



**Coimisiún na Scrúduithe Stáit**  
**State Examinations Commission**

**Junior Cycle 2025**

**Marking Scheme**

**Engineering**

**Common Level**

### **Note to teachers and students on the use of published marking schemes**

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

### **Future Marking Schemes**

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.



Coimisiún na Scrúduithe Stáit  
*State Examinations Commission*

**Junior Cycle Final Examination, 2025**

**Engineering**

**Common Level**

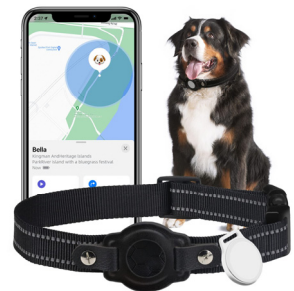
**Marking Scheme**

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**120 Marks**

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Answer **all** questions



# Outline Marking Scheme 2025

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;"><b>Question 1      (29 marks)</b></p> <p>(a) (i) Material @ 2 marks<br/>(ii) One reason @ 2 marks<br/>(iii) Two advantages @ 2 marks each</p> <p>(b) (i) One advantage @ 2 marks<br/>(ii) One application @ 2 marks</p> <p>(c) (i) Two reasons @ 1 mark each<br/>(ii) Explanation @ 2 marks<br/>(iii) Correct selection @ 1 mark<br/>(iv) Name @ 2 marks</p> <p>(d) (i) Explanation @ 2 marks<br/>(ii) Circuit @ 4 marks</p> <p>(e) (i) Explanation @ 2 marks<br/>(ii) One reason @ 2 marks</p>                                                                                                                                    | <p style="text-align: center;"><b>Question 2      (29 marks)</b></p> <p>(a) (i) Three processes @ 1 mark each<br/>(ii) One advantage @ 2 marks</p> <p>(b) One advantage @ 2 marks<br/>One disadvantage @ 2 marks</p> <p>(c) (i) Explanation @ 2 mark<br/>(ii) One benefit @ 2 marks<br/>(iii) Explanation @ 2 marks<br/>(iv) Function @ 2 marks</p> <p>(d) (i) Explanation @ 1 mark<br/>(ii) One application @ 2 marks</p> <p>(e) (i) Correct selection @ 1 mark<br/>(ii) Explanation @ 1 mark</p> <p>(f) (i) Two metals @ 1 mark each<br/>(ii) Design and rendered sketch<br/>@ 5 marks</p> |
| <p style="text-align: center;"><b>Question 3      (35 marks)</b></p> <p>(a) Complete table @ 4 marks</p> <p>(b) Advantage @ 2 marks<br/>Disadvantage @ 2 marks</p> <p>(c) (i) Correct selection @ 2 marks<br/>(ii) Explanation @ 2 mark<br/>(iii) One precaution @ 1 mark</p> <p>(d) (i) One advantage @ 2 marks<br/>(ii) Explanation @ 2 marks</p> <p>(e) (i) Explanation @ 2 marks<br/>(ii) One reason @ 2 marks</p> <p>(f) (i) One advantage @ 2 marks<br/>(ii) One reason @ 2 marks<br/>(iii) Explanation @ 2 marks</p> <p>(g) (i) One reason @ 1 mark<br/>(ii) Complete table @ 4 marks<br/>(iii) Complete table @ 2 marks<br/>(iv) Explanation @ 1 mark</p> | <p style="text-align: center;"><b>Question 4      (27 marks)</b></p> <p>(a) (i) Description @ 2 marks<br/>(ii) Design and rendered sketch<br/>@ 5 marks</p> <p>(b) (i) Match four @ 1 mark each<br/>(ii) Explanation @ 1 mark</p> <p>(c) (i) Function @ 2 marks<br/>(ii) Two precautions @ 2 marks each<br/>(iii) Correct conversion @ 2 marks</p> <p>(d) (i) Correct selection @ 2 marks<br/>(ii) Calculation @ 2 marks<br/>(iii) Function @ 1 mark</p> <p>(e) Positive impact @ 1 mark<br/>Negative impact @ 1 mark</p>                                                                    |

### Question 1

(a) An outdoor light fitted with a Light Emitting Diode (LED) is shown.

(i) Name one suitable material for the manufacture of the body of the outdoor light shown.

Material: Aluminium.

**One material @ 2 marks**

(ii) State one reason for the selection of your chosen material.

Reason for selection: Aluminium is a light material .....  
(or a relatively cheap material or easy to assemble or  
have an attractive finish applied).

**One reason @ 2 marks**

(iii) Describe two advantages of using LED lighting.

Advantage 1: LED technology tends to be more robust and therefore have a long life cycle.

Advantage 2: LED's tend to be very energy efficient resulting in reduced energy costs.

**Two advantages @ 2 marks each**

(b) The smart pet collar shown uses Global Positioning System (GPS) technology.

(i) Describe one advantage of using GPS technology in a pet collar.

Description: The use of GPS technology will allow the pet owner to monitor the location of their pet in real time. This provides the owner with the ability to quickly locate their pet if they wander off or get lost.

**One advantage @ 2 marks**

(ii) State one other application for GPS technology.

Application: GPS technology is used in a variety of applications from satnavs to mapping, farming and sport.

**One application @ 2 marks**



(c) The fishing rod shown is made from carbon fibre and has a foam handle.

(i) State two reasons for using carbon fibre for the manufacture of the fishing rod shown.

Reason 1: Carbon fibre has an excellent strength-to-weight ratio.

Reason 2: Carbon fibre will not corrode when exposed to water.

Two reasons @ 1 mark each

(ii) Explain why foam is used for the handle of the fishing rod.

Explanation: Foam will provide a soft and comfortable handle that is easy to grip. Foam is also durable and wear resistant.

