SCENIC CONSTRUCTION AND DRAWING

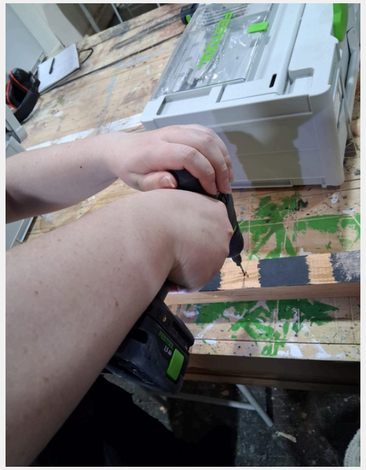
SOPHIE DICKSON

I CONFIRM THAT I HAVE NOT USED ANY AI TOOLS IN THE RESEARCH AND CREATION OF THIS ASSIGNMENT. I CONFIRM THAT I HAVE NOT PRESENTED ANY AI GENERATED MATERIALS AS MY OWN WORK. I CONFIRM I HAVE COPIES OF MY DRAFTS, NOTES, AND OTHER RESOURCES I USED, WHICH I MAY BE ASKED TO PROVIDE IN EVIDENCE.

DRILLS









“When buying drill bits, remember that wood bits can be used only in wood, but metal bits will do metal, wood and plastics. you might save some money.” - Stock scenery construction handbook by Bill Raoul (1990 p. 7)

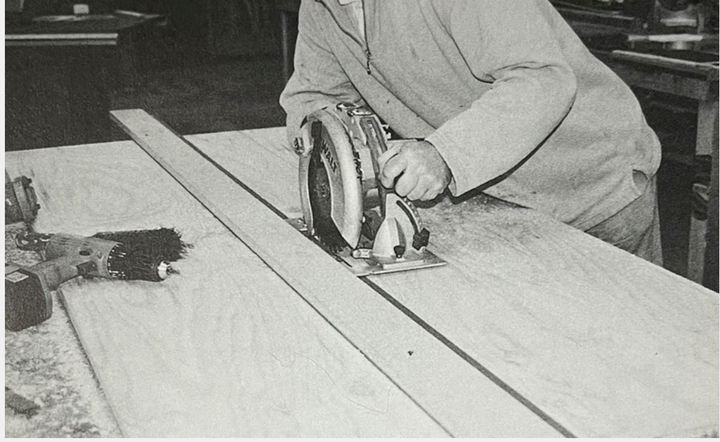
I like the drills we have in the workshop as they are compact and lightweight which makes them easy to work with. I also think they are very comfortable to hold. It is very easy to change the drill bits as you can just click the different attachments on and off, this is very helpful as it means you can just use one drill and changing the drill bit doesn't take up much of your time when changing between drilling and screwing.

I have used drills before but not Festool ones so it was interesting to learn about the different settings, setting 1 for screwing and setting 2 for drilling, I remembered this as Dave said to just remember “I want 2 drill a hole”. However, at first I did often forget to change the dial at the bottom of the drill which has speeds for screwing and a setting for drilling holes but I'm getting better at remembering this.

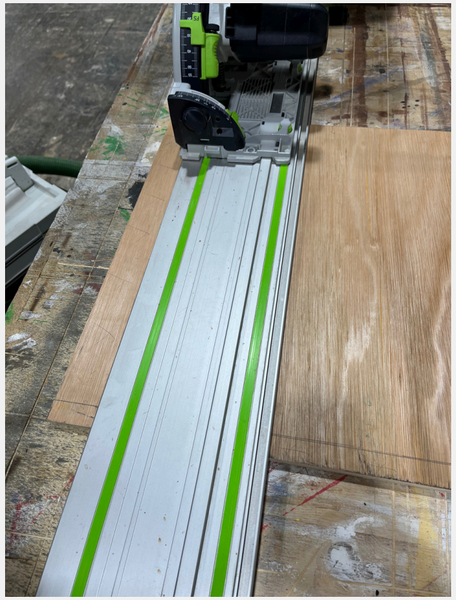
RAIL SAW

“The hand-held circular saw is capable of cutting sheet materials to parallel widths, softwood to length, as well as most other cutting tasks in the scenic construction field.” “the author has found that the most effective method of repetitive straight ripping can be achieved by using a very simple jig, which can be applied in many ways to many tools. The fence provides the user with a straight, consistent edge to cut to and also, being set to the width of the outer edge of the circular saws base plate, makes marking out very simple. When marking out without the fence, it is necessary to mark twice: once for the position of the saw cut and once for the position of the straight edge; whereas with the fence, only one mark is necessary” - Troubridge and Blaikie (2002 p. 18,19)

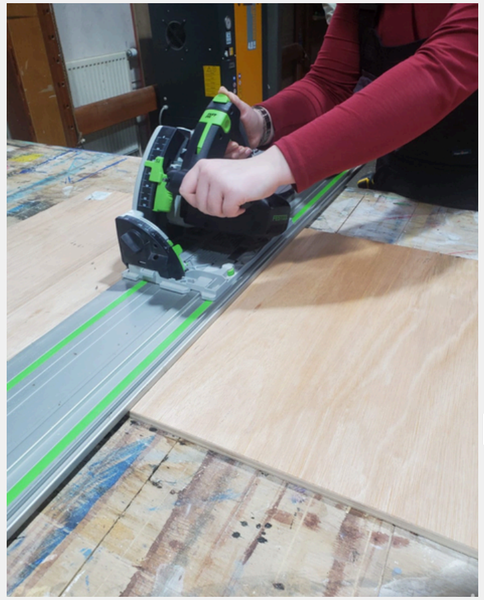
I think this part from Scenic art and construction is interesting as it shows how the rail saw has developed over time, the book was published in 2002 and I like how the rail is more modern than what is shown in the book but still almost identical.



