Australian Government

MEM07043A Identify causes of faulty aluminium extrusions

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM07043A Identify causes of faulty aluminium extrusions

Modification History

New unit - Release 1

Unit Descriptor

This unit of competency covers the skills and knowledge needed to systematically examine aluminium extrusions for faults and to trace the reasons for the faults. This unit includes determining the most appropriate corrective action for the fault and, where appropriate, providing recommendations to extruder operators, die designers and die manufacturers.

Application of the Unit

This unit applies to die correctors working in an aluminium extrusion workplace who are required to investigate product fault reports, including determining the root cause of the fault, and recommending the most appropriate action. The unit applies to extrusions produced on solid and hollow dies and to faults that are both die and non-die related.

Band: A
Unit Weight: 6

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEM09002B Interpret technical drawing

MEM12023A Perform engineering measurements

MEM12024A Perform computations

MEM15002A Apply quality systems

MEM15024A Apply quality procedures

MEM16006A Organise and communicate information

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

1	Collect information on faulty extrusion	1.1 Liaise with extruder operator on die service or fault correction requests
		1.2 Access and examine die following all relevant work health and safety (WHS) procedures
		1.3 Examine extruder records and identify any previous die corrections
		1.4 Consult with die designer on faults, where required

		1.5	Examine extruder maintenance records and liaise with maintenance department, where required
2	Interpret die drawing and specifications	2.1	Identify layout and pre-forming of die apertures
		2.2	Identify bearing and pocket design/specification
		2.3	Identify measurements and tolerances for bearings, die components and die support system
		2.4	Identify bolster and spacer specification for die
		2.6	Identify press specifications
		2.7	Identify speed estimate for die
		2.8	Identify ports and bridges for hollow dies
3	Examine faulty extrusions	3.1	Check extrusions for shape distortion
		3.2	Check extrusion measurements are to specification
		3.3	Inspect surface finish of extrusions for defects
		3.4	Identify whether faults apply from the start to the end of extrusion runouts
		3.5	Make a preliminary assessment as to whether faults are related to die or die support system or other factors
4	Check for faults not related to die or die support system	4.1	Examine die and billet heating and temperature records and confirm heating and temperature was to specification
		4.2	Confirm extruder was run at correct speed and other settings were to specification
		4.3	Examine billet history and determine if billet was recycled or faulty
		4.4	Confirm with maintenance department that extruder is free of mechanical, electrical, control or structural faults

5	Identify die and die support related faults	5.1	Safely access die and die support system
		5.2	Inspect die for overall wear, dishing, damage and other defects
		5.3	Inspect bearings for shortening, surface defects, loss of specified angle and clearances
		5.4	Determine if die can be corrected, scrapped or returned to manufacturer
		5.5	Inspect die support system and components for defects and die slide misalignment
6	Record cause of fault and communicate as required	6.1	Prepare recommendations for die correction and obtain any required approvals
		6.2	Prepare recommendations for any changes to process or temperature settings and distribute, as appropriate

Required Skills and Knowledge

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

Required skills

Required skills include:

- interpreting die maintenance requests for information on likely fault causes
- liaising with extruder operators, die designers and die makers, and maintenance department
- interpreting die drawings
- interpreting production records and die maintenance records
- evaluating solid die extrusion faults, including:
  - loss of shape
  - incorrect extrusion length, width or thickness
  - surface faults
- evaluating hollow die extrusion faults, including:
  - loss of shape
  - incorrect extrusion length, width or thickness
  - surface defects
  - unbalanced flow through ports
  - speed differences through die
  - collapse of extrusion or extrusion features
- evaluation of die support system for:
  - slide alignment
  - coining (impression) of bolster
  - faults and incorrect tolerances and alignment of backers, feeder plates and bolsters

Required knowledge

Required knowledge includes:

- 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, such as
  - 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 reheating
- 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, such as:
  - breakdown
  - pickup
  - tearing
  - streaking
  - die lines

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 the identification of the cause of faults in aluminium extrusions and to determine 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 WHS, regulatory requirements and risk management procedures
- correctly identify bearings, apertures,components, and critical measurements and tolerances on die drawing
- liaise with extruder operators, die designers and die makers to obtain information to assist in the identification of causes of faults
- identify root cause of faults in both hollow and solid die extrusions
- identify die, die support, process and temperature-related shape and surface faults
- identify appropriate action to take to remedy extrusion faults
- access, analyse and add to die history records.

Context of and specific resources for assessment

- This unit may be assessed on the job or a combination of both on and off the job. Access to the extruder and die producing the faulty extrusions and to die and extrusion records must be possible.
- Assessment must cover extrusions produced by both solid and hollow dies and across a range of extrusion shapes and faults.
- The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. 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.

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

	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 forced 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.
Faults	Faults expected to be considered by a die corrector include faults in: • dies • die support systems • billet and die heating • billet composition • extruder settings • extruder operation
Backer	The die must be given support against the force needed to make metal flow. The first item of 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 press 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	• Some larger press 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 bolster which closely follows the primary aperture so as to back it up. • Secondary bolsters are likely to be shared by several primary bolsters

Unit Sector(s)

Competency field Machine and process operations

Unit sector

Custom Content Section

Not applicable.