Rewarding Learning

General Certificate of Secondary Education
2018

Manufacturing

Paper 2

Assessment Unit 3

assessing

Manufacturing Technology

[GMA32]

FRIDAY 22 JUNE, AFTERNOON

MARK SCHEME

General Marking Instructions

Introduction
Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

Assessment Objectives
Below are the assessment objectives for Manufacturing.

Candidates must:
- recall, select and communicate their knowledge and understanding of manufacturing in a range of contexts (AO1);
- apply skills, knowledge and understanding, including quality standards, in a variety of contexts, and plan and carry out investigations and tasks involving a range of tools, equipment, materials and components (AO2); and
- analyse and evaluate evidence, make reasoned judgements and present conclusions (AO3).

Quality of candidates' responses
In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking
Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking
Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks
Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes
Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the "best fit" bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- ***Threshold performance*:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.

- ***Intermediate performance*:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.

- ***High performance*:** response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Marking calculations
In marking answers involving calculations, examiners should apply the "own figure rule" so that candidates are not penalised more than once for a computational error.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is excellent.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level 1 (Limited): The level of accuracy of the candidate's spelling, grammar and punctuation is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

Level 2 (Satisfactory): The level of accuracy of the candidate's spelling, grammar and punctuation is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

Level 3 (Excellent): The level of accuracy of the candidate's spelling, grammar and punctuation is excellent. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is excellent. There is excellent use of appropriate specialist vocabulary.

AVAILABLE MARKS

1 (a) (i) Any **two** from the list below:
- lightweight or high strength to weight ratio;
- less chance to corrode or doesn't rust;
- suitable for outdoor use.

All alternative answers will be considered.
(2 × [1]) [2]

(ii) Any **one** material from the list below:
- mild steel;
- stainless steel;
- ABS plastic.

All alternative answers will be considered.
(1 × [1]) [1]

Any **two** reasons from the list below:
- mild steel – strong and able to support heavy objects; readily available in box section; less expensive than aluminium;
- stainless steel – resistant to rust or corrosion; hard and very strong;
- ABS plastic – requires no additional finish or painting; non-toxic; does not conduct electricity

All alternative answers will be considered.
(2 × [1]) [2]

(b) (i) Any **two** from the list below:
- mdf;
- plywood;
- melamine formaldehyde covered chipboard.

All alternative answers will be considered.
(2 × [1]) [2]

(ii) Material – MDF
Mechanical property • impact resistant
• resistant to deformation
Reason • can withstand impact of nailing, etc.
• able to withstand force of clamping.

Material – Plywood
Mechanical property • resist bending forces
• very strong
Reason • reduces warping and shrinking

Material – Melamine chipboard
Mechanical property • hardwearing
Reason • sustainable;

All alternative answers will be considered
(2 × [1]) [2]

(c) Answer should include:
- The two pieces of the bamboo work surface are connected to a vice mechanism (or lead screw mechanism) underneath [1] by being connected using 2 bolts, nuts and washers at each side or four self tapping screws. [1]

All alternative answers will be considered.
(2 × [1]) [2]

AVAILABLE MARKS

(d) (i) Any **one** from the list below:
- a component or part purchased from an outside company [1] to aid the manufacture or assembly of a product. [1]
- a standard size or shape of component(s) already made [1] and is readily available in large quantities to purchase. [1]

All alternative answers will be considered.
(2 × [1]) [2]

(ii) Any **two** from the list below:
- the quality of 'bought-in' component not of similar high quality of the product;
- the company that supplies the 'bought-in' component increases prices if the product is successful;
- greater chance of defective parts.

All alternative answers will be considered.
(2 × [1]) [2]

(iii) Any **one** from the list below:
- speeds up manufacture [1] and reduces manufacturing and maintenance costs; [1]
- damaged parts can be sourced easily [1] and replaced; [1]
- no need to purchase new machines; [1]
- no need to hire or train new staff. [1]

All alternative answers will be considered.
(2 × [1]) [2]

(e) (i) Any **one** from the list below:
- anodising;
- powder coating;

All alternative answers will be considered.
(1 × [1]) [1]

(ii) Any **two** from the list below:
- vinyl cutter;
- CNC mill;
- CNC router;
- CNC engraver;

All alternative answers will be considered.
(2 × [1]) [2]

(f) • **Frame legs**:
Frame legs could be pressed or extruded, then cut to length. Ends prepared. Automatic drilling machines could be used to drill the holes in the frame legs for assembly of cross members and folding mechanism. Plastic feet inserts assembled to the frame. Plastic joints assembled to frame. Appropriate method of producing lettering/branding to frame (stickers/CNC router, etc.)

