T Level Technical Qualification in Engineering and Manufacturing – Design and Development

8714-321 Mechanical Occupational Specialism

Grade Standard Exemplification Material

Pass - Summer 2025

Version 1.0

Version and date	Change detail	Section	Question
v1.0 31st October 2025	First published		

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Introduction

Summer 2025 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2025 assessment series to achieve a pass grade for the 8714-321 Design and Development in Mechanical engineering Occupational Specialism (OS)

The Grade Standard Exemplification Material (Grade SEM) evidence provided for the pass grade displays the holistic standard required across the tasks to achieve the pass grade boundary in the summer 2025 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to pass standard (threshold competence) in summer 2025. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.

The pass grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Tasks

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Candidate evidence that was or was not included in this Grade SEM has also been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1 Design
Task 2 Manufacture and Test
Task 3 Peer Review
Task 4 Evaluation and implementation

Candidate evidence

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by provider assessors. This was evidence that was captured as part of the assessment and then internally marked by the provider assessor.

The Occupational Specialism brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (https://www.gov.uk/government/publications/ofqual-guide-for-schools-and-colleges-2025/ofqual-guide-for-schools-and-colleges-2025#grading), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was sufficient to achieve the pass grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than pass grade).

Grade descriptors

To achieve a pass (threshold competence), a candidate will be able to:

Demonstrate a basic use of software/technologies to model, evaluate and produce mechanical engineering diagrams and simulations that meets the requirements of the brief.

Demonstrate basic technical skills when developing models and prototypes, resulting in a prototype that may require some modifications.

Apply basic knowledge and understanding of testing processes, resulting in a prototype that has been tested against most of the design criteria.

Interpret information, plan, assess risk and follow safe working methods appropriately when applying practical skills to an acceptable standard in response to the requirements of the brief.

Apply basic knowledge and understanding of the design principles required for mechanical engineering resulting in proposals and solutions that meet the minimum requirements of the brief.

Work safely showing an understanding and suitable level of awareness in the preparation and application of processes, selection and use of tools and manufacturing materials and components, resulting in tasks that are carried out with some minor errors.

Use industry and technical terminology accurately most of the time in both written and verbal contexts.

Task 1 Design

Assessment number (eg 1234-033)	8714-321
Assessment title	Mechanical Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	Design Specification Annotated sketches Selected design for development with justifications Selection and use of materials and components needed for the proposed design with justifications All design calculations, including all workings Engineering drawings of the proposed design Outcomes of the virtual modelling of the proposed design, either as screen captures or printouts Bill of materials, with justifications Any notes produced of research undertaken including citation of sources and internet search history
Date submitted by candidate	DD/MM/YY

Task 1

Assessment themes:

- Health and Safety
- Design and Planning

You must:

a) produce a detailed design specification that builds on the design criteria given in the assignment brief and Technical Drawing Pack DD321, including references to any research used
b) sketch and annotate three potential designs for the mobile crane
c) select one appropriate mobile crane design for development with justifications
d) select and justify the use of the materials and components needed for the proposed design
e) carry out calculations to support the proposed design:
    - the loading applied to any components of the design that are subject to stress
    - the mechanical advantage afforded by the design
f) create engineering drawings of the proposed mobile crane design using CAD software
g) produce a virtual model of the proposed mobile crane design using CAD software
h) create a bill of materials (BoM) listing all of the parts required in your final design proposal, with justifications.

Additional evidence of your performance that must be captured for marking:

none

Candidate evidence

Task 1 Design specification

With my crane I aim to build a simple, yet very efficient design and I aim to do this by keeping it using a simple but effective mechanical system so that it can achieve all the functions that were outlined in the design brief. I made three crane designs which one drastically stuck out to me, and this was design 2 and the design I will be going with.

The crane will start out with a large base plate made out of MDF (researched on What Is MDF, Its Types, & Uses (A Complete Beginner's Guide)) –(1) which will be 750mm x 750mm wide and 50mm tall with 4 counterweights on all four corners these counterweights will ensure stability whichever way the crane turns. My base plate is purposely oversized to ovoid the crane from succumbing to bending moment. This is why I can omit certain calculations.

Then the I will construct a base tower made of solid balsa wood which will be 200mm tall 150 wide on both sides (researched on Balsa Wood Properties, Uses and Advantages - Timber Blogger)-(2) Balsa wood is known for its high strength to weight ratio and the fact it is an easy wood to work with as it has a property in being high malleable. This base tower will be secured on all sides with screws and right-angle aluminium brackets on all sides (researched on What Are The Properties Of Aluminium? - thyssenkrupp Materials (UK) – (3)and Paper_711_do druku_A4.pdf)-(4) . The base tower will then be supported by four support beams on every side also made of balsa wood which will be 175mm tall. All these 4 support beams will be all secured down with screws and with two brackets on either side both at the bottom and top of the support beams. These brackets will have to me made in the workshop as they will have to be a precise angle.

At the top of the base tower, I will construct a top plate also made of MDF this plate will be 300mmx300mm wide and 20mm tall this top plate is deliberately oversized to be able to fit screws in to prevent the crane from moving more than 180 degrees and to put a locking mechanism at 90 degrees. This top plate is what the rotational turn table will sit on. This is what the base of the top tower will then sit on. This top plate will be secured to the base tower with screws and aluminium brackets on all four sides. On the top plate will be three screws two to completely prevent the top tower rotating more than 180 degrees and one to make a locking mechanism at 90 degrees.

On my top tower which will also will also be constructed of balsa wood in the same way I constructed the base tower it will be 75mmx75mm and 200mm tall which will sit on the turntable. I will then attach a small piece of aluminium sheet metal for the locking mechanism. Then at the top of the tower I will attach the arm made of balsa wood made in the same way as the base and top tower,

the arm will be 75mm wide to fit flush on the top of the tower then 50mm tall and 275mm long. This will be secured to the top of the tower by screws and right-angle brackets on the inside of the connection and straight bits of aluminium to ensure maximum strength. It will then be supported with two pieces tri-angled pieces of plywood either side (researched on Plywood: Properties, Characteristics, Types & Uses - WoodworkMag.Com)-(5) the pieces of plywood will ensure maximum amount on strength and stability while also keeping the top half of the tower light.

On the outside of the crane there a double pulley system to operate the cranes hook. This double pulley system will use mechanical advantage to lift more weight than the same crane with a single pulley system. The pulley system will be attached with screws and then fixed points for the nylon rope to pass through (researched on Nylon Ropes - Strengths)- (6) there will be two types of fixed points, these is points fixed directly to the arm with a hole passing through and then hooks attached to the arm when closer to a corner. It will then have a stainless-steel hook attached to the end of the rope.

