



**Australian Government**

# **MEM07043 Identify causes of faulty aluminium extrusions**

**Release: 1**

# MEM07043 Identify causes of faulty aluminium extrusions

## Modification History

Release 1. Supersedes and is equivalent to MEM07043A Identify causes of faulty aluminium extrusions

## Application

This unit of competency defines the skills and knowledge required to systematically examine aluminium extrusions produced on solid and hollow dies for faults that are both die, and non-die related and tracing the reasons for the faults.

It includes determining the most appropriate corrective action for the fault and, where appropriate, providing recommendations to extruder operators, die designers and die manufacturers.

Where the selection and use of power tools/hand held operations is required Unit MEM18002 Use power tools/hand held operations should also be selected.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

**Band: A**

**Unit Weight: 6**

## Pre-requisite Unit

|          |                                                              |
|----------|--------------------------------------------------------------|
| MEM09002 | Interpret technical drawing                                  |
| MEM11011 | Undertake manual handling                                    |
| MEM12023 | Perform engineering measurements                             |
| MEM12024 | Perform computations                                         |
| MEM13015 | Work safely and effectively in manufacturing and engineering |
| MEM16006 | Organise and communicate information                         |
| MEM18001 | Use hand tools                                               |

## Competency Field

Machine and process operations

## Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- |   |                                                 |     |                                                                                          |
|---|-------------------------------------------------|-----|------------------------------------------------------------------------------------------|
| 1 | <b>Determine job requirements</b>               | 1.1 | Follow standard operating procedures (SOPs)                                              |
|   |                                                 | 1.2 | Comply with work health and safety (WHS) requirements at all times                       |
|   |                                                 | 1.3 | Use appropriate personal protective equipment (PPE) in accordance with SOPs              |
|   |                                                 | 1.4 | Identify job requirements from specifications, drawings, job sheets or work instructions |
|   |                                                 |     |                                                                                          |
| 2 | <b>Collect information on faulty extrusion</b>  | 2.1 | Liaise with extruder operator on die service or fault correction requests                |
|   |                                                 | 2.2 | Access and examine die in accordance with procedures                                     |
|   |                                                 | 2.3 | Examine extruder records and identify any previous die corrections                       |
|   |                                                 | 2.4 | Consult with die designer on faults, where required                                      |
|   |                                                 | 2.5 | Examine extruder maintenance records and liaise with maintenance department              |
|   |                                                 |     |                                                                                          |
| 3 | <b>Interpret die drawing and specifications</b> | 3.1 | Identify layout and pre-forming of die apertures                                         |
|   |                                                 | 3.2 | Identify bearing and pocket design/specification                                         |
|   |                                                 | 3.3 | Identify measurements and tolerances for bearings, die components and die support system |
|   |                                                 | 3.4 | Identify bolster and spacer specification for die                                        |
|   |                                                 | 3.5 | Identify press specifications                                                            |
|   |                                                 | 3.6 | Identify speed estimate for die                                                          |
|   |                                                 | 3.7 | Identify ports and bridges for hollow dies                                               |

| Elements describe the essential outcomes. |                                                                  | Performance criteria describe the performance needed to demonstrate achievement of the element. |                                                                                                                   |
|-------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 4                                         | <b>Examine faulty extrusions</b>                                 | 4.1                                                                                             | Check extrusions for shape distortion                                                                             |
|                                           |                                                                  | 4.2                                                                                             | Check extrusion measurements are to specification                                                                 |
|                                           |                                                                  | 4.3                                                                                             | Inspect surface finish of extrusions for defects                                                                  |
|                                           |                                                                  | 4.4                                                                                             | Identify whether faults apply from the start to the end of extrusion runouts                                      |
|                                           |                                                                  | 4.5                                                                                             | Make a preliminary assessment as to whether faults are related to die or die support system or other factors      |
| 5                                         | <b>Check for faults not related to die or die support system</b> | 5.1                                                                                             | Examine die and billet heating and temperature records and confirm heating and temperature was to specification   |
|                                           |                                                                  | 5.2                                                                                             | Confirm extruder was run at correct speed and other settings were to specification                                |
|                                           |                                                                  | 5.3                                                                                             | Examine billet history and determine if billet was recycled or faulty                                             |
|                                           |                                                                  | 5.4                                                                                             | Confirm with maintenance department that extruder is free of mechanical, electrical, control or structural faults |
| 6                                         | <b>Identify die and die support related faults</b>               | 6.1                                                                                             | Access die and die support system                                                                                 |
|                                           |                                                                  | 6.2                                                                                             | Inspect die for overall wear, dishing, damage and other defects                                                   |
|                                           |                                                                  | 6.3                                                                                             | Inspect bearings for shortening, surface defects, loss of specified angle and clearances                          |
|                                           |                                                                  | 6.4                                                                                             | Determine if die can be corrected, scrapped or returned to manufacturer                                           |
|                                           |                                                                  | 6.5                                                                                             | Inspect die support system and components for defects and die slide misalignment                                  |
| 7                                         | <b>Record cause of fault and</b>                                 | 7.1                                                                                             | Prepare recommendations for die correction and obtain any required approvals                                      |

