

Technical Description

技术描述

Composite Technology

复合技术



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. 世界技能国际，按照宪法和比赛委员会的决议，世界技能比赛中此赛项的现行指令和比赛规则执行下面最低要求。

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1 INTRODUCTION 介绍

1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION 技能比赛名称和描述

1.1.1 The name of the skill competition is 技能比赛名称

Composite Technology 复合材料技术

1.1.2 Description of the associated work role(s) or occupation(s).相关工作角色或者职位描述

Manufacture of composite products is one of the fastest growing innovative sectors of the economy both in Russia and worldwide. This sector of economy has demonstrated a continuous and steady growth even in the context of global economic recessions.

复合材料产品制造是俄罗斯乃至全球经济增长最快的创新行业之一，这个领域显示了持续稳定的增长，即使是在全球经济衰退的情况下。

This sector of economy develops and implements state-of-the-art technology solutions for all modern industries such as aerospace, automotive, shipbuilding, construction, electronics, energy (hydro, heat, nuclear, wind, etc.) extraction, transportation and processing of oil, gas, coal, non-ferrous metals and other minerals, sports industry, consumer goods, defence etc.

这个领域为现代化工业开发和实施最先进的技术解决方案，例如 航空，汽车，造船，建筑，电子，能源利用（水能，热能，核能，风能等），石油运输和处理，天然气，煤炭，非金属和其他矿物，运动产业，消费品，国防等。

What makes composite production unique is that it requires small investments, small production areas and small teams of responsible, polymathic, competent and qualified experts, and only such experts can solve any tasks, even the most challenging ones. 让复合材料生产独特的是他要求投资额小，生产面积小，以及负责任的，博学的，有能力和资质的少量专家，只有这样的专家能够任完成任何任务，即使是最具挑战的那个。

Raw materials, production methods, technologies and equipment for the manufacture of composite items fit all fields of application, from aerospace through construction to sports. Materials and processing technologies are selected depending on the complexity, production volume, scope of application and the purpose of the product.

复合材料制造所需的原材料，生产方法，技术和设备满足符合各个领域的应用，从航天到建筑再到运动，原材料和工艺的选择取决于产品的复杂性，产量，应用范围和用途。

The correctness of the choice depends on the competence of the expert and is confirmed by the product consumer. Products can be simple or complex, but they must always be technically and economically efficient, i.e. have a reasonable market price and a high profit margin at the same time. Only competent and skilled experts of different levels (engineers, technicians, technologists and highly skilled workers) can ensure this will happen.

选择的准确性取决于专家的能力并且需要得到产品消费者的确认。产品可以简单或者复杂，但是他们必须具有技术和经济效益，例如，具有合理的市场价格同时具有客观的利润，

To make the right choice, an expert must be knowledgeable in material sciences, design and manufacturing of products from composites for various purposes (including economics of

production), and have skills to produce and test such products. The set and scope of the expert's skills and knowledge depends on the person's competence, position (manager, engineer, technician, blue-collar worker etc.), level of payment, and demand in the labour market.为了作出正确的选择, 专家必须在材料科学, 设计和制造各种用途(包括生产经济学)的产品方面具有丰富的知识, 并具有生产和测试这些产品。专家的技能 and 知识范围取决于个人的能力, 职位(经理, 工程师, 技师, 蓝领工人等), 支付能力, 劳动力市场的需求。

The expert should be able to design the product and moulds, perform strength calculations for the product, develop design and production documentation, make the moulds, manufacture the product from the composite materials, perform machining and finish processing of the product, and its final assembly.专家应该能够设计产品和模具, 对产品进行强度计算, 开发设计和生产文件, 制造模具, 用复合材料制造产品, 对产品进行加工和精细化处理, 完成最终装配。

This knowledge and skills will help an expert not only to find a job in various business positions of various levels (small, medium, large businesses) in any sector of the economy where composite products are applied, but also, with proper will and resolution, establish and successfully grow her / his own business.这些知识和技能不仅能帮助专家在复合产品应用的任何领域内找到不同层次(小型, 中型, 大型的)的商业岗位工作, 以适当的意愿和决心, 建立并成功地发展自己的事业。

Since raw materials, production methods, technologies and composite products manufacture equipment are universal for all fields of application worldwide; a highly competent expert can work or conduct business anywhere in the world.既然原材料, 生产方法, 工艺和复合产品的制造设备在世界范围内的所有应用领域都是通用的, 一个非常有能力的专家可以在世界任何一个地方工作或者指导业务。

Depending on the matrix materials, composites fall into polymeric, ceramic, metal and carbon composites. Ceramic, metal and carbon composites have unique properties that are necessary mainly in production of defence or dual-use items; usually they have a very high market price. Civil or special purpose products are made of polymer composites, have a moderate market price, and are used in all advanced industries.从基材来看, 复合材料分为聚合物、陶瓷、金属和碳复合材料, 陶瓷, 金属和碳复合材料具有独特的性能主要用于生产国防或者军民双用途产品, 通常具有很高的市场价格, 用聚合物复合材料制造的民用或者特殊用途产品具有稳定的市场价格, 主要用于高科技产业。

Based on these technical and market trends, the "Composite Technology" competence focuses on conducting contests and assessing the knowledge, abilities and skills of experts in the manufacture of items from polymer composites.基于技术和市场前景, 复合技术主要致力于开展竞赛和评估专家用聚合物复合材料在产品制造中知识, 能力和技能。

The contest in "Composite Technology" competence is special because it is a team contest, a contest of teams of complementary specialists, rather than a contest for individuals. This competence contest simulates an experienced composite production firm where engineers, technologists and high-skilled workers use their competencies in various combinations.

复合材料技术的比赛是特殊的因为它是团队比赛, 由相互补充的专家组成的团队进行的竞赛, 而不是个人的比赛, 这项技能比赛模拟了一家经验丰富的复合材料生产公司, 在公司内, 工程师、技术人员和高技能工人在各种组合中使用他们的能力。

The task of such a production team is to develop and produce a product prototype made of a polymer composite in accordance with the terms of reference. To this end, the team members must conduct structural calculations, select an economically efficient method of manufacture and all the necessary raw materials, draft the required design and production documentation,

manufacture, assemble and test the product — which must be of proper quality and have a reasonable market price.