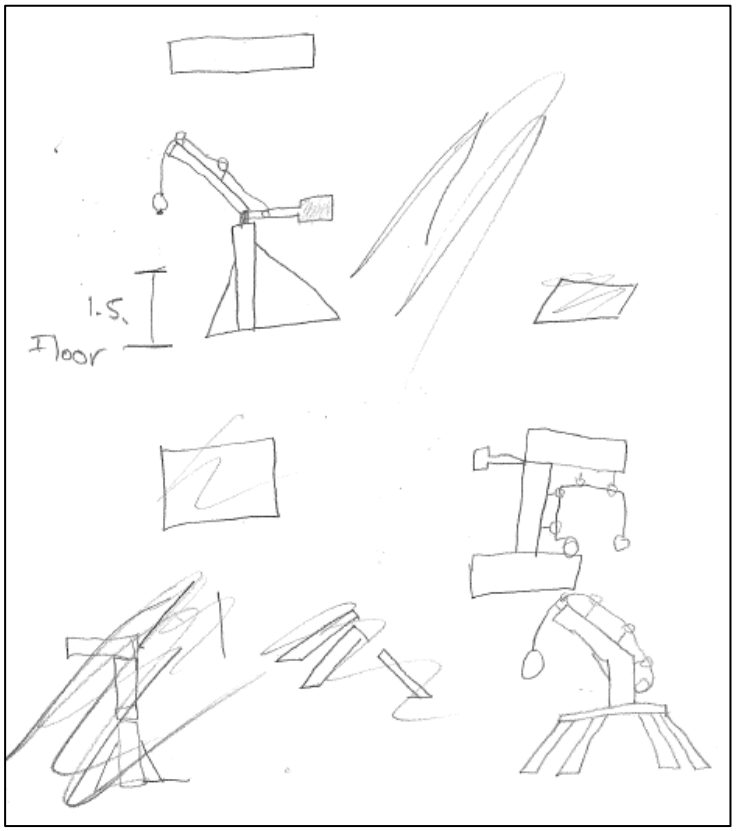
References: Design specification

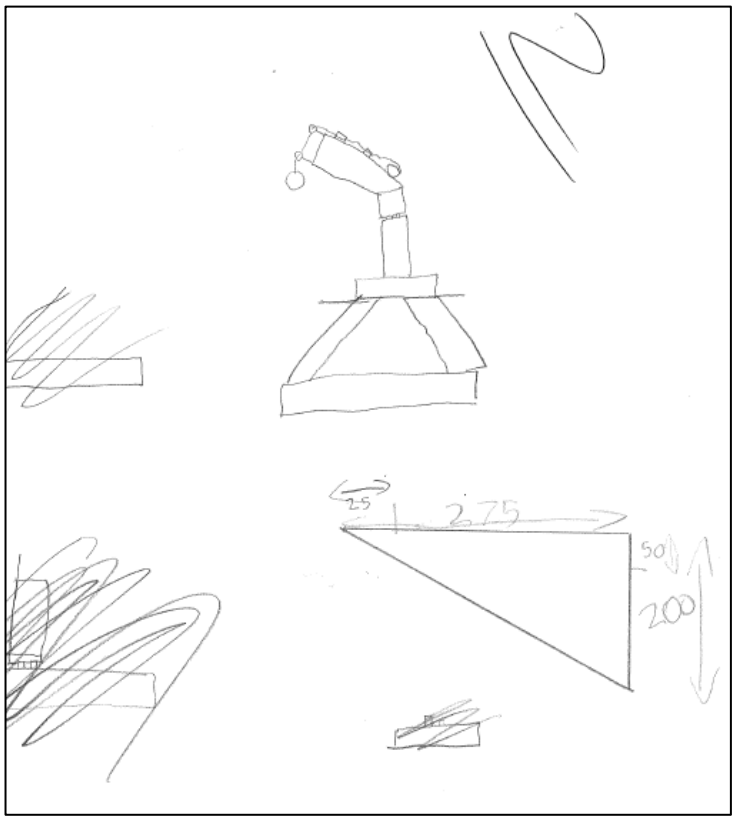
1) https://woodworkingly.com/what-is-mdf-and-its-uses/
2) https://www.timberblogger.com/balsa-wood/
3) https://www.thyssenkrupp-materials.co.uk/properties-of-aluminium
4) http://archive.sciendo.com/ACE/ace.2019.65.issue-4/ace-2019-0055/ace-2019-0055.pdf
5) https://www.woodworkmag.com/plywood/
6) https://www.engineeringtoolbox.com/nylon-rope-strength-d_1513.html

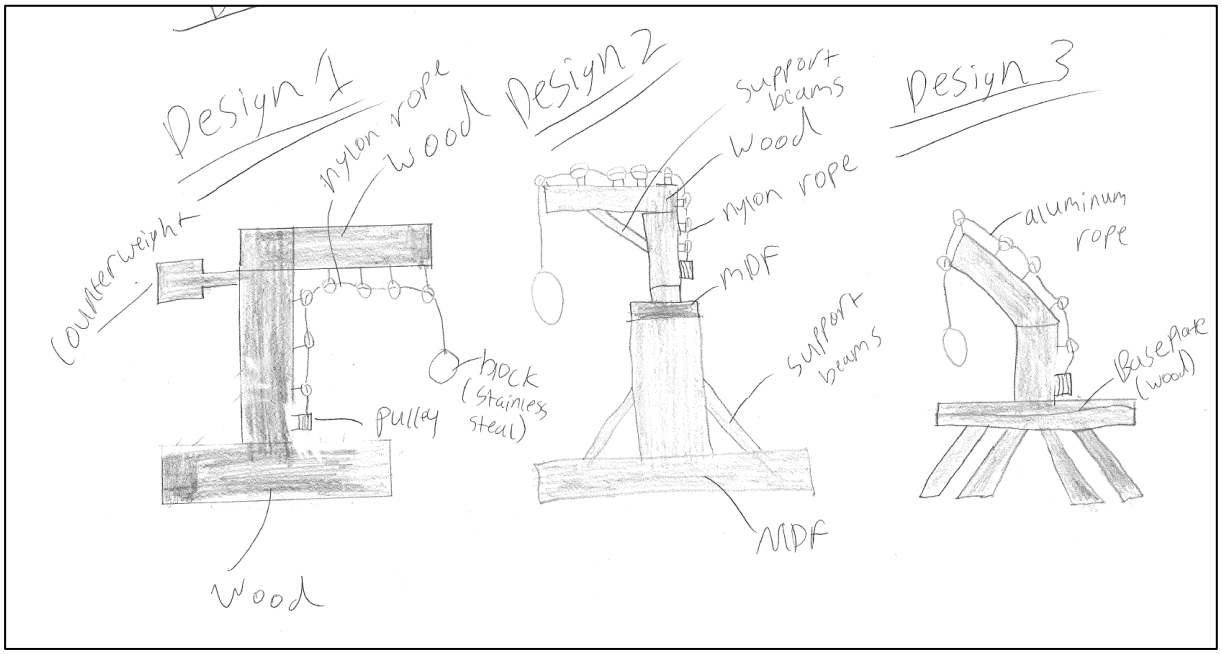
Health and Safety

When I build the crane health and safety is a top priority, I will make sure that I will be always wearing the following PPE: Steal toe capped boots, Gloves, Goggles, Protective overalls. It is also very important to keep a clean and clear working environment both on the worktable and on the floor. This will greatly reduce risk of injury from falling and hand and arm injuries etc. Keeping a clean worktable and staying very clean after finishing every day's work. Safe conduct is vital in the workshop especially when you or others are working on heavy machinery.

Task 1 Sketches of potential designs







support beams cut from mdf or wood.

things to thred wire through all sizes.

(have to be screwed in.

pully 20 mm diamiter (37-0405)

