



**Australian Government**

# **MEM07042A Undertake corrections and basic maintenance to aluminium extrusion dies and die support systems**

**Release 1**

## **MEM07042A Undertake corrections and basic maintenance to aluminium extrusion dies and die support systems**

### **Modification History**

New unit - Release 1

### **Unit Descriptor**

This unit of competency covers the skills and knowledge required to correct aluminium extrusion dies and die support systems after faulty extrusions have been examined and causes of faults identified.

### **Application of the Unit**

This unit applies to die correctors in an aluminium extrusion workplace who are making corrections to aluminium extrusion dies and their die support systems as well as undertaking basic maintenance of dies. The unit applies to both solid and hollow dies. The corrections may be made using hand tools, handheld power tools, or workshop machines.

The unit does not cover manufacture of dies or major repair or remanufacture of dies. This unit presumes that the cause/s of faulty extrusions has already been identified.

The units MEM11010B Operate mobile load shifting equipment and MEM11011B Undertake manual handling should be selected where the die corrector is required to remove and replace dies in extruders.

Band: A

Unit Weight: 4

### **Licensing/Regulatory Information**

Not applicable.

## **Pre-Requisites**

MEM07001B	Perform operational maintenance of machines/equipment
MEM07003B	Perform machine setting (routine)
MEM07004B	Perform machine setting (complex)
MEM07024B	Operate and monitor machine/process
MEM07025B	Perform advanced machine/process operation
MEM07032B	Use workshop machines for basic operations
MEM07043A	Identify causes of faulty aluminium extrusions
MEM07044A	Test a new aluminium extrusion die
MEM09002B	Interpret technical drawing
MEM12023A	Perform engineering measurements
MEM18001C	Use hand tools
MEM18002B	Use power tools/hand held operations
MEM18003C	Use tools for precision work
MEM18055B	Dismantle, replace and assemble engineering components

## Employability Skills Information

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency. Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

- |   |                            |     |  |
|---|----------------------------|-----|--|
| 1 | Prepare for die correction | 1.1 | Identify work health and safety (WHS), regulatory requirements, and risk management procedures relevant to die access and handling, extruder operation and die correcting procedures |
|   |                            | 1.2 | Identify extrusion specifications, extruder operating procedures and other information relevant to die correction task   |
|   |                            | 1.3 | Where required, consult with die designer on intended correction   |
| 2 | Correct solid dies         | 2.1 | Calculate intended change in extrusion flow or speed   |
|   |                            | 2.2 | Determine bearing choke angles or length of bearing shortening as appropriate for required correction  |
|   |                            | 2.3 | Speed up flow, where required, through appropriate shortening of bearing   |
|   |                            | 2.4 | Slow down flow, where required, through appropriate choking of bearing   |
|   |                            | 2.5 | Relieve clearances   |
|   |                            | 2.6 | Supervise or run trial extrusions to test corrections  |

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|---|--|-----|--|
| 3 | Correct hollow dies                      | 3.1 | Assess if shortening or choking of mandrel bearings is required and select bearings to be corrected                    |
|   |  | 3.2 | Determine choke angles and length of shortening as appropriate for required corrections                                |
|   |  | 3.3 | Undercut mandrel to widen chambers, where required   |
|   |  | 3.4 | Increase depth of chamber back into bridge, where required   |
|   |  | 3.5 | Adjust mandrel stems, where required   |
|   |  | 3.6 | Adjust weld bridges, as required   |
|   |  | 3.7 | Speed up flow, where required, through appropriate shortening of bearing   |
|   |  | 3.8 | Slow down flow, where required, through appropriate choking of bearing   |
| 4 | Undertake basic maintenance of dies      | 4.1 | Monitor case and assess when re-nitriding is required  |
|   |  | 4.2 | Prepare die for re-nitriding   |
|   |  | 4.3 | Clean and polish dies when required  |
|   |  | 4.4 | Repair fine bearing damage   |
|   |  | 4.5 | Maintain bearing angle and flatness during polishing and repairs   |
|   |  | 4.6 | Monitor fittings and devices for lifting die and die support components and arrange replacement or repair as necessary |
| 5 | Adjust die support system and components | 5.1 | Ensure toolstack components are flat and square with die   |
|   |  | 5.2 | Check for and replace any coined bolsters  |
|   |  | 5.3 | Check die slide alignment is within tolerance and re-align if necessary  |
|   |  | 5.4 | Report persistent die support related faults after adjustment and recommend redesign or stiffening as appropriate      |

- 6 Maintain die records
  - 6.1 Record details of all die corrections, including trial extrusions
  - 6.2 Recommend any simple die design changes that increase productivity and recovery

## Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

### Required skills

Required skills include:

- shortening of bearings through milling, grinding, hand or machine polishing as appropriate to speed up flow or increase feed
- techniques to choke bearings to achieve slowing of flow, including:
  - opening of angle of bearing on inner web
  - hand filing
- machining and dressing of bearings to remove roughness and rags
- peening of bearings
- surface grinding of die face
- chiselling ends of blunt bridges in hollow dies
- undercutting of mandrels to relieve blockages
- increasing pocket clearances
- performing precision measurement
- adjusting bolster and die support, including:
  - selection of different size backers
  - polishing of surfaces to overcome dishing
- identifying simple die design changes (e.g. layout, orientation, number of holes, and so on) to increase productivity and recovery
- recording corrections on die history cards and providing feedback to die designers

### Required knowledge

Required knowledge includes:

- die technology:
  - construction:
    - solid dies
    - hollow dies
    - die support components
    - composition and characteristics of various die steels
  - die manufacturing process
  - nitriding process and purpose
  - extrusion design process and behaviour of typical shapes during extrusion
  - bearings:
    - shape and definition