生产团队的任务是按照职责，用聚合物复合材料开发和生产一个产品雏形，为了这个目的，团队成员必须开展结构计算，选择具有经济效益的制造方法和所需原材料，绘制所需设计和产品文件，制造，组装和测试产品- 其必须具有特有的质量和合理的市场价格。

Teams competing in this competence are comprised of two complementary experts aged 16 to 24.参与这个技能比赛的团队是由两名优势互补的年龄在 16 到 24 岁的专家组成。

They are conventionally called “Head with Hands” (an engineer or a technologist) and “Hands with a Head” (a technologist or a worker). The task of the teams is to do structural calculations and produce, within three days, a product from polymer composite in accordance with the contest assignment.按照惯例他们成为“头和手”（一位工程师或者一位技术人员）和“手和头”（技术人员和一个工人）。团队的任务是按照比赛任务用聚合物复合材料在三天内进行结构计算和生产。

The team is independent in its choice from the contest infrastructure sheet of the desirable product manufacturing technology, raw materials and equipment for manufacturing the moulds and the product, alongside with the rules for its teamwork to achieve the best result.

团队需要独自从比赛硬件清单中按照团队工作达到最佳结果的原则选择理想的产品制造技术，制造模具和产品所有的原材料和设备，

The team is also expected to make reasonable use of the software (CAD, CAE and CAM systems) and modern equipment (robot manipulator, CNC milling machines, vacuum, test and measuring equipment) available on the contest site and demonstrate the ability to minimise manual labour and maximise automation of labour required in the process of manufacture and machining of the tools and products.团队还需要合理使用比赛现场可用的软件（CAD, CAE 和 CAM 系统）和现代化设备（机器人操作手，CNC 铣床，真空吸尘器，测试和测量设备）并且展示在制造和工具及产品加工过程中减少体力劳动和扩大劳动力自动化的能力

1.2 THE RELEVANCE AND SIGNIFICANCE OF THIS DOCUMENT 这份文件的相关性和意义

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. 这份文件包含参与这项技能所需标准的信息以及管理这场比赛的评分原则，方法和程序。

Every Expert and Competitor must know and understand this Technical Description. 每一位专家和选手必须了解和理解这项技术描述

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence. 各种语言的技术描述发生冲突的情况下，英文版本优先。

1.3 ASSOCIATED DOCUMENTS 伴随文件

Since this Technical Description contains only skill-specific information it must be used in association with the following: 因技术描述只包含具体技能信息，他必须和下面的文件一起使用：

- WSI - Competition Rules 比赛规则
- WSI - WorldSkills Standards Specification framework 世界技能标准说明框架

- WSI - WorldSkills Assessment Strategy WSI Online resources as indicated in this document 如本文件所示，世界技能评估战略在线资源
- WorldSkills Health, Safety, and Environment Policy and Regulations 健康，安全和环境政策和规则

2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

2.1 GENERAL NOTES ON THE WSSS 关于世界技能的标准说明的一般注意事项

The WSSS specifies the knowledge, understanding and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSSS). WSSS 为国际上在技术和职业表现方面的最佳实践指明了知识、理解和具体技能，它应该反映出代表工业和商业相关的工作角色或职业的全球共识。

The skill competition is intended to reflect international best practice as described by the WSSS, and to the extent that it is able to. The Standards Specification is therefore a guide to the required training and preparation for the skill competition. 技能比赛目的是按照 WSSS 描述反映国际最佳实践，因此标准规范技能比赛所需培训和准备的一个指导。

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding. 在技能比赛中，知识和理解的评分将会贯穿于整个操作评分，不会在单独进行知识和理解的测试。

The Standards Specification is divided into distinct sections with headings and reference numbers added. 标准规范用标题和参考号码分为不同的部分。

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards Specification. The sum of all the percentage marks is 100. 每一部分都被分配了总分的百分比来显示它在标准规范内的重要性。所有百分数分值之和是 100 分。

The Marking Scheme and Test Project will assess only those skills that are set out in the Standards Specification. They will reflect the Standards Specification as comprehensively as possible within the constraints of the skill competition. 评分方案和比赛内容只会评估标准规范中列明的那些技能，他们在技能比赛的限定内尽可能全面的反映标准规范。

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

评分方案和比赛内容将在标准规范实际可行的范围内遵循分值的分配，允许 5% 的偏离，只要这不违反标准规范分配的权重。

2.2 WORLDSKILLS STANDARDS SPECIFICATION 世界技能标准规范

Section 部分		Relative importance (%) 相关重要性
1	Work organization and management 工作组织和管理	25
	The individual should know and understand: 个人应该知道和理解: <ul style="list-style-type: none"> The procedure of planning and calculating of time costs during design, technological preparation and manufacturing of the final product 	

	<ul style="list-style-type: none"> • 在最终产品设计，工艺准备和制造过程中时间成本的计划和计算过程 • Materials consumption and tools application planning procedure 材料消耗和工具应用计划程序 • Legislation and best practice for health and safety in the working environment 在工作环境中健康和安全的规则和最佳实践 • Range of tools and their proper use in relation to the composites manufacturing 复合材料制造相关的工具和适当使用 • Technical language, terms and symbols used in composite products design 复合材料产品设计中使用的技术语言，术语和符号。 • Basic patterns, classifications and basics of chemical-technological processes 基本模具，分类和化工技术流程的基本要素。 • The chemical-technological process parameters correlation 化工技术流程参数相关性。 • Typical technological processes and manufacturing modes 主要技术流程和制造模式。 • Main disturbance causes of technological regime 技术体制的主要干扰原因。 • Characteristics of raw materials, semi-finished products and their compliance to industry standards 原材料，半成品和他们符合半成本的特点。 • Effective technological process control methods 有效的技术流程控制方法。 • The compilation procedure for main types of technological documentation 技术文件的编译过程。 • EHS protocols for composites industry 复合材料行业的 EHS 协议 	
	<p>The individual should be able to:个人应该能够:</p> <ul style="list-style-type: none"> • Effectively apply all current health and safety regulations in the workplace 有效地将所有现行的健康和安全法规应用于工作场所 • Select and set the most appropriate tools necessary for certain operations 选择并设置某些操作所需的最合适的工具 • Maintain all tools to ensure their best condition 维修所有工具确保处于最佳状态。 • Prepare the necessary quantity of structural and auxiliary materials according to the norms of consumption, allowances, spoilage etc. • 按照消耗，公差和损坏的准则准备所需一定数量的结构和辅助材料。 • Ensure production process parameters compliance of polymer composite products manufacturing according to regulations and technical documentation 确保聚合物复合材料产品的生产工艺参数符合法规和技术文件的要求 • Control the equipment operation; maintain equipment and measuring instruments 控制设备操作，维修设备和测量仪器。 • Calculate technological process technical-economical parameters of polymer composite products manufacturing 计算聚合物复合材料产品制造的工艺流程技术经济参数。 • Analyze technological process disturbance causes which can lead to spoilage during molding 分析成型过程中可能导致失败的工艺流程干扰因素 • Develop technological process schemes of polymer composites products manufacturing 开发聚合物复合材料产品制造工艺流程方案 • Use CAD systems for technological process design 使用 CAD 设计工艺流程 	

