



Australian Government

Department of Education, Employment and Workplace Relations

MSS405082A Adapt a proactive maintenance strategy to the process operations sector

Release: 1

MSS405082A Adapt a proactive maintenance strategy to the process operations sector

Modification History

New unit, superseding MSACMT682A Adapt a proactive maintenance strategy to the process manufacturing sector* - Equivalent

* New prerequisite *MSS405081A Develop a proactive maintenance strategy* superseding MSACMT681A Develop a proactive maintenance strategy

Unit Descriptor

This unit of competency covers the skills and knowledge required to develop and apply a proactive maintenance strategy for continuous manufacturing processes which may also be major hazard facilities or similar.

Application of the Unit

This unit applies to an individual in a continuous manufacturing sector, such as chemical, hydrocarbons and refining, smelting and cement, which is seeking to improve the efficiency and reliability of equipment. Typically such an organisation will also be engaged in implementing competitive systems and practices. As continuous manufacturers, such as the chemical, hydrocarbons and refining sectors, are often also major hazard facilities this will influence the proactive maintenance choices which need to be made.

The unit covers the selection of appropriate strategies, techniques and tools and the adapting of them to the organisations needs. It also covers the application of the strategies to new areas and the improvement of operation in existing areas. This would typically be done in a team environment and in consultation with all key stakeholders.

This unit requires the application of skills associated with problem solving, initiative, enterprise, planning and organising in order to adapt a proactive maintenance strategy to meet specific needs of the enterprise. This work is done in the context of using computer technology and also requires aspects of self-management and learning to ensure improvement of own performance.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MSS405081A Develop a proactive maintenance strategy

Employability Skills Information

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

1	Interpret proactive maintenance strategy	1.1	Analyse proactive maintenance strategy
		1.2	Identify areas which may conflict with hazard or operations requirements
		1.3	Analyse data arising from incident reports (and similar) for maintenance implications
		1.4	Compile hazard control implications for proactive maintenance strategy
2	Interpret hazard information	2.1	Analyse Hazard and Operability Studies (HAZOP) (or similar) data for maintenance implications
		2.2	Analyse safety case (or similar) data for maintenance implications
		2.3	Analyse data arising from incident reports (and similar) for maintenance implications
		2.4	Compile hazard control implications for proactive maintenance strategy

- | | | | |
|---|--|-----|--|
| 3 | Identify shutdown cycle requirements | 3.1 | Determine when the next shutdown is due and the expected time between shutdowns |
| | | 3.2 | Identify plant items/maintenance activities which can only be completed during a shutdown |
| | | 3.3 | Identify critical conditions which must not be breached in order to maintain plant reliability until shutdown |
| | | 3.4 | Compile shutdown cycle requirements for proactive maintenance strategy |
| | | | |
| 4 | Identify maintenance requirements of ancillary equipment | 4.1 | Identify proactive maintenance requirements of ancillary equipment |
| | | 4.2 | Identify maintenance which can only be done when the plant is shut down |
| | | 4.3 | Compile ancillary equipment requirements for proactive maintenance strategy |
| | | | |
| 5 | Adapt proactive maintenance strategy | 5.1 | Compare identified requirements to the proactive maintenance strategy |
| | | 5.2 | Negotiate a proactive maintenance strategy which meets these requirements |
| | | 5.3 | Involve team members in relating identified problems and opportunities for improvement to the maintenance strategy, and involve them in developing any required changes to ensure awareness, learning and commitment |
| | | 5.4 | Monitor the implementation of the strategy to ensure the identified requirements are met |
| | | 5.5 | Make required adjustments and arrange for strategy review |

Required Skills and Knowledge

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

Required skills

Required skills include:

- communicating with others using a variety of media and techniques
- adapting personal communication strategy to different levels of literacy and numeracy in target individuals and groups
- working in a team
- analysing quantitative and qualitative information to determine proactive maintenance strategy options
- applying a structured approach to integrating hazard management considerations to the development of a proactive maintenance strategy
- solving problems to root cause
- applying basic mathematical and statistical techniques
- planning complex strategies, including consideration of timelines, resources, benefit/cost, implementation requirements, and monitoring and adjustment considerations
- reading and interpreting engineering specifications, drawings and charts
- using information system terminals and computers
- prioritising options, including reasons and recommendations
- recording data

Required knowledge

Required knowledge includes:

- continuous manufacturing equipment and products of the organisation
- start-up, shutdown and isolation considerations for the organisation
- skills required by operators and maintenance personnel to achieve effective proactive maintenance strategy implementation
- characteristics and strengths of different types of strategies, techniques and tools, such as:
 - total preventative maintenance/total productive maintenance (TPM)
 - reliability centred maintenance (RCM)
 - mean time between failure (MTBF)
 - failure mode and effects analysis (FMEA)
 - condition monitoring
 - root cause analysis (RCA)
- holistic costs of different strategies combining cost of maintenance with costs of lost

- production, sales, and so on, as relevant to the organisation
- business goals sufficient to match the strategy to the business needs
- strategic thinking and its application to proactive maintenance
- principles of process equipment and how to improve its reliability
- resources required and how to obtain them

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.

