



BUS.OP6 The impact of technology on operations

AQA 8132 · Calculator allowed · about 55 minutes

Total Marks

--

Name: _____ Date: ____ / ____ / ____

Answer ALL questions in the spaces provided. Show your working for any calculation: method marks are available even if your final answer is wrong. Silverdale Precision Engineering, used throughout this pack, is a fictional business.

1 Which one of the following is an example of automation in a business's operations?

- ☐ A) A machine that carries out a production task, such as cutting a component, with little or no human operator input
- ☐ B) A poster advertising a new product
- ☐ C) A worker completing a task entirely by hand with no machinery at all
- ☐ D) A customer paying for goods in cash

(Total for Question 1 is 1 mark)

2 Which one of the following best describes a benefit of computer-aided stock control?

- ☐ A) It removes the need for a business to ever hold any stock at all
- ☐ B) It updates stock records automatically as items are used, reducing manual counting errors and helping trigger reorders on time
- ☐ C) It guarantees a supplier will never deliver late
- ☐ D) It sets a business's prices automatically without any manager input

(Total for Question 2 is 1 mark)

3 State two examples of technology used in modern manufacturing operations.

(Total for Question 3 is 2 marks)

4 Silverdale currently cuts a component by hand, using 4 machinists, each paid 15 pounds an hour.

(a) Calculate the current total hourly labour cost of the 4 machinists. (2)

.....

(b) A new CNC (computer numerical control) machine would need only 1 operator, (2)
still paid 15 pounds an hour, to produce the same output. Using your answer to
part a, calculate the hourly labour cost saving from installing the machine.

.....

(Total for Question 4 is 4 marks)

5 Silverdale's factory operates for 2,000 hours a year. Using your answer to question 4b, calculate
the total annual labour cost saving from installing the machine. Show your working.

.....

(Total for Question 5 is 2 marks)

6 The CNC machine costs 45,000 pounds to buy. Using your answer to question 5, calculate the
payback period, in years, for this machine. Show your working.

.....

(Total for Question 6 is 2 marks)

7 Using your answer to question 6, calculate the payback period in months instead. Show your
working.

.....

(Total for Question 7 is 2 marks)

8 Cutting the component by hand also produces more defective components than the CNC machine would. In a weekly batch of 300 components: the hand-cut defect rate is 5%; the CNC machine's defect rate is 1%.

(a) Calculate the number of defective components in a 300-component batch cut by hand. (2)

(b) Calculate the number of defective components in the same 300-component batch cut by the CNC machine. (2)

(Total for Question 8 is 4 marks)

9 Using your answers to question 8, calculate how many fewer defective components the CNC machine produces each week than hand-cutting. Show your working.

(Total for Question 9 is 2 marks)

10 Each defective component costs 8 pounds to scrap and remake. Using your answer to question 9, calculate the total saving from fewer defective components over a full year of 48 working weeks. Show your working.

(Total for Question 10 is 3 marks)

11 Explain one advantage to Silverdale's customers of the more consistent quality produced by the CNC machine.

(Total for Question 11 is 3 marks)

12 Explain one drawback to Silverdale's employees of introducing the CNC machine.

(Total for Question 12 is 3 marks)

13 Explain one financial risk to Silverdale of going ahead with the 45,000 pound CNC machine purchase.

(Total for Question 13 is 3 marks)

14 State two benefits of computer-aided stock control that would suit Silverdale as it automates more of its production.

(Total for Question 14 is 2 marks)

15 The CNC machine would pay back its 45,000 pound cost in just 6 months from labour savings alone (question 7), plus save a further 4,608 pounds a year from fewer defective components (question 10). However, questions 12 and 13 show it also carries risks for staff and for Silverdale's finances.
Recommend whether Silverdale Precision Engineering should go ahead with the 45,000 pound CNC machine purchase. Justify your answer using the figures and points made earlier in this pack.

(Total for Question 15 is 9 marks)

Mark scheme · BUS.OP6 The impact of technology on operations

Question 1

- **B1** A cao
- **Answer: A**

Question 2

- **B1** B cao
- **Answer: B**

Question 3

- **B1** one acceptable example, e.g. computer-aided design (CAD) or computer-aided manufacture (CAM)
- **B1** a second acceptable example, e.g. robotics/automated machinery, computer-aided stock control, or 3D printing
- **Answer: Any two, e.g. CAD/CAM; robotics; computer-aided stock control; 3D printing.**

Question 4

- (a) **M1** 4 x 15 seen
- (a) **A1** 60 pounds cao
- (a) **Answer: 60 pounds.**
- (b) **M1** 60 - 15 seen (ft from part a)
- (b) **A1** 45 pounds cao
- (b) **Answer: 45 pounds.**

Question 5

- **M1** 45 x 2,000 seen (ft from question 4b)
- **A1** 90,000 pounds cao
- **Answer: 90,000 pounds.**