	<ul style="list-style-type: none"> • Compile the technological documentation according to organizational/industrial/governmental/international standards 按照组织化/工业化/政府的/国际的标准编制工艺文件 	
2	Mold/product design; calculations; 3d modeling in CAD-systems; drawing and documentation preparations 模具/产品设计, 计算, CAD 系统 3D 造型, 图纸和文件准备	15
	<p>The individual should know and understand:个人应该知道和理解:</p> <ul style="list-style-type: none"> • Applied mathematics, technical terms and symbols 使用数学, 技术术语和符号 • Specialized software (CAD-, CAE-, CAM-systems) 专业软件 (CAD,CAE,CAM 系统) • Design and technological documentation for polymer composite products manufacturing (including one used in CAD-systems) • 聚合物复合材料产品制造的设计和技术文件 (包括在 CAD 系统中使用的) • Methods of drawings, models, specifications development 图纸, 模型, 开发规范的方法 • Mechanical drawing principles 机械图纸原理 • Symbols and features used in both 2d and 3d drawings 2D 和 3D 图纸的符号和特点 • Standards, instructions and technical specifications used for technical documentation compiling 编制技术文件的标准, 导则和技术规范 • Regulations for drawings, specifications, models creating used for polymer composite products manufacturing 用于聚合物复合材料产品制造的图纸, 规范和模具创造的规则。 • Methods and ways of design documentation creating and compiling 设计文件创建和编制的方法和途径 • Major technological process stages of polymer composite products manufacturing 聚合物复合材料产品制造的主要技术流程阶段 • Structural and auxiliary materials characteristics 结构和辅助材料特点 	
	<p>The individual should be able to:个人应该:</p> <ul style="list-style-type: none"> • Use specialized software systems 使用专业软件系统 • Create drawings, specifications, models used for polymer composite products manufacturing 创建聚合物复合材料产品制造所用的图纸, 规范和模型 • Design products according to test project 按照比赛内容设计产品 • Compile the technological card 编制工艺卡片 	
3	Mold design 模型设计	10
	<p>The individual should know and understand:个人应该知道和理解</p> <ul style="list-style-type: none"> • Mold designing methodology of composite products manufacturing 复合材料产品制造模具设计方法 • Control methods of mold manufacturing technological processes 模具制造工艺流程控制方法 • Basic principles of safe operations on automated processing equipment 自动加工设备的安全操作基本原则 • Composite molds and products processing modes 复合材料模型和产品加工模型 • Software for machining programs preparation 加工程序准备软件 	
	<p>The individual should be able to:个人应该:</p>	

	<ul style="list-style-type: none"> • Choose raw materials and final composition of the composite mold 选择复合材料模具的原材料和最终成分 • Choose and customize curing regime and molding process required for product manufacturing 选择和定做产品制造所需的固化剂和模具加工 • Choose the mold material considering molding technologies, product shape, processing regime and technological equipment 按照造型工艺，产品形状，加工方式和工艺设备选择模型材料 • Identify key parameters and shape of the mold considering technological process, shape and function of the required product 按照产品的工艺流程，形状和功能确定模具的关键参数和形状。 • Design an auxiliary mold for possible additional steps of the technological process 为工艺过程中可能的附加步骤设计辅助模具 • Choose tools and processing regimes considering technical requirements and materials to be used 按照技术要求和所用材料选择工具和加工方法。 • Prepare the machining program for CNC milling machine 为 CNC 铣床编制加工程序 • Optimize time spending, materials consumption and tools application considering product requirements, such as accuracy of dimensions, surface quality, mold geometry 按照产品要求，例如尺寸精度，表面质量，模具几何尺寸，优化时间安排，材料消耗和工具应用。 	
4	Manufacturing of the composite product 复合材料产品制造	10
	<p>The individual should know and understand: 个人应该知道和了解</p> <ul style="list-style-type: none"> • Safety principles while working with fibers of different nature, resins, polymers which are used in technological process 在工艺处理过程中使用的不同性质的纤维、树脂、聚合物时的安全原理 • Composite materials molding technologies; preparation, assembly and technological mold application principles 复合材料模具工艺，准备，安装和工艺模具应用原理。 • Design methods of technological operations required for product manufacturing 产品制造所需的工艺操作的设计方法 • Manufacturing process control procedure 制造过程控制流程 • Technical request compilation procedure for structural and auxiliary materials needed for product manufacturing 产品制造所需的结构和辅助材料技术要求编制程序 	
	<p>The individual should be able to: 个人应该可以：</p> <ul style="list-style-type: none"> • Read drawings, understand the composition of fabric layers used in product, technical and technological product requirements 看图纸，了解产品中纤维层的成分，技术和工艺产品的要求 • Prepare the mold for materials layout 准备材料布局的模型 • Cut fabrics and prepregs according to the design documentation (manually or using specialized automatized equipment) 按照设计文件切割纤维和办固化片（手工或者使用专业的自动化设备） • Lay out fabrics or prepreg according to the design documentation and/or molding technique 按照设计文件和/或者成型技术布置纤维或者预浸料 • Lay out auxiliary materials, vacuum materials, peel plies, form vacuum bag (if necessary), install and adjust vacuum equipment 布置辅助材料，真空材料，脱模布（如需），安装和调整真空设备 • Place anchor elements in the product (if necessary) 放置锚点元素（如 	