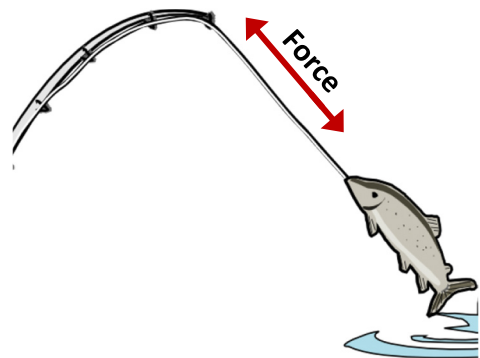
Explanation @ 2 marks



(iii) Select the type of force acting on the fishing line shown.

| Type of force     | Selection (tick one) |
|-------------------|----------------------|
| Compression Force |                      |
| Tension Force     | ✓                    |
| Shear Force       |                      |

Identify @ 1 mark



(iv) Metal fishing weights are often attached to a fishing line to help the bait to sink.

Name one metal which would be suitable for the manufacture of fishing weights.

Name of metal: Lead.

Name @ 2 marks



(d) A DPDT switch is used to raise or lower the motorised window blind shown.

(i) Explain the meaning of DPDT.

**Explanation:** DPDT stands for double pole double throw.  
This type of switch ensures that the blind shown can be raised and lowered by a flick of the switch.

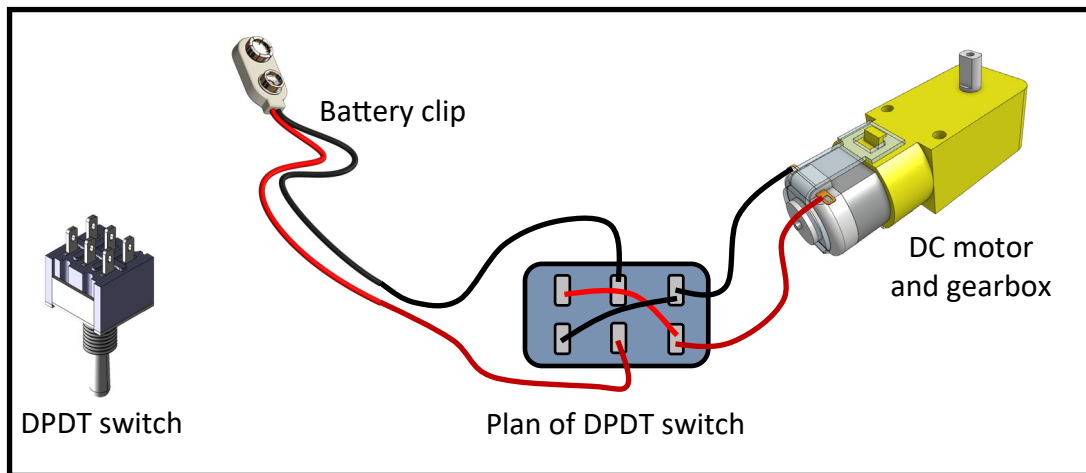


Window blind

**Explanation @ 2 marks**

(ii) A battery clip, DPDT switch and a DC motor and gearbox are shown below.

Complete the wiring circuit for these components so that the DC motor and gearbox will operate in forward and reverse.



**Circuit @ 4 marks**

(e) (i) Explain why prototyping is important in the early stages of engineering design and development.

**Explanation:** Prototyping helps to identify the best initial design possibilities while saving time and money in the overall design process.



A clay prototype helmet designed by Spiuk

**Explanation @ 2 marks**

(ii) State one reason for using a 'Gantt Chart' to manage an engineering project.

**Reason:** A Gantt Chart helps to assess how long a project should take ..... ( or determine the resources needed or plan the order in which the tasks will be completed).



Sample Gantt Chart

**One reason @ 2 marks**

## Question 2

*Engineering plays an important role in the broadcasting of sport, the development of sporting equipment and the celebration of sporting achievements.*

- (a) The AGITO multi-terrain robotic camera system is shown opposite.

- (i) Name three lathe processes used for the manufacture of the camera thumb screw shown.

Lathe process 1: Facing.

Lathe process 2: Parallel turning.

Lathe process 3: Knurling.

**Three processes @ 1 mark each**

- (ii) State one advantage of Computer Numerical Control (CNC) for the manufacture of the thumb screw shown.

Advantage: CNC ensures the rapid, accurate mass production of components such as the thumb screw.

**One advantage @ 2 marks**

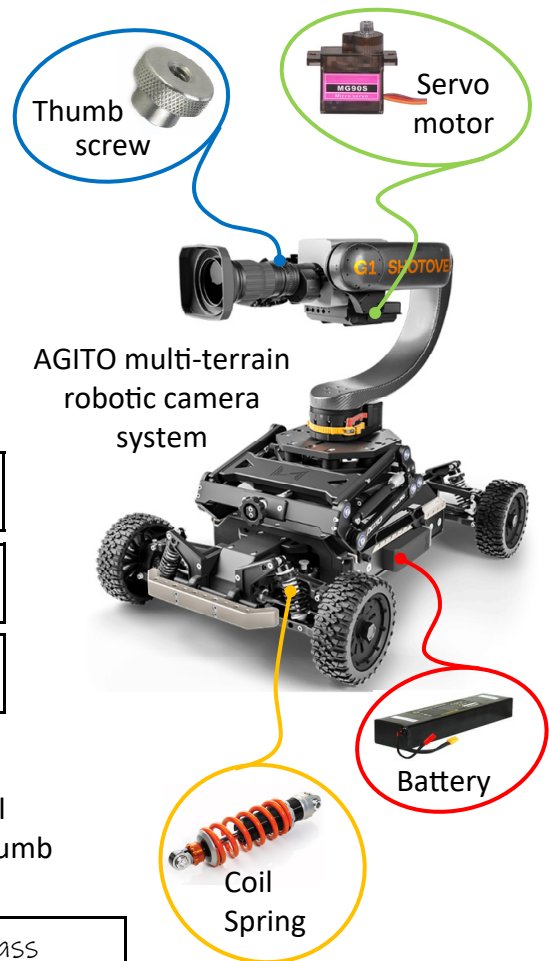
- (b) Outline one advantage and one disadvantage of using robotic cameras for sports broadcasting events.

