Examiners' Report
Lead Examiner Feedback

January 2021

Pearson BTEC Firsts

In Engineering (21174E)

Unit 9:Interpreting and Using Engineering Information

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January 2021
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General Comments on Exam

This was the fourteenth examination for this unit and the responses seen this year were less accessible than the January series of 2020. Lower ability learners are still giving inaccurate and/or simplistic responses to contextualised questions and therefore gaining limited marks. The more demanding questions provided learners with an opportunity to apply their knowledge in response to a range of engineering scenarios and some learners were able to give extended answers that focused on the vocational context. Learners would, however, continue to benefit from being taught examination skills and techniques as some continued to misread the questions and consequently they were not answered using an appropriate methodology. It was evident that some centres may not have covered the Unit Content in its widest sense as some learners struggled to gain marks for areas related to 'Zeus charts' and 'manufacturers' manuals' when given an engineering context. It should, however, be noted that the issues faced by both centres and learners in relation to the global pandemic were taken into consideration at all stages of the examining process.

Many learners, however, had greater success with a number of the multiple choice questions which was pleasing as many aspects had been seen in previous series.

Question 1

This question was aimed at health and safety signage information.

Targeted Specification Area: Learning Aim A.4

Q1(a): This was a multi-choice question that proved accessible to the majority of learners who were able to identify the correct response for the image of a warning sign as 'Caution trip hazard'.

Q1(a): This was a multi-choice question that proved accessible to the majority of learners who were able to identify the correct colours used for safe condition signs as 'Green and white'.

Q1(c): This was a line match question and nearly all of learners were able to correctly match both mandatory signs to the correct mandatory sign name. The correct responses were 'protective gloves' and 'face protection'. This is clearly an area that learners understand well.

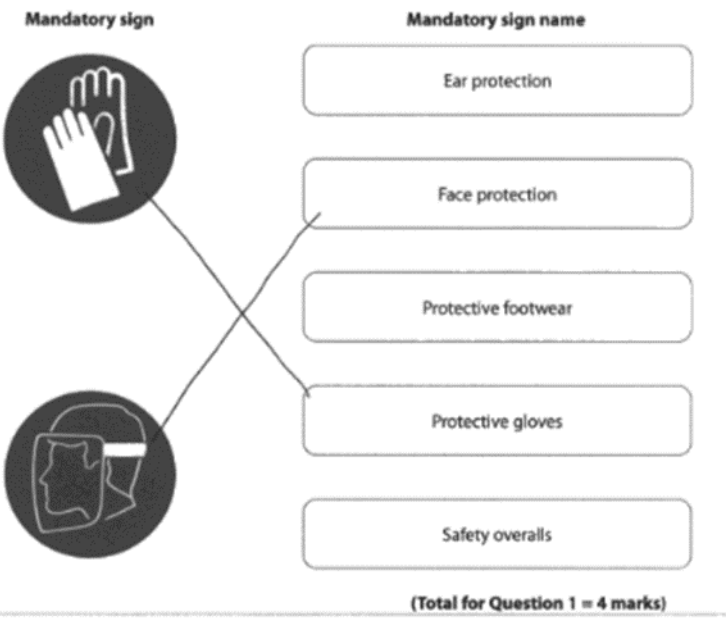
2 mark response for Q1(c)

In a workshop, signs are used to remind engineers that they must wear safety equipment.

(c) Identify the correct name for each of these mandatory signs.

Draw **one** line from each mandatory sign to **one** mandatory sign name.

(2)



(Total for Question 1 = 4 marks)