Troubridge and Blaikie (2002 p.19)







The rail saw is very useful, it allows you to cut straight lines quickly and accurately. I also particularly like how the rail doesn’t move about while you’re using it as it has rubber strips on the bottom that hold it in place.

I enjoyed using the rail saw and think I picked it up well. However, at first I did struggle with pushing up the button to lower the saw but I got the hang of this after a couple of tries.

CHOP SAW





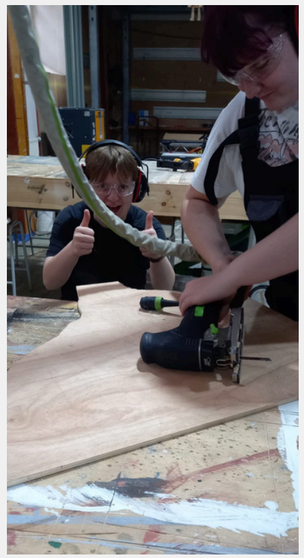


According to, Raoul (1990 p.3), Chop-saw’s or miter-box's are one of the newer power saws. It is a circular saw and the blade is lowered onto the wood to be cut. I can cut angles from a left to right 45 degree miter. However, this cannot replace a radial arm saw as it cannot cross cut boards wider than 1x4.

I have never used a chop saw before this. Therefore, learning this was really interesting for me, at first I found it difficult to line up the pieces properly, the light on the saw helped me with this and i think i have improved using the chop saw and feel confident using it. I still take a while to line up the cut if I'm not using the light guide but I feel I'm getting better at this, I like how you can pull the blade down without turning the saw on and think this is really helpful for lining up cuts. . We used this a lot when making the Hollywood flats and that allowed me to improve my skills. I really like the chop saw as it is quick to use and still gives you a clean cut.

JIG SAW





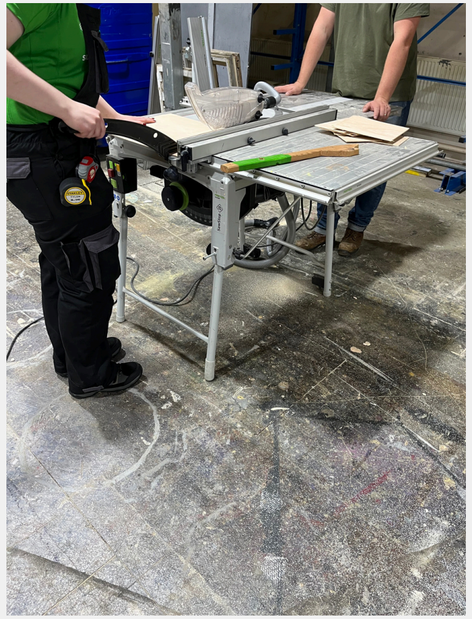

“It is used for cutting plywood and light softwoods. The variety of blades available make this tool tremendously useful for cutting metals, both ferrous and non-ferrous, plastics and a variety of specialist sheet materials.” - Raoul (2002 p.18)

I have used a jig saw before this in A-level product design. However, I am not very confident using the jig saw and struggle to cut the lines accurately. I would like to use the jig saw more to practice and improve my skills as I have only used one a few times.

I think the jig saw is very helpful as it allows you to easily cut curved edges however the piece of wood being cut needs to be held securely or the vibrations from the saw makes it move around which will make the cut inaccurate.

TABLE SAW



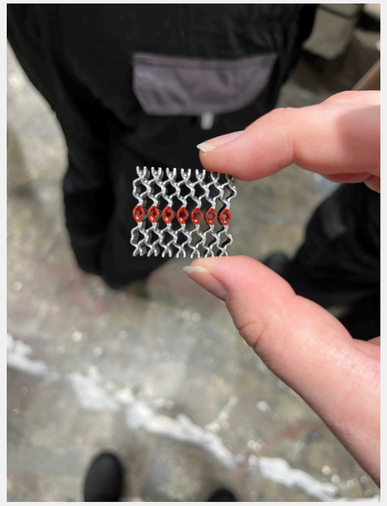


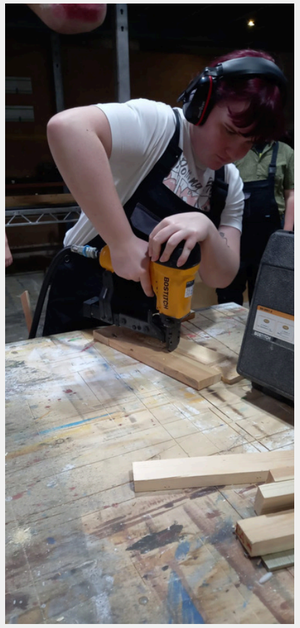
I had not used a table saw before this as our college only let the teachers use the table saw so it was very fun to learn how to use this. I think the table saw is a really helpful tool as it allows you to cut longer pieces of wood accurately and keep a straight line while cutting.

According to Raoul (1990 p.3), The table saw is ideal for ripping lumber and panel materials, it can also cut accurate dadoes and grooves. It come in different sizes depending on the diameter of the circular blade.

When talking about shop made tools, Raoul (1990 p.237), talks about “the push stick”. This is a very useful tool that allows you to use the chop saw to cut thin pieces of wood without your hand getting to close to the blade. I think the ones we have in the workshop are particularly good as they are longer so your hands are further from the blade but, i also think this gives you less control when pushing the piece through the saw. Also using two push sticks is very helpful when cutting long pieces of wood but this usually requires two people.