Advantage: Robotic cameras allow for recording safely close to the action giving angles not usually seen.

**One advantage @ 2 marks**

Disadvantage: Robotic cameras are complex and can be very expensive.

**One disadvantage @ 2 marks**



(c) The robotic camera is powered by a 3.7 V Lithium-ion rechargeable battery.

(i) Explain the meaning of the term 3.7 V.

|                                                          |
|----------------------------------------------------------|
| Explanation: 3.7 V stands for 3.7 volts. This represents |
| the force pushing the electrical current in the circuit  |

Explanation @ 2 marks



3.7 V Lithium-ion rechargeable battery

(ii) Outline one benefit of having a rechargeable battery in the robotic camera system.

|                                                             |
|-------------------------------------------------------------|
| Explanation: Rechargeable batteries are a more eco-friendly |
| solution as they help to reduce battery waste.              |
|                                                             |
|                                                             |

One benefit @ 2 marks

(iii) Explain why a servo motor is suitable to control the movements of a robotic camera.

|                                                         |
|---------------------------------------------------------|
| Explanation: Servo motors can control the speed and     |
| positions of outputs very accurately making it suitable |
| to control the movements of a robotic camera.           |
|                                                         |
|                                                         |
|                                                         |



Servo motor

Explanation @ 2 marks

(iv) Describe the function of the coil spring in the operation of the robotic camera system.

|                                                            |
|------------------------------------------------------------|
| Description: The coil springs are used to absorb shock and |
| reduce the impact of movement over uneven surfaces.        |
| The function of the coil springs is to provide the robot   |
| with a smoother ride thus ensuring better quality images   |
| for broadcasting.                                          |
|                                                            |



Coil spring

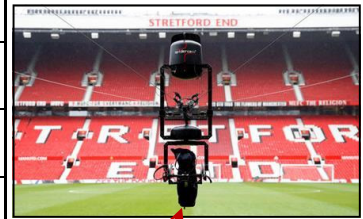
Function @ 2 marks

(d) The Skycam shown is operated by fibre optic cables which are covered with Kevlar.

(i) Explain why Kevlar is a suitable material for covering a fibre optic cable.

|                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explanation: Kevlar is relatively light and strong. Kevlar is used to protect fibre optic cables from heat, moisture and abrasion while also providing additional strength to the cable. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Explanation @ 1 mark

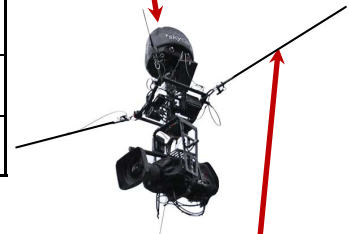


Skycam

(ii) State one other application for fibre optic cables.

|                                                                  |
|------------------------------------------------------------------|
| Application: Telecommunication (telephone and internet) Systems. |
|------------------------------------------------------------------|

One application @ 2 marks



Kevlar covered fibre optic cable

(e) (i) Select the most suitable polymer for the manufacture of a tennis nets.

| Polymer      | Selection (tick one) |
|--------------|----------------------|
| Acrylic      |                      |
| Polyethylene | ✓                    |
| Bakelite     |                      |

Correct selection @ 1 mark



Tennis net

(ii) Explain why the material you selected in (e)(i) above is suitable for use as a tennis net.

|                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------|
| Explanation: Polyethylene netting is lightweight, weather resistant and capable of absorbing shock from the impact of a tennis ball. |
|--------------------------------------------------------------------------------------------------------------------------------------|

Explanation @ 1 mark



- (f) Sports competitors finishing in the first three positions are presented with Gold, Silver or Bronze medals.



- (i) Name two metals that combine to produce bronze.

Metal 1: Copper.

Metal 2: Tin.

Two metals @ 1 mark each



Bronze  
Olympic  
Medal

- (ii) Using rendered sketching, design a display stand for the medal shown.

*Rendered sketch of display stand*



Design and rendered sketch @ 5 marks

### Question 3

*The Doosan electrically powered concept forklift is a futuristic and innovative design, incorporating features such as joystick control, solar control cabin glass, operator presence system and proximity sensors.*



*The Doosan electrically powered concept forklift*

- (a) The materials used in the manufacture of the Doosan concept forklift have the following properties:

|              |            |
|--------------|------------|
| Hardness     | Toughness  |
| Transparency | Elasticity |

Complete the table below by inserting the most suitable material property, from the list above, next to the description of the material property.

| Material Property | Description of Material Property                                                             |
|-------------------|----------------------------------------------------------------------------------------------|
| Transparency      | The ability of a material to allow light to completely pass through.                         |
| Hardness          | The ability of a material to withstand surface indentation, scratching and wear.             |
| Elasticity        | The ability of a material to return to its normal shape after being stretched or compressed. |
| Toughness         | The ability of a material to withstand shock and impact.                                     |

**Complete table @ 4 marks**

- (b) Identify one advantage and one disadvantage of using electric powered vehicles.

|                                                                                                           |
|-----------------------------------------------------------------------------------------------------------|
| <b>Advantage:</b> Less environmental pollution as fossil fuel is not burned in electric powered vehicles. |
|                                                                                                           |

**Advantage @ 2 marks**

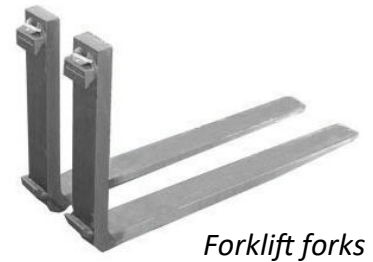
|                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Disadvantage:</b> The journey range is limited by the amount of battery charge and the current lack of availability of charging stations can make be problematic when making long journeys. |
|                                                                                                                                                                                                |

**Disadvantage @ 2 marks**

- (c) (i) Circle the most suitable material for the manufacture of the forklift forks shown.

|         |        |             |      |
|---------|--------|-------------|------|
| Acrylic | Copper | Alloy Steel | Lead |
|---------|--------|-------------|------|

Correct selection @ 2 marks



- (ii) Explain why the surface of the forklift forks are heat treated.

|                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Explanation: Heat treatment ensures that the forks are hard and tough. This will ensure that the forks can withstand impact and therefore extend their overall life. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Explanation @ 2 marks

- (iii) State one safety precaution to be observed when heat treating metals.

|                                                                                                               |
|---------------------------------------------------------------------------------------------------------------|
| Safety precaution: Ensure to wear appropriate protective clothing such as goggles boots, overalls and gloves. |
|---------------------------------------------------------------------------------------------------------------|

One safety precaution @ 1 mark

- (d) The forklift joystick shown is made from the thermoplastic material, High Density Polyethylene (HDPE) and is marked with the polymer identification code shown.