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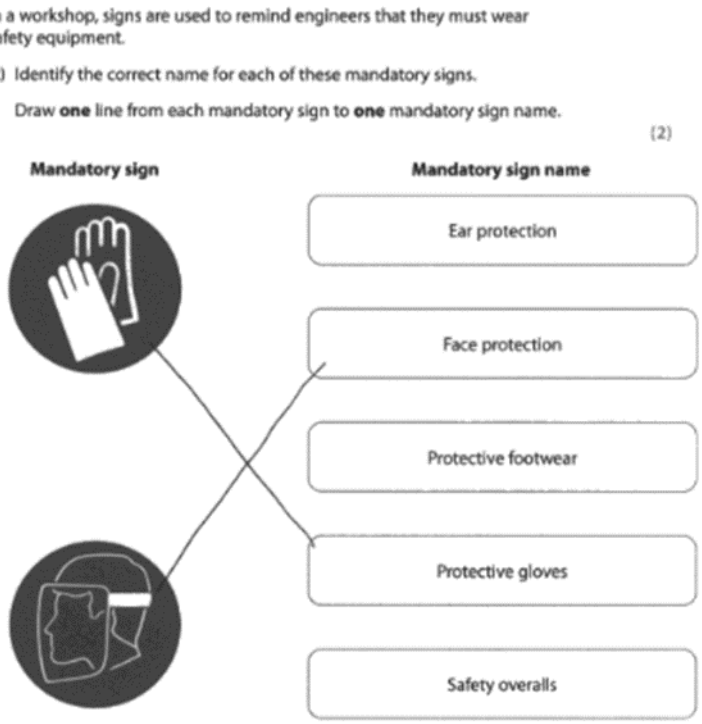


(Total for Question 1 = 4 marks)

Question 2

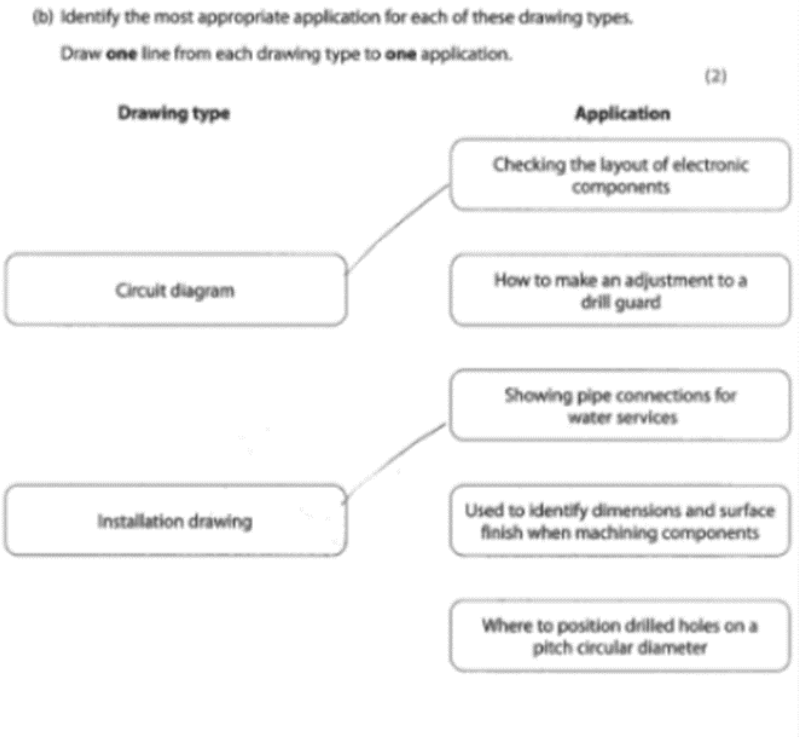
This question was aimed at a range of information associated with engineering drawings.

Targeted Specification Area: Learning Aim A.1

Q2(a): This was a multi-choice question that proved accessible to the majority of learners who were able to identify the correct response for the type of working drawing shown in Figure 1 as 'General assembly'.

Q2(b): This was a line match question which proved to be relatively accessible to learners. The majority were able to correctly match one of the drawing types to the correct application. The correct responses were 'checking the layout of electronic components' and 'showing pipe connections for water services'.

2 mark response for 2(b)

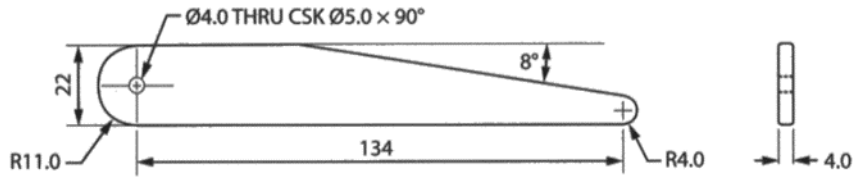


Targeted Specification Area: Learning Aim A.2

Q2(c)(i): This question proved to be relatively accessible for learners. The question was answered correctly by most learners who were able to state the meaning of the abbreviation R from the engineering drawing. The correct response was 'Radius'. Additional acceptable answers were Radii and RAD.

