts, as this will affect the calculation of mass and loads. The three-dimensional model should also consist of parts, not a single monolith (unless this has been requested by the customer), which will help the experts to assess the possibility of manufacturing this product.

建模時，應明確監看從挑選的材料到零件是否為試題中的正確選擇，因為這將影響質量和負載的計算。3D 模型也應該由零件所構成，而非單一的大型材料（除非這是顧客的要求），如此才能有助於裁判評估該產品的製造可能性。

Once the project is ready, the Competitor either sends it for printing, or checks against loads, or begins to develop the design documentation at his or her discretion. When sending to print, the Competitor should choose the optimal printing mode in terms of time and accuracy of production. Arrange the parts for printing on the table in a logical manner, be economical.

專案就緒後，選手可自行決定開始列印模型、檢查模型的負載，或是開始製作設計文件。進行 3D 列印時，選手必須根據生產的時間和正確性來選擇最佳的列印模式，合理安排表上的列印零件順序，請節約使用材料。

When printing, it is considered whether the printing was stopped and for what reason. When checking the object against loads, it is considered what type of loads the Competitor has chosen and to which points they were applied. Whether the Competitor's choice reflects the actual future workloads and whether he or she has taken the data from the calculation into account in the design, whether there have been any corrections made to the project.

無論選手的選擇是否反映真正的未來工作流程、是否在設計中考慮到計算所得的數據、是否對專案進行任何修正，列印時，請將印刷故障和原因考慮在內，檢查物件的負載時，則應考慮到選手選擇的負載類型和應用哪些施力點。

When checking the weight of the product, one can determine not only the total weight, but also its stability at certain points. Design documentation is required to check the configuration of the parts and to select the material for them in the final project.

檢查產品的重量時，須確認總重量和產品在臨界點的穩定性，設計文件的必要性在於能檢查最終專案的零件配置和材料選擇。

The stamp and frame are selected at the discretion of the task developer and filled in by the Competitor, which also applies to the specification table. Documentation and loads are printed. During prototype modelling, the Competitor should focus on the final appearance of the product, its shape and colour composition.

試題制定者可自行決定是否納入標誌和框架，並由選手填寫資料，這亦適用於規格表，請將文件和負載印出，在原型製作期間，選手應專注在產品的最終外觀、外形和色彩組成上。

The more detailed the prototype, the better. The prototype is made to scale. Execution of working elements (operating on/off button, opening door, etc.) is possible in the task. The prototype should be neat and maintain its shape for a long time (the presentation takes place the next day).

原型是按比例製作而成，因此細節越多越好，試題中可能涵蓋工作元素的執行（操作開關按鈕、將門打開等等），原型必須簡潔整齊且能長時間保持外形不變（隔天進行簡報）。

Module 4 – Hot point 4: Project development and presentation

模組 4 – 熱點 4：專案製作與簡報

The task in this module is to make a report and a presentation of one's project.

此模組的試題是製作專案的報告和簡報。

The participant is given 6 hours to complete this module. The presentation should include materials from the previous modules: sketches, data from the calculation of the product mass, and data of the object pertaining to its sustained loads, and a 3D model. The Competitor must take images of the object with the flying camera (at least 2 different trajectories using additional light sources), assembly/disassembly of the object, video showing the launch of loads to the object, and motion features of the object.

將給予選手 6 個小時時間完成此模組，簡報應包含前面模組的材料：草圖、量產的計算數據、關於物件持續負載的數據，以及 3D 模型。選手必須以環繞鏡頭（至少 2 種使用額外光源的不同路徑）為物件拍攝照片、組合／取消組合物件、錄製施加在物件上的負載作用以及移動特色。

When developing a presentation, the participant can use the music provided to him or from his music folder, formed by him prior to the start of the competition. Slides in the presentation should change automatically. The structure of the project presentation is determined by the participant himself.

製作簡報時，選手可使用提供的音樂或賽前自行製作的音樂資料夾，簡報中的投影片應選擇自動播放，專案簡報的結構由選手自行決定。

An environment and/or a human figure can be further embedded into the video when the materials are agreed upon before the presentation commences. The presentation should also contain text explanations about the processes shown on the screen and explanations (annotation) about the project itself.

