Title:	Unit 10: Inspecting Components and Machines
Level:	3
Credit value:	5
GLH:	30
Unique Reference Number:	Y/651/1996
Sector Subject Area:	4.1 - Engineering
Aim:	The aim of this unit is to provide learners with the skills and knowledge to be able to inspect components and machines using a variety of techniques, and to effectively complete related documentation.
Assessment Type:	Practical assignment
Assessment Guidance:	Assessment of this unit will be through the completion of a mandatory internally set and internally assessed practical assignment.

Learning outcomes
The learner will:

1. Be able to describe quality assurance and control processes within a machining setting.

Delivery content:

The aim of this learning outcome is to provide the learners with the knowledge and understanding on common quality assurance and control processes in order to use these within the workplace. (K12, K16, K19)

The learner must:

1.1 Describe the **difference between quality control and quality assurance**. (K12)

1.2 Describe common **quality assurance processes**, including features of quality assurance documentation. (K12, K16, K19)

1.3 Describe **quality control processes,** and the possible problems that could occur if quality control is not carried out.

1.4 Explain **escalation procedures** within their organisation. (K19)

1.5 Describe features of quality assurance and quality control documentation and record keeping, and the importance of keeping accurate records.

2.	Be able to inspect machined parts using a range of techniques.
Delivery content: The aim of this learning outcome is to provide the learners with the knowledge and skills to inspect machined parts against a drawing using a range of techniques. The learner must: 2.1 Carry out inspections on a range of components using a range of **measuring techniques and equipment**. (K14, S16, S17, S18, S19)) 2.2 Identify and describe **faults and issues** with finished components and the methods for resolving these. (K13) 2.3 Demonstrate recording of **data** collected from inspections. (S7, S11, S16) 2.4 Explain the importance of accurate measurements from inspections.	
3.	Be able to give written and verbal feedback on machining issues.
Delivery content: The aim of this learning outcome is to provide the learners with the knowledge, skills and behaviours to give effective feedback, both written and verbally, to address and resolve issues. (K15, S21, B4) The learner must: 3.1 Demonstrate **effective verbal feedback** to address an issue with a machined part. (K15, S19, S21, B4) 3.2 Give **constructive written feedback** to address an issue with a machined part. (K15, S19) 3.3 Use **machining industry terminology** correctly to ensure accurate feedback. (K15)	
4.	Be able to carry out checks on tooling for machining.
Delivery content: The aim of this learning outcome is to provide the learners with the knowledge and skills to carry out checks on tooling for machining. The learner must: 4.1 Identify different **types of wear on tooling**. (K19) 4.2 Describe the **effects of tool wear** on finished pieces. (S17)	

4.3 Explain how to **reduce wear on tooling** to prolong the life of the tool and maintain the quality of the finished piece.
5. Be able to carry out checks on equipment and machinery.
Delivery content: The aim of this learning outcome is to provide the learners with the knowledge and skills to carry out checks on equipment and machinery prior and during work to maintain quality, and identify or prevent issues. The learner must: 5.1 Describe and carry out checks made prior to every machining activity. 5.2 Carry out **daily checks** made on machinery. (K13, S11, S17) 5.3 Describe **weekly checks** made on machinery. (K13, S11, S17) 5.4 Explain the importance of regular checks. 5.5 Explain the **escalation processes** for issue reporting for their workplace. (S19) 5.6 Explain the differences between **planned and reactive maintenance**. (K17)

Scope of Training The Scope of Training identifies areas that must be covered during the delivery of this unit. This is the minimum that is expected but tutors are expected to include other areas, knowledge of which will benefit their learners, based on location, types of work available and from the tutors own professional experience.	
Requirements	
Difference between quality control and quality assurance	For example: • Quality control concerns the end product, whereas quality assurance concerns the processes throughout production. • Quality control identifies defects, quality assurance aims to prevent defects.
Quality control processes	For example: • Inspection. • Measurement. • Testing. • Defect identification.
Quality assurance processes	For example: • Process design. • Standard Operating Procedures. • Training.

	• Auditing. • Continuous improvement. • Verifying drawings prior to production. • Investigation of defects.
Escalation procedures	For example: • Identification of non-conforming parts. • Notifying supervisor. • Documentation of findings. • Following Standard Operating Procedures.
Measuring techniques and equipment	For example: • Callipers. • Micrometer. • Ring gauge. • Plug gauge. • Dial indicator. • Feeler gauge. • Go/no-go gauges. • Co-ordinate measuring machine (CMM).
Faults and issues	For example: • Poor surface finish. • Repeated tool breakages. • Repeated material failure. • Inconsistencies between parts in batches.
Data	For example: • Batch number. • Dates. • Machinists. • Machines used. • Any issues during production.
Effective verbal feedback	For example: • Constructive tone. • Specific detail with correct terminology. • No subjective details – details should be purely factual. • Open communication with an emphasis on collaboration and solving issues as a team. • Providing realistic, actionable suggestions.
Constructive written feedback	For example: • Detailed, succinct and constructive feedback. • Provide realistic, actionable suggestions. • Complete company specific paperwork correctly, including storage or distribution.
Machining industry terminology	For example: • Correct tool names. • Correct process names. • Machine names. • Feature names.
Types of wear on tooling	For example: • Abrasive wear. • Edge chipping.

	• Flank wear. • Crater wear. • Thermal cracking. • Built-up edge. • Notch wear. • Plastic deformation.
Effects of tool wear	For example: • Poor surface finish. • Increased cutting force. • Decreased accuracy of finished parts.
Reducing wear on tooling	For example: • Selecting of the most appropriate tooling. • Optimising machine parameters (spindle speed, feed rate, depth of cut, etc.) • Roughing vs finishing. • Work holding. • Design for manufacturing. • Use of lubricants.
Daily checks	For example: • Cleanliness of machine bed, moving parts, etc. • Security of machine guards and their effectiveness/. • Lighting. • Emergency buttons. • Overall function. • Lubricant levels and leakages. • General checks for damage.
Weekly checks	For example: All of the above, as well as: • Check oil levels. • Gearbox. • Cabling. • Lubrication of moving parts.
Escalation processes	For example: • Reporting to line manager. • Completing reports. • Maintenance requests.
Planned and reactive maintenance	For example: • Purpose of planned maintenance. • Benefits of planned maintenance, such as increased reliability, extended lifespan, improved safety, planned downtime. • Issues with reactive maintenance, such as machine down time impacting on production, expense of repairing faults, etc.

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