1 mark response for 2(c)(i)

Figure 2 shows part of an orthographic drawing for a drill drift.



All dimensions in mm

Figure 2

(c) Engineers use a range of abbreviations on engineering drawings.

(i) State the meaning of the abbreviation R.

(1)

The abbreviation R is used to represent the radius

Q2(c)(ii): This question also proved to be relatively accessible for learners. The question was answered correctly by most learners who were able to state the meaning of the abbreviation CSK from the engineering drawing. The correct response was 'Countersink' or 'Countersunk'.

1 mark response for 2(c)(ii)

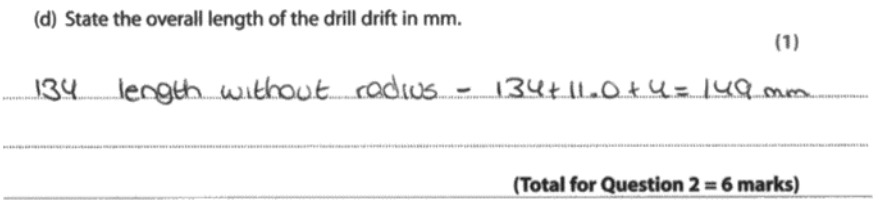
(ii) State the meaning of the abbreviation CSK.

(1)

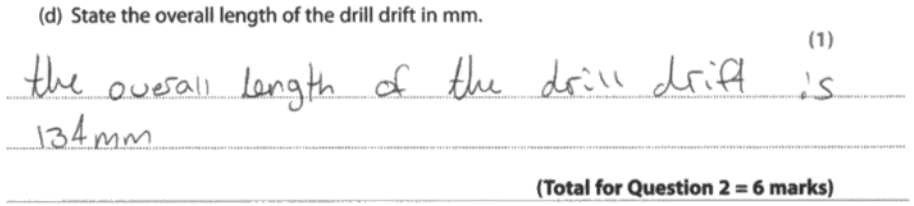
Counter Sink feature

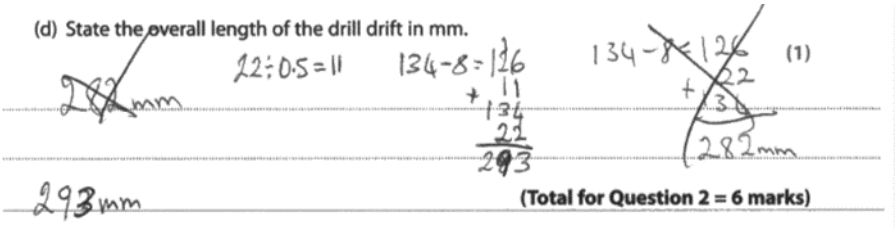
Q2d: Only a minority of learners were able to correctly state the overall length of an engineering component (a drill drift) from information in figure 2 which showed part of an orthographic drawing. To calculate the overall length learners needed to add three values which were stated on the drawing. These were R11.0 (11mm) The dimension 134 (134mm) and R4.0 (4mm). Therefore, the calculation was 11 + 134 + 4 = 149.

1 mark response for 2(d)



1 mark incorrect responses for 2(d)





Question 3

This question was aimed at understanding of the characteristics and applications of using related documentation.

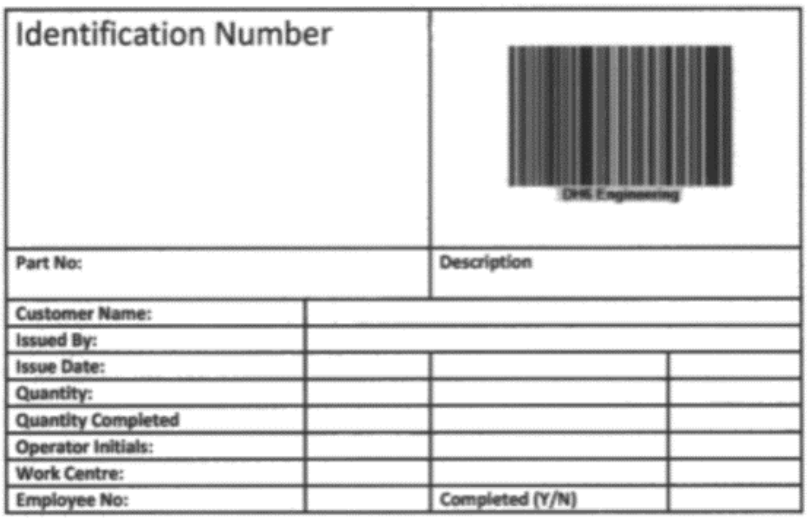
Targeted Specification Area: Learning Aim B.2