在簡報開始前，如在材料上取得同意，則可在影片中可進一步嵌入環境和／或人物，簡報也應當涵蓋和畫面呈現之過程有關的文字說明，以及和專案自身相關的說明（註解）。

The artistic aspects of the presentation are at the discretion of the Competitor. The objective of the presentation is to draw attention to one's project and to be remembered. Reading text off a sheet of paper is not permitted. Test Project has been improved in relation to its original version, and whether the project actually meets the customer requirements and consumer profile.

簡報的藝術性呈現由選手自行決定。簡報的目標是讓眾人將注意力放到專案上，並留下深刻

印象，因此，不允許以閱讀書面文字形式呈現。須考量試題是否相較於最初版本明顯提升其品質，專案是否真正符合顧客的要求與消費者的描述。

The participant must also prepare a report on the work done in the form of a book consisting of products developed by him during the entire competition, for example, sketches, product drawings, calculations, analytics and market research and issues.

選手還必須在完成試題後準備書籍形式的報告，內容應涵蓋選手在整個競賽期間的產品開發過程，例如：草圖、產品繪製、計算、分析及市場研究與問題。

5.4 Test Project development 制定試題

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.

試題務必以國際技能競賽組織提供的模板提交（www.worldskills.org/expertcentre），文字文件使用 Word 模板，圖稿使用 DWG 模板。

5.4.1 Who develops the Test Project or modules 試題或模組的制定者

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

試題／模組將由獨立命題人員與技能競賽經理合作制定。

5.4.2 When is the Test Project developed 試題的制定時間

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

試題／模組根據下列時間表制定：

Time 時間	Activity 活動
Prior to the Competition 競賽前	The Test Project/modules are developed. 制定試題／模組。
At the Competition on C-4 競賽前 4 天	The Test Project/modules are presented to the Experts without any technical information. 在不提供任何技術資訊的情況下，向裁判展示試題／模組。
At the Competition on C1 競賽第 1 天	The full Test Project/modules are presented to the Competitors. 向選手展示完整的試題／模組。

5.5 Test Project initial review and verification

試題的最初審查與驗證

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,

試題的目的是為選手創造挑戰，因為他們真正代表的是在已確認職業中出色從業人員的工作生活，透過此作法，試題將應用評分方案並完整體現 WSOS 精神，在其背景、目的、活動和期望中都是獨特的存在。

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 is expected to identify one or more independent, expert, and trusted individuals initially to review the Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

以恰當的嚴格品質保證和設計過程支持試題設計與制定（請參閱競賽規則第 10.6-10.7 項），WorldSkills 核准後，希望獨立命題人員能讓一位或多位獨立人員、裁判和可信賴者參與最初的命題者想法與計畫審查，然後在試題確認前進行驗證。

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.

技能顧問將協調並確保此安排順利進行，並根據支持競賽規則第 10.7 項的風險分析，保證最初審查和驗證的適時性與完整性。

5.6 Test Project validation 確認試題

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

技能競賽經理須協調試題確認流程，確保試題／模組能在競賽材料、設備、知識和時間的限制下完成。

5.7 Test Project selection 挑選試題

The Test Project/modules are selected by the Independent Test Project Designer in collaboration with the Skill Competition Manager.

由獨立命題人員與技能競賽經理共同挑選試題／模組。

5.8 Test Project circulation 公佈試題

If applicable, the Test Project is circulated via the website as follows:

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 every morning of each Competition day.

如適用，試題可經由網站公布，如下：

試題／模組不會在競賽前公布。競賽前 4 天向裁判展示試題／模組；競賽每一天早上向選手展示試題／模組。

5.9 Test Project coordination (preparation for Competition)

協調試題（為競賽作準備）

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

協調試題／模組的工作由技能競賽經理負責。

5.10 Test Project change 更動試題

There is no 30% 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 to infrastructure limitations.

在競賽過程中，試題／模組無須進行 30% 的更動。

修正試題中的技術性錯誤及場地設備材料的限制為例外情況。

5.11 Material or manufacturer specifications

材料或製造商的規範

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 such items may include those for fault finding modules or modules not circulated.