	需) <ul style="list-style-type: none"> • Carry out structural materials polymer impregnation, carry out excess materials removal 进行结构材料聚合物注入，多余材料移除。 • Setup and maintain curing temperature regimes required 设置和保持所需固化温度 • Separate product from mold, remove vacuum and auxiliary materials without damaging mold of product (if necessary)在不破坏产品模具下从模具中分离产品，消除真空和辅助材料 • Use personal protective equipment required 使用个人所需防护设备 	
5	Assembly and final processing of the composite product 组装和精加工	5
	The individual should know and understand:个人应该知道和了解: <ul style="list-style-type: none"> • Safety principles of working with fibers of different nature, resins, polymers, auxiliary substances and materials used in technological process 在工艺处理过程中使用的不同性质的纤维、树脂、聚合物、辅助物质和材料时的安全原理 • Composite products final processing and assembly technologies 复合材料产品精加工和组装技术 	
	The individual should be able to:个人应该: <ul style="list-style-type: none"> • Read drawings, technical and technological product requirements 看图纸，技术和工艺产品要求 • Carry out final processing of the product according to design documentation requirements using manual or automatized tools/equipment 按照设计文件要求，使用手工或者自动化工具.设备进行产品精加工。 • Mark out the product according to drawing; choose correct tools for final processing 按照图纸，使用合适的工具进行精加工，完成产品。 • Use control programs for product machining on the CNC mill 在 CNC 铣床上使用控制程序进行产品加工 • Assemble the product considering design documentation requirements 按照射界文件要求组装产品 • Use personal protective equipment required 使用个人所需防护设备 	
6	Mold and product testing/quality control 模具和产品测试/质量控制	35
	The individual should know and understand:个人应该知道和了解 <ul style="list-style-type: none"> • Methods and means of surface quality control, dimensional accuracy control, products and molds testing 表面质量控制，尺寸精度控制，产品和模具测试的方法和方式 • Manuals for using special equipment, tools and methods of composite products nondestructive testing 使用专业设备的手册，复合材料产品无损检测和工具和方法 • Methods of strength and performance characteristics evaluation for composite products 复合材料产品的强度和使用性能评估方法 	
	The individual should be able to:个人应该能够: <ul style="list-style-type: none"> • Conduct measurements and quality control procedures for final product using special equipment, tools and methods of nondestructive testing 使用专用设备，工具和无损检测方法对最终产品进行检测和质量控制程序。 	
Total		100

3 THE ASSESSMENT STRATEGY AND SPECIFICATION 评分方案和规范

3.1 GENERAL GUIDANCE 总体指导

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

世界技能评估策略是由世界技能管理的，策略建立了世界技能评估和评分必须遵循的原则和方法。

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). 专家评估行为是世界技能竞赛的核心，为此，他是持续的职业发展和审查的主体，评估专业知识的增长将为今后的使用提供信息和世界技能比赛使用的主要评估 指导的方向：评分方案，比赛内容和比赛信息系统。

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. 世界技能评分分为两类：测量和判分，对于两类评分，使用明确的基准来评估每个方面对于保证质量是至关重要的。

The Marking Scheme must follow the weightings within the Standards Specification. The Test Project is the assessment vehicle for the skill competition, and also follows the Standards Specification. The CIS enables the timely and accurate recording of marks, and has expanding supportive capacity. 评分方案必须遵循标准规范的权重，比赛内容是技能比赛的评分工具，也需要遵循标准规范，CIS 系统能够及时和准确的评分记录，并且支持力度不断扩大。

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

评分方案，概括的讲，将会指导比赛内容设计的过程，此后，评分方案和比赛内容通过迭代过程设计和开发来确保他们一起优化他们和标准规范和评分战略的关系，专家同意后提交给 WSI 一起批准来体现他们的质量和和标准规范的一致性。

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

在提交给 WSI 批准之前，评分方案和测试项目将与 WSI 技能顾问联系，以便从 CIS 的能力中获益。

4 THE MARKING SCHEME 评分方案

4.1 GENERAL GUIDANCE 总则

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. 这部分描述了评分方案的角色和地位，专家是如何通过比赛内容，评分程序和要求来评估选手展示的工作。

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standards that represent the skill. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards Specification. 评分方案是世界技能的关键手段，他将评分和代表技能的标准联系在一起，按照标准规范中的权重为每个操作得分点进行分配分数。

By reflecting the weightings in the Standards Specification, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together. 通过反映标准规范中的权重，评分方案建立了比赛内容设计的参数，按照技能的性质和他的评分需要，最初需要适当更详细的开发评分方案作为比赛内容设计的指导，从这点上来说评分方案和比赛内容需要一起开发。

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards Specification, if there is no practicable alternative. 上面 2.1 部分显示了评分方案和比赛内容偏离标准规范中权重的程度，如果没有切实可行的替代方案。

The Marking Scheme and Test Project may be developed by one person, or several, or by all Experts. The detailed and final Marking Scheme and Test Project must be approved by the whole Expert Jury prior to submission for independent quality assurance. The exception to this process is for those skill competitions which use an external designer for the development of the Marking Scheme and Test Project. 评分方案和比赛内容可以由一个人，几个人或者所有专家开发，详细的和最终的评分方案和比赛内容在提交独立质量保障前必须得到所有专家委员会批准，那些使用外部设计者开发评分方案和比赛内容的技能除外。

In addition, Experts are encouraged to submit their Marking Schemes and Test Projects for comment and provisional approval well in advance of completion, in order to avoid disappointment or setbacks at a late stage. They are also advised to work with the CIS Team at this intermediate stage, in order to take full advantage of the possibilities of the CIS. 另外，为了避免后期失望或者周折，鼓励专家在比赛提前提交他们的评分方案和比赛内容，征求意见和临时批准。在中间阶段，他们也需要和 CIS 团队一起努力以便充分利用 CIS 系统的各种可能性。

In all cases the complete and approved Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition using the CIS standard spreadsheet or other agreed methods. 任何情况下，完整的和已经批准的评分方案必须在比赛前 8 周使用 CIS 标准数据表或者其他认可的方法录入 CIS 系统。

4.2 ASSESSMENT CRITERIA 评分标准

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived in conjunction with the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards Specification; in others they may be totally different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme must reflect the weightings in the Standards Specification. 评分方案的主题是评分标准。这些主题是从比赛内容得到的。在一些技能比赛中评分标准和标准规范中的主题部分相似，在另一些技能中他们可能完全不同，可能正常在评分标准 5 和 9 之间，无论主题是否符合，评分方案必须反映标准规范的权重。

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). 评分标准是由开发评分方案的人员开发，他们可以自定义他们认为最适合比赛内容的评估和打分的标准。每一个评分标准按照字母 (A-I) 分开。

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria. 由 CIS 系统生成的打分摘要表包含评分标准。

The marks allocated to each criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each A within that Assessment Criterion. CIS 系统将会计算分配给每一个标准的分值，这些将会累计计算评分标准内的每一个 A 的分值。

4.3 SUB CRITERIA 子标准

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. 每个评分标准分为一个或者几个子标准，每一个子标准会成为世界技能评分表的标题

Each marking form (Sub Criterion) has a specified day on which it will be marked.