Q3(a): This question proved to be relatively accessible for most learners who were able to identify the type of production documentation shown in Figure 3 as a ‘job card or ‘job ticket’.

1 mark response for 3(a)

3 Engineering technicians are given production documentation when carrying out manufacturing operations.

Figure 3 shows a type of production documentation.



Identification Number			
Part No:		Description	
Customer Name:			
Issued By:			
Issue Date:			
Quantity:			
Quantity Completed			
Operator Initials:			
Work Centre:			
Employee No:		Completed (Y/N)	

Figure 3

(a) Identify the type of production documentation shown in Figure 3.

(1)

Job Card

Q3(b): This question proved to be relatively accessible for learners with the majority being able to correctly identify one or two of the types of working instruction.

2 mark response for 3(b)

(b) Identify **two** types of working instruction.

(2)

- ☒ **A** Critical path analysis
- ☒ **B** Contract of employment
- ☒ **C** Manufacturers' manual
- ☒ **D** Pareto chart
- ☒ **E** Weld procedure specification

Q3(c)(i): This question proved to be less accessible for most learners. Learners were asked to state a specific information source that contains material properties for a type of carbon steel. The correct responses for the question were 'Material specifications/spec sheets', 'Material data sheets', 'MatWeb'.

1 mark response for 3(c)(i)

(c) Engineering technicians use other sources of information when carrying out manufacturing operations.

(i) State a specific information source that contains details of material properties for a type of carbon steel.

(1)

Material Specification Sheet

1 mark **incorrect** responses for 3(c)(i)

(c) Engineering technicians use other sources of information when carrying out manufacturing operations.

(i) State a specific information source that contains details of material properties for a type of carbon steel.

(1)

The bill of materials.

(c) Engineering technicians use other sources of information when carrying out manufacturing operations.

(i) State a specific information source that contains details of material properties for a type of carbon steel.

(1)

Zues book

Q3(c)(ii): This question proved to be very accessible for learners. The majority of learners were able to state a specific information source to include the drill diameter to produce an M10 x 1.5 internal thread. Correct responses from learners included 'Tapping drill reference charts', 'Drill/tapping wall charts', 'Zeus chart', 'Engineers pocket book', 'Machinery handbook', 'Engineering/component/working drawing' and 'Other appropriate online resource'.

1 mark responses for 3(c)(ii)

(ii) State a specific information source that includes the drill diameter required to produce an M10 × 1.5 internal thread.

(1)

Engineering drawing

(ii) State a specific information source that includes the drill diameter required to produce an M10 × 1.5 internal thread.

(1)

tapping Chart

(ii) State a specific information source that includes the drill diameter required to produce an M10 × 1.5 internal thread.

(1)

Zeus book

3(d): This question proved accessible for the majority of learners showing good understanding which was reflected in the learner responses. Learners were able to gain marks through typical learner responses which included the breaking down of projects into individual tasks, meeting of delivery dates, the ease of reading, determination of start and finish times and resource requirements.

Although many learners were able to identify advantages, some were unable to gain additional marks for an appropriate expansion or linked response. Learners who did not score marks in the 3-4 range often repeated their original response for a second advantage.

