



Australian Government

MEM07044A Test a new aluminium extrusion die

Release 1

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Modification History

New unit - Release 1

Unit Descriptor

This unit of competency covers the skills needed by die correctors working in an aluminium extrusion workplace who are required to undertake the initial testing of a new extrusion die. The unit includes liaison with die designers and makers on the performance of the new die and making corrections to the die to ensure optimal performance.

Application of the Unit

This unit applies to die correctors who have received a new die for installation and testing in an aluminium extrusion machine. This unit applies to testing of the new die's performance against design and product specifications. The unit requires testing of both solid and hollow dies, and includes evaluation of extruded product for any faults, determining the root cause of faults, and adjusting the die support system or correcting the new die as required.

Band: A

Unit Weight: 4

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEM07043A Identify causes of faulty aluminium extrusions

MEM09002B Interpret technical drawing

MEM12023A Perform engineering measurements

MEM12024A Perform computations

MEM18001C Use hand tools

MEM18002B Use power tools/hand held operations

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

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| 1 | Interpret die drawing and die specifications relevant to die trial | 1.1 | Identify work health and safety (WHS), regulatory requirements and risk management requirements associated with extruder operation and die handling |
| | | 1.2 | Identify layout and pre-forming of die apertures |
| | | 1.2 | Identify bearing and pocket design/specification |
| | | 1.3 | Identify measurements and tolerances for bearings, die components and die support system |
| | | 1.4 | Identify bolster and spacer specification for die |
| | | 1.5 | Identify press specifications |
| | | 1.6 | Identify speed estimate for die |
| | | 1.7 | Identify ports and bridges for hollow dies |
| 2 | Liaise with die designer | 2.1 | Clarify die drawing and die specifications with die designer where design information is not clear |
| | | 2.2 | Determine if die requires finishing off and clarify final design measurements, tolerances and speed specifications |
| | | 2.3 | Obtain any special instructions from die designer for conduct of test extrusions |

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| 3 | Finish off die, if required | 3.1 | Finish lands and bearings to specified tolerances |
| | | 3.2 | Finish ports, bridges and mandrels of hollow dies, if required |
| | | 3.3 | Undertake any final polishing |
| | | 3.4 | Confirm all measurements are to design specification after finishing off |
| 4 | Analyse trial extrusions | 4.1 | Check extruder and surrounds for compliance with operation safety requirements |
| | | 4.2 | Operate or supervise operation of extrusion press to produce trial extrusions |
| | | 4.3 | Check hot extrusions for shape distortion |
| | | 4.4 | Check thickness of extrusions are to specification |
| | | 4.5 | Check surface finish of extrusions |
| | | 4.6 | Identify whether faults apply from the start to the end of the runout of the extrusions |
| | | 4.7 | Conduct additional trial extrusions to confirm extrusion faults occur consistently |
| | | 4.8 | Record extruder settings for each trial extrusion |
| 5 | Identify appropriate remedy for out of specification results | 5.1 | Examine faulty extrusions and determine if fault relates to die design, incorrect process or temperature settings, or faulty die support system |
| | | 5.2 | Determine fault is die related and able to be eliminated through correction of die |
| | | 5.3 | Determine if fault can be corrected through adjustments to die supports |
| | | 5.4 | Determine if fault can be eliminated through adjusted process control or billet heating |
| | | 5.5 | Recommend either return of die for re-design or manufacture of a new die where faults are unable to be corrected |

- 6 Re-test die after correction
 - 6.1 Conduct trial extrusions after correction of die, die support adjustment or process or temperature adjustment
 - 6.2 Return die to die manufacturer if faulty extrusions persist
 - 6.3 Record adjustments to die on die design drawings ensuring correct feedback codes are used
 - 6.4 Record adjustments made to die support system, process and temperature settings

Required Skills and Knowledge

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

Required skills

Required skills include:

- interpreting of die design drawings
- supervising trial extrusions to ensure trial is conducted to die design specifications
- diagnosing faults on solid and hollow dies
- diagnosing faults on aluminium extrusions, including:
 - shape distortions
 - out of specification wall thickness
 - serrations or castellations on flanges
 - surface faults
 - shape changing from start to end of runout
- liaising with die designers, die makers and extruder operators on performance of new die

Required knowledge

Required knowledge includes:

- aluminium extrusion die construction
- aluminium extrusion process
- the effects of nitriding and re-nitriding on tool performance
- requirements of AS/NZS 1866:1997 Aluminium and aluminium alloys - Extruded rod, bar, solid and hollow shapes
- techniques for correcting solid and hollow dies
- die support system, including role and types of feeder plates, bakers, bolsters and spacers
- extruder components, including:
 - container
 - container liner
 - billet
 - die slide
 - pressure rings
 - platen
- hollow die components, including:
 - weld chamber
 - mandrel
 - die holder

- weld feeds
- bridges
- ports
- die and extruder performance and adjustment records

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 testing a new aluminium extrusion die, including carrying out any required finishing off, conducting trial extrusions, identifying reasons for any faults in the trial extrusions and determining the appropriate action to remedy the fault.

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 relevant WHS, regulatory requirements and risk management
- correctly identify bearings, apertures, and critical measurements and tolerances on die drawing
- supervise and conduct trial extrusions
- use workshop machines and hand tools to finish off a die to design specifications
- identify cause of extrusion faults from both hollow and solid die extrusions
- identify appropriate action to take to remedy extrusion faults
- report and document results.

Context of and specific resources for assessment

- This unit must be assessed on the job with access to the extruder for which a new die has been designed.
- Assessment must cover the testing of both solid and hollow dies across a range of extrusion shapes.
- Assessment should cover sufficient trial extrusions to ensure that both shape and surface faults related to die performance are observed.
- The competencies covered by this unit would usually be demonstrated by an individual working in a team environment that includes extruder operators and 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,

Method of assessment

- recording and reporting associated with testing a new aluminium die.
- 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 a number of extrusions and at least one new solid and one new hollow die) 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 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. 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.

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| Die support | Die support is the specified toolstack dimensions that will support dies, according to the force the extruder can exert. |
| Container | The container is the part of the extruder that holds the billet and billet support components. |
| Support tooling | Support tooling is the name given to the various pieces of tooling (e.g. bolsters that provide stiffness to the die |

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| | during extrusion). |
| Die holder | Die holders accommodate the diesets (feeder plate, die plate and backer). Die holders are the first components in toolstacks. |
| Bolster | 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. |
| Die slide | The die slide is the part of the extruder that accommodates the dies and other tooling that makes up the toolstack. |
| Toolstack | The toolstack is the assembly of die, feeder plate and backer, holder and support tooling that fits into the die slide. |
| Die | The die is the part of the tooling that creates the extrusion shape as the metal is pressed through it. |
| Bearing | 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. |
| Feeder plate | 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. |
| Backer | 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. |
| Platen plate | The platen plate or pressure ring is set into the front wall of the extruder as a replaceable feature. Platen plates take up the forces applied to the toolstack and transmit them to the extruder structure. |
| Primary and secondary bolsters | <ul style="list-style-type: none"> • Some larger extruders operate with a combination of single, one piece bolsters for special shapes and a split system of primary and secondary bolsters. • 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 |

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| | <p>bolster which closely follows the primary aperture so as to back it up.</p> <ul style="list-style-type: none">• Secondary bolsters are likely to be shared by several primary bolsters. |
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Unit Sector(s)

Competency field Machine and process operations

Unit sector

Custom Content Section

Not applicable.