L2 Lead Examiner Report 1806

June 2018

NQF BTEC Level 1/Level 2 Firsts in Engineering

Unit 9: Interpreting and Using Engineering Information

(21174E)

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Introduction

This report has been written by the Lead Examiner for BTEC Engineering Unit 9 – Interpreting and Using Engineering Information. It is designed to help you understand how learners performed overall in the exam. For each question, there is a brief analysis of learner responses. You will also find some example learner responses for some questions. We hope this will help you to prepare your learners for future examination series.

Grade Boundaries

Unclassified	Level 1 Pass	Level 2		
		Pass	Merit	Distinction
0	8	18	28	39

General Comments on Exam

This was the tenth examination for this unit and the responses seen this year were weaker than that of the previous May series of 2017. Lower ability learners are still giving inaccurate and/or simplistic responses to questions and therefore gaining limited marks. The more demanding questions provided some learners with an opportunity to apply their knowledge in response to a range of engineering scenarios; however, most learners were not 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 still evident that some centres had not covered the unit content in its widest sense. Many learners struggled to gain marks for areas related to production capacity, welding information and quality control documentation and information when given an engineering context.

Some 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 the identification of a range of health and safety signs along with linetypes used on engineering drawings.

Targeted Specification Area: Learning Aim A.4

Q1(a): The majority of learners were able to correctly identify at least one of the examples of mandatory signs as either 'Face protection' or 'Use of guard'. Face protection was usually the more common correct response.

Q1(b): This was a line match question and the majority of the learners were able to select 'Corrosive' and 'Explosive' as being the correct responses.

Targeted Specification Area: Learning Aim A.2

Q1(c): The majority of learners were also able to state at least one type of line that is used on engineering drawings. Typical responses included 'hidden detail', 'centre line' or 'dimension line'. Some learners misinterpreted the question and gave different drawing types such as 'isometric' or 'oblique' which were both incorrect.

2 mark response:

(c) Name **two** types of line that are used on engineering drawings.

(2)

1 ~~Dotted line~~ Hidden detail line

2 Dimension line

Question 2

This question looked at how engineering companies use working instructions and other sources of information that are relevant to a task being carried out.

Targeted Specification Area: Learning Aim B.2

Q2(a): The majority of learners struggled with this question. This was surprising as this has been tested on previous series. Those learners that were successful were able to identify the working instruction as 'job card' or 'operation sheet'. Many learners identified this as a 'test report' which was incorrect.

Q2(b): The majority of learners were able to correctly identify at least one of the other types of working instruction as either 'Test schedule' or 'Installation manual'. Installation manual was usually the more common correct response.

Targeted Specification Area: Learning Aim A.3

Q2(c)(i) &(ii): Most learners struggled with both parts of this question. There was question misinterpretation and many learners identified a property of steel such as 'strength' and a hole size for an M8 thread and gave 80mm as a common and incorrect response. The question asked for reliable sources of information when finding out about these. Correct responses included 'steel manufacturer's data sheets' and 'Zeus chart' respectively. Many learners simply put 'Internet' or 'Books' which was far too generic.

Question 3

This question was aimed at using drawings to communicate information about components.

Targeted Specification Area: Learning Aim A.2

Q3(a): The majority of the learners were unable to perform the simple calculation to determine the maximum overall length. There were lots of blank responses which was a concern. Where learners had made an attempt, they had failed to add the tolerance to give the maximum overall length of 36.5mm. Some learners simply quoted the length between the hole centres which was incorrect.

Q3(b)(i) & (ii): The majority of learners were clearly able to identify the abbreviations as being 'Diameter' and 'Countersink'. There were some very creative responses for DIA but unfortunately, they were incorrect.

Targeted Specification Area: Learning Aim A.1

Q3(c): This proved to be a little more accessible to learners with the majority gaining at least one mark here for identifying an advantage of using orthographic projections for component drawings. Typical correct responses centered on 'dimensions are visible', 'multiple views of the components' and 'hidden detail can be seen'. Some learners were able to give extensions that gained the second mark as such 'removing any guess work' in respect to the dimensions being visible.