- (i) State one advantage of joystick control systems.

|                                                                                                     |
|-----------------------------------------------------------------------------------------------------|
| Advantage: Joystick control ensure a fast connection between the operator and the device interface. |
|-----------------------------------------------------------------------------------------------------|

One advantage @ 2 marks



- (ii) Explain the meaning of the arrowed lines in the polymer identification code shown.

|                                                                    |
|--------------------------------------------------------------------|
| Explanation: The arrows indicate that the product can be recycled. |
|--------------------------------------------------------------------|

Explanation @ 2 marks



Polymer identification code

- (e) The cabin of the Doosan electric concept forklift is capable of tilting forward and backwards and is fitted with solar control glass.

- (i) Explain the benefit of a tilting cabin in a forklift.

|                                                       |
|-------------------------------------------------------|
| Explanation: Tilting of the cabin allows the operator |
| to view the load from a different perspective as the  |
| load is raised. The changed cabin position is also an |
| added safety feature.                                 |

**Explanation @ 2 marks**

- (ii) State one reason for fitting solar control glass to the forklift cabin.

|                                                        |
|--------------------------------------------------------|
| Reason: The solar glass ensures that the cabin will be |
| comfortable for the operator by keeping the cabin      |
| cool in a warm climate.                                |

**One reason @ 2 marks**



- (f) The forklift lifting mechanism shown uses a hydraulic ram and chain.

- (i) State one advantage of using a chain in a lifting mechanism.

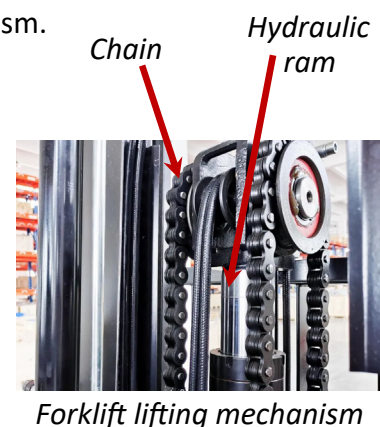
|                                                   |
|---------------------------------------------------|
| Advantage: The lifting capacity of the machine is |
| increased by the use of a chain mechanism.        |

**One advantage @ 2 marks**

- (ii) Outline one reason why it is necessary to lubricate a chain mechanism.

|                                                    |
|----------------------------------------------------|
| Reason: Lubricating a chain prevents corrosion and |
| wear.                                              |

**One reason @ 2 marks**



- (iii) Explain the meaning of the term *hydraulic*.

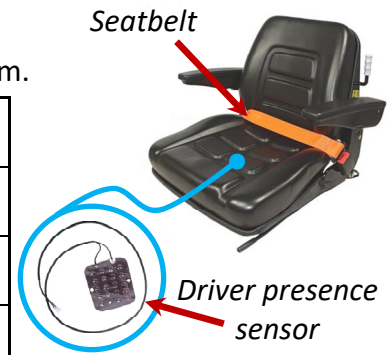
|                                                                                    |
|------------------------------------------------------------------------------------|
| Explanation: Hydraulic is a mechanical function that operates through the force of |
| liquid (frequently oil) pressure.                                                  |

**Explanation @ 2 marks**

- (g) Modern forklifts are fitted with a seatbelt and an 'Operator Presence System', which senses when the operator (driver) is seated.

- (i) Explain one reason for using an Operator Presence System.

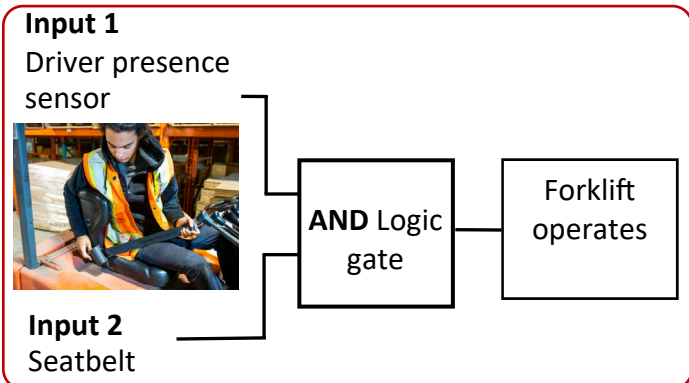
|                                                         |
|---------------------------------------------------------|
| Reason: The Operator Presence Sensor is a safety device |
| that ensures the forklift will only operate when an     |
| operator is present and seated.                         |
|                                                         |



One reason @ 1 mark

- (ii) The following information is relevant to activate the forklift controls:

No driver detected = Logic level 0  
 Driver detected = Logic level 1  
 Seat belt not engaged = Logic level 0  
 Seat belt engaged = Logic level 1



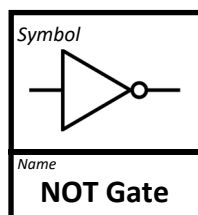
The truth table shown represents the input information outlined above.

Complete the truth table shown

| Input 1 | Input 2 | Output |
|---------|---------|--------|
| 0       | 0       | 0      |
| 1       | 0       | 0      |
| 0       | 1       | 0      |
| 1       | 1       | 1      |

Complete table @ 4 marks

- (iii) A NOT gate is used to invert (reverse) an electronic output. Complete the truth table for a NOT gate.