每一个评分表（子标准）有一个具体的评分日期

Each marking form (Sub Criterion) contains Aspects to be assessed and marked by measurement or judgement. Some Sub Criteria have Aspects marked by both measurement and judgement, in which case there is a marking form for each.

每一个评分表（子标准）包含需要通过测量或者判断方法评估或者打分的得分点，一些子标准有一些通过测量和判断的得分点，这种情况下每一个得分点有一个评分表。

4.4 ASPECTS 评分点

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

每一个得分点详细说明了需要评估和打分的点以及分值，或者分值是如何得到的。得分点通过测量或者判断进行评估，并且体现在评分表格上。

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

评分表详细的列明了每一个评分点和给其分配的分值以及对标准规范中规定的技能部分的引用。

The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the skill in the Standards Specification. This will be displayed in the Mark

Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1) 分配给每个得分点的分值总数必须在标准规范中技能部分规定分值的范围内。当评分方案从 C-8 周复审时，这个将按照下面的格式在 CIS 系统中的分值分配表中显示，

	CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE	
	A	B	C	D	E	F	G	H				
STANDARDS SPECIFICATION SECTION	1			2.75	1.00	1.25	0.25	1.00		6.25	6.00	0.25
	2		4.25			2.00		0.50	1.00	7.75	6.00	1.75
	3	11.00	9.75							20.75	22.00	1.25
	4			10.25	1.00					11.25	22.00	0.75
	5					9.50	10.00	1.50		21.00	22.00	1.00
	6					2.00		7.00	14.00	23.00	22.00	1.00
TOTAL MARKS	11.00	14.00	13.00	12.00	14.75	10.25	10.00	15.00	100.00	100.00	6.00	

4.5 ASSESSMENT AND MARKING USING JUDGEMENT 裁判评分和打分

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, judgement must be conducted using: 判分的范围是 0-3。为了应用的严禁和一致性，判分必须使用：

- benchmarks (criteria) for detailed guidance for each Aspect 每个得分点的详细指导基准（标准）
- the 0-3 scale to indicate: 0-3 分是指：
- 0: performance below industry standard 0: 操作没有达到工业标准
- 1: performance meets industry standard 1: 操作复合工业标准
- 2: performance meets and, in specific respects, exceeds industry standard
- 2: 操作满足，在具体得分点上高于工业标准。
- 3: performance wholly exceeds industry standard and is judged as excellent
- 3: 操作全部高于工业标准并且被判定为优秀

Three Experts will judge each Aspect, with a fourth acting as a judge where required to prevent compatriot assessment. 三名专家将对每个得分点进行判分，第四名专家作为裁判防止对本国人评分。

4.6 ASSESSMENT AND MARKING USING MEASUREMENT 使用测量方法进行评估和打分

Three Experts will be used to assess each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. 三名专家对每个得分点进行评估，除非另有规定只打最高分和零分，在用到的地方，打其他分值的标准会在得分点中明确规定。

4.7 THE USE OF MEASUREMENT AND JUDGEMENT 测量和判断的使用

Decisions regarding the selection of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.关于标准和评估方法选择和决定将会在比赛设计事通过评分方案和比赛内容开制定。

4.8 COMPLETION OF SKILL ASSESSMENT SPECIFICATION 技能评估规范的完成

The skill assessment criteria are clear concise Aspect specifications which explain exactly how and why a particular mark is awarded. The following table is an example how the marks can be organized. The final Marking Scheme will be decided by the Experts prior to the Competition.

技能评分标准是清楚简明的得分点说明解释 特定分值是如何和为什么得到的，下面的表格是一个分值安排的例子，最终评分方案将在比赛前由专家决定。

CRITERIA 标准						TOTAL MARKS PER SECTION 每部分总分	WWWS MARKS PER SECTION	VARIANCE 偏差
STANDARDS SPECIFICATION SECTION		A	B	C	D			
	1	25,0				25	25	0
	2	0,5	13,1			13,6	15	1,4
	3	1,5		6,0		7,5	10	2,5
	4	0,5		11,0		11,5	10	1,5
	5	1,5	0,9	2,0		4,4	5	0,6
	6			7,0	31,0	38	35	3
TOTAL MARKS		29	14	26	31	100	100	

4.9 SKILL ASSESSMENT PROCEDURES 技能评分程序

There is to be a majority agreement (minimum = 50% + 1) from Experts on the accepted Competition marking scale.有一个大多数专家可接受的比赛评分协议。

The Experts will decide on the marking criteria and the dimensional tolerances of the Objective Marking Form, Subjective Marking Form and the Mark Summary Form.

专家将会决定客观评分表，主观评分表和评分摘要表的评分标准和尺寸公差，

The Chief Expert will then divide the Experts into teams for the purpose of marking and setting up the marking schedule in accordance with the requirements of subsection 5.3. Every team will mark a similar percentage of marks. Each team will be assigned to a workstation on a rotation basis by the DCE.首席专家会按照 5.3 小节的要求 把专家分为组用来评分和建立评分安排，

The teams will be divided into preference of expertise with each team being led by an English speaking team leader.按照专业特长进行分组，每组由一名讲英语的来领导。

All teams will be on the floor at once providing assistance to the Competitors where required and observing for illegal actions or unsafe actions by Competitors. 所有小组都需要原地待命随时为选手提供所需帮助并且观察选手的违规操作或者危险操作。

There will be four teams of which each team will mark approximately 25% of the project each. Each team will judge all aspects in their control. 有四只小组，每个小组将对项目的将近 25% 进行评分，每个小组将对他们负责的所有得分点进行裁判。

The Experts must sign the written hard copy assessment sheet daily of their compatriot Competitor and use it to verify with the final copy from CIS system in the last day

专家必须在他们本国选手的每日的书面评分表复印件上签字，最后一天用 CIS 系统的最终副本进行验证。

Primary clarification and dispute resolution will be addressed by module ESR and DCE in the first instance, in order to ensure a tiered management structure.