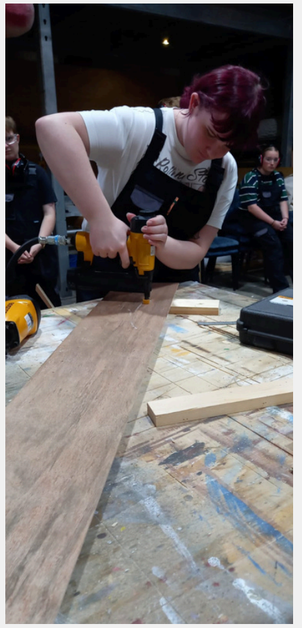
STAPLE GUNS





This is a corrugated fastener gun. It is larger than a normal staple gun and only uses wiggle pins. To put wiggle pins in the staple gun make sure the red stripe is facing up when you put then into the gun so the sharp edge is facing down and will go into the piece. It is often used for cladding and you should always put the pins in diagnolly across the grain of the wood.

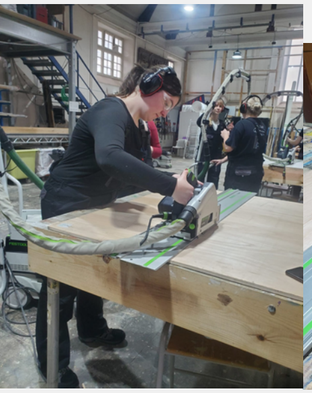
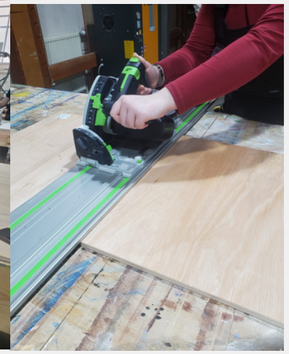
If labor and time are considerations, these powered fastening tools will quickly repay their investment. - Raoul (1990 p.6)



This is a normal staple gun it can be used for staples and nails. It is ideal for connecting thin plywood to frames, making it a very useful tool for making flats or any other cladded set.

I have not used a staple gun before this. However, I think I picked it up quickly and I enjoy using the staple gun. I think it is very useful as it is good for connecting plywood sheets to flats or connecting small pieces of wood quickly. On my first try the gun did bounce as I didn't put my hand on the top of the gun so it didn't have enough pressure pushing it down when the staple came out but I didn't do this again and i have been fine using it since.

MAKING GRAVESTONES

First we measured how big we wanted the gravestone to be, this height included the detail on the top. Then we cut this out using a rail saw.




Next we drew out the shape we wanted as the top detail and cut it out using a jig saw. The cuts were slightly wonky at first and there was a lot of splinters so we used a file to smooth is out.





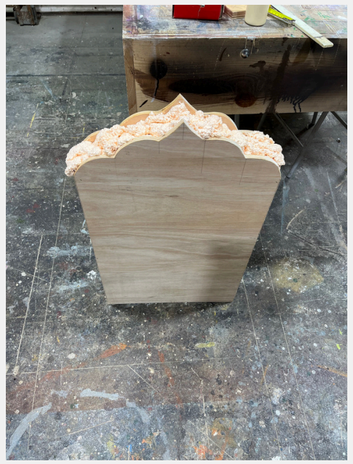
Then we cut out beams to go between the two sides of the gravestone and attached them to one of the sides we used clamps to hold it in place to dry.

MOODBOARD

We then used expanding foam to fill the top section which we left to dry and expand overnight.

Then we attached the other side using wood glue and pins.



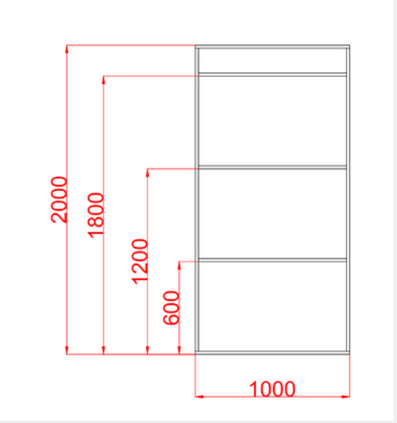
Dry and expand



Once it had dried we cut off the excess with a knife to give it a smooth finish.




MAKING HOLLYWOOD FLATS - THE FRAME



From the drawing we were given we first made a cutting list for the frame of the flat all of these pieces were made from 20mm plywood.

Cutting list

Rail -2x 1000mm

Style - 2x 1960mm

Toggle - 3X 960mm



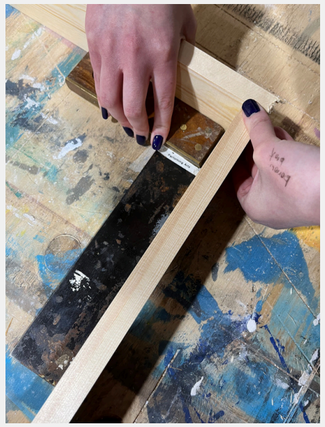




Next we measured out and began cutting out all the pieces starting with the biggest pieces. To make sure the measurement is more accurate we would cut a piece remeasure and cut the next one this stops the thickness of the blade from making the measurement incorrect.

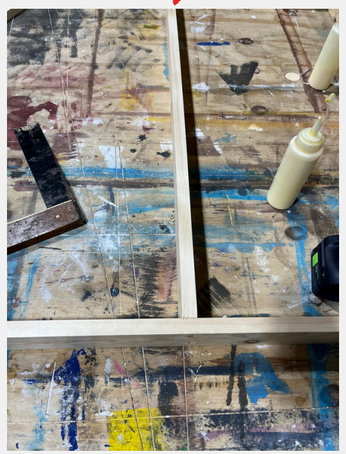






Once we had all the pieces cut we began assembling the frame. We started with the outer frame with the rails and styles, then added the toggles in the middle. To connect the pieces we drilled pilot holes and used two screws for each connection.