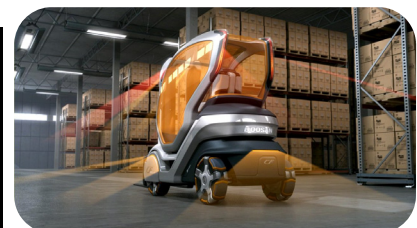


| Input | Output |
|-------|--------|
| 0     | 1      |
| 1     | 0      |

Complete table @ 2 marks

- (iv) Explain the purpose of proximity sensors on a forklift.

|                                                       |
|-------------------------------------------------------|
| Purpose: The proximity sensors alerts the operator to |
| the potential for a collision with a structure or a   |
| person / other workers.                               |



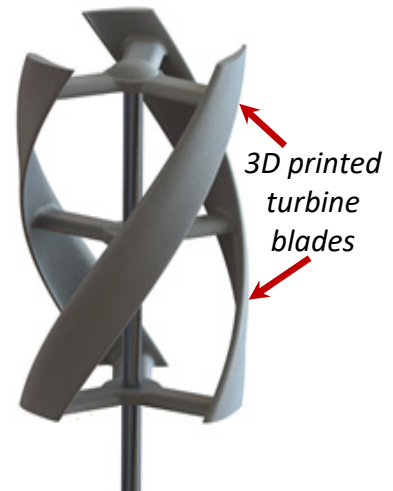
Explanation @ 1 mark

#### Question 4

(a) 3D printed turbine blades for a *Vertical Axis Wind Turbine* (VAWT) are shown.

(i) Describe the 3D printing process.

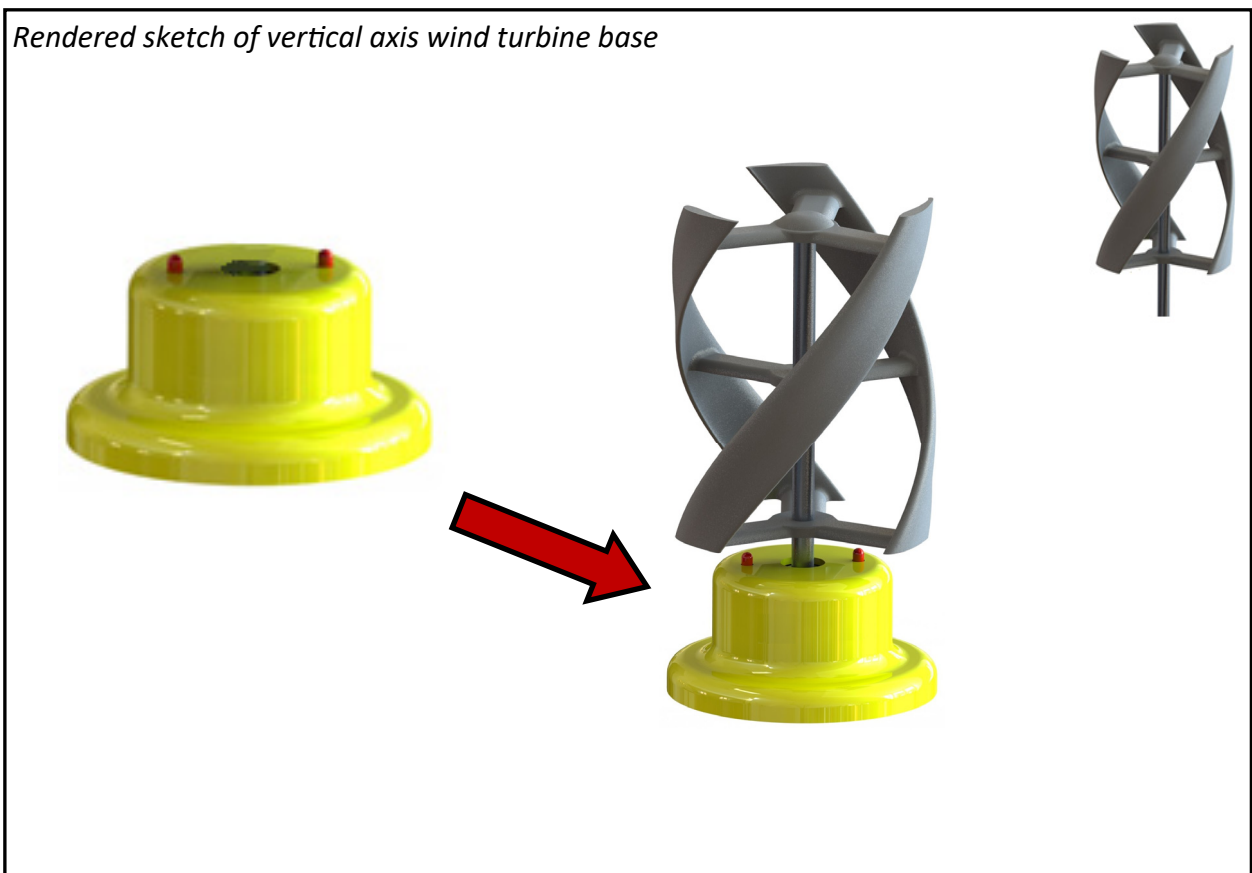
|                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description: 3D printing is an additive manufacturing process that creates a physical object from a digital design. The process works by linking an electronic design file to a 3D printing machine which will allow thin layers of a material, such as plastic resin, to be laid down and then fused together to create the object. |
|                                                                                                                                                                                                                                                                                                                                      |



Description @ 2 marks

(ii) Using rendered sketching, design a base for the vertical axis wind turbine.

