



Australian Government

Department of Education, Employment and Workplace Relations

PMBPROD290B Operate filament winding equipment

Revision Number: 1

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Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the operation of filament winding equipment for composite products and the resolving of routine problems to procedure in the production process.

Application of the Unit

Application of this unit

This competency applies to operators who are required to undertake the routine operation of filament winding equipment. This competency is typically performed by operators working either independently or as part of a work team. The operator:

- takes product off the machine
- checks product for quality and conformity to specifications
- checks raw material feed
- deals with nonconforming products, waste and scrap
- notices any problems and takes required action (e.g. reporting)
- completes logs and reports.

They may record key variables such as machine conditions and production rate and reasons for interruptions.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit has **no** prerequisites.

Employability Skills Information

Employability Skills

The required outcomes described in this unit contain applicable Employability Skills. The Employability Skills Summary of the qualification(s) in which this unit is packaged will assist in identifying Employability Skill requirements.

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

ELEMENT ELEMENT	PERFORMANCE CRITERIA 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. Check work requirements.	1.1 Identify work requirements from production plan or request. 1.2 Check product, materials and equipment meet requirements for job(s). 1.3 Recognise requirements which may not be in accordance with usual practice. 1.4 Ask questions of appropriate person to confirm unusual practice. 1.5 Ensure housekeeping is to requirements. 1.6 Identify hazards associated with the job and take appropriate action 1.7 Perform other pre-operational checks in accordance with procedures.
2. Conduct pre-operational checks as required.	2.1 Check safety equipment is in place and working. 2.2 Check moulds, closures and fitting to procedures 2.3 Check moulds for cracks, chips marks and cleanliness 2.4 Check materials, including fibres, resins, additives and release agents are correct 2.5 Undertake other pre-operational checks in accordance with procedures.
3. Operate equipment to procedures.	3.1 Check process is operating within required limits. 3.2 Check product is in specification and to required quality standard. 3.3 Collect products and store as required. 3.4 Maintain supply of material(s) as required. 3.5 Complete logs and records as required. 3.6 Collect and segregate scrap, waste and other materials as required. 3.7 Keep equipment and work are clean. 3.8 Pause machine cycle and perform emergency stop as required.
4. Respond to routine problems in accordance with procedures.	4.1 Recognise known faults that occur during the operation.

ELEMENT ELEMENT	PERFORMANCE CRITERIA Performance Criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the Evidence Guide.
	4.2 Identify and take action on causes of routine faults. 4.3 Log problems as required. 4.4 Identify non-routine problems and report to designated person.

Required Skills and Knowledge

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

Application of knowledge of the materials, equipment, and process sufficient to recognise out of specification products, process problems and materials faults. For example, the impregnated fibres need to be consistently laid onto the mandrel to ensure a strong, uniform finished product. Therefore, the fibre bandwidth diameter needs to be monitored.

Knowledge of organisation procedures and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards.

Application of the knowledge of managing risks using the hierarchy of controls applied to the filament winding process. Application of approved hazard control and safety procedures and the use of PPE in relation to handling materials, equipment operation and cleanup.

Knowledge of and skills in the operation of filament winding equipment and the main components sufficient for consistent production of quality products including:

- production workflow sequences and materials demand
- the reasons for checking process control panels and reporting readings which do not conform to the work instructions
- accurately monitoring equipment operation and product quality
- the potential effects of variations in raw materials and equipment operation in relation to quality of product
- waste management and importance of reusing non-conforming products wherever possible
- correct selection and use of equipment, materials, processes and procedures
- identify factors which may affect product quality or production output and appropriate remedies
- setting up dies, mandrels or formers
- use of composites materials, including release agents, resins and fibres
- operation of equipment, including PLC controls
- curing of products, including application of wraps, heat or pressure.

Competence also includes the ability to:

- plan own work, including predicting consequences and identifying improvements
- identify when the operator is able to rectify faults, when assistance is required and who is the appropriate source for assistance
- identify and describe own role and role of others involved directly in the process

Language, literacy and numeracy requirements

This unit requires the ability to read and interpret typical product specifications, job sheets, procedures, material labels and safety information as provided to operators.

Writing is required to the level of completing workplace forms.

Numeracy is required to the level of reading tables of figures and graphs (and applying the resultant information), using formula percentages/ratios to determine the required mass of an additive (catalyst, pigment etc.) for a given amount of resin, and similar manipulations and interpretation.

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 competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- apply the required skills and knowledge to operate a filament winding machine
- apply approved procedures.

Consistent performance should be demonstrated. For example, look to see that filament winding production standards are met consistently.

Assessment method and context

Assessment will occur during the filament winding process for composites and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- by using an appropriate, industrial filament winding machine requiring demonstration of operation and emergency procedures
- in a situation allowing for the generation of evidence of the ability to respond to problems
 - by 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 applies to the operation of filament winding equipment used to manufacture filament wound composite products. It includes the operation of all relevant additional equipment where that equipment is integral to the process.

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.

Tools and equipment

This competency includes use of equipment and tools such as:

- filament winding equipment and its major components
- hand tools used in the this process
- material loading equipment used for loading of filament spools and resins
- relevant personal protective equipment.

Hazards

Typical hazards include:

- spills
- dusts/vapours
- slip and fall
- temperature (such as heat from curing oven)
- hazardous substances
- moving equipment (such as removing the mandrel using an extractor carriage)
- manual handling hazards.

Problems

'Respond to routine problems' means 'apply known solutions to a limited range of predictable problems'. Typical process problems may include:

- equipment malfunction
- variations in process conditions
- variations in materials or contamination of materials
- equipment, tool, die damage
- machine malfunction
- mould/tooling problems
- variations in materials and/or contamination of materials.

Typical product problems may include:

- voids
- poor surface finish
- colour contamination
- release from mandrel damage
- routine product faults.

Appropriate action for non-routine problems may be reporting to designated person or other action specified in the procedures.

Variables

Key variables to be monitored include:

- operating temperatures
- speed
- colour
- cycle time
- output rate
- product weight
- product integrity and general conformance to specification/sample.
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Unit Sector(s)

Not applicable.