讓選手得以完成試題的必要特定材料和／或製造商規範，將由競賽主辦單位提供，也可以從位於網站「裁判中心區」的 www.worldskills.org/infrastructure 取得。但請注意，在部分情況下，特定材料和／或製造商規範的詳細資訊可能處於保密狀態，不得於競賽前公布，這些項目包含故障排除或不公開的模組。

6 Skill management and communication

技能管理與溝通

6.1 Discussion Forum 論壇

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.

競賽之前，所有與技能競賽有關的討論、溝通、合作和決策，必須在該職類論壇（<http://forums.worldskills.org>）內進行，唯有在論壇內被採用的技能相關決策和溝通才具有效力。論壇主持人為裁判長（或裁判長任命的裁判），有關溝通與競賽發展要求的時間表，請參閱競賽規則。

6.2 Competitor information 選手資訊

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

已登錄的選手可在網站中的「選手中心區」取得資訊（www.worldskills.org/competitorcentre）。

This information includes: 資訊包括：

- Competition Rules 競賽規則
- Technical Descriptions 技術說明書
- Mark Summary Form (where applicable) 評分總表（如適用）
- Test Projects (where applicable) 試題（如適用）
- Infrastructure List 場地設備材料清單
- WorldSkills Health, Safety, and Environment Policy and Regulations
- WorldSkills 健康安全與環境政策與規章
- Other Competition-related information
- 其他競賽相關資訊

6.3 Test Projects [and Marking Schemes] 試題〔和評分方案〕

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

已公告的試題請見 www.worldskills.org/testprojects 及「選手中心區」（www.worldskills.org/competitorcentre）。

6.4 Day-to-day management 日常管理

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).

競賽期間的技能日常管理定義於技能管理計畫內；該計畫係由技能競賽經理領導的技能管理小組所建立，技能管理小組由技能競賽經理、裁判長和副裁判長組成，技能管理計畫於賽前 6 個月內逐步發展而成，並在競賽時經全體裁判同意後定案，技能管理計畫可見於「裁判中心區」（www.worldskills.org/expertcentre）。

6.5 General best practice procedures 一般最佳實務程序

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.

一般最佳實務程序明確描述最佳實務程序的內容和技能之特殊規定（第9項）之間的差異，一般最佳實務程序是在裁判和選手無法對違反競賽規則或技能之特殊規定負責時，作為問題與爭議解決程序的一部分給予懲處，如倫理規範與行為守則懲處系統。在部分情況下，針對選手部分的一般最佳實務程序將反映在評分方案中。

Topic/task 主題／工作 任務	Best practice procedure 最佳實務程序
Use technology – local software for translation 科技產品的使用 – 使用 本國軟體進行翻譯	<ul style="list-style-type: none"> From C1-C4 Competitors are allowed to use the local software, according to the Infrastructure List, to translate the signs/labels on the sketches and any text in the presentation according the instructions in the Test Project. 從競賽第1天到第4天，選手均可依場地設備材料清單的規定，使用本國軟體翻譯試題說明簡報中的草圖和所有文字內容上的標誌／標籤。
Use of technology – 3D printing process 科技產品的使用 – 3D 列 印流程	<ul style="list-style-type: none"> Competitors are allowed to leave the 3D printing in the prototyping process during the lunchtime however they will take full responsibility and have to deal with any after effects. If the process goes wrong the Workshop Manager is allowed to stop the 3D printer but the Competitor's time is not extended. 選手可以在午餐時間離開正在進行3D列印的原型製作流程，但他們必須全權負責並處理一切可能產生的後果，如果過程出現錯誤，場地經理有權停止3D印表機運作，但不會將時間補給選手。

7 Skill-specific safety requirements

技能之特殊安全要求

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

請參閱主辦國或主辦地區的 WorldSkills 健康安全與環境政策與規章。

Task 工作任務	Sturdy shoes with closed toe and heel 堅固耐用的包頭 鞋	Safety shoes 安全鞋
General PPE for safe areas 安全區域的一般個人防護設備	√	
Competitor workstations 選手的工作站		√

8 Materials and equipment 材料與設備

8.1 Infrastructure List 場地設備材料清單

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

場地設備材料清單詳列競賽主辦單位提供的所有設備、材料和設施。

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

場地設備材料清單請見 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 such items may include those for fault finding modules or modules not circulated.