matches the 20 mm wire

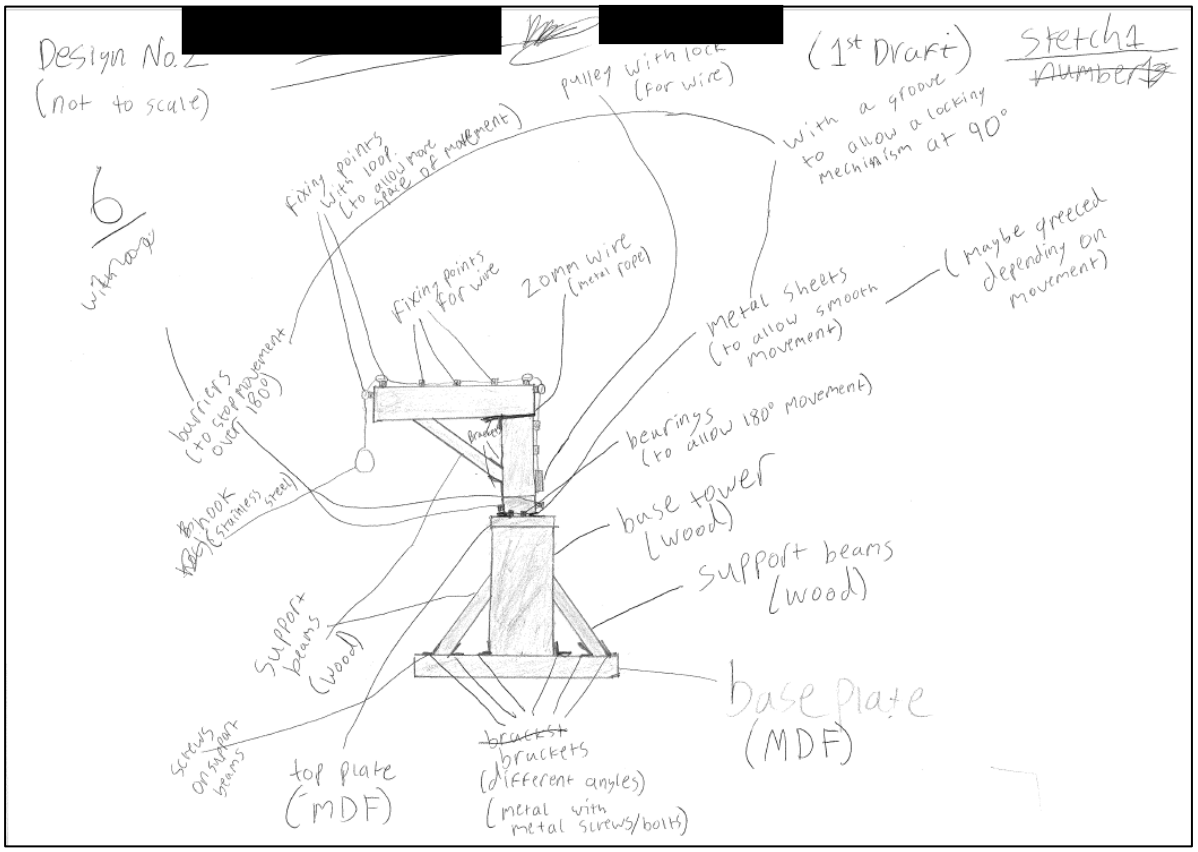
make brackets out of metal

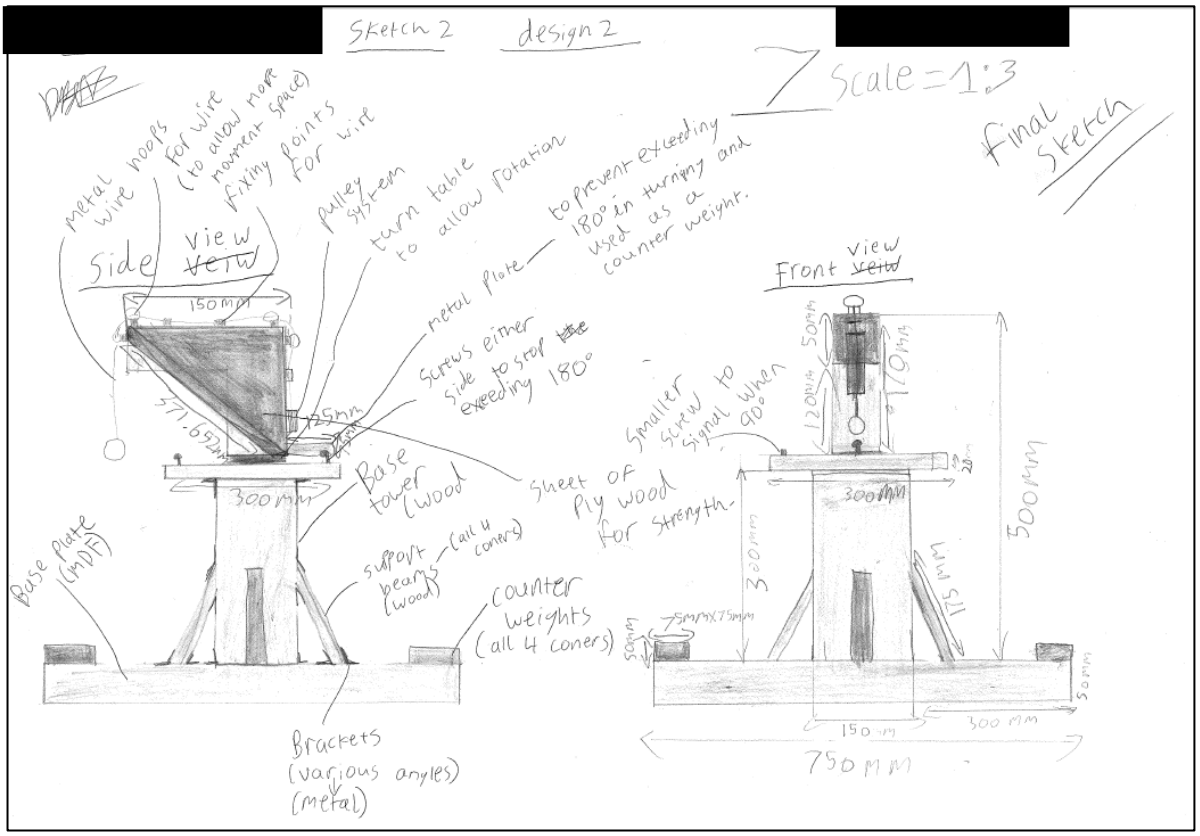
List of materials 5

1) aluminum
2) nylon (rope)
3) MDF
~~Pine wood~~
4) Balsa wood
5) Stainless steel.

28x9.81

Task 1 Design development drawings





im going to have to figure out a lockin system and a turning system

Base plate with two wholes for beraning (tripple measursed and fixed to the buse of the structure.

Use sheet metal and a groove to help stop at 90° and make a full stop at 180° @ both sides.

place pulley flat

Task 1 Evaluation matrix and justifications

Criteria	Sustainability	Aesthetics	Cost	Resistance	Manufacturing	Stability
Design 1	Same	Same	Better	Worse	Better	Worse
Design 2	Better	Better	Same	Better	Same	Better
Design 3	Worse	Worse	Same	Worse	Worse	Worse

Justification

My second design really stuck out to me as it seemed to do all of the necessary functions there were detailed in the design brief while also keeping simple and easy to build/manufacture. There were a few reasons the second design stuck out to me the most but the biggest reason I was choosing it was the strength of the crane both from the base and at the arm of the crane. The second design had three options to put in supports at first, but I then changed one of the support beams to two pieces of plywood either side. Design one only had one didn't have any available place to put a support beam due to the positioning of where the pulley system bas placed, this was because this was a crane that was intended to rotate from the base. Rotating from the base clearly seemed like an issue after creating and looking over design one so my other two designs have cranes that rotated elevated off the ground.

The reasoning for picking design 2 over design three in this aspect was because while design three has an elevated rotation point it still didn't solve my issue as the base plate that I was building the crane on is what the rotating turn table sat on top of base plate and bribing the base plate off the ground didn't give me the strength I needed.

Another reason that I picked design two was the simplicity of the design, Design two seemed also simpler than design three as I wouldn't need to build legs to put the base plate on I would just need to secure a tower to the top of a base plate and then add 4 support beams on all 4 sides. It also made it easier to add other aspects on later because of the simplicity of the design such as the pulley systems and also added support which I later added on. This was a useful aspect of the second design which I only realised fully later along in the design process.

The stability of the second design stuck out to me over the other two designs because I aimed to have a base plate of the crane the wider on all angles than the arm of the crane because this would make it impossible for the crane to tip over so I would only have to worry about the strength of the crane and not the stableness. I also helped this problem later by

added 4 counterweights on ever corner of the base plate to make it more secure, this was something that I couldn’t do on the other two designs because not all of them had four corners on the base plate that I could put counterweights on. However in design one I did find another place to put a counter weight which was on the opposing side to the arm.

I also felt as if the aesthetics on the second design were far superior to the other two. It has a sleek clean looking design that is simple but efficient. Design three stuck out to me as the least aesthetically pleasing due to the fact I didn’t like the legs below the base plate. However, design one and two are very similar designs and have a similar look to them so I couldn’t really put one in front of the other.

I believe due to all these criteria that design number two was the best design by and I feel like I was correct by choosing design two to go further with, edit and perfect. I made a lot of changes to the original sketch over the design process, but the key idea still remains the same.

Task 1 Justification of materials

In my crane we start at the base plate which is made of MDF which is a very strong, but light engineered wood. I am making my baseplate out of it because I believe out of all of the options it seemed best suited, I as I mentioned its very strong but this can also make it difficult to work with when completing certain tasks, this is why I have opted for other materials in all other aspects of my crane except for the base plate and the top plate at the top of the base tower.

The base tower and the top tower and the arm of the crane are all made from balsa wood. Balsa wood is known for its incredible weight to strength ratio making it ideal for the more built-up parts of the crane. This will be incredibly useful when building the arm of the crane because I wil have to keep the crane light to stop it from adding more strain onto the tower of the crane but will still need to hold a considerable amount of weight to complete the lifting function. I also use Balsa wood for the four support beams supporting the base tower to the baseplate of MDF all the properties listed above will be very helpful to ensure stability of the base tower.

I then will use plywood to use as two pieces of support on either side of the arm. I have opted for plywood as it light, strong and naturally comes thin cut already. This is useful because I don’t want to add any more weight to the top of the tower but by using two slabs of plywood either side, I can ensure the relationship between the arm and the tower will be incredibly strong.

The use of aluminium in my crane is vital to the structure and stability of my crane. I use aluminium brackets, which will all be custom made a lot in my crane I’m aiming to use around 23 brackets and 3 straight pieces of aluminium to secure my crane together. Using aluminium was the most obvious choice for me as its light weight but also incredibly malleable which is very useful because not all of my brackets are going to be right angles and some of them will be placed at very tight angles.

I had the choice to use aluminium or nylon rope I opted for the nylon rope because I believed that in my design with all of the corners and tight holes if has to pass through, I thought the nylon ropes would be best suited. Also looking at the difference in weight that they could carry, it didn’t seem worth it to use the aluminium rope.

Gravity calculation

g= 9.81m/s^2

mass = 26 Kg

therefore 26x9.81=255.06N = Load

Mechanical advantage

Output force = Load

Input force = Maximum two-handed vertical downward pull × g(Ref)

44lbs = 19.9580643 kg

$$Mechanical\ advantage = MA = \frac{Output\ Force}{Input\ Force} = \frac{255.06\text{N}}{195.788\ N} = 1.3$$

Task 1 Bill of materials

Material	Price Per unit/KG/Metre	Amount	Total price
Aluminium	£11/1000mm	2	22
Nyon rope	£26/1roll	1	26
MDF	£65/1sheet	1	65
Balsa wood	£7.99/(6x6x300mm)	3	23.97
Stainless steal	£14/1 hook	1	14
Pulley	£11.99/4 (only need 2)	1	11.99
Screws	£7.99/1 box	1	7.99
			170.95

Evidence

Online Aluminium Flat Bar 40mm x 5mm Length 1000mm (100cm) Next Working Day Delivery. : Amazon.co.uk: Business, Industry & Science

RS PRO PP Polypropylene Rope, 220m | RS

MDF Dado Rails | MDF Store

Balsa Wood Sticks, 50 PCS Square Wooden Sticks for Craft, Natural Wood Strips, Unfinished Dowling Rods for Art, DIY Projects & Woodcraft (6 x 6 x 300 mm) : Amazon.co.uk: DIY & Tools