3 mark response for 3(d)

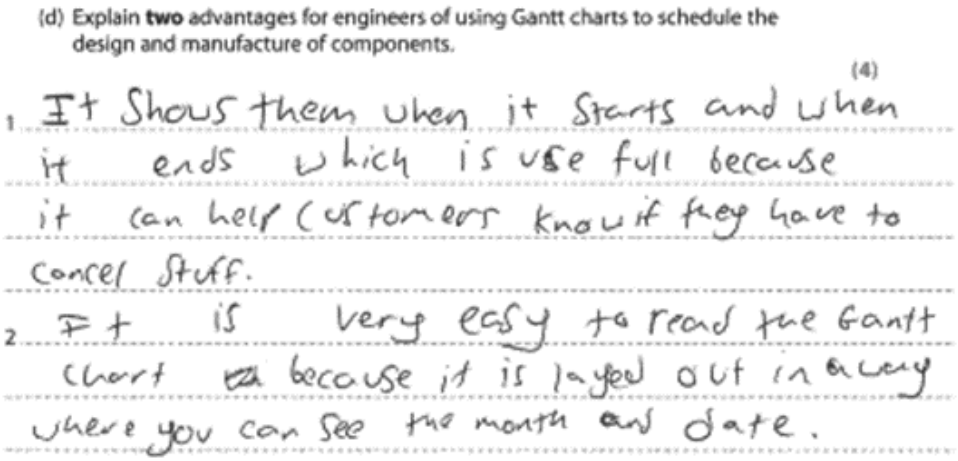
(d) Explain **two** advantages for engineers of using Gantt charts to schedule the design and manufacture of components.

(4)

1 keeping track of all teams to ensure the deadline can be met

2 you can plan the impact of any delays at any stage

4 mark response for 3(d)



(d) Explain **two** advantages for engineers of using Gantt charts to schedule the design and manufacture of components.

(4)

1. It Shows them when it starts and when it ends which is use full because it can help customers know if they have to cancel stuff.
2. It is very easy to read the Gantt chart ~~ea~~ because it is layed out in a way where you can see the month and date.

Question 4

This question was aimed at the interpretation of engineering drawings and the characteristics and key features of working drawings (company standardised layouts).

Targeted Specification Area: Learning Aim A.1

Q4a(i): This question proved to be accessible for most learners who were able to name the heading ‘A’ from the section of a company standardised layout. Correct responses were ‘Material’, ‘Material type’ (e.g. metal).

1 mark responses for 4(a)(i)

4 SR3 Engineering produces precision engineering components that are used in the manufacture of medical equipment. Engineers at SR3 Engineering use a company standardised layout for working drawings.

(a) Figure 5 shows a section of a company standardised layout.

PART No	DESCRIPTION	QTY	A
12	DOWEL	4	TITANIUM
9	SLEEVE	2	BRASS
8	TAPER PIN	2	COPPER
6	SPRING	1	NICKEL BASE ALLOY
5	RETAINING SCREW	6	BRASS
3	COUPLING	4	ALUMINIUM

ALL DIMENSIONS IN mm GEN TOL ±0.20mm	B 	DRAWN BY: IP 29/04/2020	CHECKED BY: AW 30/04/2020	SCALE 1:1

Figure 5

(i) Name the heading indicated by the letter A.

(1)

Materials

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(a) Figure 5 shows a section of a company standardised layout.

PART No	DESCRIPTION	QTY	A
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ALL DIMENSIONS IN mm GEN TOL ±0.20mm	B 	DRAWN BY: IP 29/04/2020	CHECKED BY: AW 30/04/2020	SCALE 1:1

Figure 5

(i) Name the heading indicated by the letter A.

(1)

Metal

Q4a(ii): This question proved to be relatively accessible for learners. Learners were asked to name the heading 'B' from the section of a company standardised layout. Correct responses were Orthographic projection, Type of projection/projection, First angle/third angle.

1 mark responses for Q4(a)(ii)

(ii) Name the heading indicated by the letter B.

(1)

orthographic projection

(ii) Name the heading indicated by the letter B.

(1)

1st angle projection.

Q4(b): The majority of learners were unable to access this question. Unfortunately, many learners focussed upon drawings and not the layout and gave responses with no rewardable content. A minority of learners were able to gain 3 or 4 marks from this question.

4 mark response for Q4(b)

(b) Explain **two** advantages for SR3 Engineering of using a company standardised layout for working drawings.

(4)

1 It enables consistency between drawings allowing the engineer to interpret Informa tion more efficiently

2 Much of the Information can be repeated or easily edited on the template so drawin time is reduced

Question 5

This question was contextualised around a company that manufactures tooling trays from sheet metal. This context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

Targeted Specification Area: Learning Aim A.1

Q5(a): This was a multiple-choice question which proved to be very accessible for learners. The majority of learners were able to name the type of drawing shown in Figure 6. The correct response was A. Isometric.