1 mark response:

(c) The engineering drawing in Figure 2 is an example of an orthographic projection.

Explain **one** advantage of using orthographic projections for component drawings.

(2)

Using orthographic projection is easier to understand also it gives clear dimensions

2 mark response:

(c) The engineering drawing in Figure 2 is an example of an orthographic projection.

Explain **one** advantage of using orthographic projections for component drawings.

(2) Q

It transcends the ~~langog~~ language barrier, so engineers, manufacturers or clients abroad will be able to understand it.

Question 4

This question was contextualised around a small engineering company carrying out activities to manufacture electromechanical components.

Targeted Specification Area: Learning Aim A.1

Q4(a): The majority of learners were able to correctly identify at least one of the two pieces of information that are found on a standardised layout as either 'Title block or 'Company logo. Title block was usually the more common correct response.

Targeted Specification Area: Learning Aim A.2

Q4(b): This proved to be a little more accessible to learners with the majority gaining at least one mark here for identifying two examples of dimensional detail on a drawing. Typical correct responses centered around physical dimensions such as 'length', 'width', 'radius' and 'diameter'. This gave learners access to one mark. For the second mark, learners needed to identify dimensional details outside that of physical dimensions such as 'scale' or 'tolerances'.

1 mark response:

(b) 5UF Engineering includes dimensional details on its drawings.

Identify **two** examples of dimensional details.

(2)

1 RADIUS - R - RAD

2 LENGTH

2 mark response:

(b) 5UF Engineering includes dimensional details on its drawings.

Identify **two** examples of dimensional details.

(2)

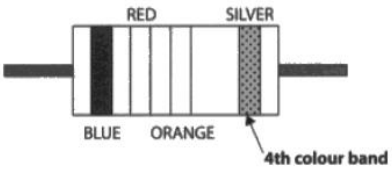
1 ~~Length of component~~ Radius

2 Tolerance

Targeted Specification Area: Learning Aim B.2

Q4(c)(i) & (ii): Resistor colour codes continue to present a problem for learners. Less than 20% of the cohort was able to identify the correct value of the resistor as being 62000 ohms. This is quite concerning as this is clearly signposted in the specification and this has been tested on numerous occasions. This is not a new concept within centres and should be a fundamental part of interpreting electronic information. Far too many learners simply gave '623' as a response which just translated the colours or '11' where all the individual numbers were simply added together. Poor responses were also used for 4c(ii). The majority of learners could not identify the fourth colour band is relating to the resistors 'tolerance'. Many learners left this blank and stated that this indicated the resistors power value.

(c) 5UF Engineering uses resistors in electromechanical components. The value of a resistor can be identified by a colour code system.



BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

Figure 3

(i) State the value of the resistor in Figure 3 using the first three colour bands.

(1)

$62 \times 10^3 = 62000 = 6k\Omega$

(ii) State the reason for the fourth colour band on the resistor in Figure 3.

(1)

STANDS FOR TOLERENCE

Targeted Specification Area: Learning Aim B.3

Q4(d): Learners who had been taught about the use of filing cabinets were able to gain at least one mark here for responses relating to 'drawings becoming damaged when removing from the cabinet' or 'drawings can be lost/misplaced'. Some learners were able to give linked responses to gain both marks. Many learners discussed drawings becoming damaged through dirty hands but this had nothing to do with storing in filing cabinets and therefore incorrect.

1 mark response:

(d) 5UF Engineering only keeps paper copies of its drawings.

Explain **one** disadvantage for 5UF Engineering of storing its engineering drawings in filing cabinets.

(2) Q04d

could get damaged overtime. Have to look through
loads of paper to find drawing needed.

2 mark response:

(d) 5UF Engineering only keeps paper copies of its drawings.

Explain **one** disadvantage for 5UF Engineering of storing its engineering drawings in filing cabinets.