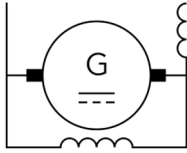
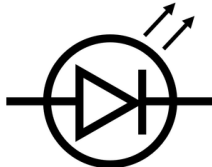
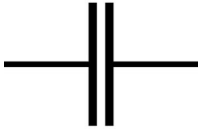
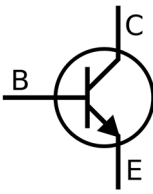
Rendered sketch of vertical axis wind turbine base



Design and rendered sketch @ 5 marks

(b) The electronic components shown below are used in the electric circuit for the vertical axis wind turbine

- (i) A capacitor is matched to its electronic symbol as shown.  
Match the remaining electronic components to the correct electronic symbol for that component.

| Electronic components                                                                                              | Electronic symbols                                                                   |
|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Resistor</b><br>               |    |
| <b>Transistor</b><br>             |    |
| <b>DC Generator</b><br>         |   |
| <b>Light Emitting Diode</b><br> |  |
| <b>Capacitor</b><br>            |  |

Match four  
@ 1 mark each

- (ii) A DC generator is used in the circuit. Explain the meaning of DC.

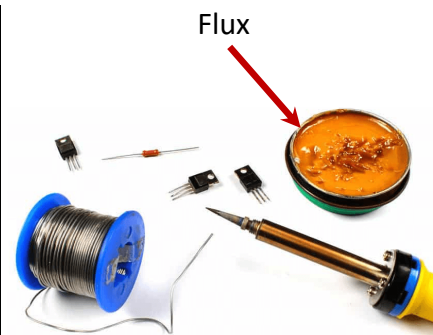
Explanation: DC stands for Direct Current. This is an electrical current that will be produced by the generator which consistently flows in one direction.

Explanation @ 1 mark

(c) The electronic components used in the vertical axis wind turbine are joined by soldering.

(i) Describe the function of a flux when soldering.

|                                                       |
|-------------------------------------------------------|
| Description: Flux is a chemical compound that helps   |
| to clean and protect a connection to be soldered. The |
| flux helps to remove oxides and prevent the           |
| formation of oxides and ensures the flow of solder.   |
|                                                       |
|                                                       |



**Function @ 2 marks**

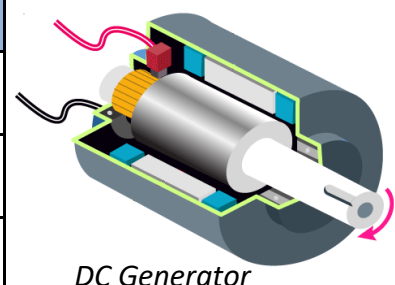
(ii) State two safety precautions to be observed when soldering electronic components.

|                                                                             |
|-----------------------------------------------------------------------------|
| Safety precaution 1: Wear appropriate eye protection.                       |
|                                                                             |
|                                                                             |
|                                                                             |
| Safety precaution 2: Use an extractor fan or have adequate ventilation when |
| Soldering to avoid inhaling toxic fumes.                                    |
|                                                                             |
|                                                                             |

**Two precautions @ 2 mark each**

(iii) Select the energy conversion that takes place in a DC generator.

| Energy conversion:                     | Selection<br>(tick one) |
|----------------------------------------|-------------------------|
| Electrical energy to chemical energy   |                         |
| Mechanical energy to electrical energy | ✓                       |
| Kinetic energy to mechanical energy    |                         |



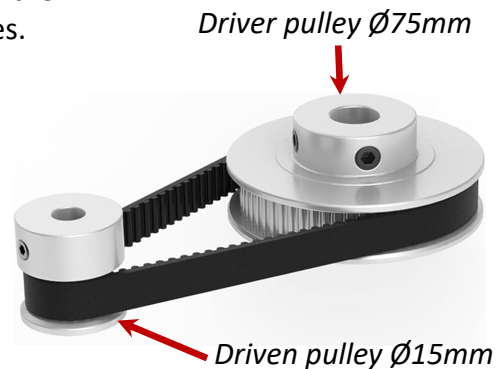
**Correct conversion @ 2 marks**

(d) The vertical axis wind turbine uses a toothed pulley and belt drive mechanism.

(i) For the drive mechanism shown, select whether the speed of the driven pulley increases or decreases.

| Driven speed                  | Selection<br>(tick one) |
|-------------------------------|-------------------------|
| Increased driven pulley speed | ✓                       |
| Decreased driven pulley speed |                         |

**Correct selection @ 2 marks**



(ii) Calculate the output speed of the driven pulley, in RPM, if the driver pulley rotates at 50 RPM.

*Calculation*

Ratio = Driver / Driven

Ratio = 75 / 15 ..... = 5

50 RPM X 5 = 250 RPM

Output speed is 250 RPM

**Calculation @ 2 marks**

(iii) State the function of the ball bearing used in the vertical axis wind turbine assembly.

Function: The ball bearing shown helps to position the turbine shaft and ensures that the turbine rotates freely by reducing the impact of friction.



*Ball bearing*

**Function @ 1 mark**

(e) Describe one positive environmental impact and one negative environmental impact of wind turbine technology.

Positive impact: Generating energy from wind turbine technology does not release any carbon emissions as is done by burning fossil fuels.

Negative impact: Wind turbine technology can be dangerous to some wildlife habitats ..... or (Wind turbines can be noisy).



