



Australian Government

PMAOPS601 Debottleneck plant

Release: 1

PMAOPS601 Debottleneck plant

Modification History

Release 1. Supersedes and is equivalent to PMAOPS601A Debottleneck plant

Application

This unit of competency covers the skills and knowledge required to make changes to plant or process that increase the throughput of a plant. It applies to a small plant or a section/area of a larger plant.

This unit of competency applies to senior technicians or those in similar roles who are required to apply in-depth technical knowledge of process and plant operation and problem solving in order to identify the rate limiting step/process/plant unit (bottleneck), evaluate possible solutions, select the most appropriate option, and coordinate and supervise the plant and/or process modifications.

This unit of competency does not apply to:

- identification of the need for debottlenecking; the need for the debottlenecking may arise from a continuous improvement project, as a result of an analysis of plant performance or from any other source
- design of equipment; this would typically be an engineering role
- work requiring special certification (e.g. registered structural engineer).

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Operations

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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| 1 | Identify rate | 1.1 | Determine throughput of plant/area |
|---|----------------------|-----|------------------------------------|

	limiting step/process	1.2	Determine capacity of units within plant/area based on design and/or performance data
		1.3	Identify which units is operating at capacity/is the bottleneck
2	Investigate bottleneck	2.1	Analyse the science of what is occurring in the bottleneck unit
		2.2	Analyse the engineering/design specification of the bottleneck unit
		2.3	Determine the root cause of the capacity limitation of the bottleneck unit
		2.4	Investigate methods of increasing the capacity of the bottleneck unit
		2.5	List solutions to the bottleneck
3	Select technically best solution	3.1	Investigate impact of solutions on the other units of the plant/area
		3.2	Identify any 'knock on' effects of solution
		3.3	Determine process/quality benefits and costs of solutions
		3.4	Determine economic benefits and costs of solutions
		3.5	Short list and rank the best solutions
4	Compare hazard profile of possible solutions	4.1	Organise a hazard analysis (e.g. hazard and operability study (HAZOP)) for the solutions according to company procedures
		4.2	Ensure that all stakeholders are represented on the hazard analysis team
		4.3	Brief the hazard analysis team on the problem and solution alternatives under evaluation
		4.4	Eliminate alternatives which do not meet hazard requirements

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| | | 4.5 | Rank remaining competing items by safety performance |
| 5 | Make final choice of solution | 5.1 | Seek further information, where necessary, to allow a rational selection to be made |
| | | 5.2 | Choose the modification which meets all required minimum standards and will provide the best solution |
| | | 5.3 | Verify choice in discussion with production and engineering managers and other key stakeholders |
| 6 | Check solution | 6.1 | Initiate and monitor the implementation of the solution |
| | | 6.2 | Ensure all checks and acceptances are done to procedures |
| | | 6.3 | Conduct trials/test runs as required |
| | | 6.4 | Collect and analyse data |
| 7 | Complete modification | 7.1 | Evaluate performance of solution |
| | | 7.2 | Make adjustments as required |
| | | 7.3 | Ensure plant procedures and training material updated |
| | | 7.4 | Ensure plant drawings and engineering specifications are updated |
| | | 7.5 | Complete all other required paperwork |

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory framework The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used, and include one or more of the following:

- legislative requirements, including work health and safety (WHS)
- industry codes of practice and guidelines
- environmental regulations and guidelines
- Australian and other standards
- licence and certification requirements

All operations to which this unit applies are subject to stringent health, safety and environment (HSE) requirements, which may be imposed through state/territory 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

Hazards Hazards include one or more of the following:

- electricity
- gas
- flow, pressure
- equipment failures
- plant services (steam, condensate and cooling water)
- flammability and explosivity
- hazardous products and materials
- other hazards that might arise

Procedures All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, include one or more of the following:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes

- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to PMAOPS601A Debottleneck plant

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875>

Assessment Requirements for PMAOPS601 Debottleneck plant

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria, and include the ability to:

- determine options for debottlenecking to address identified needs
- determine agreed technical requirements, operations requirements, timelines, cost and other requirements for modifications
- evaluate types of modification and classes of equipment against specifications, hazard and operability study (HAZOP), economic performance and legislative requirements to select best solution
- ensure training, procedures, plant drawings and specifications are updated to reflect modifications.

Knowledge Evidence

Evidence must be provided that demonstrates knowledge of:

- the operations of the plant and each major unit in it
- the principles of operation of the equipment being investigated to the extent required to interpret technical specifications in a meaningful manner
- the basics of plant economics and whole of life costing
- hazard analysis principles
- typical hazards with the type of equipment being investigated
- work health and safety (WHS) legislative requirements related to plant, including registration and documentation requirements related to modification of registered plant
- problem isolation techniques
- problem analysis techniques
- systems operating parameters, integrity limits
- process-specific science (physics, chemistry and biochemistry)
- hierarchy of control
- hazards that may arise in the job/work environment, and:
 - their possible causes
 - potential consequences
 - appropriate risk controls.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence based on a holistic assessment of the evidence.
- The collection of performance evidence is best done from a report and/or folio of evidence drawn from:
 - a single project which provides sufficient evidence of the requirements of all the elements and performance criteria
 - multiple smaller projects which together provide sufficient evidence of the requirements of all the elements and performance criteria.
- A third-party report, or similar, may be needed to testify to the work done by the individual, particularly when the project has been done as part of a project team.
- Assessment should use a real project in an operational workplace. Where this is not possible or practical assessment must occur using a sufficiently rigorous simulated environment reflecting realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition, the assessor or anyone acting in subject matter expert role in assessment must demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they must assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed

- being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
- having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
- conducting on-the-job training/assessments of the type of work being assessed
- being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work

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