Elements describe the essential outcomes.

**communicate as required**

Performance criteria describe the performance needed to demonstrate achievement of the element.

7.2 Prepare recommendations for any changes to process or temperature settings and distribute, as appropriate

## Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Unit Mapping Information

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## Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

# Assessment Requirements for MEM07043 Identify causes of faulty aluminium extrusions

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## Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- complying with work health and safety (WHS), regulatory requirements and risk management procedures
- identifying bearings, apertures, components, and critical measurements and tolerances on die drawing
- liaising with extruder operators, die designers die makers and maintenance personnel to obtain information to assist in the identification of causes of faults
- identifying root cause of faults in both hollow and solid die extrusions
- identifying die, die support, process and temperature-related shape and surface faults
- identifying appropriate action to take to remedy extrusion faults
- accessing, analysing and adding to die history records.

## Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- die components in an extrusion machine:
  - die
  - die support
  - container
  - support tooling
  - die holder
  - bolsters – single and split systems
  - die slide
  - tool stack
  - bearing
  - feeder plate

- backer
- platen plate
- aluminium extrusion process, including:
  - die heating
  - billet heating
  - loading of dies and billets
  - breakthrough control
  - flow speed
  - rolling
  - quenching
  - stretching
- aluminium extrusion alloys and their extrusion performance
- extruder components and controls
- requirements of AS/NZS 1866:1997 Aluminium and aluminium alloys – Extruded rod, bar, solid and hollow shapes for extruded products
- causes of die deformation, including:
  - damaged or die
  - poor or incorrect die support due to:
    - poor manufacture
    - wear
    - incorrect component placement/selection
- die and die support design and die manufacturing related faults, including:
  - tolerances and clearances too tight and beyond range of realistic correction by die corrector
  - tolerances and clearances too great causing components to move out of position during extrusion leading to flow blockage
- reasons for die blockage, including:
  - die damage
  - over polishing or incorrect die polishing
  - tongue bending
  - bearing clearances too tight
  - overheating of billet
- indicators of die support faults, including:
  - deflecting mandrels
  - die dishing
  - die movement during extrusion
- check for metal extruding inwards or outwards
- effects of nitriding and re-nitriding on die performance
- billet composition and billet heating procedures
- changes in billet composition caused by re-heating
- process related faults:

- incorrect temperature settings for pre-heating of billet
- bad breakthrough control by operator (setting too fast or too high a pressure):
  - poor extruder settings
  - speed through die too fast/slow
  - fouling of section on relief
  - unsuitable support of extrusion after exiting die
  - poor/incorrect quenching
  - faults not subject to action by die corrector
  - poor quality billet
  - mechanical/electrical fault with extruder
- types of extrusion faults and their relationship to die correction techniques and die correction limitations, including:
  - shape distortion:
    - during extrusion
    - on exit from die
    - loss during quenching
  - length overruns
  - section collapse
  - surface faults including:
    - breakdown
    - pickup
    - tearing
    - streaking
- die lines.

## Assessment Conditions

- Assessors must:
  - have vocational competency in identifying causes of faulty aluminium extrusions at least to the level being assessed with relevant industry knowledge and experience
  - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills

- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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