**Positive impact @ 1 mark, negative impact @ 1 mark**

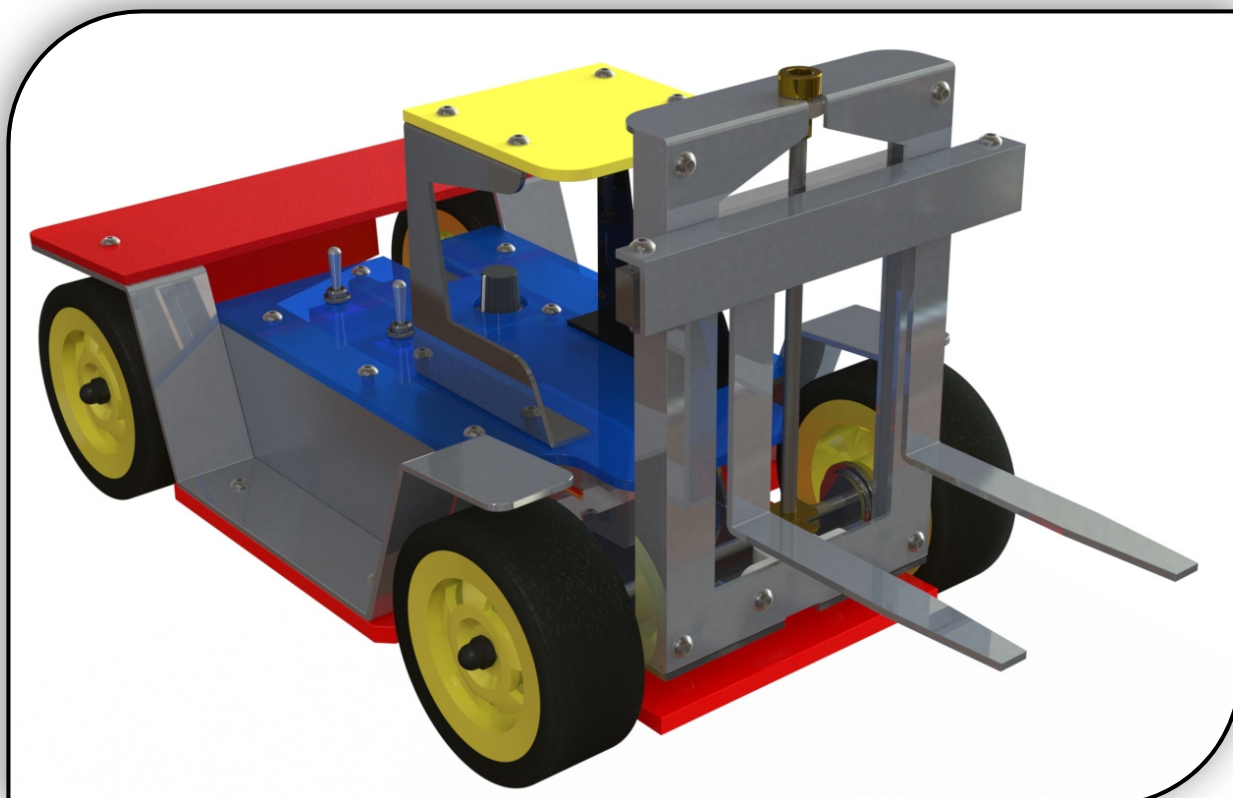


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## Junior Cycle Engineering Project

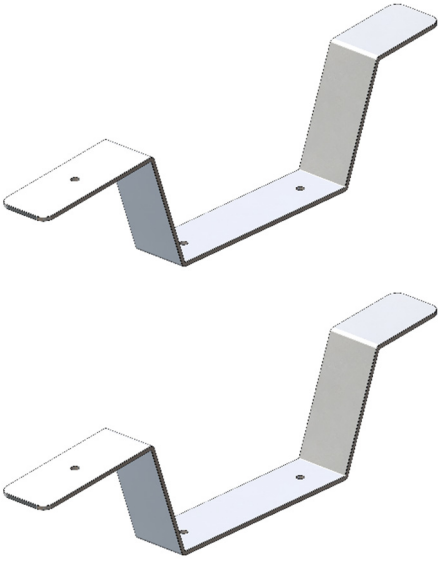
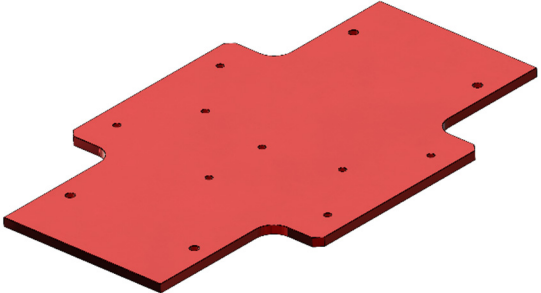
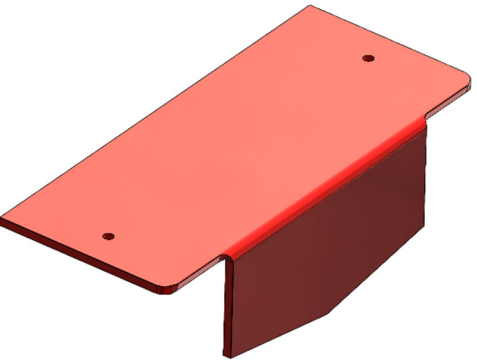
### Model Forklift

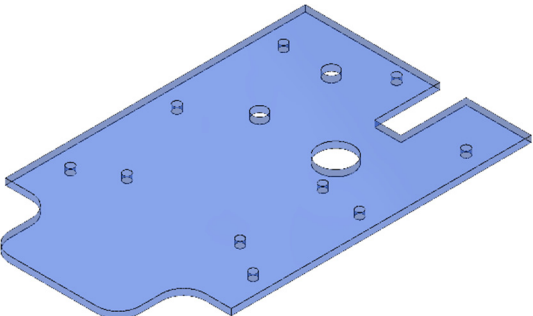
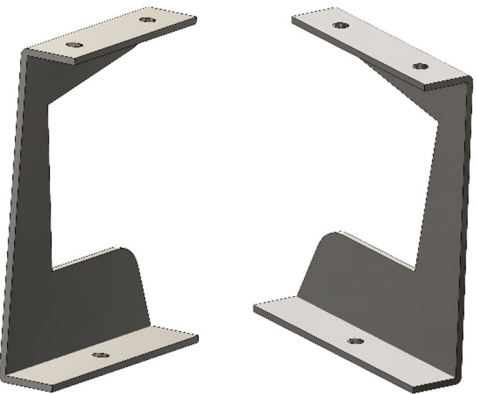
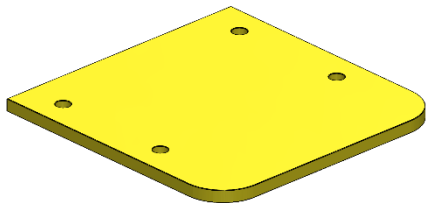
### Marking Scheme 2025



