



Australian Government

Department of Education, Employment and Workplace Relations

FDFOP2036A Operate an extrusion process

Revision Number: 1

FDFOP2036A Operate an extrusion process

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the skills and knowledge required to set up, operate, adjust and shut down an extrusion process. This unit refers to both wet and dry extrusion processes.
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Application of the Unit

Application of the unit	This unit has application in a food processing production environment. It typically targets the production worker responsible for applying basic operating principles to the operation and monitoring of an extrusion process and associated equipment. When operators are required to perform batch or product changeover procedures as part of this work process, the procedures should the application of this unit. Where more detailed changeovers are carried out, FDFOP2011A Conduct routine maintenance, should be selected.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare the extrusion equipment and process for operation	1.1. Materials are confirmed and available to meet operating requirements 1.2. Machine components and related attachments are selected and fitted to meet operating requirements 1.3. Processing and operating parameters are entered as required to meet safety and production requirements 1.4. Equipment performance is checked and adjusted as required 1.5. Pre-start checks are carried out as required by workplace requirements
2. Operate and monitor the extrusion process	2.1. Ingredients and additives are delivered to the extrusion process in the required quantities and sequence 2.2. Preparation of the mass is monitored to confirm that specifications are met and mass is suitable for extrusion 2.3. The extrusion process is operated according to workplace procedures 2.4. Equipment is monitored to identify variation in operating conditions 2.5. Variation in equipment operation is identified and maintenance requirements are reported according to workplace reporting requirements 2.6. The extruded product is monitored to confirm that specifications are met 2.7. Out-of-specification product/process outcomes are identified, rectified and/or reported to maintain the process within specification 2.8. The work area is maintained according to housekeeping standards 2.9. Work is conducted in accordance with workplace environmental guidelines 2.10. Workplace records are maintained according to workplace recording requirements
3. Shut down the extrusion process	3.1. The appropriate shutdown procedure is identified 3.2. The process is shut down according to workplace procedures 3.3. Maintenance requirements are identified and reported according to workplace reporting requirements

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Ability to:

- access workplace information to identify processing requirements
- select, fit and use personal protective clothing and/or equipment
- confirm supply of necessary materials/ingredients and services
- conduct pre-start checks, such as inspecting equipment condition to identify any signs of wear, selecting and fitting appropriate attachments where required, setting processing parameters, cancelling isolation or lockouts as required, confirming that equipment is clean and correctly configured for processing requirements, positioning sensors and controls correctly, ensuring any scheduled maintenance has been carried out, and confirming that all safety guards are in place and operational
- start, operate, monitor and adjust process equipment to achieve required outcomes, including monitoring control points and conducting inspections as required at each stage of the extrusion process to confirm process remains within specification, such as:
 - parameters such as throughput
 - load/work input as measured by rpm (revs per minute)
 - kilowatts
 - amps and/or Hz (hertz) at each stage of the process
- monitor supply of materials to and from the extrusion process
- take corrective action in response to out-of-specification results
- respond to and/or report equipment failure within level of responsibility
- locate emergency stop functions on equipment
- follow isolation and lock out/tag out procedures as required to take process and related equipment off-line in preparation for cleaning and/or maintenance within level of responsibility
- demonstrate batch/product changeovers
- complete workplace records as required
- maintain work area to meet housekeeping standards
- use process control systems according to enterprise procedures
- conduct routine maintenance according to enterprise procedures
- collect samples and conduct tests according to enterprise procedures
- clean and sanitise equipment according to enterprise procedures
- use oral communication skills/language competence to fulfil the job role as specified by the organisation, including questioning, active listening, asking for clarification and seeking advice from supervisor
- work cooperatively within a culturally diverse workforce

REQUIRED SKILLS AND KNOWLEDGE

Required knowledge

Knowledge of:

- purpose and basic principles of each part of the process, including the purpose and methods used to achieve each stage of the extrusion process
- basic operating principles of equipment, including main equipment components, status and purpose of guards, equipment operating capacities and applications, and the purpose and location of sensors and related feedback instrumentation
- services required and action to take if services are not available
- the flow of the extrusion process and the effect of outputs on downstream processes
- quality characteristics of extruded output, including required characteristics of mass or blend to be extruded, such as:
 - gelatinisation and viscosity
 - dimensions, texture and hardness of extruded product
 - moisture content
- effect of variation in inputs and/or services on process performance
- operating requirements and parameters and corrective action required where operation is outside specified operating parameters, including the effect of variation in key variables, such as:
 - throughput and work input at each stage of the process
 - effect of time and temperature
 - barrel pressures and temperatures at each zone
- typical equipment faults and related causes, including signs and symptoms of faulty equipment and early warning signs of potential problems, such as:
 - screw and barrel assembly wear
 - die plate wear
 - wear of conditioner paddles
 - extruder knife condition
- methods used to monitor the extrusion process, such as inspecting, measuring and testing as required by the process
- inspection or test points (control points) in the process and the related procedures and recording requirements
- common causes of variation and corrective action required
- contamination risks related to the extrusion process and related control measures
- occupational health and safety (OHS) hazards and controls
- requirements of different shutdowns as appropriate to the process and workplace production requirements, including emergency and routine shutdowns and procedures to follow in the event of a power outage
- product/process changeover procedures and responsibilities
- isolation, lock out and tag out procedures and responsibilities