- bearing deflections
- bearing wash
- bearing choke where entrance to die aperture is wider than the exit angle
- negative bearing (entrance is narrower than the exit angle) increases speed of flow
- die support technology and common faults:
  - bolsters:
    - matching of dies to bolsters
    - typical faults in extrusions related to poor bolster selection or fit
  - backers:
    - softening
    - dishing
  - feeder plates:
    - tolerances too close can cause heat related surface defects on extrusions
    - tolerances not matched to bearings in die can cause shape loss
- extrusion process:
  - shape behaviour of typical extrusion products
  - channel shapes and tongue movement faults and typical distortions and corrections
  - runout length variations and possible causes:
    - recycled and unevenly cooled billets
    - out of alignment die slides
    - bearings worn or polished unevenly
  - operator variables:
    - incorrect heat settings
    - incorrect selection of bolster for die
    - poor breakthrough management
  - principles of flow:
    - variation of flow speed through local details and thicknesses
    - variation across container diameter
    - variation due to length of bearing
    - speed of metal through die along with temperature determines how metal flow fills die
  - source and purpose of heating of:
    - billet
    - die
    - extrusion and extrusion created heat
  - surface defects and their causes:
    - die lines caused by roughness at surface edges, damaged bearing edges, bearing wash or flaking of nitriding
    - pick up (surface tearing)
    - streaking



- blisters
- inclusions in billets
- nitriding flaking off die face
- effects of incorrect heat:
  - collapsing of thin walled sections due to over heating
  - blocking of the die
- surface breakdown and faults:
  - roughness
  - streaking
  - tearing
- dangers of welding extrusion dies
- die efficiency considerations:
  - monitor die performance over time using examine die and extrusion records
  - balance die correction against tonnage, speed and recovery rates
  - recommend new die or major re-work by die manufacturer where required

## Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria required skills and knowledge range statement and the Assessment Guidelines for the Training Package.

### Overview of assessment

A person who demonstrates competency in this unit must be able to take a systematic approach to correcting solid and hollow dies and their die support systems, including conducting trial extrusions to verify corrections. Proper use of hand and power tools and workshop machines is required in undertaking corrections.

### Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently:

- comply with WHS, regulatory requirements and risk management associated with extruder operation and die handling
- relate intended changes to bearings, apertures, other die components, and toolstack components to particular extrusion faults
- adjust metal flow using workshop machines, hand tools and handheld power tools to correct bearings
- maintain bearings and other die components to specification
- identify situations where die or other components must be either scrapped or returned to die manufacturer
- supervise or conduct trial extrusions to verify corrections
- report and document results of corrections.

### Context of and specific resources for assessment

- This unit must be assessed on the job with access to the extruder for which the die has been designed and relevant die and extrusion records. Access to hand and machine tools, including a milling machine, surface grinder and relevant hand and power tools, are also required.
- The competencies covered by this unit would usually be demonstrated by an individual working in a team environment that includes extruder operators, die designers and die makers. The assessment environment should not disadvantage the candidate.
- This unit may be assessed in conjunction with any other units addressing the safety, quality, communication, hand tools, machine operation,

recording and reporting associated with die correcting.

### Method of assessment

- Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package.
- Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.
- Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application.
- Assessment may be applied under project-related conditions (real or simulated) and require evidence of process.
- Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
- Assessment may be in conjunction with assessment of other units of competency where required.

### Guidance information for assessment

Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

## Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

<b>Die support</b>	Die support is the specified toolstack dimensions that will support dies, according to the force the extruder can exert.
<b>Container</b>	The container is the part of the extruder that holds the billet and billet support components.

<b>Support tooling</b>	Support tooling is the name given to the various pieces of tooling (e.g. bolsters that provide stiffness to the die during extrusion).
<b>Die holder</b>	Die holders accommodate the diesets (feeder plate, die plate and backer). Die holders are the first components in toolstacks.
<b>Bolster</b>	Bolsters are deep discs of steel that provide stiffness in the toolstack to allow the die to remain flat and thus do its work properly. The term bolster includes any inserts designed to cut the cost of support tooling.
<b>Die slide</b>	The die slide is the part of the extruder that accommodates the dies and other tooling that makes up the toolstack.
<b>Toolstack</b>	The toolstack is the assembly of die, feeder plate and backer, holder and support tooling that fits into the die slide.
<b>Die</b>	The die is the part of the tooling that creates the extrusion shape as the metal is pressed through it.
<b>Bearing</b>	The die contains bearings of various lengths. Bearings are lands that act as frictional controls on metal flow. The bearing is an outline of the extrusion shape cut through the die to the highest precision possible.
<b>Feeder plate</b>	The feeder plate precedes the die and provides an additional degree of flow control. It is also described as a control plate. It is bolted to the die and backer, forming the dieset.
<b>Backer</b>	The die must be given support against the force needed to make metal flow. The first item of this support is the backer. Backer profiles are usually slightly larger than die apertures (precision cut) and are not high precision items.
<b>Platen plate</b>	The platen plate or pressure ring is set into the front wall of the press as a replaceable feature. Platen plates take up the forces applied to the toolstack and transmit them to the extruder structure.
<b>Primary and secondary bolsters</b>	Some larger press operate with a combination of single, one piece bolsters for special shapes and a split system of primary and secondary bolsters.

	<p>The primary bolster is usually deeper than the secondary and provides the main support. It is cut closer to the die aperture than the secondary bolster which closely follows the primary aperture so as to back it up.</p> <p>Secondary bolsters are likely to be shared by several primary bolsters.</p>
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## **Unit Sector(s)**

**Competency field** Machine and process operations

**Unit sector**

## **Custom Content Section**

Not applicable.