Australian Government

Department of Education, Employment and Workplace Relations

PMAOPS305B Operate process control systems

Revision Number: 1

PMAOPS305B Operate process control systems

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the operation of a centralised control panel. These controllers use a range of control algorithms and multiple control loops. The panel will control multiple vessels/plant items and or products. It will typically be located off plant in a control room.

Application of the Unit

Application of the unit	In a typical scenario an operations technician uses a centralised process control system to operate and monitor the plant. This control system would typically be a distributed control system (DCS) and may include other local controllers which are integral to its operation (stand alone local controllers are covered by *PMAOPS216B Operate local control system*). This panel technician/central control room operator has an overall responsibility for the operation of all units of equipment covered by the control system. As such they often also take a lead role as part of the operating team. Competencies required by this role other than panel competencies as such are not covered by this unit. The operations technician would: • identify, correct and report operational problems • be aware of and contribute to a safe working environment • contribute to the safe and productive operation of the system • operate, monitor and maintain equipment using relevant procedures • take appropriate action following an alarm or out of specification condition developing Generally the operations technician would be part of a team during start up, shut down and normal operating conditions and would be expected to be capable of demonstrating competence in all parts of this unit. He/she would be taking a leading role in liaising and cooperating with other members of the team. Typically the panel operator will liaise with other 'outside operators', however this unit does not preclude the situation where the panel operator may also undertake 'outside' functions.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	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

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work.	1.1. Identify work requirements 1.2. Identify and control hazards 1.3. Coordinate with appropriate personnel
2. Use operator interface.	2.1. Use keyboards, track ball and monitor and/or stand alone controllers to access control system/panel 2.2. Monitor the process using the operator interfaces 2.3. Select appropriate controller modes 2.4. Access historical data and information 2.5. Acknowledge messages and alarms.
3. Access control information.	3.1. Obtain relevant data and information from the control system by applying systems knowledge 3.2. Identify the status of individual pieces of equipment from the control panel and use information to identify potential faults 3.3. Minimise fluctuations and variations in process through the interpretation of existing trends and control schematics 3.4. Record process variations/irregularities to procedures.
4. Control process variations and monitor operations.	4.1. Use historical data to assist the identification of problems 4.2. Process available information to identify potential faults 4.3. Undertake required set point/output changes to meet plant and process requirements 4.4. Optimise plant operating conditions in accordance with guidelines 4.5. Adjust production in response to test results and control panel information 4.6. Monitor key process and environmental variables and take appropriate action 4.7. Adjust controller settings in accordance with procedures 4.8. Use fine tuning software as appropriate 4.9. Coordinate with up stream and downstream units as appropriate 4.10. Record adjustments and variations to specifications/schedules 4.11. Communicate to appropriate personnel as required.

ELEMENT	PERFORMANCE CRITERIA
5. Facilitate planned and unplanned process start-ups and shut-downs.	5.1. Select and apply procedures to planned startup and shutdown processes 5.2. Select and apply procedures to unplanned shutdown processes 5.3. Implement all required emergency responses 5.4. Communicate necessary information to all personnel affected by events 5.5. Log all required information.
6. Respond to alarms or out of specification conditions.	6.1. Identify system(s) affected by the alarm or condition 6.2. Interpret alarms and prioritise actions to be taken 6.3. Take appropriate action to respond to the alarm or incident 6.4. Deal with any out of specification material in accordance with procedures 6.5. Communicate the problem/solution to appropriate personnel 6.6. Record the information as required 6.7. Provide details of the alarm and action taken to the next shift at change over

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This describes the essential skills and knowledge and their level, required for this unit.
Required skills
Competence includes the ability to distinguish between causes of problems/alarms/fault indications such as: • instrument failure/malfunction • electrical failure/malfunction • mechanical failure/malfunction • equipment design deficiencies • product parameters (temperature, flows, pressure and levels) • process control system malfunction • power/utility failures. An ability to communicate with other work groups and personnel during the operation and monitoring of this panel is considered an essential Element of this unit of competency.
Required knowledge
The knowledge referred to in the Evidence Guide for this unit includes: • the architecture and location of the process/production equipment • specific plant process operations • interactions between plant items/processes • product specifications and tolerances • systems operating parameters • system integrity limits • process control philosophies and strategies • emergency shutdown procedures • process specific physics, chemistry and mathematics • basic science of upstream and downstream processes • relevant chemistry of the process to the level of interpreting chemical equations and manipulating factors controlling rate of reaction and yield (or equivalent physics for a physical process/biochemistry for a biochemical process) - chemistry to include both intended products and interfering reactions, eg salts, hydrates • impact of external factors, eg variations in weather, feed etc • process drawings, eg P&ID, PFD • cause and effect • basis of control for the plant/s • instrumentation and control systems, including feed forward, feed back and open control • instrumentation and control system components, eg relevant primary sensing devices, final control elements, transducers/transmitters

REQUIRED SKILLS AND KNOWLEDGE
• control loops, including PID control, set points, controlled variable, indicated variable • interaction between multiple control loops, including cascade control • impacts of changing controller settings and the limits within which changes can be made • effective communication techniques • organisation procedures • UPS and its applications and use.

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, the Range Statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	Assessment of this unit should include demonstrated competence on actual plant and equipment in a work environment. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for assessment of parts of this unit. Simulation should be based on the actual plant and will include walk-throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios, role plays and 3D virtual reality interactive systems. In the case of evacuation training or of training for competencies practiced in life threatening situations, simulation may be used for the bulk of the training. This unit of competency requires an application of the knowledge contained in the use of the process control system and its integral equipment, to the level needed to maintain control and recognise and resolve problems. This can be assessed through questioning and the use of what-if scenarios both on the plant (during demonstration of normal operations and walk-throughs of abnormal operations) and off the plant.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate responses. The emphasis should be on the ability to stay out of trouble rather than on recovery from a disaster. Consistent performance should be demonstrated. In particular look to see that: • early warning signs of equipment/processes needing attention or with potential problems are recognised

EVIDENCE GUIDE	
	• the range of possible causes can be identified and analysed and the most likely cause determined • appropriate action is taken to ensure a timely return to full performance • obvious problems in related plant areas are recognised and an appropriate contribution made to their solution. These aspects may be best assessed using a range of scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations, which may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar sources.
Context of and specific resources for assessment	Assessment will require access to a process control system over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork, communication and leadership units.
Guidance information for assessment	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.

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 italicized wording, if used in the Performance Criteria, is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs if the candidate, accessibility of the item, and local industry and regional contexts.	
Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Context	This unit of competency includes all such items of equipment and unit operations which form part of the control system. For your control room this may include (select relevant items): • process control systems, eg Distributed Control Systems • personal computers • printers • fire and gas detection/protection systems • emergency shutdown systems • communications systems. Typical problems for your plant may include: • loss of power/utilities • analysing failure modes • variation/loss of feed • unstable control of pressure, temperature level and flows • control equipment failure • process plant trips • change in atmospheric conditions (rain, temperature, wind, lightning) • emergency situations.
Alarms or abnormal conditions	Alarms or other abnormal conditions includes: • emergency, including emergency shut down • partial or complete controller failure.
Other problems	Other problems includes: • problem solving control functions
Appropriate action	Appropriate action includes: • determining problems needing action • determining possible fault causes • rectifying problem using appropriate solution within area of

RANGE STATEMENT	
	responsibility • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person.
Health, **safety and environment** (**HSE**)	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence.

Unit Sector(s)

Unit sector	Operational/technical

Competency field

Competency field	

Co-requisite units

Co-requisite units	