Targeted Specification Area: Learning Aim B.2

Q5(b): Learners were asked to state two reasons types of information found on a production plan. This question was well answered by the majority of learners who were able to gain one or two marks for their responses.

2 mark responses for Q5(b)

(b) Engineers at DH1 Engineering need to create a production plan before they start making the tooling tray.

State **two** types of information found on a production plan.

(2)

1 Name of product

2 All the stages of production

(b) Engineers at DH1 Engineering need to create a production plan before they start making the tooling tray.

State **two** types of information found on a production plan.

(2)

1 A production plan states the start and finish of the product being made.

2 It contains the materials and tools used for the production.

Targeted Specification Area: Learning Aim A.2

Q5(c): The majority of learners were not able to correctly state two reasons why an engineer would refer to weld symbols on an engineering drawing before welding the joints. Typically, welding questions prove demanding for learners at this level, unfortunately this was the case once again.

1 mark responses for Q5(c)

When making the tooling tray the joints are welded together.

(c) State **two** reasons why an engineer would refer to weld symbols on the engineering drawing before welding the joints.

(2)

1 So they can tell what type of weld they are using

2

When making the tooling tray the joints are welded together.

(c) State **two** reasons why an engineer would refer to weld symbols on the engineering drawing before welding the joints.

(2)

1 It is easier to understand for anyone

2 To make sure they get the correct one before the welding process.

Targeted Specification Area: Learning Aim B.2

Q5(d): This question proved to be relatively accessible for most learners who showed understanding of the application and advantages of using the documentation. Learners were able to gain marks through typical learner responses which included highlighting of problems, allowing corrective measures to be applied, prevention of faulty goods from reaching the customer and advantages associated with traceability. It was evident that this topic had been delivered well by the majority of centres.

3 mark response Q5(d)

DH1 Engineering uses quality control documentation to record inspection results when making the tooling trays.

(d) Explain **two** advantages for DH1 Engineering of using quality control documentation in this situation.

(4)

1 Reduction of complaints due to in consistent production

2 An ability to check pass/reject rates so that adjustments could be made to production process to minimise waste

4 mark response Q5(d)

DH1 Engineering uses quality control documentation to record inspection results when making the tooling trays.

(d) Explain **two** advantages for DH1 Engineering of using quality control documentation in this situation.

(4)

1 See ~~eact~~ whether there was an incorrection in one of them and correct it, to make sure all of the products are of the best quality.

2 looking back on past mistakes and finding ways to overcome them and improve, making sure past mistakes will never happen.

Question 6

This question was contextualised around a company that carries out planned maintenance and repairs on machines. The maintenance engineers always refer to manufacturers' manuals when they are working on machines. This context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

Targeted Specification Area: Learning Aim B.2

Q6(a): This question proved to be relatively accessible for learners. Learners were asked to explain one reason why the maintenance engineers refer to manufacturers' manuals when working on machines. The majority of learners were able to gain one mark by giving an appropriate reason. These included access to drawings, part numbers and fault finding. Although many learners were able to identify reasons, some were unable to gain an additional mark for an appropriate expansion or linked response.

1 mark response Q6(a)

6 DH6 Engineering Systems carries out planned maintenance and repairs on machines. The maintenance engineers always refer to manufacturers' manuals when they are working on machines.

(a) Explain **one** reason why the maintenance engineers refer to manufacturers' manuals in this situation.

(2)

To check how it needs to be assembled or installed which will be found in the Manufactures manuel.

2 mark response Q6(a)

6 DH6 Engineering Systems carries out planned maintenance and repairs on machines. The maintenance engineers always refer to manufacturers' manuals when they are working on machines.

(a) Explain **one** reason why the maintenance engineers refer to manufacturers' manuals in this situation.

(2)

The Manufactures manual provide information to the engineer on repairs and common Faults. Becoming less time consuming for the engineer. Informs of which tool are ~~required~~ required

Targeted Specification Area: Learning Aim B.2

Q6(b): This question relatively accessible for learners. Learners were asked to explain one reason why maintenance engineers need to handle manufacturers' manuals carefully during maintenance activities.

