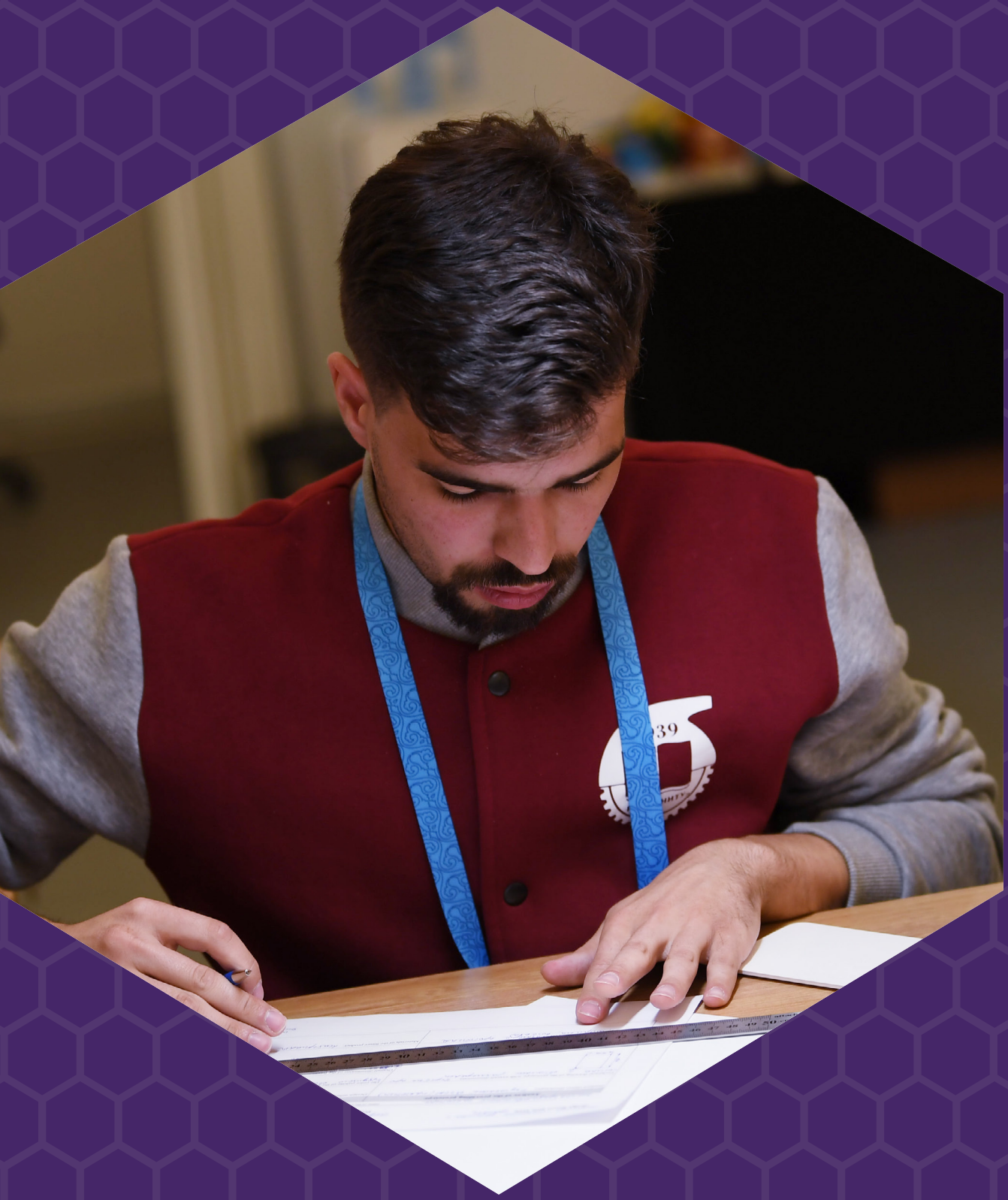
MANUFACTURING AND ENGINEERING TECHNOLOGY

Industrial Design Technology



WorldSkills Occupational Standards

 WSC2021_WSOS59_Industrial_Design_Technology

WorldSkills Occupational Standards (WSOS)

General notes on the WSOS

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).

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.

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

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

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards. This is often referred to as the "weighting". The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

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

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

WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	5

The individual needs to know and understand:

- The role and responsibilities of the industrial design technician, and how it differs from craft-based design, creativity, and production
- Principles and practices for safe working practice across different work settings
- Principles and methods for
- organizing own time efficiently and effectively
- setting and reaching goals for self and own areas of responsibility
- scheduling and organizing work assignments
- establishing priorities and rescheduling
- Good practice in generating and maintaining records
- Ethical principles for safeguarding and maintaining clients' and organizations' security and proper business advantage
- The norms and expectations for best practice in one's role.

The individual shall be able to:

- Apply safe working methods personally and for others
- Select and keep to efficient and effective work methods and habits
- Estimate time requirements for each phase of the design process, and create timelines
- Select and use appropriate planning and management tools
- Maintain orderly and secure work areas
- Maintain work records as required and helpful
- Minimize distractions that impact on own effectiveness and efficiency
- Respond positively to formal and informal opportunities to learn and update knowledge and expertise.

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

The individual needs to know and understand:

- Their organization's
  - brand
  - position in the market
  - range and nature of products and services
  - business strategies and plans
- The sources of design commissions and requirements
- Principles and methods for researching
  - Customer satisfaction
  - Market opportunities
- Principles, methods and ethics for obtaining information by
  - Observation
  - Feedback
  - Surveys
  - Analysis
  - Secondary (indirect) sources
- Principles and techniques for drawing conclusions from data and inputs:
  - Inductive reasoning (combining information in order to generalize)
  - Deductive reasoning (applying general rules to situations).