<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>A person who demonstrates competency in this unit must be able to provide evidence of the ability to:</p> <ul style="list-style-type: none"> • analyse hazards and risks and determine implications for proactive maintenance strategies • consider a variety of proactive maintenance strategies for suitability to an organisation • consult operators, maintenance, management and other stakeholders in decisions on proactive maintenance strategies • monitor implementation of selected proactive maintenance strategies and make appropriate adjustments.
<p>Context of and specific resources for assessment</p>	<p>Assessment of performance must be undertaken in a workplace using or implementing one or more competitive systems and practices. Access may be required to:</p> <ul style="list-style-type: none"> • workplace procedures and plans relevant to work area • specifications and documentation relating to planned, currently being implemented, or implemented changes to work processes and procedures relevant to the assessee • documentation and information in relation to production, waste, overheads and hazard control/management • reports from supervisors/managers • case studies and scenarios to assess responses to contingencies.
<p>Method of assessment</p>	<p>A holistic approach should be taken to the assessment. Competence in this unit may be assessed by using a combination of the following to generate evidence:</p>

	<ul style="list-style-type: none">• demonstration in the workplace• workplace projects• suitable simulation• case studies/scenarios (particularly for assessment of contingencies, improvement scenarios, and so on)• targeted questioning• reports from supervisors, peers and colleagues (third-party reports)• portfolio of evidence. <p>In all cases it is expected that practical assessment will be combined with targeted questioning to assess underpinning knowledge.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p>
--	---

Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the candidate and the work being performed.
--	--

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.

Competitive systems and practices	<p>Competitive systems and practices may include, but are not limited to:</p> <ul style="list-style-type: none"> • lean operations • agile operations • preventative and predictive maintenance approaches • monitoring and data gathering systems, such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Materials Resource Planning (MRP) and proprietary systems • statistical process control systems, including six sigma and three sigma • Just in Time (JIT), kanban and other pull-related operations control systems • supply, value, and demand chain monitoring and analysis • 5S • continuous improvement (kaizen) • breakthrough improvement (kaizen blitz) • cause/effect diagrams • overall equipment effectiveness (OEE) • takt time • process mapping • problem solving • run charts • standard procedures • current reality tree <p>Competitive systems and practices should be interpreted</p>
--	--

	<p>so as to take into account:</p> <ul style="list-style-type: none">• the stage of implementation of competitive systems and practices• the size of the enterprise• the work organisation, culture, regulatory environment and the industry sector
--	---

Safety case	<p>Safety case refers to:</p> <ul style="list-style-type: none"> • a formal requirement of major hazard facilities in order to procure an operating licence
Shutdown	<p>Shutdown refers to:</p> <ul style="list-style-type: none"> • the regulatory shutdown of the plant for safety inspections (this is also the only time major maintenance can be done)
Ancillary equipment	<p>Ancillary equipment includes other plant, such as:</p> <ul style="list-style-type: none"> • boilers • utilities • plants • waste treatment and hazard control equipment (e.g. fire ring mains, fire monitors, steam curtains, gas (or other loss of containment) monitors, blast protection and flare stacks)
TPM	<p>TPM includes:</p> <ul style="list-style-type: none"> • an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing OEE
RCM	<p>RCM includes:</p> <ul style="list-style-type: none"> • moving maintenance from reactive, or even planned/programmed towards a focus on uptime and OEE
RCA	<p>RCA is a structured problem solving technique. Typically there are many possible causes of any problem. Eliminating some will have no impact, others will ameliorate the problem. However, elimination of the root cause will eliminate the problem. There should only be one root cause for any problem and so the analysis should continue until this one cause is found. Elimination of the root cause permanently eliminates the problem.</p>
MTBF	<p>MTBF is one key measure of the effectiveness of a maintenance procedure, and is an indicator as to whether root causes are being found and resolved. If MTBF is reducing, then it is an indicator that the maintenance regime is failing.</p>
FMEA	<p>FMEA is a systematic approach that identifies potential failure modes in a system, product, or operations/assembly operation caused by either design or</p>

	operations/assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. FMEA is a tool used to prevent problems from occurring. Some industry sectors have highly adapted forms of FMEA and may practice traditional FMEA in say their routine maintenance while using another technique, such as HAZOP, for design and modification.
Uptime	Uptime refers to: <ul style="list-style-type: none"> the overall availability of the plant (it is the inverse of downtime) or the unavailability of the plant. Ideal uptime is 100%
OEE	OEE is the combination of the main factors causing loss of productive capacity from equipment/plant and is where: $OEE = \text{availability} \times \text{performance} \times \text{quality rate}$ <ul style="list-style-type: none"> availability takes into account losses due to breakdown, set-up and adjustments performance takes into account losses due to minor stoppages, reduced speed and idling quality rate takes into account losses due to rejects, reworks and start-up waste
Condition monitoring	Condition monitoring involves often quite sophisticated monitoring of equipment, including such things as: <ul style="list-style-type: none"> vibration monitoring instrumental analysis of lubricating oil, and so on to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability
HAZOP	HAZOP is a form of FMEA which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.

Unit Sector(s)

Unit sector

Competitive systems and practices

Custom Content Section

Not applicable.