



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **PMBTECH402B Set advanced or complex dies**

**Revision Number: 1**

## PMBTECH402B Set advanced or complex dies

### Modification History

Not applicable.

### Unit Descriptor

#### Unit descriptor

This competency covers the ability to set advanced or complex dies, verify machine, die, and ancillary equipment functions and remove advanced or complex injection dies.

This competency is typically performed by technicians working either independently or as part of a work team.

### Application of the Unit

#### Application of this unit

This competency applies to technicians typically in the injection moulding and blow moulding sectors who set complex dies and make sure they are ready for production. The key factors are the efficient setting and validation of the right die for the job and the tuning of this die for efficient production. It includes:

- understanding die/process/material/product interactions
- selecting the right die and equipment such as actuated cores, power and control units
- checking the die for wear and damage
- setting and adjusting the replacement die according to specifications
- checking the die and process for efficient operation and making appropriate adjustments

*PMBPREP304C Set a die* covers the die setting for simple dies.

This unit does NOT include making adjustments, repairs or modifications to dies or equipment which require trade level skills such as might be made by a mechanical, tradesperson or toolmaker or similar skilled metals tradesperson.

### Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

### Prerequisites

This unit has the prerequisite of *PMBPREP304C Set a die*.

## Employability Skills Information

### Employability Skills

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

| ELEMENT                                                          | PERFORMANCE CRITERIA                                                                                                                                                            |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elements describe the essential outcomes of a unit of competency | Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide. |

## Elements and Performance Criteria

| <b>ELEMENT</b><br><b>ELEMENT</b>              | <b>PERFORMANCE CRITERIA</b><br>Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Prepare to change advanced or complex die. | 1.1 Determine when changeover will be required, and plan requirements for die change.<br>1.2 Prepare dies and all equipment related to the advanced or complex die change.<br>1.3 Prepare the moulding machine for die removal according to enterprise procedures.                                                                                                                                                                                                                                                                                                                |
| 2. Change dies.                               | 2.1 Remove die according to enterprise procedures, in a safe, systematic and time efficient manner.<br>2.2 Clean and store die according to workplace procedures applying corrosion protection if required.<br>2.3 Prepare the moulding machine according to procedures.<br>2.4 Attach replacement die to the machine according to procedures.                                                                                                                                                                                                                                    |
| 3. Set advanced or complex die.               | 3.1 Set machine conditions for new die.<br>3.2 Restart machine as per procedure.<br>3.3 Dry cycle machine and die according to enterprise procedures.<br>3.4 Check operation of die and power and control devices against die set up specifications.<br>3.5 Check the first off sample for compliance with required standards.<br>3.6 Fine tune settings and other production variables as required.<br>3.7 Note any equipment variances between actual production and documented set up conditions.<br>3.8 Complete workplace documentation and report to appropriate personnel. |
| 4. Anticipate die setting problems.           | 4.1 Identify potential problems which may occur during the die changing and setting process.<br>4.2 Determine possible causes of these problems.<br>4.3 Identify most likely causes and prioritise appropriate actions.<br>4.4 Rectify problems using appropriate solutions                                                                                                                                                                                                                                                                                                       |

| <b>ELEMENT</b> | <b>PERFORMANCE CRITERIA</b>                                                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ELEMENT        | Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide. |
|                | within area of responsibility.<br>4.5 Recommend improvements in systems or procedures.                                                                                          |

## Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit.

Knowledge and understanding of advanced and complex dies and their interactions with the process, materials and products is required.

Knowledge of organization standard procedures and work instructions and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and in a manner relevant to the job.

Knowledge about advanced/complex dies and their features which makes them more complex for setting than simple dies. This may include knowledge of:

- sliding blocks or cores actuated by skew pins or cams
- baffled, spiral, tube, and heat pipe cooling systems
- rising cores
- internally actuated unscrewing systems
- external power and control sources,
- externally actuated sliding blocks, cores, and unscrewing systems
- safety interlocks.

Skills in the safe, precise, efficient and correct installation of advanced and complex dies.

Competence includes the ability to apply and/or explain to a level sufficient for the practical completion of the job:

- die setting procedures for advanced/complex dies
- verification procedures for advanced/complex dies.

Competence also includes the ability to distinguish between causes of faults such as:

- wrong dies
- wrongly set die
- worn or damaged die
- non-optimum process conditions
- material type or quality.

### Language, literacy and numeracy requirements

This unit requires the ability to read and interpret technical specifications and data.

## Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for this training package.

### Overview of assessment

A holistic approach should be taken to the assessment.

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge.

