WORLDSKILLS STANDARD SPECIFICATION

Skill 43

Plastic Die Engineering

THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

GENERAL NOTES ON THE WSSS

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

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

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding.

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

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards Specification. The sum of all the percentage marks is 100.

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

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

WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	**Work organization and management**	**5**
	The individual needs to know and understand: • Legislation and best practice for health and safety in the working environment • Range of tools and their proper use in relation to Plastic Die Engineering • Technical language and symbols used in plastic engineering design • The importance of effective communications and inter-personal working relationships • Customer focused attitude • Good understanding of advance mathematics	

	The individual shall be able to: • Effectively apply all current health and safety regulations in the work place • Proactively promote best practice in health and safety in the working environment • Select and set the most appropriate tools for the planned work • Maintain all tools to ensure that they are in the best condition • Communicate and collaborate effectively with colleagues, team members and other professionals • Engage with customers effectively, always prioritizing their needs • Explain complex technical details to non-specialists • Proactively engage in continuous professional development to promote excellence in the work and maintain expertise in current industrial practice • Analyse the manufacturing feasibility • Successfully apply mathematical principles to complex industrial scenarios • Demonstrate high degrees of critical thinking	
2	**Product Designs and Drawings**	**10**
	The individual needs to know and understand: • Symbols and features of both 2D and 3D drawings • The potential for problems with drawings and their implications • The importance of correct locations for a gate and ejector pins • Methods of calculating shrinkage of plastic materials	

	The individual shall be able to:
	• From the drawings, identify and correct potential problems that might occur during the manufacturing and injection moulding process, for example:
	  • Plastic material incompletely injected
	  • Weld line, Crack, sink mark and whitening
	• See the availability of correct location for a gate
	• See the availability for correct location for ejector pins
	• Select position of a gate and ejector pin
	• Decide parting lines
	• Calculate shrinkage of plastic materials	

3	**Plastic Material**	**5**

	The individual needs to know and understand:
	• Working materials and their characteristics
	• Properties of plastic materials, for example:
	  • Flow ability
	  • Heat deflection temperature
	  • Moulding temperature
	  • Stability
	  • Percentage of shrinkage	

	The individual shall be able to: • Specify the size and position of the gate • Specify the dimensions of core and cavity as per the shrinkage of material • Set up moulding temperature • Handle all materials safely • Select appropriate materials for a given job	
4	**Mould Design**	**20**
	The individual needs to know and understand: • Principles and practice of 2D and 3D mould design • How to apply CAD/CAM systems for a range of solutions • Current ISO drawing standards • Specifications and fixtures of measuring equipment • Methods to split parting lines • Styles and types of layout • Set up for ejector pins • Set up for coolant line • Principles of low cost design • Coating requirements for mould and component • Material selection for various mould elements • Heat treatment requirements • Design principles that ensure mass production capability and product life expectancy	
	The individual shall be able to: • Read and interpret drawings in both first and third angle projections • Interpret various geometrical tolerance/dimensioning and dimensional tolerances • Create technical engineering drawings that conform to international standards and clearly convey the details to the end user • Write reports to describe the concept of designing dies • Design moulds using 2D and 3D methods • Calculate shrinkage • Split parting lines, core and cavity • Design a position and size of a gate • Design a position and size of an ejector pin • Design a coolant line, position and size coolant line • Apply principles that ensure mass production capability and maximize product life expectancy	
5	**Machining**	**28**
	The individual needs to know and understand: • Functions and features of Computer Aided Manufacturing (CAM) • Settings for cutting conditions according to the mould material • Settings for working procedures • Settings for a piece of work and the way to measure it • The importance of inspecting machines and tools	

	The individual shall be able to:
	• Apply the principles and processes of Computer Aided Manufacturing (CAM)
	• Set up and use a Machine Centre
	• How to position and adjustments for an ejector pin
	• Consider, plan and account for the proper size and layout of the injection points and ejector pins
	• Input data into the CNC machine conveyor (tool offset)
	• Machine each part of the die in consideration of the requirement of the plastic product Measure a piece of work accurately
	• Fabricate parts to a commercial standards using;
	  • Machine centre
	  • Pin cut off grinder
	  • Drilling machine
	  • Bench grinder
	• Trouble shoot dies, find innovative solutions to complex problems	

6	**Assembly**	**5**
	The individual needs to know and understand: • Purpose and method of polishing a component • Way to match the face between the Core and Cavity • Process to assemble a mould	
	The individual shall be able to: • Polish a component using a polishing tool • Drill a component • Apply the principles of pin cutting • Apply principles of surface contact • Assemble components in preparation for testing	
7	**Try Out of Mould**	**17**

	The individual needs to know and understand:
	• Setting up of mould on injection moulding machine for try out
	• Settings and conditions for defects free products such as:
	  • Pressure
	  • Time
	  • Speed
	  • Temperature
	  • Distance	

	The individual shall be able to:
	• Change:
	  • Injection pressure
	  • Back pressure
	  • Holding pressure
	  • Clamping pressure
	  • Injection time
	  • Injection speed
	  • Ejection speed
	  • Melt temperature
	  • Stroke (metering, opening, ejection, etc.)
	• Inject ten products in a row	

8	**Plastic Products**	**10**
	The individual needs to know and understand: • Types of defect and how to identify these defects in plastic products • Most likely defects and their causes • Solutions for remedying defects in plastic products	

	The individual shall be able to:
	• Locate and identify defects in plastic products, for example:
	  • Weld line
	  • Crack
	  • Whitening
	  • Flow mark
	  • Burn mark
	  • Sinking mark
	  • Plastic material incompletely injected
	• Propose solutions for identified defects
	• Implement proposed solutions
	Accurately measure the dimensions of a product
	• Check the condition on both the interior and exterior of a product
	• Modify and develop the plastic product	