主要澄清和争议调解将会由模块 ESR 和 DCE 在初审中解决，来确保分层管理结构。

The Chief Expert will not judge Competitor's work but will be responsible for clarifying disputes or inconsistencies in the final marking, if called upon by the DCE. 首席专家不会评判选手的比赛，但是会负责最终评分的争议澄清或者矛盾，如果应 DCE 要求。

5 THE TEST PROJECT 比赛内容

5.1 GENERAL NOTES 总则

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary
段落 3 和 4 控制比赛内容的开发，这些说明是补充。

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

不管是单一的模块，还是一系列单一模块或者连在一起的模块，比赛内容能够在 WSSS 每部分内对技能进行评分。

The purpose of the Test Project is to provide full and balanced opportunities for assessment and marking across the Standards Specification, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme and Standards Specification will be a key indicator of quality. 比赛内容的目的是为跨标准规范的评估和评分提供全面和平衡的机会

The Test Project will not cover areas outside the Standards Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2. 比赛内容不会包含标准规范之外的领域，或者在标准规范内影响分数的平衡，第 2 条所指明的情况除外

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work. 比赛内容能够使知识和理解能够通过实际应用得到单独评估。

The Test Project will not assess knowledge of WorldSkills rules and regulations. 比赛内容不会评估世界技能规则和规定的知识。

This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards Specification. Section 2.2 refers.

此技术描述将告知影响比赛内容支持与标准规范相关的全面评估的能力的任何问题。

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

比赛内容模式/结构

The Test Project is a series of standalone modules. 比赛内容是一系列独立的模块

- Module one: Preparation of Design and Process Documentation for the Product; 模块 1: 产品设计和处理文件的准备
- Module two: Manufacture of Moulds for the Product; 模块 2: 产品模具的制造
- Module three: Manufacture of the Product; 模块 3: 产品制造
- Module four: Finishing the Product. 模块 4: 完成产品

5.3 TEST PROJECT DESIGN REQUIREMENTS 比赛内容设计要求

Overall, the Test Project must: 总的来说，比赛内容:

- Be modular; 模块化
- Be in accordance with the current Technical Description; 和目前的技术说明一致

- Be in accordance with the current WorldSkills Refrigeration Standards; 和目前的世界技能标准一致
- Comply with WorldSkills requirements and numbering standards;按照世界技能要求和编号标准
- Be accompanied by a marking scale that will be finalized at the Competition in accordance with subsection 4.7;按照子目录 4.7 ， 评分表需要在比赛时定稿。
- Be supplied digitally and in hard copy; 需要提供电子版和复印件
- Contain a detailed material list; 包括详细的材料表
- Be self-explanatory and include schematic diagrams and tables to minimize the requirement of translation; 用示意图后和表格来减少翻译
- Be accompanied by proof of function/proof of construction/completion in the set time etc. - as appropriate to this skill category. For example, a photograph of a project done according to the Test Project within material, equipment, knowledge, and time constraints; 附上功能证明/施工证明/在规定时间内完工证明等-适用于本技能类别。 例如，一张根据测试项目在材料、设备、知识和时间限制内完成的项目的照片
- The marking criteria must be designed to mark the Test Project objectively; 评分标准的设计必须客观的评价比赛内容
- The Competitor must independently carryout the required modules of the Test Project using the material and equipment provided by the Competition Organizer. 比赛选手必须独立的使用比赛组委会提供的材料和设备 操作比赛内容所需模块

5.4 TEST PROJECT DEVELOPMENT 比赛内容开发

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. 比赛内容必须使用世界技能国际提供的模板 (www.worldskills.org/expertcentre)。 文字文件使用 word 模板， 图纸使用 DWG 模板。

5.4.1 Who develops the Test Project or modules 谁来开发比赛内容或者模块

The Test Project/modules are developed by nominated Experts. 比赛内容/模块由任命的专家开发

The Experts will be nominated at the end of the previous Competition. All Experts can put forward an idea and then the nominated Experts will choose and develop modules. 专家将在上届比赛结束时任命，所有的专家都能提出想法然后被任命的专家讲选择和开发模块。

5.4.2 How and where is the Test Project or modules developed The Test Project/modules are developed independently. 比赛内容或者模块是如何以及在哪里开发， 比赛模块/模块是独立开发的。

The Test Project/modules are developed jointly on the Discussion Forum. 比赛内容/模块也会在讨论区进行讨论。

The nominated Experts will initially be allowed to start developing the modules on their own. 起初被任命的专家允许独自开发模块

However, test project under development, will be posted on the Discussion Forum for all Members to review and post their feedback. 然而， 模块在开发过程中会被发布到讨论区以便所有成员复核和提供自己的反馈。

5.4.3 When is the Test Project developed 比赛内容开发时间

The Test Project is developed according to the following timeline: 比赛内容按照下面时间表开发

TIME 时间	ACTIVITY 活动
At the previous Competition 在上届比赛	Experts are nominated to develop the Test Project for the next Competition 任命专家来开发下届比赛的比赛内容
Nine (9) months prior to the Competition 在比赛前 9 个月	Experts developing the Test Project are required to post their Test Project on the Discussion Forum for all Experts to review 要求专家把正在开发的比赛内容发布到讨论区让所有专家复审
Six (6) months prior to the Competition 比赛前 6 个月	The Test Project is developed 比赛内容开发完毕
Four (4) months prior to the Competition 比赛前 4 个月	Experts vote to select the Test Project 专家对比赛内容进行投票表决
Three (3) months prior to the Competition 比赛前 3 个月	Test Project is circulated on the WSI website 比赛内容通过 WSI 网站公布
At the Competition 比赛时	All Experts ensure the validity of the Test Project. Evaluation questions pertaining to any of the modules are changed to constitute the 30% change 所有专家确保比赛内容的正确性, 评估任何模块有关的问题, 构成 30% 的变化的一部分。

5.5 TEST PROJECT VALIDATION 比赛内容有效期

At the Competition all Experts ensure that: 在比赛时专家确保:

- Test Project are accurate and complete; 比赛内容是准确和完整的
- There are no requirements that cannot be completed; 没有不能完成的要求
- The tasks can be completed in the prescribed time of 22 hours; 任务能够在给定的 22 小时内完成
- Proper function is achievable; 特有的工厂是可以实现的
- The material/equipment list is accurate. 材料和 设备清单是准确的

5.6 TEST PROJECT SELECTION 比赛内容选择

Development of the Test Projects will be done by elected Experts. All Experts will have the right to vote on the selected Test Project. 比赛内容的开发由选拔出来的专家完成, 所有的专家都有权对所选比赛内容进行投票