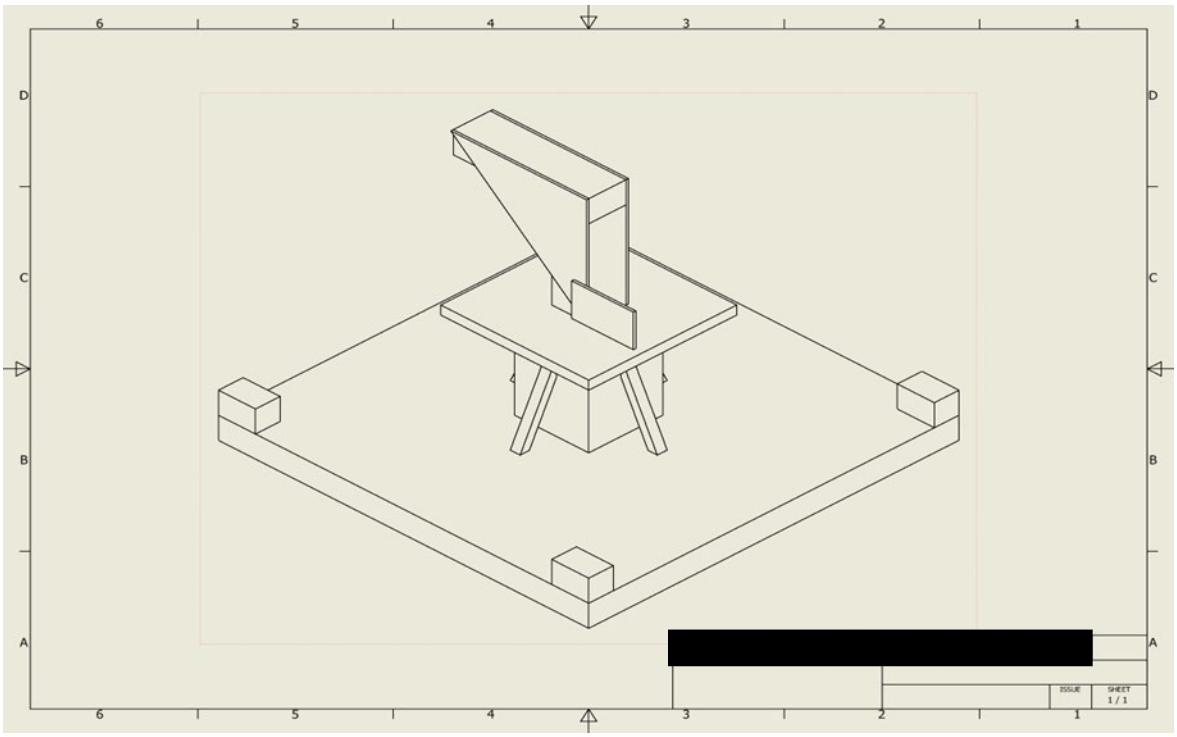
2 Pcs Cargo Snap Hook 304 Stainless Steel Lifting Hook Heavy Duty Crane Hook Hoisting Hook Crane Lifting Hook (Working Load 200KG 300KG) : Amazon.co.uk: Business, Industry & Science

Wood Screws Kit,360pcs Self Tapping M3,M3.5,M4 Screws Assortment, Ideal for Diy,Furniture Assembly, and Repairs. Durable, and Perfect for Various Woodworking Projects : Amazon.co.uk: DIY & Tools

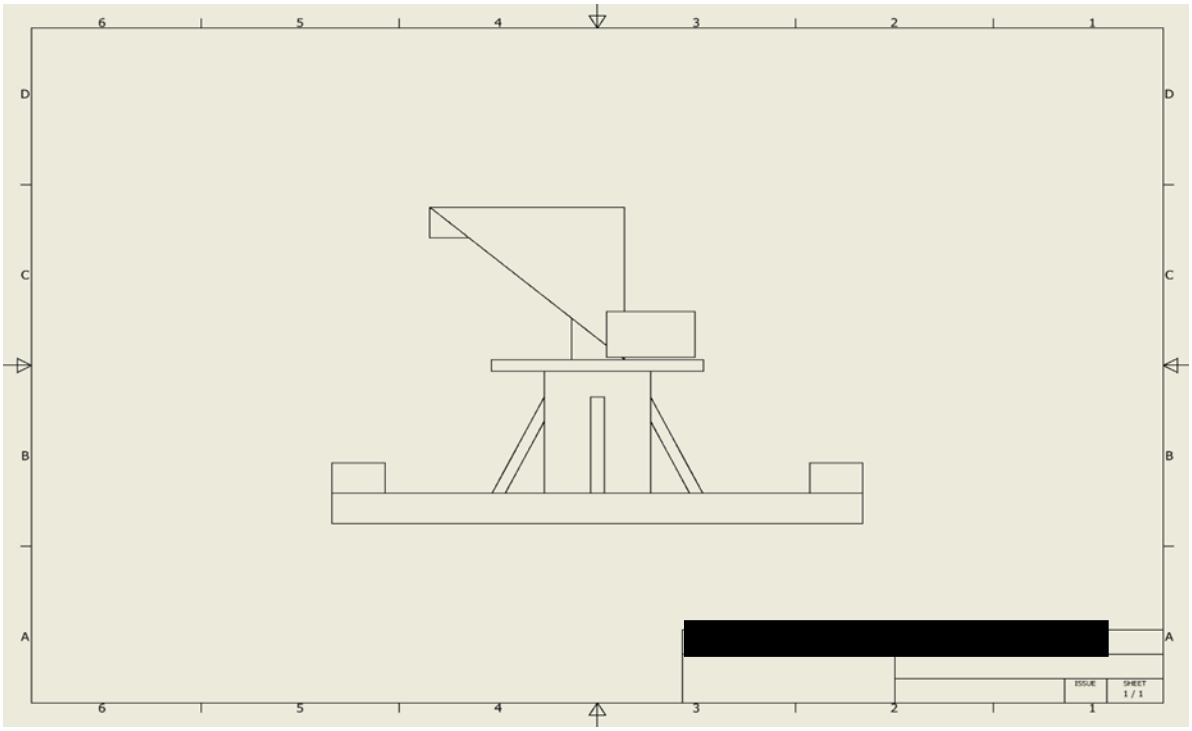
QWORK® 4 Pack 90mm Gym Pulley Wheel, High Strength Wear Resistant Bearing Pulleys for Gym Fitness Machine Wire Rope Pulley : Amazon.co.uk: Sports & Outdoors