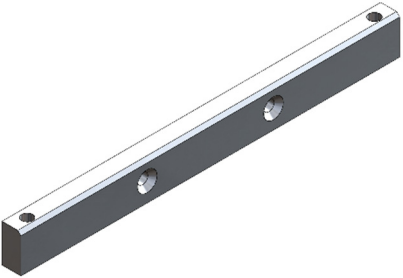
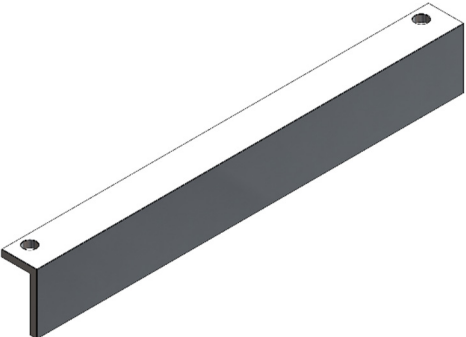
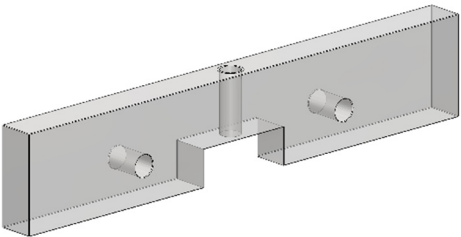
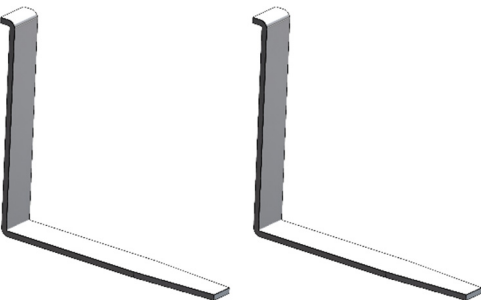
| Section 1: Complete Model ('Design Element' not included) |                         |       |
|-----------------------------------------------------------|-------------------------|-------|
| Headings                                                  | Description             | Marks |
| Assembly                                                  | Subjective Grade 1 – 20 | 20    |
| Finish                                                    | Subjective Grade 1 – 20 | 20    |
| Mechanical Function                                       | Subjective Grade 1 – 15 | 15    |
| Electrical Function                                       | Subjective Grade 1 – 15 | 15    |
| Section 1 - Total                                         |                         | 70    |
| Section 2: 'Design Element' (Not required for 2025)       |                         |       |
| Section 2 - Total                                         |                         | --    |

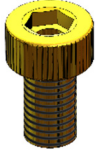
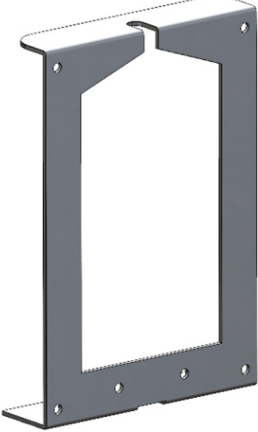
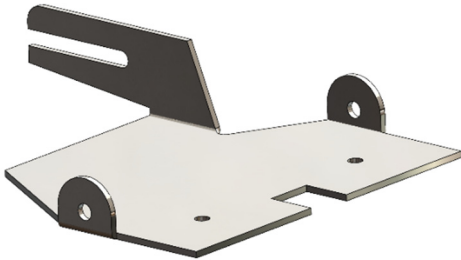
### Section 3:

| Headings                                                                                                               | Description                      |    | Marks |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------|----|-------|
| <b>Part 2 – Mudguard (x2)</b><br><br> | Mark out, Shape, Drill & Bend    | 10 | 10    |
| <b>Part 10 – Chassis</b><br><br>    | Mark out, Shape, Chamfer & Drill | 10 | 10    |
| <b>Part 11 – Rear cover</b><br><br> | Mark out, Drill, Shape & Bend    | 10 | 10    |

|                                                                                                                                                 |                               |    |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|-----------|
| <b>Part 15 – Centre cover</b><br>                              | Mark out, Shape, Drill & Slot | 10 | 20        |
| <b>Part 16 – Side Panels (x2)</b><br>                         | Mark out, Shape & Drill       | 10 |           |
| <b>Parts 5 &amp; 6 – Cab side panel left &amp; right</b><br> | Mark out, Drill, Shape & Bend | 15 | 20        |
| <b>Part 9 – Cab roof</b><br>                                 | Mark out, Shape & Drill       | 5  |           |
| <b>Section 3 - Total</b>                                                                                                                        |                               |    | <b>70</b> |

## Section 4:

| Headings                                                                                                            | Description                    |    | Marks |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------|----|-------|
| <b>Part 1 – Carriage</b><br>       | Mark out, Drill, CSK & Chamfer | 10 | 15    |
| <b>Part 7 – Load backrest</b><br> | Mark out, Shape & Drill        | 5  |       |
| <b>Part 8 – Lift</b><br>         | Mark out, Drill, Tap & Slot    | 9  | 15    |
| <b>Part 17 – Forks (x2)</b><br>  | Mark out, Shape & Bend         | 6  |       |

|                                                                                                                          |                                        |    |            |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----|------------|
| <b>Part 3 – Leadscrew support</b><br>   | Centre Drill & Drill<br>Ø4mm           | 2  | 15         |
| <b>Part 12 – Mast</b><br>               | Mark out, Shape, Slot,<br>Drill & Bend | 13 |            |
| <b>Part 13 – Guide rails (x2)</b><br>  | Mark out, Drill, &<br>Chamfer          | 10 | 10         |
| <b>Part 4 – Servo arm</b><br>         | Drill Ø3mm                             | 2  | 15         |
| <b>Part 14 – Tilting platform</b><br> | Mark out, Shape, Drill,<br>Slot & Bend | 13 |            |
| <b>Section 4 – Total</b>                                                                                                 |                                        |    | <b>70</b>  |
| <b>Overall Total</b>                                                                                                     |                                        |    | <b>210</b> |