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

It is essential that the procedures and the importance of critical die characteristics be understood. Competence must be demonstrated in the ability to recognise potential situations requiring action and then in implementing appropriate action.

Consistent performance should be demonstrated. For example, look to see that at least one type of advanced or complex die has been correctly set and removed and that there is evidence that other types of advanced or complex dies can also be set/removed.

### **Assessment method and context**

Assessment will occur on equipment using complex dies and will be undertaken in a work-like environment.

Competence in this unit may be assessed using an appropriate, industrial moulding machine:

- requiring demonstration of start-up, operation and emergency stop procedures
- requiring demonstration of changing and setting procedure for an advanced or complex die
- in a situation allowing the generation of evidence of the ability to recognise and resolve problems
- using a suitable simulation and/or a range of case studies/scenarios
- through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

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

### **Specific resources for assessment**

This section should be read in conjunction with the Range Statement for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method.

Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

Access must be provided to appropriate learning and/or assessment support when required.

Where applicable, physical resources should include equipment modified for people with disabilities.

## **Range Statement**

### **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. Add any 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.

Where reference is made to industry codes of practice and/or Australian/international standards, the latest version must be used.

### **Context**

This competency unit includes the setting and removal of advanced or complex dies. It does not include simple dies or moulds.

This competency applies typically to the injection moulding and blow moulding sectors. It requires an understanding of the operation of all relevant equipment and processes but does not necessarily require them to be used personally.

**Procedures**

All operations are performed in accordance with procedures.

Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

**Die**

A die is a former used to give shape to the product and used under pressure. Dies are typically used in the extrusion, injection, blow moulding and general rubber sectors. Dies which are not subject to pressure are referred to as 'moulds' in this Training Package.

**Advanced dies**

Advanced dies are two or three plate dies with one or more product forming components which move in a direction other than the mould open axis, and which are driven by the mould rather than external actuation. Typical features may include:

- sliding blocks or cores actuated by skew pins or cams
- baffled, spiral, tube, and heat pipe cooling systems
- rising cores
- internally actuated unscrewing systems.

**Complex dies**

Complex dies are dies which:

- use at least one external power and control source to actuate product forming components
- move in a direction other than the mould open axis
- require sequencing with the mould operation.

They include moulds which retain polymer melt within the mould between cycles.

Typical features may include:

- hot runners
- insulated runners
- externally actuated sliding blocks, cores and unscrewing systems
- safety interlocks.

**Setting**

Setting of the machine conditions may include setting the mould height on the machine, the clamp force, the mould safety system, the ejector system, the mould opening and closing distances, speeds and forces and the injection unit.

These settings may be performed automatically, using an electronic storage device to load settings from a previous run of this product, or may be performed by manually setting controls individually.

**Die and machine preparation**

The die and machine preparation may include making connections such as:

- hydraulic
- pneumatic
- electrical.

**Die fitting**

Die fitting includes the placement, attachment and adjustment of dies against predetermined specifications, but does not include the modification of dies or equipment to make them fit against new specifications or to change their performance as might be done by a toolmaker or similar metals tradesperson. Repairs to dies are also not covered by this unit.

**Die operations**

Die operations may include:

- die temperature control
- die component stroke
- clamping force
- speed
- pressure
- sequencing
- interlocks

**Machine operations**

Machine operations may include:

- machine movement speed and stroke
- pressure
- sequencing
- interlocks.

**Ancillary equipment operations**

Ancillary equipment operations may include:

- hot-runner temperature control
- hydraulic or pneumatic power supply for actuation of equipment such as cores or sliding blocks
- mould temperature control.

**Tools and equipment**

This competency includes use of equipment and tools such as:

- hand carts and trolleys
- hoists/lifting equipment not requiring any special permits or licences
- basic hand tools
- relevant personal protective equipment.

**Hazards**

Typical hazards include:

- hazardous materials
- manual handling hazards
- hot surfaces.

**Anticipate problems**

'Anticipate problems' includes taking a proactive approach to a wide range of routine and non-routine problems, using product and process knowledge to develop solutions to problems which do not have a known solution/a solution recorded in the procedures, and endeavouring to learn from the problem so that it does not recur.

Typical die setting problems may include:

- lack of cleaning of die surface and cooling channels, leading to corrosion
- inadequate fitting of the dies to the platens, causing poor alignment or movement during production
- fine adjustments of die movements, to optimise production.

All operations are performed in accordance with procedures.

**Variables**

Key variables, and their causes, to be monitored include:

- time/effort required to set a die
- number of attempts to produce a first off within specification
- the need to reset/adjust a die during then production run.
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**Unit Sector(s)**

Not applicable.