Task 1 Engineering drawings

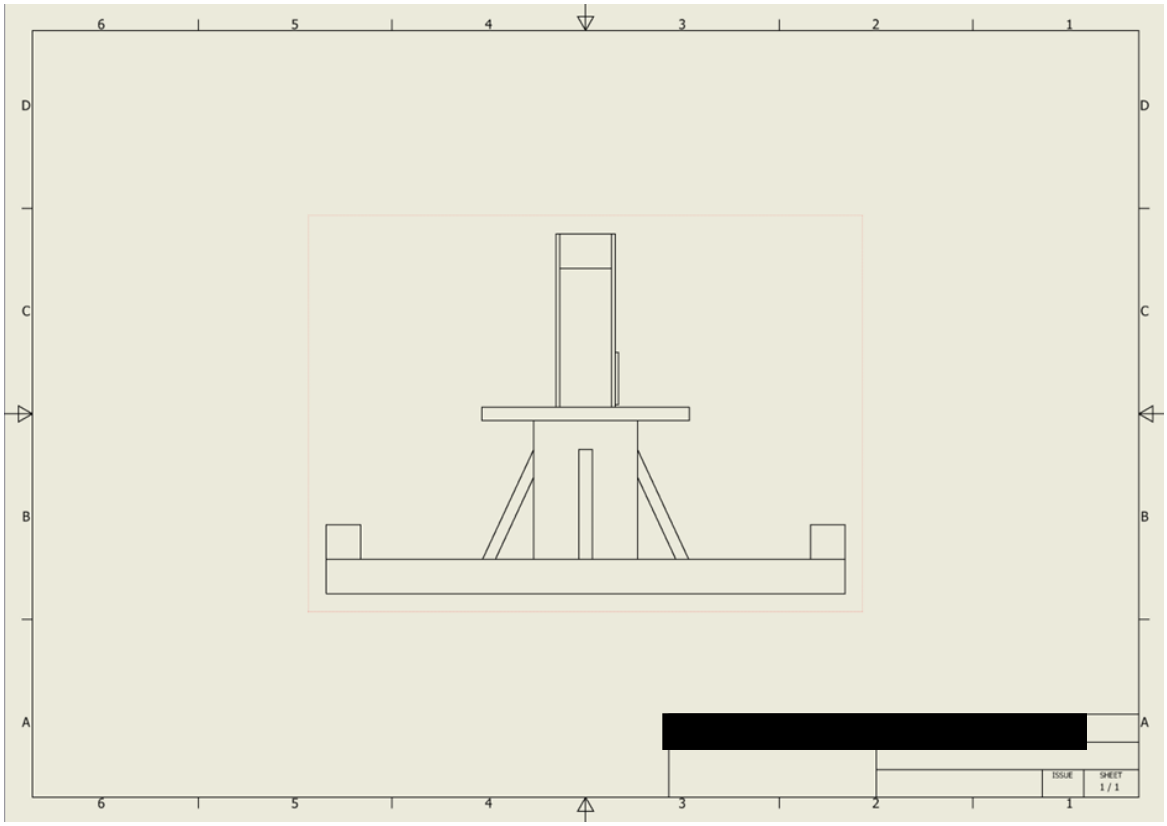
Auxiliary View



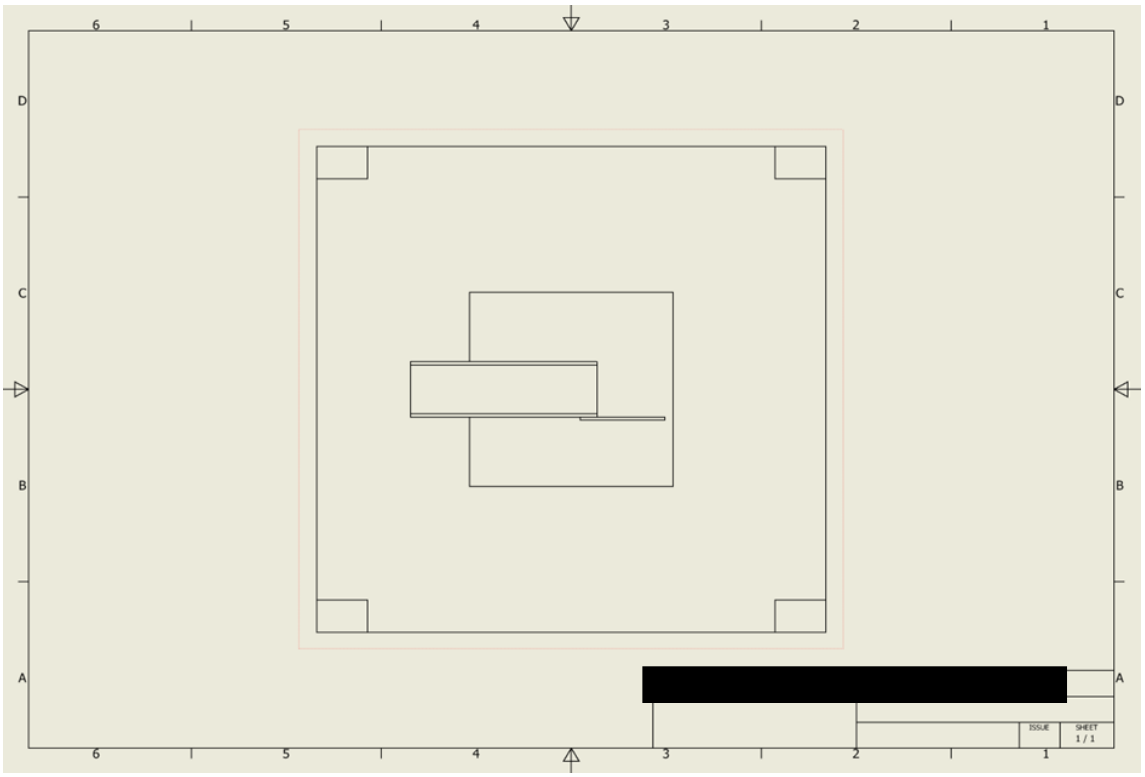
Right side view



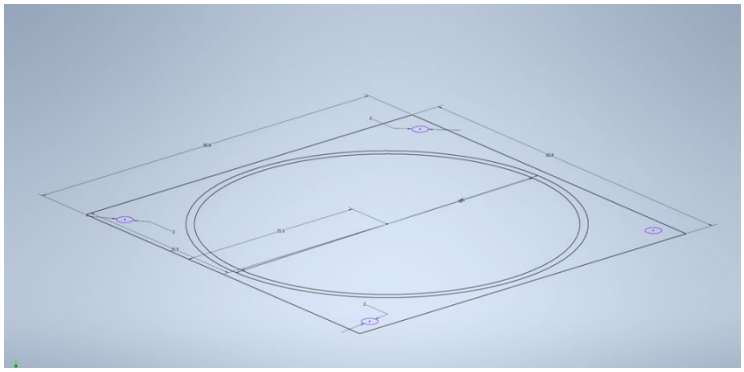
Front view



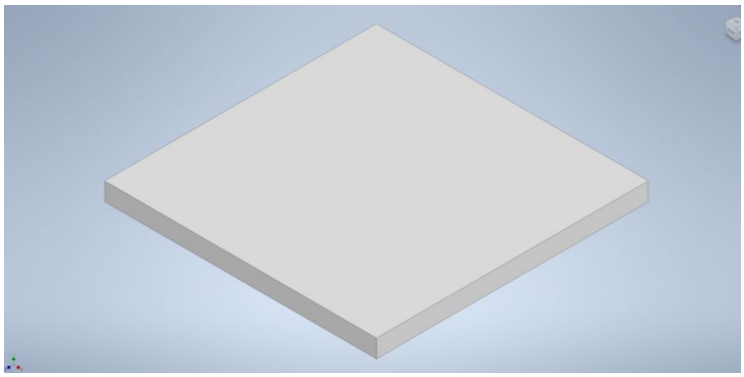
Top view



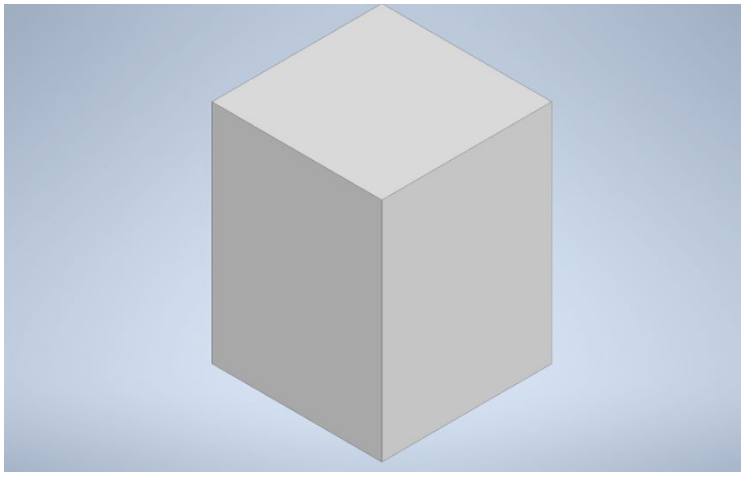
Turntable



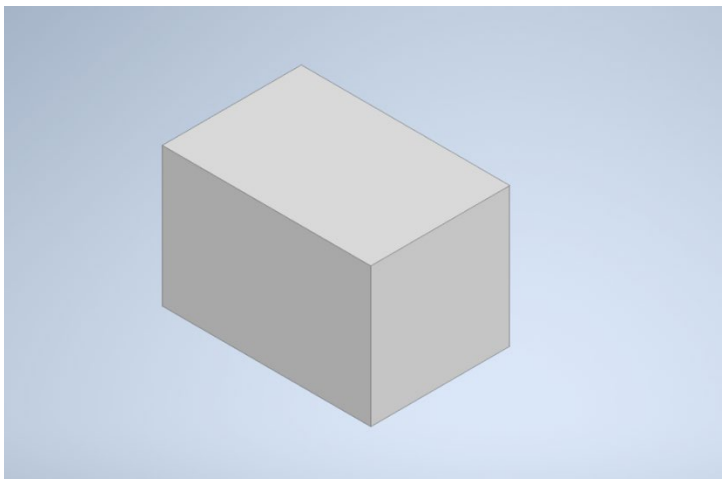
Baseplate



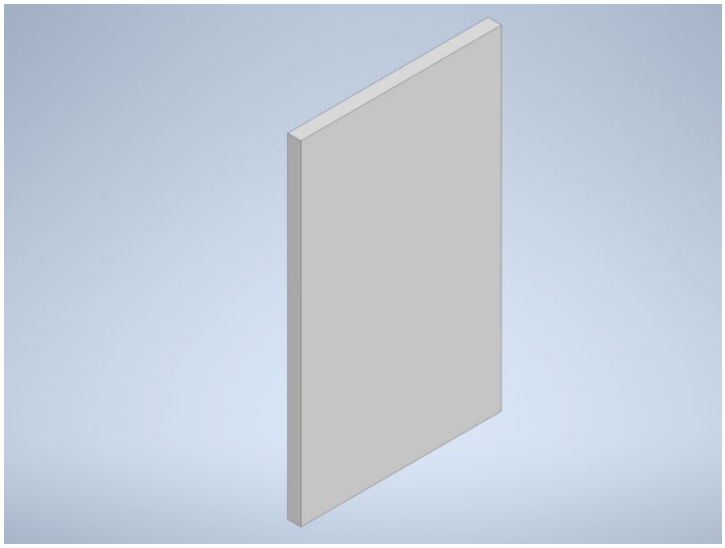
Base tower



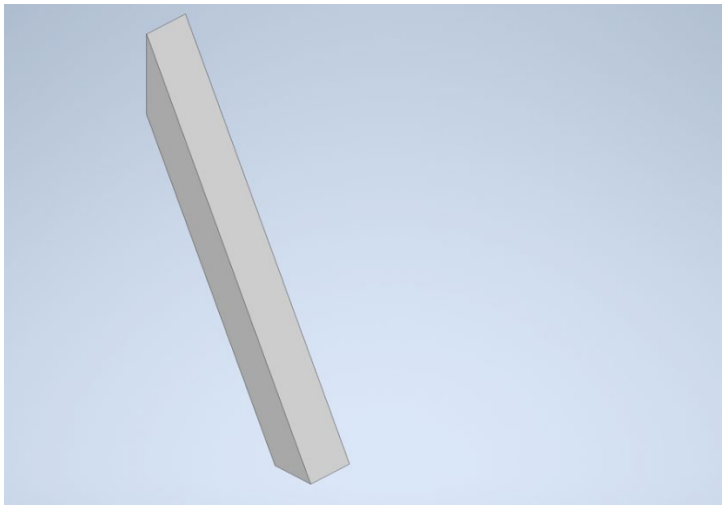
Counterweight



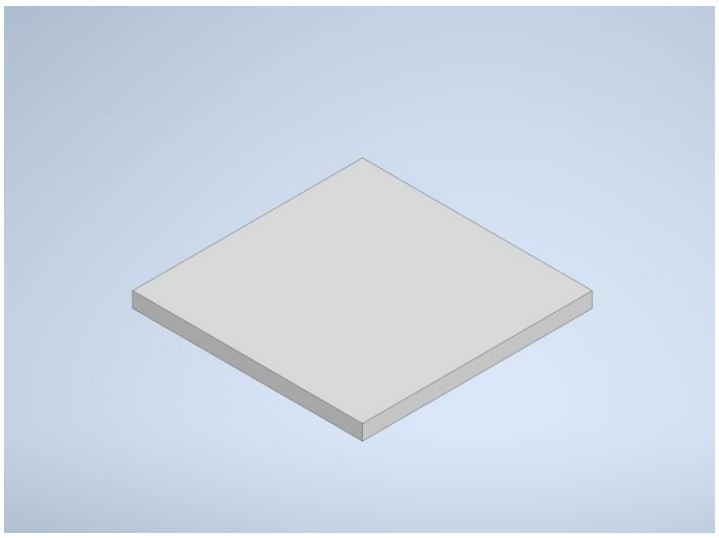
Locking mechanism



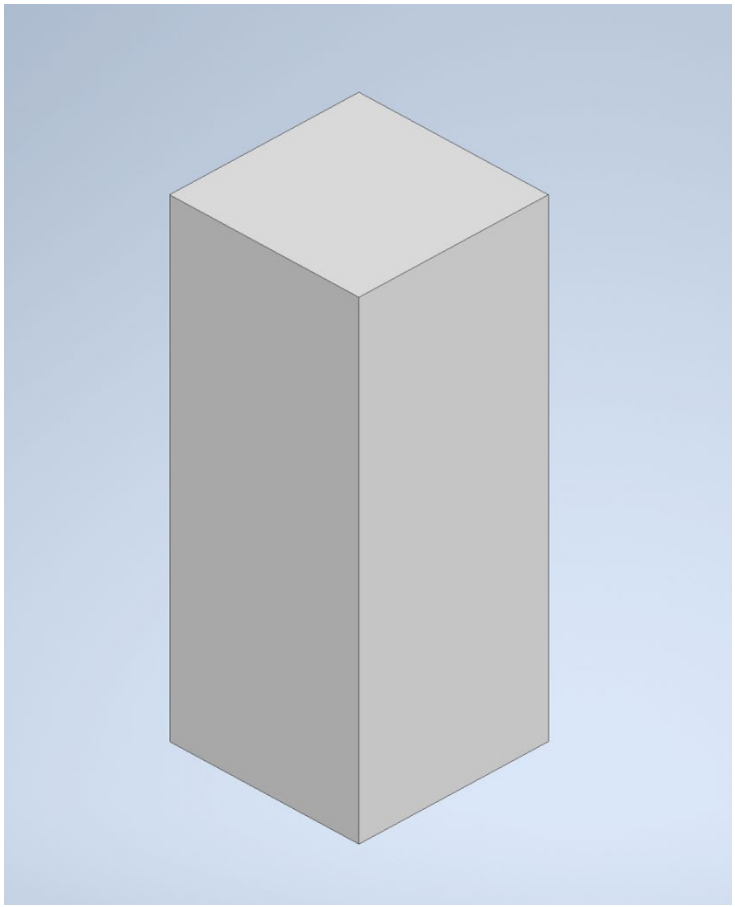
Support beam



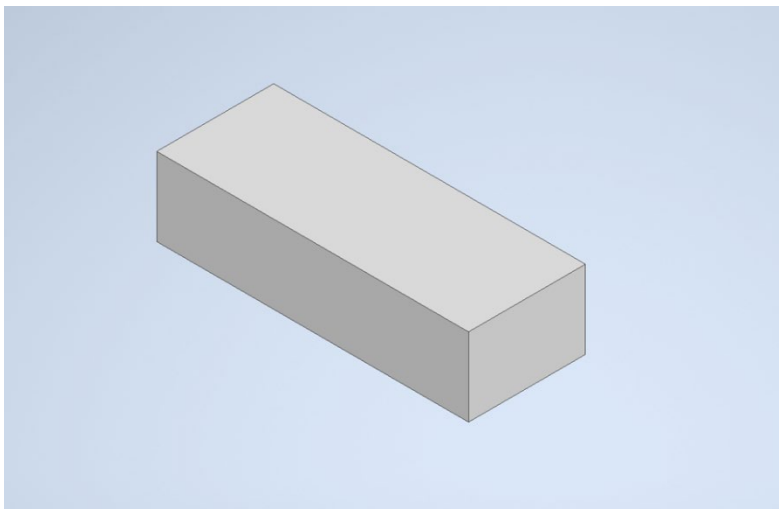
Top plate



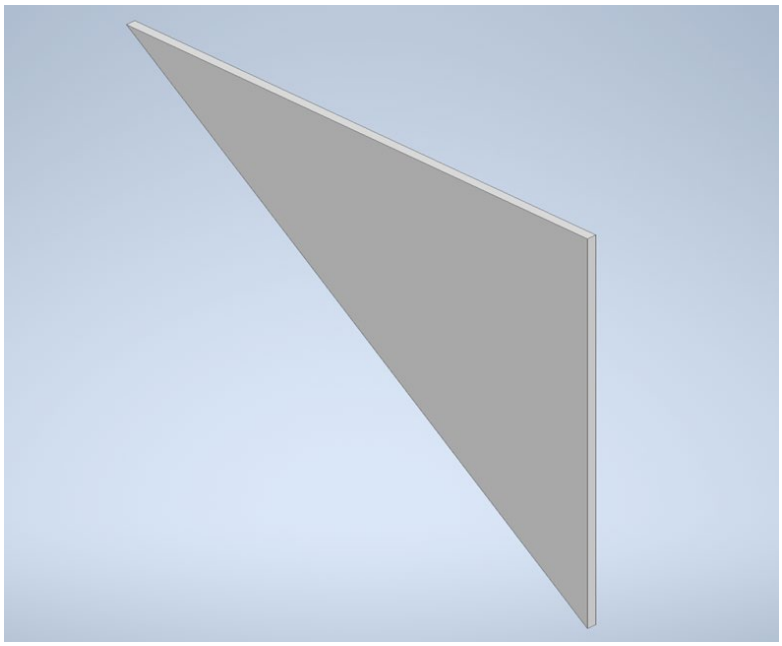
Top tower



Crane arm



Support beams (upper crane)



Task 2 Manufacture and test

Assessment number (eg 1234-033)	8714-321
Assessment title	Mechanical Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	Completed risk assessment Practical observation form Photographic evidence
Date submitted by candidate	DD/MM/YY

Task 2

Assessment themes:

- Health and Safety
- Manufacturing
- Reports

You must:

a) produce and complete a risk assessment for the manufacture of the prototype
b) manufacture the prototype
c) test the operation of the completed prototype.

Note: The prototype can be manufactured to be full size or a scale model (the minimum acceptable size is 1:5 scale).

Additional evidence of your performance that must be captured for marking:

- assessor observations:
  - manufacture of the prototype
  - testing of the prototype.
- photographic evidence which shows:
  - sequence of photos during the construction of the prototype, to include:
    - results of tool selection and usage
    - the fit and relative orientation of the mechanical parts
    - final prototype.

Candidate evidence

Task 2 Risk assessment

Activity/Hazard	Risk	Control methods	Likelyhood	Possible injury rating
Using sharp objects	Risk of cutting yourself	PPE and extra care taken	Medium Risk	High
Slipping on spills	Risk of drnking water spilling	Ensure lids on bottles	High Risk	Medium
Other students causing accedents	Risk of accidents casued by other students	Staying away from other students and PPE	Low Risk	Medium
Drilling	Risk of eye or hand injurys	PPE and extra care taken	Medium Risk	High
Using saw/hacksaw	Risk of cutting yourself with the saw	PPE and extra care taken	High Risk	High
Using hammers	Risk of hand injurys	PPE and extra care taken	High Risk	High
Strain on your back/neck	Risk of back pain and futher complications	Stand up straight and work with good posture	High Risk	Low

Task 2 Practical observation form

8714-321 Design and Development: Mechanical - Summer 2025

Candidate name	Candidate number