The individual shall be able to

- Receive and mentally process information and requests
- Participate in new market research and product planning
- Review the relationship of potential new products to the organization's product range and plans
- Review and select alternative methods for obtaining market intelligence
- Investigate the potential need and benefit of new products and product lines using suitable research methods
- Draw conclusions from the market research
- Maintain records of the market research and thinking process.

Section		Relative importance (%)
3	**The design process**	15

The individual needs to know and understand:

- Design as a process for creating and developing concepts and specifications, through strategic problem-solving
- Principles of design
- Design processes and steps for mass consumption products and services
- Constraints and opportunities as they relate to the client and organization
- Principles for visual and physical realisation
- The available techniques, methods, tools, and aids to support design and development
- The impacts of innovation on design and the design process for mass consumption.

The individual shall be able to:

- Conduct research into trends in design
- Conceive or receive a design idea
- Through market research and consultation, create, realize, and evaluate design concepts for manufacturing
- Evaluate the feasibility of design ideas, relative to
  - Appearance
  - Safety
  - Function,
  - Serviceability
  - Budget
  - Production methods and costs
  - Market characteristics
- Modify and refine design ideas, based on the above factors
- Complete the design process within the parameters of the business or commission.

Section		Relative importance (%)
4	**Drawing, illustration, and graphics**	**20**

The individual needs to know and understand:

- The essential characteristics of visualization for industrial design, including colour, visual materials' properties, composition, and typography
- Principles, purposes, and techniques for sketching within the industrial design process
- The range of equipment and tools used to support sketching
- The creative process for industrial design
- The range of graphics equipment and tools that support the representation of the design idea
- Principles and methods for generating desired impressions and impact on viewers
- The range and sequence of information required for design documentation for mass consumption
- The relationship of design documentation to the whole development process
- The available choices for IT hardware and software
- International design documentation systems.

The individual shall be able to:

- Explore ways of articulating design ideas visually
- Prepare sketches, iteratively, exploring options and results
- implement decisions regarding colour, visual materials' properties, and composition
- Create
  - detailed drawings
  - illustrations
  - artwork or blueprints
- use drafting instruments and tools
- use CAD software
- draft, lay out, and specify technical devices, plants and equipment
- update sketches, drawings, and documentation as development proceeds
- maintain document control throughout the design process.

Section		Relative importance (%)
5	**Materials science and engineering**	**15**

The individual needs to know and understand:

- The practical application of engineering science and technology
- The principles, techniques, procedures and equipment relevant to design and production
- Machines and tools, including their design, uses, repair, and maintenance
- Raw materials
- Production processes, quality control, and costs
- Circuit boards, processors, chips, electronic equipment, hardware and software
- Applied mathematics
- Physical principles, properties, laws, interrelationships, and applications for
  - Fluids
  - Materials,
  - Atmospheric dynamics
  - Mechanics
  - Electrics
- Atomic and sub-atomic structures and processes
- Properties of materials
- Trends in materials and their applications
- Methods for identifying, testing, and selecting materials
- Developments in the digitalizing of industrial processes.

The individual shall be able to:

- Consult with engineers and/or other knowledge sources to plan tests and prototypes
- Select and specify machines and tools for prototyping
- Identify and apply relevant procedures and regulations to the testing and prototyping process
- Determine the purposes, range and scope of tests and prototypes
- Put in place measures to ensure the validity of information and data collected
- Conduct tests and prototyping
- Collect planned information and data for analysis
- Review the implications of the analysis for
  - The manufacturing process, and outcomes, and
  - the selection and use of materials.

Section		Relative importance (%)
6	**The development process**	**20**

The individual needs to know and understand:

- The technical standards governing the design idea and purpose
- Ergonomics for the purpose of fitting users' needs and characteristics
- Manufacturing processes and available options for given items
- The impacts of manufacturing and assembly on the function and appearance of given items
- The impact of materials and manufacture on the mass and weight of given items
- Principles, methods and techniques for collecting test data
- The options for use of testing and analytical products, methods, techniques and tools.

The individual shall be able to:

- Research production specifications, costs, production materials, and manufacturing methods
- Provide cost estimates and itemized production requirements
- Build models, patterns, or templates
- Fabricate models or samples in a range of materials, using hand and power tools
- Monitor processes, materials, and surroundings to detect or assess problems
- Collect and process information by compiling, categorizing, calculating, and verifying information and data
- Select and use suitable and robust testing equipment, tools, methods, and techniques
- Analyse and evaluate information to determine compliance with standards
- Estimate or quantify sizes, numbers, or amounts, of items relevant to production
- Determine time, costs, resources, or materials needed for production
- Present designs and reports to clients or managers for approval
- Raise and discuss the needs for and benefits of modification
- Techniques for optimizing manufacture and distribution
- Review, adapt, and provide documentation, detailed instructions/specifications, or drawings, for fabrication, construction, assembly, modification, maintenance and use.

Section		Relative importance (%)
7	**Implementation**	**10**
	The individual needs to know and understand: • Principles and methods for showing, promoting, and selling products or services • The organization's • Marketing strategy and tactics • Product demonstration • Sales techniques • Sales control systems.	

	The individual shall be able to:
	• Develop industrial standards and regulatory guidelines
	• Check the relationship of the product to the organization's business strategy and plan
	• Develop promotional strategies or plans for the product
	• Develop artistic or design concepts for decoration, exhibition, or commercial purposes
	• Design graphic material for use as ornamentation, illustration, advertising, and packaging
	• Present evaluation reports, including
	  • Handling and safety
	  • Market appeal
	  • Production efficiency
	  • Distribution.
	  • Use
	  • Maintenance.	

	Total	**100**

References for industry consultation

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

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

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

There were no responses to the requests for feedback this cycle