This was how the frame looked once fully assembled and was ready for the plywood sheets to be added.

MAKING HOLLYWOOD FLATS - ADDING PLYWOOD











After we had the frame fully made we measured the size of the plywood sheet we would need and cut it out with a rail saw. We then checked this fit over the frame before starting to secure it. However when we went to attach the sheet we found the frame wasn't perfectly straight to we used a clamp to hold the sheet in place as we stapled it, this straightened out the frame as we attached the sheet.

Once the sheets were secure on the frame we had to sand the edges and corners to give them a clean finish, we used and electric sander for this and I was sanding the flat whilst my group started to make the supports.











Once the main body was finished we started to work on the supports. First we made a right angled piece for the bottom that the flat would rest on. We did this by clamping the two pieces to the table to hold it in place then screwing them together.

MAKING HOLLYWOOD FLATS - THE SUPPORTS





Next to make the top bit of the supports we cut two pieces of plywood on each one end was 33 degrees and the other was 60, this made them a perfect triangle when sat on the bottom part of the brace.



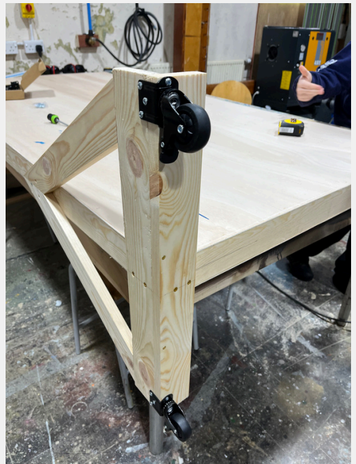




These pieces where then glued together and we attached them using wiggle pins in the staple gun, we used these because they are much stronger than normal staples.



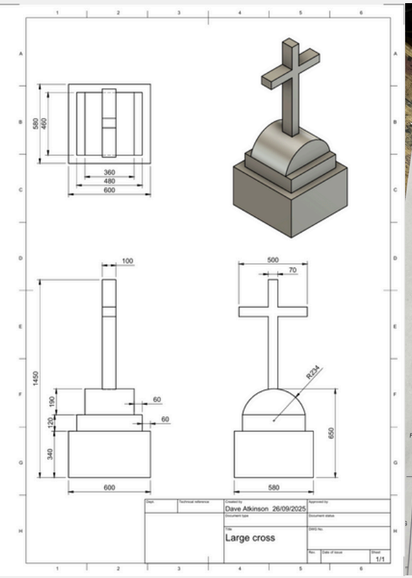


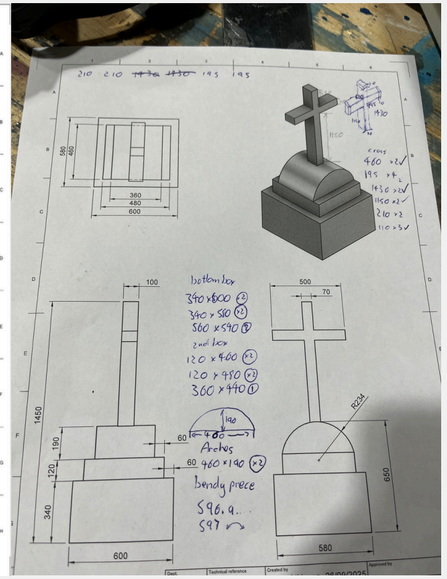


Finally we drilled pilot holes into the bottom corners of each support to attach the wheels we had to use screwdrivers for this instead of drills as the screws where tiny.



MAKING GRAVESTONES - THE CROSS





We first started by looking at the technical drawing and scale model to help us make a cutting list for each section.

CUTTING LIST - CROSS

460mm x2
195mm x4
1430mm x2
1150mm x2
210mm x2
110mm x3

CUTTING LIST - BOTTOM BOX

340x600 x2
340x510 x2
560x540 x1

CUTTING LIST - SECOND BOX

120x400 x2
120x480 x2
360x440 x1

CUTTING LIST- ARCH

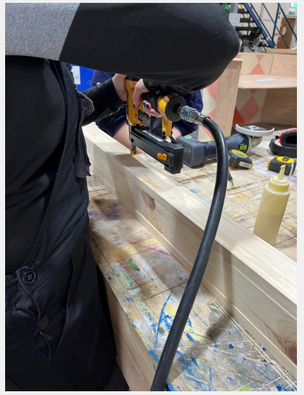
Arch 460x190 x2
I worked out the circumference for the curve however we ended up later just measuring the foam over the arches once they where made.

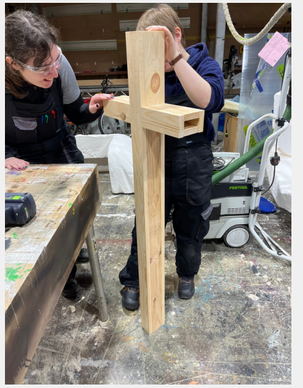






We decided to start by making the cross, this is because we could then fit the box around the cross which we thought would be easier. We started by measuring and cutting all the pieces on out cross cutting list and we lay them all out on the table to check everything fit and looked right. We then began by attaching one of the “arms” to the 1150mm pieces and the other to the 210mm pieces to make the top and bottom sections of the cross. We then attached the 1430mm pieces either side to connect the top and bottom of the cross. Next we attached the 195mm sections to the front and back “arms” completing the bacis shape of the cross. We where going to then add the 110mm pieces to the top and ends of the “arms”, however, Dave suggested that it would look better and more like one solid block if the pieces went inside the cross rather than sitting on the ends. So i cut down the 110mm pieces to make pieces that would fit into the cross, i made these quite snug then used a hammer to get them into place, these where then also help with staples for extra security.