<candidate>	ABC1234
Provider name	**Date**
<provider>	

Complete the table below referring to the relevant marking grid, found in the assessment pack.
Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Manufacture of the prototype	• Manufacture of the prototype.	• Health and Safety • Manufacturing
Testing of the prototype	• The testing of the prototype.	• Health and Safety • Manufacturing

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*

Manufacture of the prototype:

The mechanical workshop was laid out so all the candidates had their own workbench with a selection of common hand tools (scriber, engineers square, metal rule, ball-peen hammer, centre punch, hacksaw, junior hacksaw, wood saw, pencil, dividers, odd leg callipers, screwdriver set and retractable tape measure), as well as their own eye protection and face mask, so there was no need for interaction between candidates or individuals work being touched by working on a shared bench. Also available were battery hand drills, tinsnips, sandpaper, emery cloth and a wide selection of screws, nuts and bolts, hot glue guns, wood glue, pop rivets, pulleys, hooks, string, cables and brackets.

At the end of every practical session, the candidate cleaned and tidied their workbench ready for the next session (broom, hoover, dustpan & brush). Before the practical session started, the candidate put on their PPE (overalls, safety boots) and was given the option to wear gloves or barrier cream to protect their hands, which they did. The candidate knows the importance of H&S and wearing PPE as their work placement was with the local NHS and their engineering maintenance team, so wearing PPE was mandatory and they had a H&S induction. The candidate also had a safety induction and was supplied PPE every time they used the workshop at the college. The candidate enjoys practical work, and they abided by the workshop H&S rules, but occasionally they had to be reminded to wear their eye protection or face mask when cutting or drilling into wood. However, they had to be reminded more about good

housekeeping and ensuring their work area is always tidy and safe because they left offcuts of wood on the floor which were trip hazards but once reminded, they tidied up to make their work area safe.

The candidate is confident and good at using the tools and equipment correctly and safely, they knew the purpose of each hand tool and when to use it to do their task. They also used the workshop equipment and machines (pillar drill, bending machine and guillotine) correctly and safely but they like to do everything as quick as possible so they were constantly reminded to slow down and do the task once and correctly or mistakes will happen.