REQUIRED SKILLS AND KNOWLEDGE

- procedures and responsibility for reporting production and performance information
- environmental issues and controls relevant to the extrusion process, including waste/rework collection and handling procedures related to the process
- basic operating principles of process control, where relevant, including the relationship between control panels and systems and the physical equipment
- sampling and testing associated with process monitoring and control where relevant
- routine maintenance procedures where relevant
- cleaning and sanitation procedures where relevant

Evidence Guide

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

Assessment must be carried out in a manner that recognises the cultural and literacy requirements of the assessee and is appropriate to the work performed. Competence in this unit must be achieved in accordance with food safety standards and regulations.

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

Evidence of ability to:

- conduct pre-start checks on machinery used for extrusion
- start, operate, monitor and adjust process equipment to achieve required quality outcomes
- take corrective action in response to typical faults and inconsistencies
- complete workplace records as required
- apply safe work practices and identify OHS hazards and controls
- safely shut down equipment
- apply food safety procedures.

Context of and specific resources for assessment

Assessment must occur in a real or simulated workplace where the assessee has access to:

- personal protective clothing and equipment
- work procedures, including advice on safe work practices, food safety, quality and environmental requirements
- information on equipment capacity and operating parameters
- production schedule/batch instructions
- specifications, control points and processing parameters
- extrusion and related equipment and services
- ingredients/blend/mass to be extruded
- sampling schedules and test procedures and equipment as required
- documentation and recording requirements and procedures
- cleaning procedures, materials and equipment as

EVIDENCE GUIDE	
	required.
Method of assessment	This unit should be assessed together with core units and other units of competency relevant to the function or work role. Examples could be: • FDFOP2003A Clean equipment in place • FDFOP2004A Clean and sanitise equipment • FDFOP2011A Conduct routine maintenance • FDFOP2013A Apply sampling procedures • FDFOP2030A Operate a process control interface • MSL973001A Perform basic tests .
Guidance information for assessment	To ensure consistency in one's performance, competency should be demonstrated on more than one occasion over a period of time in order to cover a variety of circumstances, cases and responsibilities, and where possible, over a number of assessment activities.

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. 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.

Policies and procedures

Work is carried out according to company policies and procedures, regulatory and licensing requirements, legislative requirements, and industrial awards and agreements

Legislative requirements

Legislative requirements are typically reflected in procedures and specifications. Legislation relevant to the industry includes:

- the Food Standards Code including labelling, weights and measures legislation
- legislation covering food safety, environmental management, occupational health and safety, anti-discrimination and equal opportunity

When applied to the pharmaceutical industry, relevant Good Manufacturing Practice (GMP) codes apply in place of the Australian Food Standards Code and reference to food safety is replaced by GMP

Workplace information

Workplace information may include:

- standard operating procedures (SOPs)
- specifications
- production schedules and instructions
- manufacturers' advice
- standard forms and reports

Extrusion process

The extrusion process typically includes:

- feeding/dosing
- conditioning/cooking
- mixing
- extruding
- drying and cooling

It may also involve screening/sieving, a final additive addition stage and further processing,

RANGE STATEMENT	
	such as sheeting or aeration according to product type
Extrusion equipment	Extrusion equipment may include: • ingredients handling and addition equipment • mixers • conditioners • cookers • dryers and coolers Some systems may also include: • expanders • oil coating systems • screens and sieves • sheeting • cutting/stamping equipment • tray feeders/take off • stackers
Operation of equipment and processes	Operation of equipment and processes may require: • the use of process control panels and systems
Shutdown procedures	Shutdown procedures may include: • cleaning (in some cases cleaning may be carried out by a dedicated cleaning crew)
Services	Services may need to be confirmed. These depend on the nature of the process. Typical examples include: • power • steam • water • vacuum • compressed and instrumentation air

Unit Sector(s)

Unit sector	Operational
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		