場地設備材料清單明定技能管理小組為下屆競賽所要求的品項和數量，競賽主辦單位將逐步更新清單，列明品項實際數量、種類、品牌和型號。請注意，在部分情況下，特定材料和／或製造商規範的詳細資訊可能處於保密狀態，不得於競賽前公布，這些項目包含故障排除或不公開的模組。

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.

每次競賽時，技能管理小組必須檢視並更新場地設備材料清單，為下屆競賽做準備，如需增加任何空間和／或設備，請技能競賽經理務必告知技能競賽主任。

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

每次競賽時，技術觀察員務必稽查該競賽使用的場地設備材料清單。

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.

場地設備材料清單不包括選手和／或裁判必須自備的品項，也不包括選手不得攜帶的品項—如下所列。

8.2 Competitors toolbox 選手的工具箱

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

選手不得將工具箱寄送至競賽場，所有工具由競賽主辦單位提供。

8.3 Materials, equipment, and tools supplied by Competitors 選手自備的材料、設備和工具

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

不適用工業設計技術職類，因為該職類選手無須攜帶材料、設備和工具至競賽場。

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

但選手必須自備個人防護設備，如第 7 項技能之特殊安全要求所述。

8.4 Materials, equipment, and tools supplied by Experts

裁判自備的材料、設備和工具

Experts are not allowed to bring materials, equipment, or tools. All is supplied by the Competition Organizer.