The majority of learners were able to gain one mark by giving an appropriate reason. These included manuals becoming dirty and damaged, therefore becoming difficult to read, there only being one available copy and replacement copies not being available. Some learners gave linked responses that were awarded 2 marks.

1 mark response Q6(b)

(b) Explain **one** reason why maintenance engineers need to handle manufacturers' manuals carefully during maintenance activities.

(2)

Manufactures manuals comes with the machines, and it can be hard to get another if something happens to it.

2 mark response Q6(b)

(b) Explain **one** reason why maintenance engineers need to handle manufacturers' manuals carefully during maintenance activities.

(2)

They need to handle them carefully because if that machine is no longer being produced neither are the manuals.

Q6(c): This proved to be a challenging question for the majority of learners. This was an unfamiliar context with a relatively complex question stem and consequently a number of learners misinterpreted the question and many learners focussed upon the advantages of the use of ICT based systems rather than the disadvantages of paper based systems. This generated some responses that did not have any rewardable content.

1 mark response Q6(c)

DH6 Engineering Systems is updating the storage of its maintenance drawings and documents from a paper-based system to an ICT-based system.

(c) Explain **two** disadvantages for the company of using a paper-based system.

(4)

1 They can't back up the documents so if any of the documents were to go missing or get damaged they would have to copy up the documents

2 They're not password protected. Therefore people could gain access to the documents and steal/destroy them. They're not as safe as they would ~~B~~ be in an ICT based system

4 mark response Q6(c)

DH6 Engineering Systems is updating the storage of its maintenance drawings and documents from a paper-based system to an ICT-based system.

(c) Explain **two** disadvantages for the company of using a paper-based system.

(4)

1 Paper documents are damaged easily and take a long time to make again is hard-drawn.

2 Paper storage takes up a lot of space compared to an ICT-based system, so there might not be enough room to store every paper document.

Question 7

This question was contextualised around a small company that specialise in the manufacture of one-off engineering components for customers who restore classic cars. All the engineers are supplied with Zeus charts. Learners were asked to discuss how engineers would use Zeus charts to support them with the engineering tasks that they carry out.

Targeted Specification Area: Learning Aim A.3

Q7: The majority of learners were unable to access this question and consequently gained very little reward despite the familiar context to the question and that this topic had been covered in previous series.

There was clear evidence from the responses given that the majority of learners had limited understanding of the use, content and purpose of Zeus charts. There were also some learner responses that discussed content that was not applicable to Zeus charts such as weld specifications and feeds and speeds.

Mark band 1 response:

7 Discuss how the engineers would use the Zeus charts to support them with the engineering tasks they carry out.

(8)

Zeus charts contain all the information that you need when making parts it has the formulas for measuring all the info you would need on cos sin and tan it has the measurements for drilling I believe that it has some stuff on materials and all the info thats on the charts next to drills so that can the Chart to help them with the measuring of the components it tells them what setting to use on drills for what material they are using and that's only £2.

Mark band 2 response:

7 Discuss how the engineers would use the Zeus charts to support them with the engineering tasks they carry out.

(8)

Engineers from NEG1 Engineering can refer to zues charts when producing specific components for classic cars as it gives them important information of specific tools and equipment that is needed, such as all drill bit sizes, tapping sizes and lathe speeds.

It also tells them how to produce specific finishes with the lathe and all the required speeds and cutting bits. This means they can produce these components to the customers specific instructions

~~It tells them what~~

NEG1 produce 'one off' components, which means not all of them will need standard size drill or tapping bits. They can then refer to the zues charts and get the exact sizes for the components specification

This is the same case for things such as Weld specification procedures, which allow the engineer to refer to the zues charts to get the correct filler rod size and material, and use the correct welder, ~~and~~ power and feed speed.

(Total for Question 7 = 8 marks)

Mark band 3 response:

7 Discuss how the engineers would use the Zeus charts to support them with the engineering tasks they carry out.

(8)

The Zeus chart can be used to convert dimension and other necessary information from imperial to metric or metric to imperial. This means time will not be wasted trying to figure out different dimensions for components.

The Zeus chart also records many tolerances required to different sized holes, this will remove guesswork for employess, and will not waste time by employees trying to workout other essential information.

Overall the Zeus chart cuts-down time wasting and guesswork. for employees, this will also decrease waste as mistakes will not be made by guesswork, this will benefit the company greatly.

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