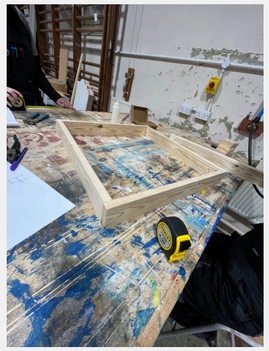




MAKING GRAVESTONES - THE BOXES

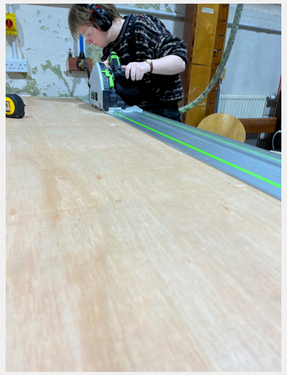
After the cross we started making the bottom box, for this box we decided to make a frame out of timer then cover it with plywood. This is because the frame will give it extra strength and support, this is important as this box holds up the cross and all the other elements on top of it. We started by cutting all the pieces of timber in out cutting list. Then we screwed together the bottom square to get the basic shape, after we had this we then added the pieces to each corner that would make it the correct height. Once this was done we added the top square which completed the box and finally we put beams across the bottom box, these are to hold the cross in place when the gravestone is standing. Once the frame was completely done we measured and cut the plywood pieces for the sides on the rail saw.















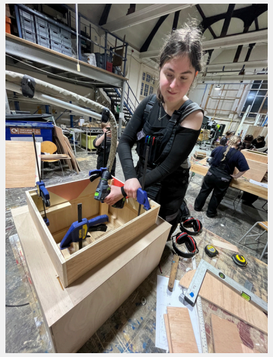


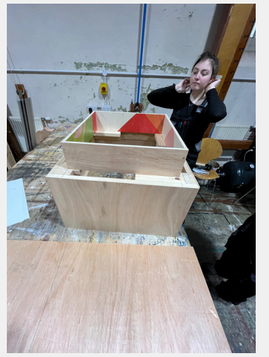
Next we made the second box that rests on top of the first one. This box did not need to be as structurally strong as the first one so we just made it from 12mm plywood without a frame. We started by measuring and drawing out all of the sides then cutting these out with a rail saw. Next we used clamps to help us hold the pieces at a right angles while we screwed them together as we were struggling to keep the straight by just holding them ourselves. Once the basic frame was made we made a top for this box. To do this we used the rail saw to cut a piece that would fit over and cover the box perfectly then we measured out exactly where the middle was and drew where the cross would go through. To cut this hole in the middle we first drilled holes in each corner of the shaoe then used a jig saw to cut it out.

MAKING CROSSES - ASSEMBLY

Once both boxes where made we needed to connect them. Firstly we put small blocks of wood into each corner of the second box, this was so that we had something to drill into from the first box, as if wed drilled into the second box we risked the screws coming out the side and damaging the box. We attached clamps to the pieces of wood and the bottom box, this help everything in place while we drilled the boxes together. Because the screws had to go in from underneath we found that the easiest way to attach the boxes was by putting them on the table leaning over the edge. We could drill the pilot holes from above but to put the screws in I had to sit on the floor and do it from underneath the box. Once they where connected we put the lid on the second box and fitted checked the cross fit before we went any further.











Aisling made the arches for the grave whilst me and Gilly made the second box. Once we had both arches they where attached to the lid we made for the second box. We then added timber between the two arches to make it more structurally sound. We glued these into place then held them with clamps to dry. Once this was all attached we could put the lid back on the second box.





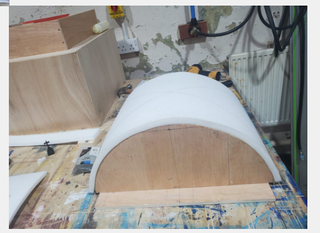


To maker the arch shape we added foam to over the wooden arch structure. This was stuck down with contact adhesive. Then a hole was cut in the top of the arch to fit the cross through.



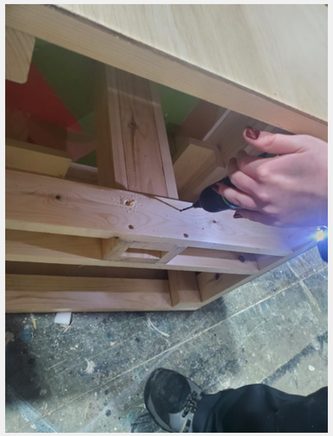






MAKING GRAVESTONES - FINISHING TOUCHES





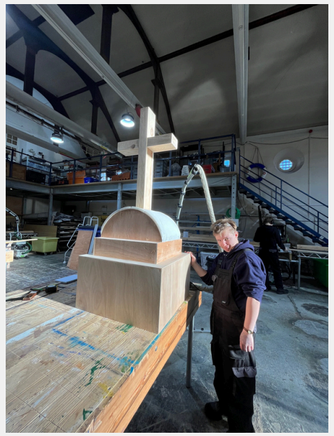
Once all the sections fit together the bottom of the cross was drilled into the bottom box this ensured it would stay in place and upright.







After everything was assembled me and Gilly sanded the gravestone with an electric sander, this was so the gravestone was smooth and looked like one piece rather than a bunch of pieces stuck together. This will help us when we paint it during scenic art.



This is the gravestone completely finished.

