



Australian Government

Department of Education, Employment and Workplace Relations

MSACMT682A Adapt a proactive maintenance strategy to the process manufacturing sector

Release: 1

MSACMT682A Adapt a proactive maintenance strategy to the process manufacturing sector

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the knowledge and skills needed to develop and proactive maintenance strategy for continuous manufacturing processes which may also be major hazard facilities or similar.
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Application of the Unit

Application of the unit	<p>In a typical scenario, an organisation engaged in <i>competitive manufacturing</i> using continuous manufacturing technology also adopts proactive maintenance strategies. Continuous manufacturers such as the chemical, hydrocarbons and oil refining sectors are often also major hazard facilities and this will change the priority of some of the choices which need to be made.</p> <p>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.</p> <p>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.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	<i>MSACMT681A</i>	<i>Develop a proactive maintenance strategy</i>
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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. 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 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

ELEMENT	PERFORMANCE CRITERIA
	strategy review

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- communication
- team work
- analysis
- problem solving
- mathematics
- planning and organising
- reading and interpreting engineering specifications/drawings
- computer use
- prioritising
- recording data

Required knowledge

- characteristics and strengths of different types of strategies, techniques and tools such as TPM, RCM, MTBF, FMEA, condition monitoring, RCA
- holistic costs of different strategies combining cost of maintenance with costs of lost production, sales etc 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

EVIDENCE GUIDE	
<p>The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence. It is essential for assessment and must be read in conjunction with the performance criteria, the range statement and the assessment guidelines of the relevant training package.</p>	
<p>Overview of assessment requirements</p>	<p>The person will be able to select appropriate strategies, techniques and tools and adapt them to the organisation's needs. They will also be able to apply the strategies to new areas and improve their operation in existing areas.</p>
<p>What are the specific resource requirements for this unit?</p>	<p>Access to an organisation using, or about to use, proactive maintenance strategies.</p>
<p>In what context should assessment occur?</p>	<p>Assessment will need to occur in an organisation using, or about to use, a proactive maintenance strategy or a case study or project.</p>
<p>Are there any other units which could or should be assessed with this unit or which relate directly to this unit?</p>	<p>This unit may be assessed concurrently with other relevant maintenance units and technical units related to the techniques and tools.</p> <p>This unit is related to:</p> <ul style="list-style-type: none"> • <i>MSACMT280A Undertake root cause analysis</i> • <i>MSACMT281A Contribute to the application of a proactive maintenance strategy</i> and • <i>MSACMT481A Undertake proactive maintenance analyses</i> <p>which cover different aspects/levels of this area.</p>
<p>What method of assessment should apply?</p>	<p>Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria, skills and knowledge. A holistic approach should be taken to the assessment.</p> <p>Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.</p> <p>The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.</p> <p>The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.</p>
<p>What evidence is required for demonstration of consistent</p>	<p>If evidence is provided from the initial introduction of a proactive maintenance strategy or a significant maintenance strategy, then one development and implementation may provide sufficient</p>

EVIDENCE GUIDE	
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performance?	evidence. Where evidence is from the ongoing improvements of an existing strategy, then it will be needed from a range of activities to provide sufficient evidence.
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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.

Competitive manufacturing	<p><i>Competitive manufacturing</i> is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to:</p> <ul style="list-style-type: none"> • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems control and data acquisition software (SCADA), enterprise resource planning systems (ERP), Manufacturing resource planning (MRP), and proprietary systems such as SAP • statistical process control systems, including six sigma and three sigma • Just In Time (JIT), kanban and other pull-related manufacturing control systems • supply, value, and demand chain monitoring and analysis • other continuous improvement systems <p>Competitive manufacturing should be interpreted so as to take into account the stage of implementation of competitive manufacturing approaches, the enterprise's size and work organisation, culture, regulatory environment and manufacturing sector.</p>
HAZOP	HAZOP (hazard and operability studies) is a technique of analysing process plant to determine hazard and operability issues.
Safety Case	Safety Case is a formal requirement of major hazard facilities in order to procure an operating licence.
Shutdown	Shutdown is the term applied to the regulatory shut down of the plant for safety inspections. This is also the only time major maintenance can be done.

RANGE STATEMENT	
Ancillary equipment	Ancillary equipment includes other plant such as boilers, utilities plants, waste treatment and hazard control equipment includes equipment such as fire ring mains, fire monitors, steam curtains, gas (or other loss of containment) monitors, blast protection and flare stacks.
Strategies and techniques may include:	<ul style="list-style-type: none"> • Total Productive Maintenance (TPM) • Reliability Centred Maintenance (RCM) • Root Cause Analysis (RCA) • Mean Time Between Failures (MTBF) • Failure Mode and Effects Analysis (FMEA) • Condition monitoring <p>Total Preventative Maintenance/Total Productive Maintenance (TPM) is an application of total quality management to maintenance with the intention of increasing reliability, getting it right first time and increasing <i>OEE</i>.</p> <p>Reliability Centred Maintenance (RCM) moves maintenance from reactive, or even planned/programmed towards a focus on <i>uptime</i> and <i>OEE</i>.</p> <p>RCA 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> <p>Uptime refers to the overall availability of the plant - it is the inverse of downtime - or the unavailability of the plant. Ideal uptime is 100%.</p> <p>Overall equipment efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is where:</p> $OEE = \text{availability} \times \text{performance} \times \text{quality rate}$ <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 <p>Mean time between failure (MTBF) is one key measure</p>

RANGE STATEMENT	
	<p>of the effectiveness of a maintenance procedure, and is an indicator as to whether <i>root causes</i> are being found and resolved. If <i>MBTF</i> is reducing, then it is an indicator that the maintenance regime is failing.</p> <p>Failure Mode and Effects Analysis (FMEA) is a systematic approach that identifies potential failure modes in a system, product, or manufacturing / assembly operation caused by either design or manufacturing / assembly process deficiencies. It also identifies critical or significant design or process characteristics that require special controls to prevent or detect failure modes. <i>FMEA</i> is a tool used to prevent problems from occurring. Some industry sectors have highly adapted forms of <i>FMEA</i> and may practice traditional <i>FMEA</i> in say their routine maintenance while using another technique (such as <i>HAZOP</i>) for design and modification.</p> <p>Hazard and Operability Studies (HAZOP) is a form of <i>FMEA</i> which has been practiced by the process industries for over 30 years and examines the implications of changes in process conditions to process stability.</p> <p>Condition monitoring involves often quite sophisticated monitoring of equipment including such things as vibration monitoring, instrumental analysis of lubricating oil etc to determine the current state of the equipment, monitor the change in this condition and predict when it needs servicing/maintenance to maintain reliability.</p>

Unit Sector(s)

Unit Sector	CM Tools
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Co-requisite units

Co-requisite units	
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Functional area

Functional Area	
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