At the start of the practical task, the candidate prepared their work area by selecting the tools to start measuring and marking out the wood (plywood sheet and pine) for the start of constructing their crane. They correctly marked out the wood using a pencil and tape measure and then cut them to the sizes required by either clamping them to the bench or using the bench vice with the wood saw, wearing their PPE. Once they had cut all the pieces they needed, they then planned how to construct their crane. They decided to use wood screws to join the wood together using the battery drill (with screw bit) straight into the wood without drilling a pilot hole, which made the job hard or cause some splits in the wood.

The candidate decided to use a simple wooden pin and hole method for their locking mechanism for when they rotate their crane and lock it in place at 90° and 180°.

They added some plywood to strengthen the boom to the upright of the crane so when lifting, it would not bend, which was a good idea. They needed to add metal brackets to ensure the crane upright was secured to the base because when they added a little pressure to the boom, the crane started to tilt so they worked out that they needed to add brackets that they made up themself using sheet steel, guillotine and bending machine.

The candidate made a winching mechanism with a pulley system and nylon string where they could wind up the hook and weight and it would lock with another simple pin system they made.

Overall, I observed the candidate generally working safely but had to remind them occasionally about good housekeeping and wearing eye protection and mask when cutting and drilling the wood as well as slowing down and doing the task correctly. They would tend to have an idea, use materials and then see it did not work so had to start again, whereas they should think about what they want to do and how they should do it, so it saves time and materials. They used the hand tools and equipment appropriately and safely.

They made a crane that was very close to his initial design but during the practical task changed some aspects of it as they thought it needed strengthening and improving to meet the task requirements.

They made some simple mechanisms for locking the crane and the winching systems which was creative and worked when testing but could be improved if they had more time.

The candidate enjoys practical work and has good hand skills but needs to slow down and think more about what they are doing, why they are doing it and will it work instead of doing the task to see if it works or not which is time consuming and a waste of materials.

The testing of the prototype:

The candidate decided to build a crane with a scale of 1:5 so they were required to lift a weight of 5.2kg to a maximum of 300mm.

The candidate had constructed a wooden crane that could lift a weight, lock the winching mechanism, rotate 90° then lock and the lock again at 180°.

The testing procedure was carried out in a control measure where the candidate demonstrated their crane to two tutors and a technician while a video was taken as well as photographs for evidence.

A photograph of the weight was taken before it was attached to the crane to show the exact weight it would be lifting.

The candidate then attached the weight to the crane and demonstrated the lifting process and a measurement was taken to show how high the weight was lifted (photograph was taken). They then demonstrated the movement of the crane and the locking mechanism at the two 90° points.

At the end of the demonstration, the candidate lowered the weight to make it and the crane safe.

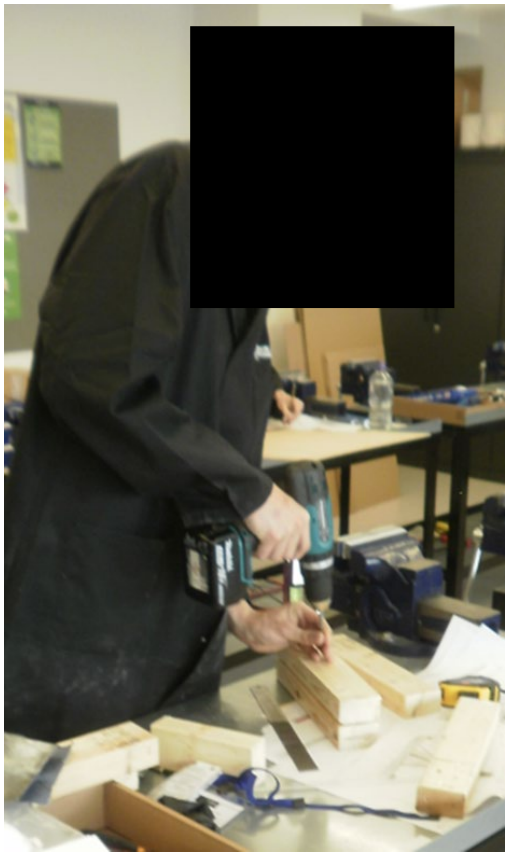
Even though their crane did not lift the 5.2kg to the maximum height of 300mm, they successfully carried out the task. They lifted the weight to a height of 210mm.

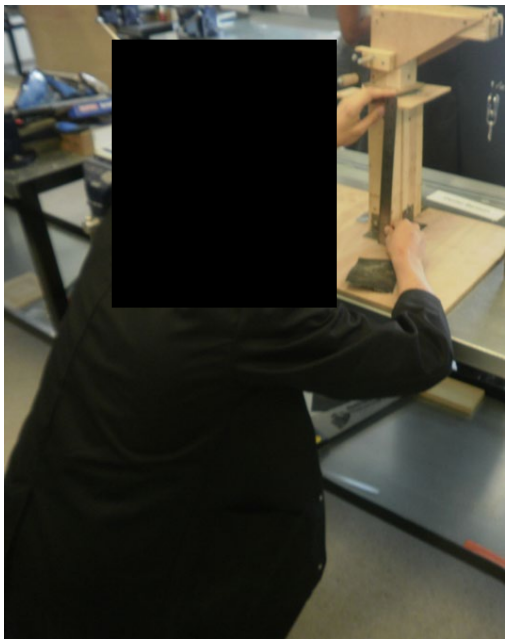
Generally, the candidate constructed a crane out of wood where they strengthened parts with brackets they made and supportive wood sections and with some parts brought in like, pulleys, hook and string\cable that did a successful task.

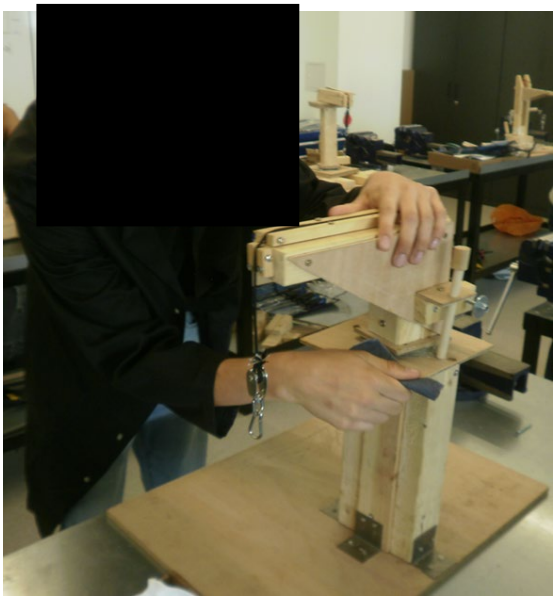
However, there were parts of the crane that would need to be relooked at, such as the “turntable” part as this was slightly bending so they would have to look into counterbalance weights to stop this.

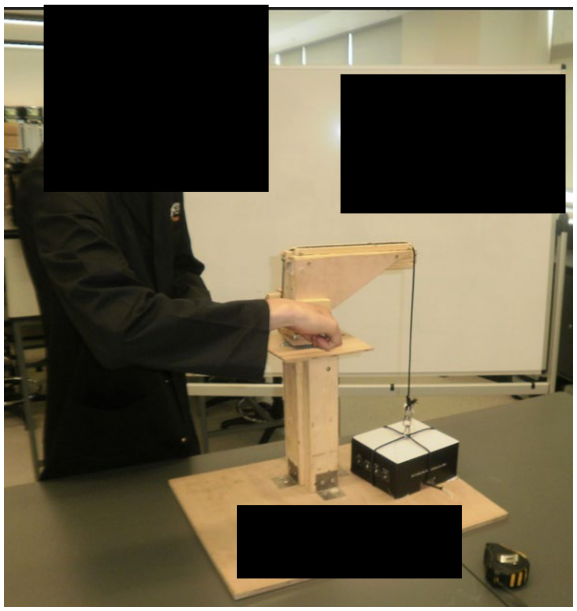
Internal assessor signature	Date
	DD/MM/YY

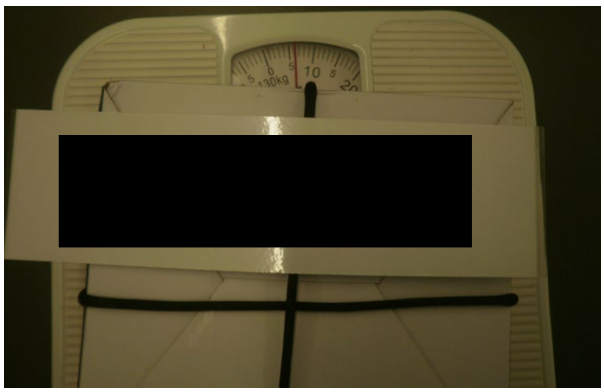
Task 2 Photographic evidence











Task 3 Peer review

Assessment number (eg 1234-033)	8714-321
Assessment title	Mechanical Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3
Evidence title / description	Peer review forms Feedback Record Form
Date submitted by candidate	DD/MM/YY

Task 3

Assessment themes:

- Reports

You must:

a) Prepare to present their design verbally using annotated sketches and diagrams.
b) Present and explain the design.
c) Peer reviewers will now have time to reflect on the design.
d) Discuss feedback from the group on the design presented in part b)
e) Peer reviewers will now complete the peer review feedback form.