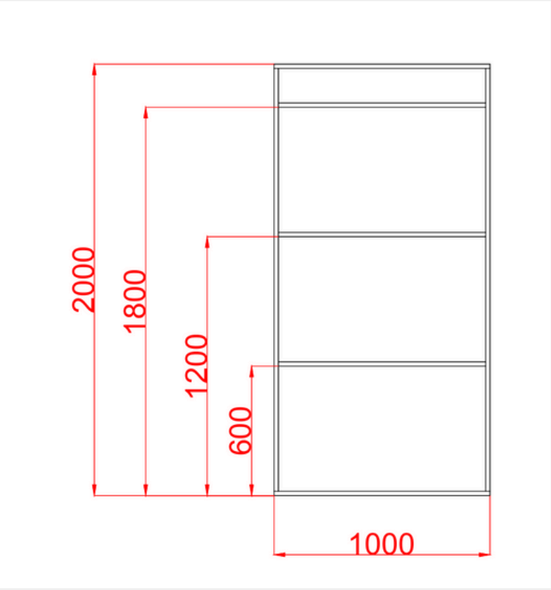
I think the gravestone ended up very well and me Aisling and Gilly worked well together in constructing this and fixing problems as they appeared. If I where to do this again i would like to have used 3mm plywood for the top of the arch but we did not have any flexible enough on hand when making these so i think the foam worked really well instead. I think this was really interesting to make as we got to use and get more familiar with a lot of the tools and we had to overcome a lot of challenged such as when we used the table to raise the boxes when attaching them.

Flats

Hollywood

Hollywood flats, or hard or rigid flats, are commonly used in film set construction as they are solid and durable. They are framed with thick lumber, typically 3x1 or 4x1 and covered with a hard surface such as plywood or lauan.

The Hollywood flats we made:



Cutting list
Rail -2x 1000mm
Style - 2x 1960mm
Toggle - 3X 960mm
Sheets - 2X 2000x1000mm

Overall amount of wood used:
Timber, 8800mm
Plywood, 4000x2000mm

Broadway

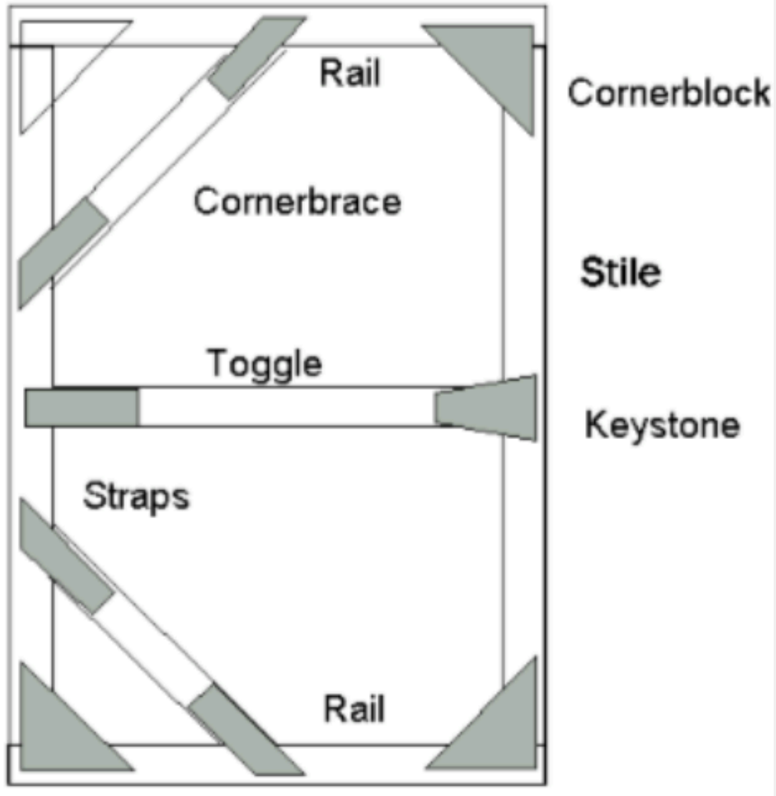
Broadway flats, also known as soft flats, are preferred for theatre productions, as they are usually more lightweight than Hollywood flats. These flats are usually made using 2x1 and covered with muslin or canvas, which is then painted to make a backdrop.

The only real similarity between Hollywood and Broadway flats is that they are both constructed from a lumber frame just with varying thicknesses of wood. However, there is many differences, for example Hollywood flats come at a high cost due to how robust and long lasting they are, whereas Broadway flats are much more budget friendly. Also Hollywood flats are ideal for film sets due to their durability but Broadway flats are better for theatre as they use a lighter frame and a soft covering. Another key difference is their purpose, Hollywood flats are built for strength and durability and Broadway flats are built to be visually appealing.

Due to being lightweight and thinner Broadway flats are very good for transport but, Hollywood flats are not due to being much more robust and heavy. Palco specialties (2024)

Making flats Hollywood vs Broadway

When making our Hollywood flats we used 3x1 timber and 3mm plywood. Our cutting list consisted of 2X 1000mm Rails, 2X 1960mm Styles and 3X 960mm toggles. The rails are the top and bottom parts of the frame meaning they stay at the full size of the flat as they go on top of/underneath the side pieces, the styles are the sides of the flat these have 40mm taken off the height as there is 20mm timber on either side as the sides sit between the top and bottom of the frame, finally there is the toggles which are the pieces that go throughout the flat for extra strength these are 960mm as there needs to be 40mm taken from the length to fit between the sides of the flat.



The cornerblocks are usually 6mm ply and generally 10" x 10" (25.4mm x 25.4mm) right angle triangles.