(2) Q04d

Drawings could get damaged such ~~as~~ as it being ~~crumb~~ crumpled and creased meaning that the drawing could wear out and be ~~unreadable~~ unreadable

Question 5

This question was contextualised around a company that produces a range of fabricated products. This context gave learners an opportunity to apply their knowledge and understanding to these questions.

Targeted Specification Area: Learning Aim B.2

Q5(a)(i) & (ii): Surprisingly, very few learners were able to state the names of the rows in the weld procedure specifications. Correct responses included 'welding process' for Row A and 'Position' for Row B. Many learners simply stated 133 (MIG) and PF (Vertical up) as their answers which was not required.

Targeted Specification Area: Learning Aim A.2

Q5(b): This was another line matching question and the majority of learners correctly identified at least one weld type symbol as being 'Fillet'. Many learners thought the second type was a 'Square butt' when the correct response was a 'Plug'.

Targeted Specification Area: Learning Aim B.2

Q5(c): Some learners scored one mark by identifying an advantage of considering production capacity when scheduling the manufacture of frameworks. Typical correct responses included 'being able to work out the maximum possible output' and 'prioritising work flow'. Many learners simply did not understand production capacity and talked about the size of the products being manufactured. Some learners gave linked explanations that were awarded higher marks.

1 mark response:

(c) M1FX Engineering considers a range of factors when scheduling the manufacturing of the frameworks.

One of these factors is production capacity.

Explain **two** advantages of considering production capacity when scheduling the manufacture of the frameworks.

(4)

1 TO SEE HOW MUCH MATERIALS ARE REQUIRED

2 mark linked response:

(c) M1FX Engineering considers a range of factors when scheduling the manufacturing of the frameworks.

One of these factors is production capacity.

Explain **two** advantages of considering production capacity when scheduling the manufacture of the frameworks.

(4) 2

1 When production capacity is considered, it means how much can the company do, this can lead onto how much material they need in which they can save money by not buying excess materials

Targeted Specification Area: Learning Aim A.3

Q5(d): The majority of learners were unable to access this question and consequently gained very little reward. This was surprising as learners have been exposed this type of question in previous series; however, the fact that this was linked to welding may have had an effect on learners poor performance. Typical low responses included 'sheets contain information about filler rod sizes' or 'the sheets specify the type of filler rod enclosed'. Occasionally some learners gave linked responses to achieve a further mark.

1 mark response:

(d) Explain **one** feature of manufacturers' data sheets that is useful to M1FX Engineering when specifying weld filler rods.

(2)

Feeds explains and shows the key information about the weld filler rods for example their diamensions or how it can be used

2 mark response:

(d) Explain **one** feature of manufacturers' data sheets that is useful to M1FX Engineering when specifying weld filler rods.

(2) 2 Q

what type of material is not different filler Rods might work better with different materials.

Question 6

This question was contextualised around a company manufacturing kits of components for a range of trailers that are self-assembled by customers. Again, 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): It was pleasing to see that a number of learners were able to identify an advantage to the company of including information about feeds and speeds on production plans. The most popular low responses included 'components will be made to a consistent specification' or 'processes can be completed faster'. Occasionally some learners gave a linked response to achieve a further mark.

1 mark response:

6 34FX Engineering manufactures kits of components for a range of trailers that are self-assembled by customers.

(a) Some of the components are machined. Technicians at 34FX Engineering use production plans that contain information about the feeds and speeds to be used.

Explain **one** advantage to the company of including information about feeds and speeds on production plans.

(2) 1 Q06a

It can make the production more efficient as key information is given to help the user know what the feeds and speeds to be used.

2 mark response:

6 34FX Engineering manufactures kits of components for a range of trailers that are self-assembled by customers.

(a) Some of the components are machined. Technicians at 34FX Engineering use production plans that contain information about the feeds and speeds to be used.

Explain **one** advantage to the company of including information about feeds and speeds on production plans.