Additional evidence of your performance that must be captured for marking:

none

Candidate evidence

Task 3 Peer review forms

Assessment ID	Qualification number
8714-321	
Candidate name	**Candidate number**
<candidate>	ABC1234
Provider name	**Provider number**
<provider>	
Date	**Series**
dd/mm/yy	Summer 2025

Question	Feedback
Explain how well the diagrams/drawings meet the design criteria.	Meets all the nessecary criteria, e.g. locking mechanism, 180° turning, non-permanent doesn't say fully locked has small movement. Handle could have been longer
Explain how well the diagrams/drawings meet the specification criteria.	Matches the scale they made it in other than it is to tall compared to what it should be
Explain how well the diagrams/drawings conform to the relevant conventions.	Changed the way the turntable was connected to increase strength • Removed a counterweight and also the support beams
Explain how the system could be optimised/improved.	The turntable could have more strengh with how it was connected • Add a counterweight

Assessment ID	Qualification number
8714-321	
Candidate name	**Candidate number**
<candidate>	ABC1234
Provider name	**Provider number**
<provider>	
Date	**Series**
dd/mm/yy	Summer 2025

Question	Feedback
Explain how well the diagrams/drawings meet the design criteria.	Made several changes however all benefit the design. Counterweight removed. Design criterea has been met.
Explain how well the diagrams/drawings meet the specification criteria.	Rotation + locking mechanism meets specification. Crane lifts minimum weight. It is non-permenant and free-standing.
Explain how well the diagrams/drawings conform to the relevant conventions.	Inscreased strength by changing the way the swivell plate was connected. Removed supports as base plate was more than strong enough.
Explain how the system could be optimised/improved.	System would've been better with counterweight however crane space was an issue. Would've used diff pulley rope. Would've made handle longer. Needed bigger swivel plate.

Feedback Record Form

Assessment ID	Qualification number
8714-321	
Candidate name	**Candidate number**
<candidate>	ABC1234
Provider name	**Provider number**
<provider>	
Date	**Series**
dd/mm/yy	Summer 2025

Candidate's notes
The other candidates had good questions and feedback, I really liked the questions about what obsticals faced and overcame. They also had practicle questions about why i did certain things in my crane. I also thought there feedback was good but a little vaige but apart from that very useful and helpful.

Task 4 Evaluation and implementation

Assessment number (eg 1234-033)	8714-321
Assessment title	Mechanical Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	Revision control document Evaluation of completed work
Date submitted by candidate	DD/MM/YY

Task 4

Assessment themes:

- Health and Safety
- Design and Planning
- Reports

You must:

a) update the virtual model of the final design solution using appropriate software to incorporate any changes made and research completed in response to feedback or as a result of manufacturing and testing
b) produce a revision control document or report justifying why changes were made or not made as a result of the peer review feedback. This document should typically be 500 words
c) produce a report evaluating the design work completed. The report should typically be 800 words. This must include:
    - the information necessary for a third party to manufacture the design, including health and safety considerations
    - calculations of the operating efficiency of the device
    - an explanation of the test methods used, reasons for their use and their limitations
    - an evaluation of the fitness for purpose of the device and its conformance to the specification
    - any further improvements or adaptions required to the design, including any reasoning and justifications if adaptions or improvements are not required.

Additional evidence of your performance that must be captured for marking:

None

Candidate evidence

Task 4 Revision control document

I would add a few things onto my crane based on the feedback I got, the first thing I would change is I would find a way to make a new locking mechanism for my crane, the feedback which was correct is that my locking mechanism was a bit loose however still did the job of locking it in at 90 degrees. I could fix this changing the wooden cylinder to metal rod and I could make the hole that in locks into smaller so that the rod sits flush this bit of feedback was good but I felt as if this decision to use a metal rod was more due to the materials in the workshop as we didn't have a metal rod that was the correct size for me to use.

Another bit of feedback I received was to add a counterweight or though I did mention how I wanted to add this during my presentation, but I didn't feel as if I had the space to add it. On the back of the top half of my crane there is the pulley and locking mechanisms so space would have been an issue. There was however a way around it which would be to attached two pieces of thin wood to each side of the top of the tower where it met the arm and build a small platform behind and attach the counterweights to.

It was also given in feedback to add a bigger swivel plate but we only had access to two sizes of swivel plates and one was to big for the base tower that I had constructed I could however had though ahead and make a base tower that could have attached the larger swivel plate to but while I was first thinking of what to construct and how I didn't think that the swivel plate would be one of my weak points. I should mention however that is wasn't the swivel plate that ended up breaking it was the piece od ply attached to the swivel plate how ever with a larger plate it would have meant I could attach the swivel plate to a larger piece of wood or MDF or plywood.

I thought that the feedback was good, but I also had similar ideas after looking back at my design after construction. I thought my design was good although there was some things I would change if I had the chance to do it again. One thing that I would have liked would be to have better aesthetics as I don't think it was the nicest looking.

Task 4 Evaluation Of Completed Work

When building my crane, I faced a few challenges but also faced parts of building, design, and manufacturing that I found easier than expected. One of the really hard steps the of manufacturing process was attaching my turntable to the bottom and top sections of my crane, another very difficult aspect of the design was trying to figure out what could be made better about my crane without getting to start the manufacturing process.

As I spoke about fixing the Lazy Susan to the top and bottom sections of my crane became a very difficult problem, I first fixed a small thin piece of ply wood to the top of the Lazy Susan and fixed with very small screws which I then cut the end off to stop sharp edges showing. This then bent the Lazy Susan and broke the whole crane in half, after this major setback I then cut a thick 12mm piece of MDF to fit accordingly and then attached this with bigger bolts which had a nut fitted on the other side. This did exactly the job I wanted it to and not only did it carry the weight but also exceeded it during testing. If I was to build the prototype again I would take extra care while building the connecting part of the crane as this was by far the weakest part of the crane.

The challenge I feel I faced during the design process was trying to figure out what would make my crane better one done with my original design. I ended up adding two pieces of plywood on the base to arm connection in a tri angle shape, this proved to be a very good addition to my crane as before I was just going to put one piece of pine wood in the middle of the connection but the plywood was easier to manufacture, easier to add onto the crane and more effective. If I had to design the crane again I would do more research and more self-reflection to ensure maximum quality of product.

I first tested the prototype by putting weights on top of the arm of the crane to decipher the weakest point of the crane, this was before putting my side supports in and it showed the weak points of the design to be the connection from the base to the top towers and the connection from the top tower and the arm, I then put the supports that I had in my original design in and it seemed to hold the weight when resting the weight on top of the arm so I built my pulley system on and then later on during testing broke, and this is when I fitted on the thicker piece of MDF and this then worked.

The crane ended up working very well and fitting all of the design spec criteria including maximum height and weight along with the locking mechanisms I built onto the crane it not only lifted the 5.2kg I needed for my scale of 1:5 but actually exceeded that in testing which I was very happy with. It was very fit for purpose and met all the criteria that I was tasked with and more.

When starting my design process I thought I wasn’t going to change much in my final design and certainly not take any aspects of my crane off my final design, but I ended up changing my crane quite a lot and not only adding new things but taking certain aspects off as well.

The main aspect of my crane that from an outside perspective may look the most different would be the support beams that I took out, but these actually made very little difference to the overall structure of the crane and the strength and stability of the crane. The main reason I didn't put them in was because the base of my crane was the strongest part of the prototype and I felt that adding support systems to the top of the crane that sat above the swivel plate would be more useful which in retrospect was a good idea as the base didn't need these supports and it would have been a waste of time to construct. I also changed my locking mechanism from a simple plate of MDF that would hit screws on all the angles it had to lock out to a more elegant solution using a small cylinder of wood that went through two holes in the crane to make it lock. In reflection would have added counterweights to the arm of the crane on the opposite side as this would have made the crane more stable while lifting the weights probably would have stopped it from breaking during testing, making the arm of the crane at a more obtuse angle in a more upward facing position as this would have helped with stability.

In conclusion I felt as if I did very well designing and manufacturing my crane as there is not much I would improve, however I still felt as if there was certain aspects I could've improved on after my peer feedback and self-evaluation.

Principal Moderator Commentary

The candidate applied basic knowledge and understanding when considering health and safety as part of the design specification, with some suggestions of personal protective equipment (PPE) that will be worn. The risk assessment was basic with some consideration of appropriate tools to produce the prototype with limited control measures. The candidate showed some understanding of working safely with a suitable level of awareness in the preparation and selection of tools, materials and components to manufacture the prototype of the crane. Some health and safety considerations were included as part of the design evaluation and implementation report, with some reference to removing sharp edges.

The candidate interpreted the specification with some technical knowledge elaborating on most of the design criteria and inclusion of some calculations. The candidate demonstrated good use of software to model and produce mechanical engineering drawings and some 3D modelling that met the requirements of the brief. Drawings and diagrams contained some dimensions and annotations to support a third party to reproduce them. Use of virtual modelling was good, meeting most requirements of the design criteria with some suggestions for improvement in the evaluation and implementation report.

The candidate demonstrated some good technical skills when selecting and using tools and equipment to manufacture the crane. The prototype met most of the requirements of the design criteria, including locking at 90° and 180° intervals. The prototype does require some modifications to lift the weight to the maximum height. The candidate applied some knowledge and understanding of testing processes against the requirements of the design criteria.

The candidate produced an implementation report which contained sufficient information that would allow a third party to reproduce their design with some suggestion of changes and modifications following peer feedback. Reports and records were mostly accurate with some industry terminology, including results of testing outputs against the design criteria.

Get in touch

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Should you require assistance, please contact us using the details below:

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