裁判無須自備的材料、設備和工具，這些將由競賽主辦單位提供。

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

裁判必須自備個人防護設備，如第 7 項技能之特殊安全要求所述。

8.5 Materials and equipment prohibited in the skill area

職類區域內禁用的材料和設備

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

嚴禁選手和裁判攜帶非第 8.3、8.4 項所列之任何材料或設備。

8.6 Proposed workshop and workstation layouts

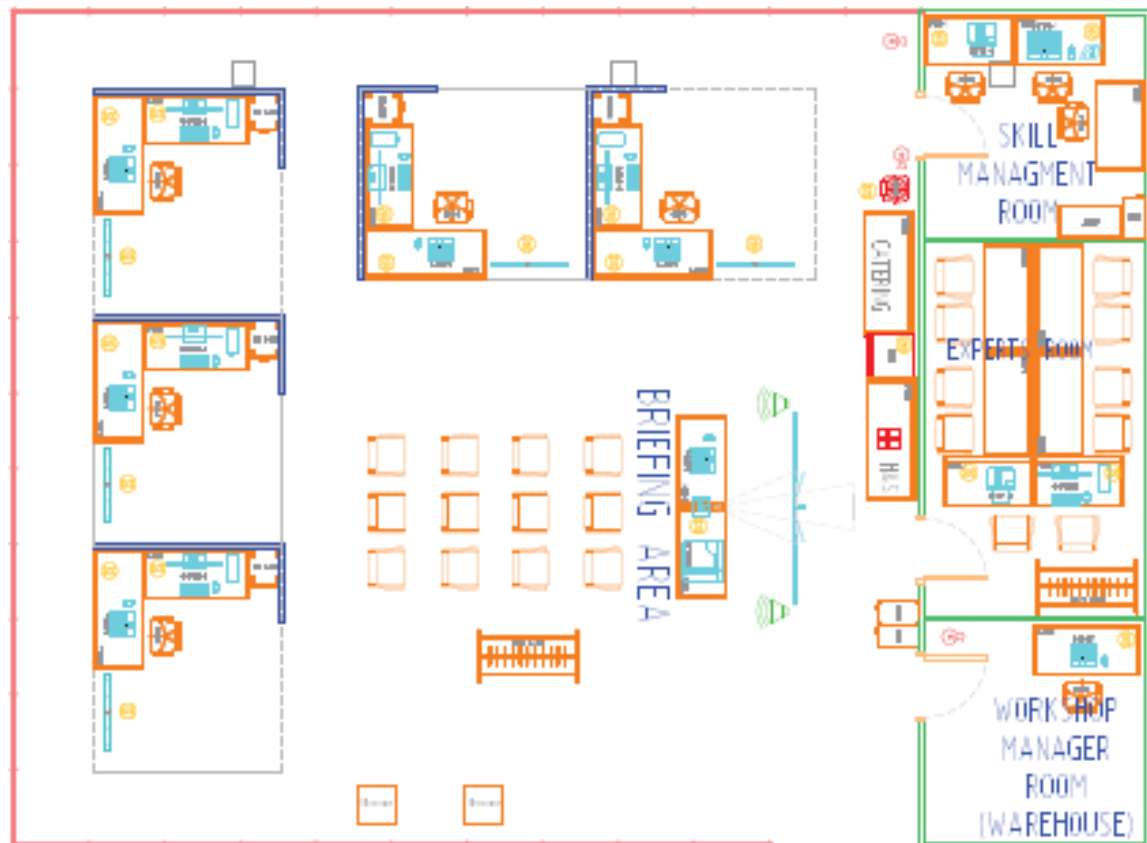
工作場地及工作站的平面圖提案

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

上屆競賽的工作場地平面圖請見 www.worldskills.org/sitelayout。

Example workshop layout

工作場地平面圖範例



9 Skill-specific rules 技能之特殊規定

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.

技能之特殊規定不得違背或優先於競賽規則，提供不同職類間可能有所差異的明確具體細節，包括但不限於個人 IT 設備、資料儲存裝置、網路存取、程序與工作流程及檔案管理與發送。違反以下規定，將依包含倫理規範與行為守則懲處系統在內的問題與爭議解決程序解決。

Topic/task 主題／工作任務	Best practice procedure 最佳實務程序
Use of technology – USB, memory sticks 科技產品的使用 – USB、記憶卡	<ul style="list-style-type: none"> No external memory devices are to be connected to the competition computer unless under the supervision of the Chief Expert and Deputy Chief Expert. 除非在裁判長和副裁判長的監督下，否則不得使用任何外部記憶體裝置連接選手的電腦。 Competitors are not allowed to load any digital data to their competition computers. If needed, it must be approved first by the Chief Expert. The Chief Expert will nominate an Expert or group of Experts to execute the necessary installations. 選手不得將任何數位資料載入他們的競賽電腦中，如有需求，必須先取得裁判長的同意，裁判長將指定一位裁判或一組裁判執行必要的安裝。 Skill Competition Manager, Chief Expert, Deputy Chief Expert, Experts, Competitors, and Interpreters are not allowed to bring and use personal memory sticks into the workshop. 技能競賽經理、裁判長、副裁判長、裁判、選手和翻譯均不得將個人記憶卡帶入工作場地並使用。
Use of technology – personal laptops, tablets, and mobile phones 科技產品的使用 – 個人筆電、平板電腦和手機	<ul style="list-style-type: none"> From C-4 to C1 Chief Expert, Deputy Chief Expert, Experts and Interpreters are allowed to use personal laptops, tablets, and mobile phones in the Expert room only. Exceptions are possible with the Skill Competition Manager approval. 從競賽前 4 天到競賽第 1 天，裁判長、副裁判長、裁判和翻譯僅能在裁判休息室中使用個人筆電、平板電腦和手機。可能的例外情況須取得技能競賽經理的同意。 The Skill Competition Manager is allowed to use his laptop, tablet and mobile phone at all times. 技能競賽經理可隨時使用他的筆電、平板電腦和手機。 Competitors are not allowed to bring personal laptops, mobile phones, and tablets into the workshop. If these items are brought into the workshop, then they must be locked in the personal locker and only removed at the end of day. 選手不得將個人筆電、平板電腦或手機帶入工作場地，若攜帶以上物品進入工作場地，則必須鎖在個人置物櫃內，僅在每日競賽結束後才可拿出。 Wireless headphones and smartwatches are not allowed for the Competitors. If these items are brought into the workshop, then they must be locked in the personal locker and only removed at the end of day.

