Overview

This unit identifies the competences you need to restore jigs or fixtures to usable condition by repair or modification, in accordance with approved procedures. You will be required to rework a range of jig and fixture components and equipment to operational condition, by repairing or modifying assemblies, sub-assemblies and components, by reforming, reworking the surface, replacing threads or the replacement of worn parts. You will also be required to select the appropriate equipment to use, based on the nature of the repair, the operations that will need to be carried out and the accuracy to be achieved.

In producing the components, you will be expected to use a range of hand tools, machine tools, portable power tools, and shaping and fitting techniques, appropriate to the type of material and repair being performed. These activities will include such things as sawing (hand, band), drilling, reaming, grinding (hand or machine), filing, scraping or lapping, threading (internal or external), turning, milling, and thermal processes. Materials to be used will include ferrous, non-ferrous, non-metallic and composites, which may be in sheet form, bar sections (such as square/rectangular, round, angle), and part-machined components.

Your responsibilities will require you to comply with organisational policy and procedures for jig and fixture reworking activities, and to report any problems with these activities or with the tools, equipment or materials used, that you cannot personally resolve or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will demonstrate a good understanding of your work, and will provide an informed approach to applying appropriate jig and fixture repair or modification procedures. You will understand the function and operating conditions of the components being repaired or modified, in adequate depth to provide a sound basis for carrying out the activities to the required specification, and to ensure that any repairs or modifications carried out are safe and practical in operation. You will also understand the organisational policy on repairing or modifying components, and its application.

You will understand the safety precautions required when carrying out the repair or modification activities. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.
Performance criteria

You must be able to:

- **P1** work safely at all times, complying with health and safety and other relevant regulations and guidelines
- **P2** follow the relevant specifications for the component to be repaired
- **P3** prepare the component for repair
- **P4** carry out the repairs within agreed timescale using approved materials and components and methods and procedures
- **P5** ensure that the repaired component meets the specified operating conditions
- **P6** produce accurate and complete records of all repair work carried out
Carrying out repairs or modifications to jigs or fixtures

Knowledge and understanding

You need to know and understand:

K1 the health and safety requirements of the area in which you are carrying out the repair or modification, and the responsibility they place on you

K2 the specific health and safety precautions to be applied during the repairing or modification procedure, and their effects on others

K3 the importance of wearing protective clothing and equipment, and of keeping the work area safe and tidy

K4 the hazards associated with the repair or modification operations being carried out (such as sawing (hand, band), drilling, reaming, grinding (hand or machine), thermal processes), and how they can be minimised

K5 the procedure for obtaining the required drawings, sketch, development sheets job instructions and other related specifications, and how to interpret them to carry out the process successfully

K6 how to determine and interpret jig and tool reference/datum points and system of tolerancing

K7 the factors to be taken into account when deciding if a repair is practical and possible (is a replacement component available, cost of replacing, safety of repair, age and condition of equipment, etc)

K8 the types of repair or modification that can be made to jig and fixture components in order to prolong their useful life (such as bushing worn holes, fitting thread inserts, building up surfaces by thermal process or metal spraying, making stepped or oversize dowels or studs)

K9 the need to liaise with other departments to have specialised operations carried out on the components (such as thermal processes, metal spraying)

K10 the shaping and profiling methods and techniques to be used, and the sequence in which the operations will need to be carried out

K11 how to produce flat, square and curved surfaces, and achieve the required surface finish, using a variety of hand and portable powered tools

K12 how to cut external threads using hand dies, and the method of fixing and adjusting the dies to give the correct thread fit

K13 how to determine the drill size for tapped holes, and the importance of using the taps in the correct sequence

K14 how to produce a sliding or mating fit, and the techniques to be adopted

K15 the types and application of portable power tools that can be used for the repair or modification operations

K16 how to use hand power tools and specialist equipment correctly (such as electrical, pneumatic, lifting equipment)

K17 how to check that portable power tools and extension cables are free from damage and are in a safe usable condition

