

Unit 327

Developing and marking out templates for metalwork

UAN:	H/601/2249
Level:	3
Credit value:	28
GLH:	91
Relationship to NOS:	This unit has been derived from national occupational standard Fabrication and Welding Engineering Unit 27: Developing and Marking Out Templates for Metalwork (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for Science, Engineering and Manufacturing Technologies.
Aim:	<p>This unit covers the skills and knowledge needed to prove the competences required for developing and marking out templates prior to cutting and/or shaping the material in accordance with approved procedures. The learner will be required to select the appropriate materials and equipment to use based on the information presented to them and the accuracy required to be achieved. The templates produced may be used for marking out, setting of fabrications or pipe arrangements or preparing (setting) heavy plate for rolling.</p> <p>The learner's responsibilities will require them to comply with organisational policy and procedures for the marking out and template making activities, seeking out relevant information and reporting any problems with the equipment, materials or template making activities that they cannot personally resolve, or are outside their permitted authority, to the relevant people. The learner will be expected to work with minimum supervision, taking personal responsibility for their own actions and the quality and accuracy of the work that they produce.</p> <p>The learner's knowledge will provide a good understanding of their work, and provide an informed approach to template making. The learner will understand the marking out and template making process and its application, and will know about the equipment, materials and processes to be carried out in</p>

sufficient depth to provide a sound basis for carrying out the activities, correcting faults and producing the templates to the required specification.

The learner will understand the safety precautions required when carrying out the template making activities and when using the associated tools and equipment. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome	
The learner will:	1. develop and mark out templates for metalwork.
Assessment criteria	
The learner can:	1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 obtain and use the correct information for marking out 1.3 obtain the appropriate marking out equipment and check that it is in a usable condition 1.4 use all of the following tools and instruments to mark out directly from drawings onto sheetmetal: <ul style="list-style-type: none"> • scribe • punch • rule or tape • straight edge • square • protractor • dividers or trammels 1.5 prepare suitable datum's and marking out surfaces 1.6 mark out using appropriate methods 1.7 mark out plate or pipe setting for two of the following: <ul style="list-style-type: none"> • angular setting • large radius section • plate setting • burner template 1.8 mark out templates for six of the following: <ul style="list-style-type: none"> • radiused and mitred corners • concentric cones • offset cones • truncated cones • square/rectangular to round • fishtail • segmented bends (lobsterback) • ball corner or spherical section • fish plates

<ul style="list-style-type: none"> • bed plates • gusset plates • structural components • simple seating (tank cradles) <p>1.9 mark out material to include all of the following features:</p> <ul style="list-style-type: none"> • datums and centre-lines • square and rectangular profiles • angles • circles and curved profiles • cutting detail and allowances • bend/fold allowances • hole centres and outlining (linear) • hole centres and outlining (on pitch circles) <p>1.10 check that the marking out complies with the specification</p> <p>1.11 develop templates which meet all the following quality and accuracy standards:</p> <ul style="list-style-type: none"> • template profile complies with drawing or job requirements • dimensional accuracy meets drawing/specification • suitably marked or labelled to identify purpose • marking out uses recognised conventions <p>1.12 deal promptly and effectively with problems within their control and report those that cannot be resolved.</p>

Learning outcome	
The learner will:	
2. know how to develop and mark out templates for metalwork.	
Assessment criteria	
The learner can:	
2.1	explain the specific safety precautions to be taken when working in a fabrication environment with sheet or plate materials (general workshop and site safety, appropriate personal protective equipment, accident procedure; statutory regulations, risk assessment procedures and COSHH regulations)
2.2	describe the personal protective clothing and equipment that needs to be worn when carrying out the fabrication activities (leather gloves, eye protection, safety helmets etc.)
2.3	explain the correct methods of moving or lifting sheet or plate materials
2.4	describe the hazards associated with fabrication work and explain how they can be minimised (such as handling sheet/fabricated components; using dangerous or badly maintained tools and equipment)
2.5	explain how to obtain the necessary drawings, template specifications and job instructions
2.6	explain how to extract the information from the engineering drawings and related specifications to include symbols and conventions to appropriate BS or ISO standards in relation to work undertaken
2.7	explain how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing

- 2.8 explain the principles and techniques for marking out templates
- 2.9 explain the geometrical methods used for developing of complex shapes (such as square to round, lobsterback sections) from sheet metal
- 2.10 explain how to produce a three dimensional shape from the two dimensional material
- 2.11 explain the use of marking out conventions, datum edges/lines and centre lines
- 2.12 describe the preparations that need to be carried out on the material prior to marking out to enhance clarity and accuracy, and safety
- 2.13 explain the component material characteristics and process considerations that need to be taken into account when marking out templates
- 2.14 explain why you need allowances for joint and weld preparations for different materials and thicknesses
- 2.15 explain how to calculate true lengths, bend allowances and circumferences
- 2.16 describe the effective use and care of tools/instruments
- 2.17 explain how to mark out and preserve the template for maximum clarity, accuracy and ease of transfer
- 2.18 describe ways of laying out the shapes/patterns to maximise the use of plate or sheet material
- 2.19 explain how to setup and adjust the tools, such as squares and protractors
- 2.20 explain how to transfer information to the underside of the sheet or plate
- 2.21 explain the importance of using tools only for the purpose intended; the care that is required when using the equipment and tools; the proper way of preserving and storing tools and equipment between operations
- 2.22 explain the need for clear and dimensional accuracy in marking out to specifications/drawings
- 2.23 describe the sort of things that can go wrong in marking out templates and explain how these can be avoided
- 2.24 describe the extent of their own responsibility and explain whom they should report to if they have problems that they cannot resolve.