- 選手亦不得攜帶無線耳機和智慧型手錶，若攜帶以上物品進入工作場地，則必須鎖在個人置物櫃內，僅在每日競賽結束後才可拿出。

<p>Use of technology – personal photo and video taking devices</p> <p>科技產品的使用 – 個人相機</p>	<ul style="list-style-type: none"> • The use of personal photo and video taking devices is forbidden in the workshop until the last break on each competition day. • 在每日競賽結束前，嚴禁於工作場地內使用個人拍照和攝影設備。
<p>Communication and contact between compatriot Expert and Competitor</p> <p>同國裁判和選手之間的溝通和聯絡</p>	<ul style="list-style-type: none"> • No communication during breaks or lunch time between Expert, Interpreter and Competitor from C1 to C4. • 從競賽第1天到第4天，嚴禁同國裁判、翻譯和選手於休息時間或午休時間進行溝通。 • Competitor and compatriot Expert/Interpreter cannot be outside the competition area at same time unless is approved by the Chief Expert. • 選手和同國裁判／翻譯不得同時出現在競賽場外，除非取得裁判長的同意。
<p>Use of technology – personal tools for sketching and prototyping</p> <p>科技產品的使用 – 繪製草圖和原型製作的個人工具</p>	<ul style="list-style-type: none"> • From C1 to C4 Competitors are allowed to check and use tools from their toolbox to do the tasks from Test Project relating to sketching and prototyping. • 從競賽第1天到第4天，選手均可檢查和使用自己工具箱內的工具，以進行與繪製草圖和原型製作相關的試題任務。

10 Visitor and media engagement 觀眾與媒體參與

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

下列為能擴大觀眾與媒體參與的可行性方法清單：

- Offer to try oneself in the profession: a site where visitors and representatives of the press can try themselves in computer modelling
- 提供參與此專業的機會：觀眾和媒體代表可以自行嘗試電腦建模的場地
- The displays showing the process of work and the information about the competitors which advertise the career prospects
- 螢幕上顯示競賽流程並提供和選手相關的資訊，以利於宣傳職業前景
- Test project text description: public display of test projects
- 試題的文字說明：公開展示試題
- Demonstration of completed modules: The result of each modules can be published after the assessment is finished.
- 完成模型的展示：評分結束後，可公布每個模型的成果。

11 Sustainability 永續性

This skill competition will focus on the sustainable practices below:

該職類將關注下列的永續實踐：

- recycling;
- 回收；
- use of environmentally friendly materials;
- 使用環保材料；
- use of completed projects in practice;
- 實際利用完成的專案；
- minimization of printing;
- 將列印次數降至最低；
- use of pdf-files and electronic documents in the maximum number of cases;
- 在最大量的情況下，使用 PDF 檔和電子檔文件；
- reduce the number of programs that need to be installed on computers of competitors.
- 減少需要安裝選手電腦的程式數量。

12 References for industry consultation

業界諮詢參考資料

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.

WorldSkills 致力於確保 WorldSkills 國際職業標準能全面反映國際公認產業和企業最佳實務的活力，為此，WorldSkills 接洽了來自全球的許多組織，請他們每兩年針對相關角色說明草案和 WorldSkills 國際職業標準提供意見回饋。

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

與此同時，WSI 也查閱了三個國際職業分類和數據庫：

- ISCO-08 國際職業標準分類：[\(http://www.ilo.org/public/english/bureau/stat/isco/isco08/\)](http://www.ilo.org/public/english/bureau/stat/isco/isco08/)
- ESCO 歐洲技能、資格和職業框架： [\(https://ec.europa.eu/esco/portal/home \)](https://ec.europa.eu/esco/portal/home)
- O*NET OnLine 美國職業資訊網站(www.onetonline.org/)

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2021.

下列表格指出已接洽組織，他們為 WorldSkills Shanghai 2021 的相關角色說明和 WorldSkills 國際職業標準提供了適當且寶貴的意見。

There were no responses to the requests for feedback this cycle

在此週期期間，尚未獲得針對我們回饋需求的回應。