• **Folding mechanism**:
Components on the folding mechanism shaped and cut to length. Holes for the parts of the folding mechanism are created using CNC drilling machines, the parts for the mechanism may be cut using an automatic CNC saw. Parts joined together with the frame using a robotic riveting machine.

- **Work surface**:
  The bamboo work surface is machined to size (length, breadth and depth) using an appropriate CNC machine. All holes are produced using CNC drilling machine. The work surface is attached to the frame using nuts and bolts. One Surface is routered to allow a pre-prepared measuring strip to be insert flush in the work surface. Appropriate method of producing lettering/branding to work surface (stickers/CNC router, etc.)

All alternative answers will be considered.

Response type	Description	Mark band
When a response is not worthy of credit, a [0] should be awarded.		
Limited	Students will describe one or more discussion points with limited detail. An attempt has been made to incorporate some terminology into the answer.	**[1]–[3]**
Satisfactory	Students will describe two or more discussion points with satisfactory detail. Some use of technical terminology will be presented and satisfactory use of punctuation and grammar.	**[4]–[6]**
Good	Students will correctly describe three discussion points with a good level of detail. Correct terminology will be used with good use of punctuation, grammar and accurate spelling.	**[7]–[10]**

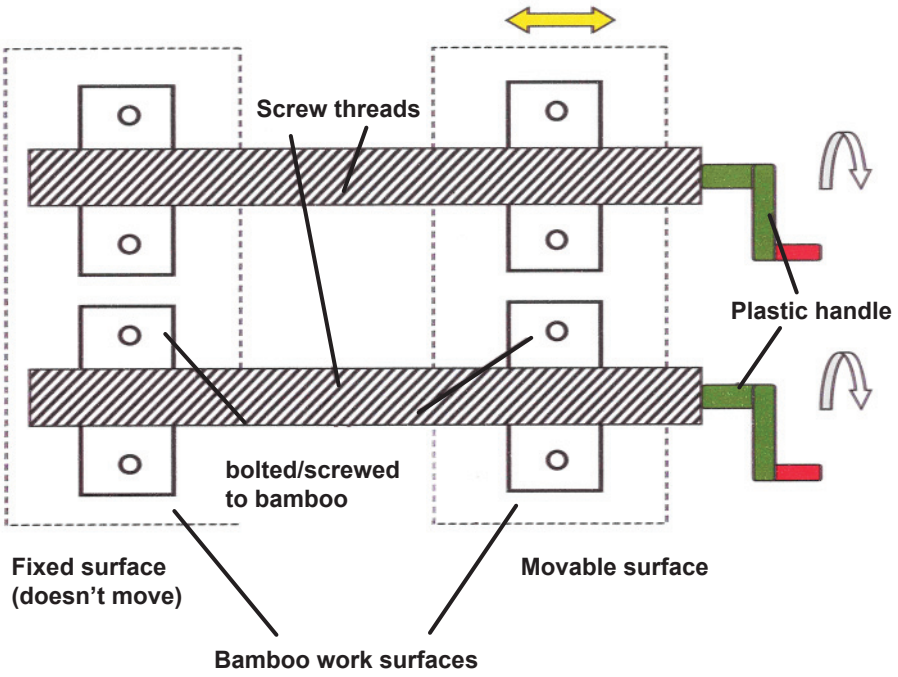
[10]

(g) Appropriate diagrams explaining that when the handles are turned clockwise, the work surface closes and when they are turned anticlockwise the work surface opens.

Opening and closing mechanism:
- Reference should be made to the ability to open the work surfaces at an angle and/or parallel.
- Diagrams should show that one section of work surface doesn't move and that the other work surface moves along a threaded bar or lead screw.

Marks will be awarded for:
– Detail contained in sketches [4]
– Quality of sketches [3]
– Detailed notes [3] [10]

Outline sketch of the **two** screw vice clamping mechanism under the folding bench



	AVAILABLE MARKS
Total	**40**