The keystones are either rectangular or “keystone” shaped. If they’re rectangular they’re usually 2 1/2" (63.5mm) - 3" (76.2mm) x 7" (177.8mm). But if keystone shaped usually about 3 1/2" (88.9mm) x 7" (177.8mm) x 2 1/2" (63.5mm). Alderson (2010)

Assuming the flat is the same size as out Hollywood flat (2000mm x 1000mm) I have made this cutting list:

Overall materials used:

Timber - 7994mm

Plywood 576.8mm x 1168.4mm

This therefore means this Broadway flat would use less material than the Hollywood Flats.

Timber

Rails - 2000mm

Styles - 3720mm

Toggle - 860mm

Cornerbraces - 1414mm

Plywood

Corner blocks - 101.6mm x 101.6mm

Keystones and straps - 457.2mm x 1066.8mm

Rostra

Health and safety for rostrums

Tourbridge and Blaikie (2002 p. 77)

> Ensure the top is supported from below on all four sides. Failure to do this will result in sag, lack of strength and possibly collapse.
> How high is the rostrum? A risk assessment must be carried out whenever a rostra is on stage. The most common risk being falling from the rostrum. This can be prevented with barriers such as handrails, kickboards or pieces of furniture.

Noise reduction

Blurton (2001 p. 59)

Rostra can sometimes act like a drum, magnifying the sound of footsteps. Microphones will also pick up on this and magnify the issue. Always ensure underfelt (or similar) be stapled to the underside of the top surface to insulate.
Another thing that will increase noise pollution is loose, wobbly or ill-fitting tops. Removable tops can be fixed down with pin-hinges and tubbing candle-grease along the edges of all tops will cut down on unwanted noise.
Some removable tops have thin rubber or neoprene strips glued to the underside, these strips are placed where the top rests upon the gate or joist and muffle unwanted sounds.

Bracing

Blurton (2001 p. 60)

As rostras increase in height the need to side bracing increases. Bracing needs to be in all three planes, althrough the plywood. Timber-gate rostra can have bracing built into the frame. Gates of 18mm plywood need no bracing the plywood sheet itself is a brace.
A steeldeck floor needs diagnol scaffold-tube bracing if it is higfher than 1550mm (+/- 5mm) A very high floor will require horizontal scaffold-tubes every 1830mm (6 feet) high, plus diagnol bracing.
Remember when drawing braces that timber is stronger in compression than it is tension.

Folding-gate rostra

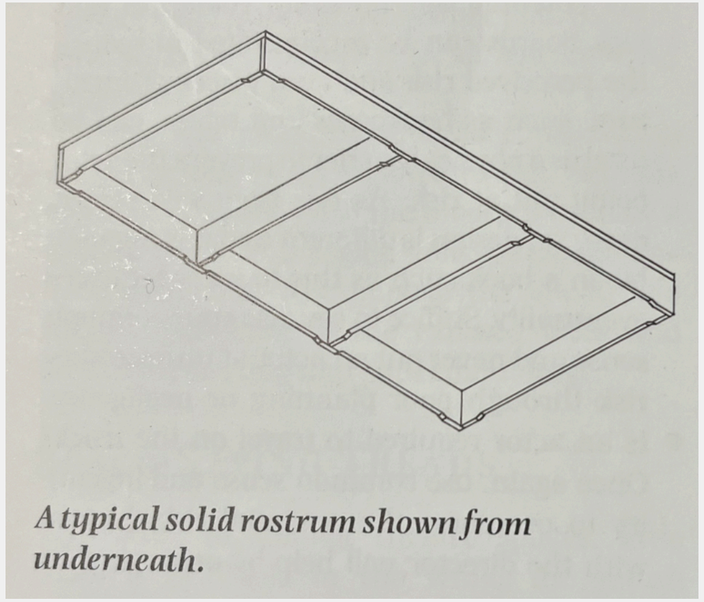
The block method

This is the simplest method of rostrum construction. This uses 18mm ply to form a sturdy construction that is quick to build. It can be any size or shape and is often used for the base of light truck constructions. However, due to how solid it is it can be extremely heavy so try remove as much surplus material as possible.

Tourbridge and Blaikie (2002 p. 78)

A standard 2440 x 1220mm rostrum may look something like this. The 200mm height has solid sides and intermediate supports. This particular one would be made from two sheets of 18mm ply. One piece for the lid and one to construct the sides and supports.

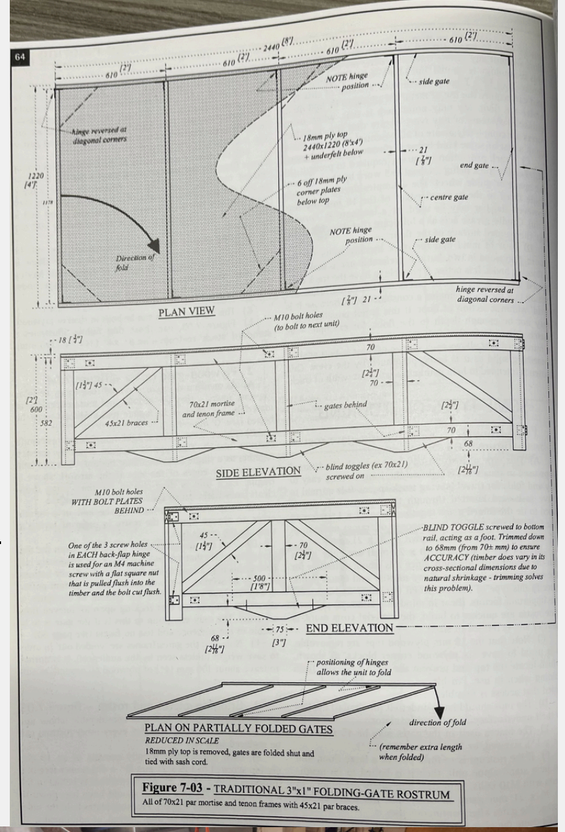
A cutting list for this rostrum would consist of: 2X 2440x1220, 4X 1184x182. The support lengths being shorter as you need to subtract the thickness of the wood. Once all these pieces are cut you need to foot the bottom of the sides. To do this cut a 15mm strip along the bottom edge of all sides. Leave 100mm at each end and every 1200mm to provide adequate support for the rostrum.



