Australian Government

Department of Education, Employment and Workplace Relations

MSACMT481A Undertake proactive maintenance analyses

Revision Number: 1

MSACMT481A Undertake proactive maintenance analyses

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the skills needed for the most common forms of analyses associated with predictive maintenance strategies.

Application of the Unit

Application of the unit	In a typical scenario, a technical expert (usually an engineer, technician or tradesperson) will be required to undertake analyses for the purpose of predictive/preventative/reliability centred maintenance as part of a ***competitive manufacturing*** strategy. This unit primarily requires the application of skills associated with communication, teamwork, problem solving, initiative and enterprise, and planning and organising in order to undertake maintenance analyses. This is normally done in the context of using computer technology, and requires aspects of learning and self management to ensure team involvement and facilitation of learning.

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. Liaise with operator	1.1. Establish a relationship with the operator/s of equipment/plant 1.2. Ensure the operator has the required skills and resources to keep the equipment/plant clean 1.3. Ensure the operator is able to effectively monitor the operation of the equipment/plant 1.4. Regularly communicate with operator about the ***Overall Equipment Efficiency*** (***OEE***) of their equipment/plant 1.5. Involve operator, team leader and other key personnel in identification of skill needs and means of skill acquisition to fill any identified gaps
2. Analyse history	2.1. Analyse ***Mean Time Between Failures*** (***MTBF***) (or similar statistical history analysis)from maintenance records 2.2. Analyse performance data of the equipment/plant 2.3. Identify causes of changes to historic trends/status 2.4. Determine methods of ensuring causes of improvements are locked in and deterioration resolved
3. Undertake Failure Mode Effects Analysis (FMEA) (or similar)	3.1. Undertake analysis 3.2. Record results of analysis 3.3. Investigate methods of eliminating possibility of failure and/or minimising the impact of the failure 3.4. Liaise with operator, team leader and other key personnel regarding possible solutions 3.5. Select most appropriate solution 3.6. Implement selected solutions
4. Undertake condition monitoring analysis	4.1. Obtain data for condition monitoring analysis 4.2. Interpret condition monitoring data 4.3. Predict required maintenance type and timing from condition monitoring data 4.4. Liaise with operator, team leader and other key personnel regarding implications of condition monitoring report 4.5. Involve team members in development of

ELEMENT	PERFORMANCE CRITERIA
	changes to maintenance strategy to ensure awareness, learning and commitment

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills:
• communication • teamwork • analysis • problem solving • mathematics • planning • reading and interpreting engineering specifications/drawings • computer use • prioritising • recording data.
Required knowledge:
• cleaning needs, techniques and principles • methods of assessing skill gaps and filling them • techniques for determining MTBF or similar • techniques for undertaking FMEA or similar • underpinning principles of competitive manufacturing strategies being implemented and how to adapt them to maintenance • root cause analysis • condition monitoring.

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 this training package.	
Overview of assessment requirements	The person will be able to undertake a range of predictive maintenance analyses as well as support operations staff, and implement an advanced maintenance strategy.
What critical aspects of evidence are required to demonstrate competency in this unit?	Evidence should be available as to the analyses undertaken and the support provided.
In what context should assessment occur?	Assessment needs to occur in an organisation using predictive maintenance strategies or a simulation in a workshop or by case study.
Are there any other units which could or should be assessed with this unit or which relate directly to this unit?	This unit may be assessed concurrently with other relevant maintenance units. This unit is related to: • *MSACMT280A Undertake root cause analysis* • *MSACMT281A Contribute to the application of a proactive maintenance strategy*, and • *MSACMT681A Develop a proactive maintenance strategy* which cover different aspects/levels of this area.
What method of assessment should apply?	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. 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. The assessee will have access to all techniques, procedures, information, resources and aids which

EVIDENCE GUIDE	
	would normally be available in the workplace. The method of assessment should be discussed and agreed with the assessee prior to the commencement of the assessment.
What evidence is required for demonstration of consistent performance?	Generally evidence will be required from a range of predictive maintenance analyses in order to have sufficient evidence.
What are the specific resource requirements for this unit?	Access to an organisation using predictive maintenance procedures.

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	Competitive manufacturing is used to describe the range of systemic manufacturing practice concepts and approaches. It covers but is not limited to: • lean manufacturing • agile manufacturing • preventative and predictive maintenance approaches • monitoring and data gathering systems such as Systems Control and Data Acquisition (SCADA) software, Enterprise Resource Planning (ERP) systems, Manufacturing Resource Planning (MRP), and proprietary systems such as SAP etc. • 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. 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.
Overall Equipment Efficiency (**OEE**	Overall Equipment Efficiency (OEE) is the combination of the main factors causing loss of productive capacity from equipment/plant and is: *OEE = availability x performance x quality rate* where: • 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 t losses due to rejects,

RANGE STATEMENT	
	reworks and start up waste.
Mean Time Between Failure (**MTBF**)	Mean Time Between Failure (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. 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.
Failure Mode and Effects Analysis (**FMEA**)	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. 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. ***Hazard and Operability Studies*** (***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.
Condition monitoring	In this unit condition monitoring is used to describe the process of analysing the implications of condition monitoring data for proactive maintenance whether it be obtained from non destructive testing reports, visual assessment by experts, diagnostic reports obtained from SCADA or other enterprise or equipment software and product or process quality analyses. It does not require the actual undertaking of the NDT or condition monitoring assessment or test. If this is required appropriate units from other Training Packages will be

RANGE STATEMENT	
	required.

Unit Sector(s)

Unit Sector	CM Tools

corequisite units

Corequisite units	

Functional area

Functional Area	