5.7 TEST PROJECT CIRCULATION 比赛内容公布

The Test Project is circulated via the website as follows: 比赛内容通过下面的网站公布:

The Test Project is circulated via WorldSkills International website three months before the current Competition. 比赛内容将在比赛前 3 个月通过世界技能国际官网公布。

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION) 比赛内容协调（准备比赛）

Coordination of the Test Project will be undertaken by Chief Expert in coordination with the Test Project development team.首席专家和比赛内容开发团队负责比赛内容的协调

5.9 TEST PROJECT CHANGE AT THE COMPETITION 比赛中比赛内容的改变

A minimum of 30% change will be decided by all the Experts at the Competition taking into consideration the materials available.比赛中所有专家做出的至少 30%变化的决定需要考虑材料是否足够

5.10 MATERIAL OR MANUFACTURER SPECIFICATIONS 制造规范的材料

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.比赛组委会将给选手提供完成比赛内容所需的特定材料和/或者制造规范，这个信息可以从 www.worldskills.org /位于专家中心的硬件获得。

6 SKILL MANAGEMENT AND COMMUNICATION 技能管理和沟通

6.1 DISCUSSION FORUM 讨论区

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the skill specific Discussion Forum

在比赛前，所有的讨论，沟通，合作以及关于比赛所做决定必须在技能特定讨论区进行。

(<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. 技能相关决定和沟通只有在讨论区进行才能生效，首席专家（或者首席专家提名的专家）是论坛的版主，交流和比赛开发要求的时间表参照比赛规则。

6.2 COMPETITOR INFORMATION 选手信息

All information for registered Competitors is available from the Competitor Centre (www.worldskills.org/competitorcentre). 已注册的选手所有信息都可以从比赛中心获得

This information includes: 信息包括:

- Competition Rules 比赛规则
- Technical Descriptions 技术规范
- Marking Schemes 评分方案
- Test Projects 比赛内容
- Infrastructure List 硬件清单
- WorldSkills Health, Safety, and Environment Policy and Regulations 健康，安全和环境政策和规则
- Other Competition-related information 其他比赛相关信息

6.3 TEST PROJECTS [AND MARKING SCHEMES] 比赛内容和评分方案

Circulated Test Projects will be available from www.worldskills.org/testprojects and the Competitor Centre (www.worldskills.org/competitorcentre). 已公布的比赛内容可以从 www.worldskills.org/ 比赛内容和选手中心获得(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 Chief Expert. The Skill Management Team comprises the Jury President, Chief Expert and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalized at the Competition by agreement of the Experts. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

在首席专家领导的技能管理团队创建的技能管理计划中已经明确规定了比赛期间技能的日常管理。技能管理团队有评审委员会主席，首席专家和副首席专家组成，技能管理计划是在比赛前 6 个月不断开发的，在比赛中经过专家同意最终定稿的，技能管理计划可以在专家中心浏览 (www.worldskills.org/expertcentre)

7 SKILL-SPECIFIC SAFETY REQUIREMENTS 特定技能安全要求

Refer to WorldSkills Health, Safety, and Environment Policy and Regulations for Host country or region regulations. 参照世界技能主办国家或者地区关于世界技能健康，安全和环境政策和规则

- All Competitors must use safety glasses when using any hand, power, or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes;
- 所有选手当用手，电动，或者机械工具或设备有可能产生伤到眼睛的碎片或者细条时，必须佩带安全眼镜
- Experts will use the appropriate personal safety equipment when inspecting, checking, or working with a Competitor's project. 当专家检测，检查，或者和选手比赛在一起时需要使用合适的个人安全设备。

8 MATERIALS AND EQUIPMENT 材料和设备

8.1 INFRASTRUCTURE LIST 硬件清单

The Infrastructure List details all equipment, materials and facilities provided by the Competition Organizer. 硬件清单包含比赛组委会提供的所有设备，材料和设施。

The Infrastructure List is available at www.worldskills.org/infrastructure. 硬件清单可以在 www.worldskills.org/infrastructure 网站获得

The Infrastructure List specifies the items and quantities requested by the Experts for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Items supplied by the Competition Organizer are shown in a separate column. 硬件清单注明了专家下届比赛所需的所有物品和数量。比赛组委会将会持续更新硬件清单注明实际数量，型号，品牌和物品的类型。比赛组委会提供的物品将会在单独一栏显示。

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts must advise the Director of Skills Competitions of any increases in space and/or equipment. 在每场比赛中，专家必须为下届比赛复审和更新硬件清单。专家必须告知技能比赛总监场地或者设备的任何增加。

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition. 在每场比赛，技术观察员审核本场比赛使用的硬件清单

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.

硬件清单不含括选手或者专家需要携带的物品以及选手不允许携带的，他们在下面注明

8.2 COMPETITOR'S TOOLBOX 选手工具箱

No toolbox is provided. All materials and tools are provided by the organizers of the competition, partners and sponsors. 不提供工具箱，所有材料和工具都是由比赛组委会，合作伙伴和赞助商。

8.3 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX 材料，设备和选手工具箱提供的工具。

No toolbox is provided. All materials and tools are provided by the organizers of the competition, partners and sponsors. 不提供工具箱，所有材料和工具都是由比赛组委会，合作伙伴和赞助商。

8.4 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS 材料，设备和专家提供的工具

Experts are not allowed to provide any personal materials, equipment or tools to competitors.

专家不允许为选手提供任何个人材料，设备或者工具。

8.5 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA 比赛区域禁止的材料和设备

Competitions have the right to use only materials, equipment and tools are provided by the organizers of the competition, partners and sponsors. The use of any other materials, equipment or tools is prohibited.