(2) 2 Q06a

If the feeds/speeds are wrong could damage the material costing the company money

Targeted Specification Area: Learning Aim B.3

Q6(b): Learners who had been taught about manufacturer's manuals were able to gain at least one mark here for a low response relating to 'allowing customers to be able to assemble the trailers correctly'. Some learners were able to give linked responses to gain both marks.

1 mark response:

(b) Trailers are self-assembled by customers using the manufacturer's manual that is supplied with each trailer.

Explain **one** advantage of providing a manufacturer's manual in this situation.

(2) 1

it shows the customer how the components fit together to make the trailer. It shows how to make the product.

2 mark response:

(b) Trailers are self-assembled by customers using the manufacturer's manual that is supplied with each trailer.

Explain **one** advantage of providing a manufacturer's manual in this situation.

(2) 2 Q06b

Customers can be provided information on how to assemble the trailer, this means that the customer can build it quicker due to the fact he knows how to assemble it rather than guessing and avoids health risks

Targeted Specification Area: Learning Aim B.2

Q6(c): Learners who had been taught about critical path analysis were able to gain at least one mark here for responses relating to 'estimating delivery times of the kits of components' or 'customers will receive the correct kits of components'. Some learners were able to give linked responses to gain further marks.

2 mark linked response:

(c) Explain **two** advantages for customers of 34FX Engineering using critical path analysis to schedule the manufacture of kits of components.

(4) 2 Q06c

1 Critical path analysis finds the quickest way to create the product, it helps reduce customer waiting time.

Targeted Specification Area: Learning Aim B.3

Question 7

This question was contextualised around a company that mass produces digital multimeters. The company produces quality control documentation and information which is used during the manufacture and assembly of the multimeters. Again, this context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

Targeted Specification Area: Learning Aim B.2

Q7: The majority of learners struggled with this question. This was a reasonably unfamiliar context and quality control documentation and information had clearly not been taught. Typical incorrect responses were associated with quality control processes that the multimeter went through rather than the documentation itself and its use. There was recognition from a number of learners that documents could be used to monitor the quality of the multimeters and reduce the likelihood of products being recalled. For learners to achieve higher marks here, there needed to be a detailed consideration of documents being used for audit trails and forming part of the companies' ability to meet industry standards such as BSI 9001. The points made by the learner needed to relevant and clearly linked to the company showing a good understanding of the use of quality control documentation and information.

Mark band 1 response:

7 **BB34 Engineering mass produces digital multimeters.** 3 Q07

Digital multimeters are hand held devices for measuring voltage, current and other characteristics in electronic circuits.

The company has produced quality control documentation and quality control information that is used during the manufacturing and assembly of the multimeters.

Discuss the use of quality control documentation and quality control information in this situation.

The quality control (QC) documentation/information provides everything the engineeres need to produce the multimeters to be right specification. The QC stops faulty products being shipped out and sold potentially causing harm to the user. It does this by completing a series of checks during the manufacture of the product at different points i.e. checking the circuit after its been made or doing the final check to see if it works and is up to standard and is fit for purpose.

Mark band 2 response:

7 **BB34 Engineering mass produces digital multimeters.** 4 Q07

Digital multimeters are hand held devices for measuring voltage, current and other characteristics in electronic circuits.

The company has produced quality control documentation and quality control information that is used during the manufacturing and assembly of the multimeters.

Discuss the use of quality control documentation and quality control information in this situation.

By using quality control information in manufacturing, the multimeter can be as effective as it can due to it being manufactured to the right quality, meaning it can measure accurately with no faults, the documentation notes the products ~~can~~ capability and failures, if made inaccurately per se ~~easyer~~, it's failure would be noted, this means what it did wrong, and how it went wrong e.g misplaced wire, with this documention, it can be used as information to not repeat the same mistake, resulting in a higher quality that it already was, the documentation can give past mistakes and their result, a manufacturer can look at this and avoid it to be able to produce the multimeter in a high quality.

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