

WORLDSKILLS STANDARD SPECIFICATION

Skill 46

Sheet Metal Technology





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	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The current health and safety regulations and recommendations for the modern sheet metal industry • The range of PPE required for work within the industry • The procedures for disposing of off cuts, swarf, used cleaning products and cleaning materials • Interpret simple and complex drawings • First angle, third angle and isometric projection • The conversion of common imperial and metric measurements between units • The use of simple mathematical formulae to calculate additional measurements, check for accuracy and estimate amounts of material required • The relevance of verifying measurements • The most suitable methods of arranging shapes to make the most economic use of materials • The common characteristics such as malleability, ductility and tenacity of a range of sheet metal to include: <ul style="list-style-type: none"> • Low carbon steels • Aluminium and aluminium alloys • Tin/brass/copper • Galvanized and anodized sheet • Stainless steel 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Operate a safe working environment with regard to themselves, work colleagues and any outside personnel • Choose, maintain and wear suitable PPE as required for the operation being undertaken • Handle sheet and section materials safely and with regard to the local environment • Prepare materials to be marked out, cut, shaped and assembled • De-burr/make safe sheet materials and sections • Accurately transfer measurements and profiles to sheet metal and sections • Accurately use manual and digital measuring equipment • Arrange shapes and forms to make the most economic use of available material and reduce scrap material • Cut, shape and manipulate sheet metal materials to account for elasticity, malleability and ductility • Use mathematical formulae to calculate allowances, finished sizes and material quantities • Work within predetermined time scales to complete all work • Manipulate simple mathematical measurements and sizes 	



2	Pattern Development	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• How to interpret drawings in First and Third angle Orthographic projection• The methods and principles of manual pattern development for parallel line, radial line and triangulated developments• The principles and methods for developing patterns using AutoCAD 2D for parallel line, radial line and triangulation• How to verify patterns and the methods to transfer to sheet metal	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Accurately transfer drawing information and dimensions to sheet metal and section• Develop patterns manually by triangulation, parallel line and radial line development• Use AutoCAD 2D to develop simple and complex patterns• Transfer generated patterns to sheet metal	
3	Cutting and Forming	30
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none">• Calculation of bend allowances and setback allowances• The selection, care and maintenance of a range of hand tools used for cutting and shaping materials• The selection, care and adjustments of the range of manually operated forming machines• The selection and programming principles when using CNC machines for shaping sheet materials• Primary folding, rolling, flanging and forming operations• The operation and adjustment of mechanical sawing machines• The selection, care and maintenance of the range of cutting tools used to cut out patterns accurately• The selection of manual cutting techniques available for pattern cutting• The operation and adjustment of machines used for cutting and forming sheet metal• The adjustment and operation of mechanical sawing equipment	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Use drawings and calculations to include bend allowance/setback to produce accurate forms and folds, including the use of templates • Use the full range of hand tools to cut, shape, and form, sheet metal • Adjust and operate manual forming equipment • Programme CNC machinery to perform forming operations • Perform primary forming operations • Adjust and operate power operated bench tools for forming and shaping materials • Adjust and operate mechanical sawing equipment • Use the range of manual cutting tools to produce accurate patterns. This range should include: <ul style="list-style-type: none"> • Snips • Shears • Nibblers • Deburring tools and drills • Use power tools to produce accurate patterns. The range should include: <ul style="list-style-type: none"> • Snips • Shears • Nibbling • Punching • Guillotining/shearing • Press Forming • Notching • Grinding and drilling equipment • Utilise CNC cutting equipment to produce accurate patterns. The range should include: <ul style="list-style-type: none"> • Laser • Water jet • Plasma • Punching • Check patterns for accuracy and correct errors before use • Adjust and operate mechanical sawing equipment 	
4	Assembly Processes	25
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The selection and operation of the range of mechanical fasteners used to assemble sheet metal and sectional components • The selection, adjustment, maintenance and of Welding processes used to assemble metal structures • The range of joints used for assembly • The choice and operation of common adhesives used in the sheet metal industry • The range of sheet metal joints available • The methods used to check dimensional accuracy, square and flatness • The international welding standards 	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Select and use the range of mechanical fasteners to include: <ul style="list-style-type: none"> • Screws • Rivets • Bolts • Manufacturers patent fasteners • Prepare surfaces to accept common adhesives • Select and use common construction adhesives • Produce common sheet metal joints for assembly to include: <ul style="list-style-type: none"> • Lock • Seamed • Knocked up • Hemming • Safety edges • Adjust and operate GMAW and GTAW and MMAW welding equipment to produce welded joints to include: <ul style="list-style-type: none"> • Butt • Seam • T fillet • Lap • Corner • Hollow section to flat sheet • Adjust and operate Oxygen/Fuel gas welding equipment for brazing and soldering • Produce welded joints to international standards • Adjust and operate resistance spot welding equipment to join sheet metal • Check work for dimensional accuracy, square, flatness 	
5	Finishing	25
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The range of finishing processes available • The characteristics of each type of finish • The range of tools and equipment required to operate finishing processes • The preparation for the range of surface finishes available including: <ul style="list-style-type: none"> • Powder coating • Anodizing • Painting • Polishing • Plating • Galvanizing 	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none">• Use hand tools to planish and finish sheet metal items• Use power tools and equipment to finish sheet metal items including surface texturing equipment• Achieve high quality finishes on assembled sheet metal articles• Leave the completed article in a finished condition• Finish welds to achieve suitable finished profiles• Polish sheet metal and sections to achieve a saleable finish	
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