选手只能使用比赛委员会，合作商和赞助商提供的材料，设备和工具，禁止使用其他材料，设备或者工具。

8.6 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS 建议的工位和 workstation 布局图

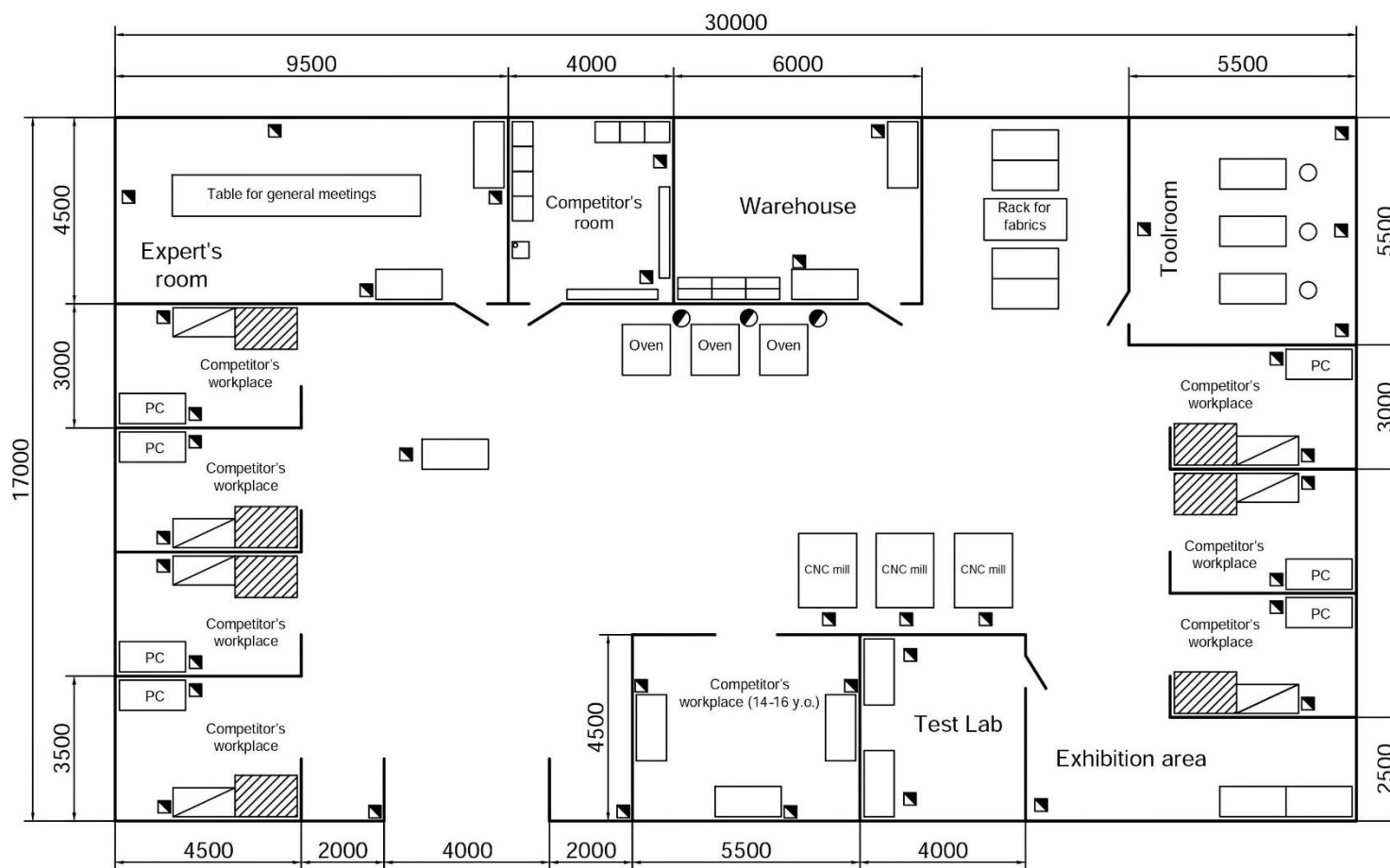
Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

Example workshop layout: 上届比赛的工位布局可以从网站 www.worldskills.org/sitelayout 获得


示范工位布局：

The general layout of the workshop venue will be as below, ensuring that there is sufficient space for the booth and for the Competitors working area as defined in below, which should not be less than 500 m² for 12 Competitors. For visitors it is desirable to have as many open barriers as possible to have a view of the Competitors work.

工位场地的总体布局如下，确保有足够的展示空间以及下面规定的选手操作区域，12 名选手不少于 500 平米，对于参观者来说，他们希望有尽可能多的开放的障碍来观看选手的操作。



Specification:

-  Desk 1600x730x760 mm (WxDxH)
-  Desk 1500x700x adjustable 800-950 mm (WxDxH)
-  Workbench 1500x1000x900 mm (WxDxH)
-  Locker
-  Universal shelving
-  Wooden bench
-  Sink
-  Power socket 220 V
-  Power socket 380 V
-  Exhaust system

9 SKILL-SPECIFIC RULES 专业技能规则

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

专业技能规则不能与比赛规则矛盾或者优于比赛规则，在不同的技能竞争中，他们提供了具体的细节和澄清。包括但不限于个人 IT 设备，数据存储设备，网络接口，程序和操作流程，文件管理和分配。

10 VISITOR AND MEDIA ENGAGEMENT 观众和媒体参与

A distinctive feature of the manufacture of products made from composite materials is that the material and the product are created simultaneously in a single technological process. This is a time-consuming process, consisting of several stages, using modern software and hardware (CAD, CAE, CAM systems, robotic manipulators, CNC machines, vacuum equipment), which makes the work of our competitors very interesting for observation by visitors.

用复合材料制造产品的一个显著特点就是材料和产品用一个工艺流程同时建立，这是一个消耗时间的工艺，包含几个阶段，使用现代化软件和硬件（CAD,CAE,CAM 系统，机器人操作手，CNC，真空设备）这些让观众参观选手的作品变的很有意思。

When choosing a product for a competition's task, modern world trends are taken into account. Competitive products that successfully passed all the tests can be presented by professionals and tested by visitors.当选择一个产品用于比赛任务时，需要考虑现代化的世界趋势，能够成功通过所有测试的有竞争力的产品能够让专业人员演示和观众体验。

11 SUSTAINABILITY 可持续性发展

This skill competition will focus on the sustainable practices below: 这项技能注重下面可持续性实践

- Cost (development of innovative products at a reasonable market price, which are in demand in all modern sectors of the economy) 成本（创新产品开发处于一个合理的价格并且满足所有现代化经济领域）
- Repeated recycling 循环利用
- Use of green materials (which is essential while working with bio-composites and wood-polymer composites) 绿色材料的使用（使用生物复合材料和木塑复合材料有必要的）
- After the competition is over, use of finished test project for organizing serial production and for introducing products to international markets. 比赛结束后，用最终比赛作品组织批量生产并推向国际市场。

12 REFERENCES FOR INDUSTRY CONSULTATION 行业咨询参考

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

世界技能致力于确保世界技能标准规范全方面反映在工业和商业领域国际公认的最佳案例的活力，为此，世界技能联系了世界范围内一系列能够提供 2 年一届相关角色和世界技能标准规范草案描述的组织。