K18 the company recording procedures to be used following the repair or
Carrying out repairs or modifications to jigs or fixtures

modification, and how to apply them

K19 the problems that can occur with the repairing and modifying of the jigs and fixtures, and how these can be overcome

K20 the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
Carrying out repairs or modifications to jigs or fixtures

Additional Information

Scope/range related to performance criteria

You must be able to:

1. carry out all of the following during the repair or modification of the jigs or fixtures:
   1.1 plan the repair or modification activities to cause minimal disruption to normal working
   1.2 use the correct issue of company and/or manufacturers’ drawings and maintenance documentation
   1.3 adhere to risk assessment, COSHH and other relevant safety standards
   1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
   1.5 provide safe access and working arrangements for the maintenance area
   1.6 carry out the repair or modification activities, using appropriate techniques and procedures
   1.7 where appropriate, re-connect and return the system to service on completion of the activities
   1.8 dispose of waste items in a safe and environmentally acceptable manner
   1.9 leave the work area in a safe and tidy condition

2. use a range of hand fitting methods, to include all of the following:
   2.1 hand sawing
   2.2 band/power sawing
   2.3 filing
   2.4 drilling/reaming
   2.5 chiselling
   2.6 threading external
   2.7 off-hand grinding
   2.8 scraping
   2.9 tapping

3. repair or modify jig and fixtures which combine several features and cover three from the following:
   3.1 flat datum faces
   3.2 faces that are parallel to each other
   3.3 faces which are square to each other
Carrying out repairs or modifications to jigs or fixtures

3.4 faces at an angle to each other
3.5 curved profiles
3.6 profiles produced from template/pattern
3.7 blind drilling and reaming
3.8 guide media
3.9 internal and external threads
3.10 sliding or mating parts

4. use appropriate techniques to carry out **six** of the following types of repair or modification to the jigs or fixtures:
   4.1 reforming the component surface by adding metal
   4.2 reworking the fit (shimming)
   4.3 reconditioning a unit by replacement of worn components
   4.4 plugging holes
   4.5 reworking the surface finish (using techniques such as filing, scraping, grinding)
   4.6 making a temporary fix
   4.7 bushing worn holes
   4.8 sleeving worn components
   4.9 re-establishing clamping conditions
   4.10 making stepped dowels or studs
   4.11 re-establishing locators and guides
   4.12 re-alignment of components
   4.13 welding or brazing joints
   4.14 replacement of internal thread (inserts)
   4.15 other specific repair procedures

5. repair or modify components made from different types of material, to include **two** from the following:
   5.1 low carbon steel
   5.2 aluminium
   5.3 composite alloy
   5.4 high carbon steel
   5.5 brass
   5.6 non-metallic
   5.7 stainless steel
   5.8 cast iron

6. ensure that the repaired or modified jigs or fixtures conform to **all** the following quality and accuracy checks:
   6.1 all dimensional tolerances are to specifications
   6.2 the profile meets production specifications
   6.3 all geometric tolerances are to specification
   6.4 the surface finish is to specification
# SEMET36

Carrying out repairs or modifications to jigs or fixtures

<table>
<thead>
<tr>
<th>Developed by</th>
<th>SEMTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version number</td>
<td>1</td>
</tr>
<tr>
<td>Date approved</td>
<td>January 2005</td>
</tr>
<tr>
<td>Indicative review date</td>
<td>December 2013</td>
</tr>
<tr>
<td>Validity</td>
<td>Current</td>
</tr>
<tr>
<td>Status</td>
<td>Original</td>
</tr>
<tr>
<td>Originating organisation</td>
<td>SEMTA</td>
</tr>
<tr>
<td>Original URN</td>
<td>O45NET36</td>
</tr>
<tr>
<td>Relevant occupations</td>
<td>Metal Machining, Fitting and instrument making trades</td>
</tr>
<tr>
<td>Suite</td>
<td>Engineering Toolmaking Suite 3 2005</td>
</tr>
<tr>
<td>Key words</td>
<td>Engineering, toolmaking, repairs, modifications, jigs, fixtures, reforming, reworking, surface finishing</td>
</tr>
</tbody>
</table>