Question 6

- **M1** 45,000 / 90,000 seen (ft from question 5)
- **A1** 0.5 years cao
- **Answer: 0.5 years.**

Question 7

- **M1** 0.5 x 12 seen (ft from question 6)
- **A1** 6 months cao
- **Answer: 6 months.**

Question 8

- (a) **M1** 300 x 0.05 seen
- (a) **A1** 15 components cao
- (a) **Answer: 15 components.**
- (b) **M1** 300 x 0.01 seen
- (b) **A1** 3 components cao
- (b) **Answer: 3 components.**

Question 9

- **M1** 15 - 3 seen (ft from question 8)
- **A1** 12 components cao
- **Answer: 12 components.**

Question 10

- **M1** 12 x 8 seen (ft from question 9)
- **M1** 96 x 48 (or 12 x 8 x 48) seen
- **A1** 4,608 pounds cao
- **Answer: 4,608 pounds.**

Question 11

- **B1** identifies the point, e.g. unlike a human worker, the machine does not tire, lose concentration or vary slightly from one component to the next
- **B1** develops the point, e.g. this means every component is cut to a more consistent size and shape, as shown by the lower defect rate in question 8
- **B1** links clearly to an outcome, e.g. customers can trust that parts will fit and perform reliably, reducing returns and increasing confidence in Silverdale
- **Answer: Unlike a human worker, the machine does not tire or vary from one component to the next, so components are cut more consistently, as shown by the lower defect rate in question 8, meaning customers can trust parts to fit and perform reliably, reducing returns.**

Question 12

- **B1** identifies the point, e.g. since the machine only needs 1 operator instead of 4 machinists (question 4), some machinists' jobs are at risk of redundancy
- **B1** develops the point, e.g. the remaining staff would also need retraining to operate and maintain the new machine
- **B1** links clearly to an outcome, e.g. this could cause anxiety or resistance to the change among staff, and Silverdale may face redundancy costs and lower staff morale in the short term
- **Answer: Since the machine needs only 1 operator instead of 4 machinists, some jobs are at risk of redundancy, and remaining staff need retraining, which could cause anxiety or resistance and leave Silverdale facing redundancy costs and lower morale in the short term.**

Question 13

- **B1** identifies the point, e.g. 45,000 pounds is a large upfront cost, and Silverdale may need to borrow money to afford it, adding interest costs
- **B1** develops the point, e.g. if customer orders fall or the machine breaks down before the 6-month payback point (question 7) is reached, the expected saving would not fully materialise
- **B1** links clearly to an outcome, e.g. this could leave Silverdale with a large debt and a costly, underused machine rather than the saving it was expecting
- **Answer: The 45,000 pound cost is large, and Silverdale may need to borrow to afford it, adding interest; if orders fall or the machine breaks down before the 6-month payback point in question 7, the expected saving would not fully materialise, leaving Silverdale with debt and an underused machine.**

Question 14

- **B1** one acceptable benefit, e.g. stock levels of raw material are updated automatically and accurately as components are cut
- **B1** a second acceptable benefit, e.g. automatic alerts when stock reaches the reorder level, or fewer errors than manual stock-taking
- **Answer: Any two, e.g. automatic, accurate stock updates as material is used; automatic reorder alerts; fewer manual counting errors.**

Question 15

- **Level 1** (1-3): Makes simple, undeveloped comments about the machine-purchase decision, with little or no use of the pack's figures and no clear recommendation.
- **Level 2** (4-6): Gives a developed argument for or against the purchase, using some of the pack's figures, but does not fully weigh both sides or reach a clearly justified recommendation.
- **Level 3** (7-9): Weighs the evidence for and against the purchase, using the payback-period and defect-saving figures from this pack, and reaches a justified recommendation supported by that analysis.
- **Indicative content:**
 - For going ahead: the machine pays back its full 45,000 pound cost in just 6 months from labour savings alone (question 7), and then continues saving 90,000 pounds a year (question 5) plus 4,608 pounds a year from fewer defects (question 10), a strong ongoing return.
 - For going ahead: the more consistent quality (question 11) could also help Silverdale win new customers who value reliability, beyond the direct cost savings already counted.
 - Against going ahead: question 12 shows the switch from 4 machinists to 1 operator puts jobs at risk and requires retraining, which could damage staff morale and cause disruption while the change is made.
 - Against going ahead: question 13 shows the large 45,000 pound upfront cost carries financial risk, particularly if Silverdale needs to borrow to fund it or if orders fall before the payback point is reached.
 - Judgement: given the very short 6-month payback period and the large, recurring annual savings that follow it, a reasonable recommendation is that Silverdale should go ahead with the purchase, provided it plans carefully for the affected machinists, for example through retraining onto the new machine or redeployment, to manage the staffing risk identified in question 12.