A typical solid rostrum shown from underneath.

Blurton (2001 p. 63)

This type of rostra has long been the traditional type used in theatre. It is lightweight, long-lasting, easy to lay and fold for travel. The materials used (70 x 21mm) are quite cheap but the labour costs are high, since it is labour-intensive when durability and lightness are important factors. The 18mm ply tops are removable. If the rostrum is to form a large floor, and not a stand-alone unit, it is bolted to the other rostras using M10 bolts.





Rostra used in,Pasadena Playhouse (2018)

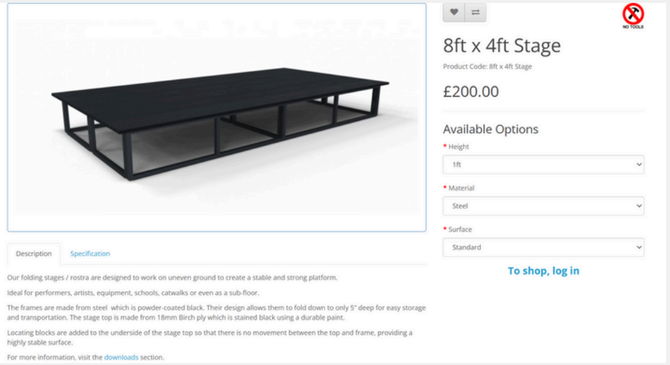
Modular steel rostra

Troubridge and Blaikie (2002 p. 80)

The introduction of steel fabrication has had massive changes in how scenic construction. Steel rostra should always be fitted with corner sockets that can take any length leg, making them completely versatile. The other major advantage of steel rostra is the high strength factor. Being highly durable, steel rostra also have longer lives, making them very economical, the only potential for damage is the rostrum top. However, steel rostra are very expensive so it is advisable to hire them instead. This saves money and the problme of post-show storage.

Modular Rostrum Sizes

2,440 × 1,220mm (8 × 4ft)
1,220 × 1,220mm (4 × 4ft)
2,440 × 610mm (8 × 2ft)
1,830 × 1,220mm (6 × 4ft)
1,220 × 610mm (4 × 2ft)
2,440 × 1,220mm right-hand triangle
2,440 × 1,220mm left-hand triangle
These dimensions are a general indication of what is available and very often other shapes are freely available, such as quadrants and other curved pieces useful for the construction of a revolving stage.



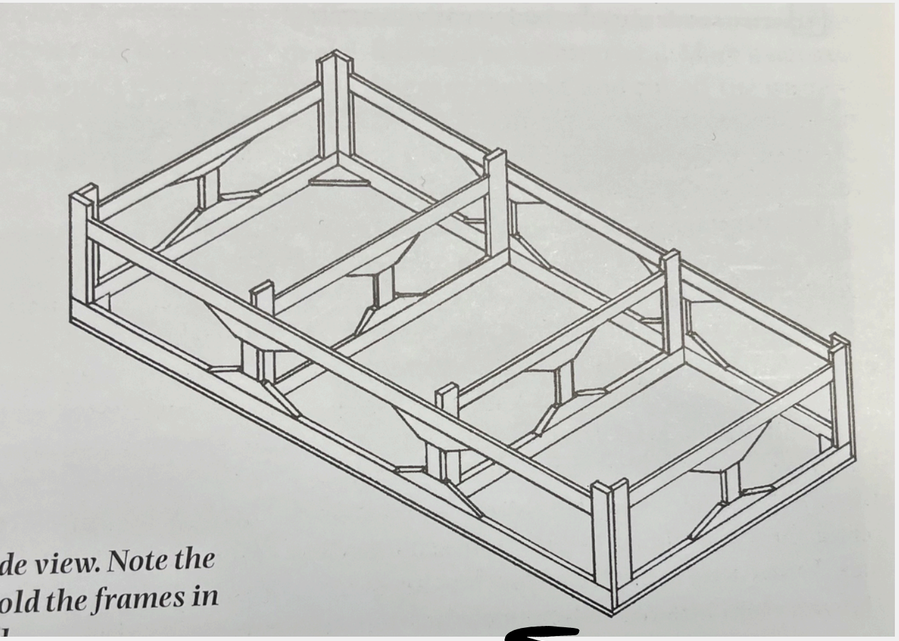
This is a stage from a company called Grumpy Joes (Grumpy Joes 1974). It is a steel rostra and “Ideal for performers, artists, equipment, schools, catwalks or even as a sub-floor.” Grumpy Joes (2019). This website also gave me a good idea of pricing of buying steel rostra, this 8ft x 4ft stage is £200.

I like his use of rostra for the structures on the stage. I think this set is very visually interesting and I like how you can see a lot of the rostra instead of it being very covered. I also think this was executed well as he has rails around the top of the platform acting as a safety barrier for the actors using it. I think this set is made using modular steel rostra.

Paul Clay's Set Design, for the Broadway Production of RENT
Clay (2025)



Gate-leg rostra



Unfortunately, I couldn't find any exampled of a gate-leg rostra online so i have included this diagram of one from Scenic art and construction. Troubridge and Blaikie (2002 p.81)

Troubridge and Blaikie (2002 p. 81-82)

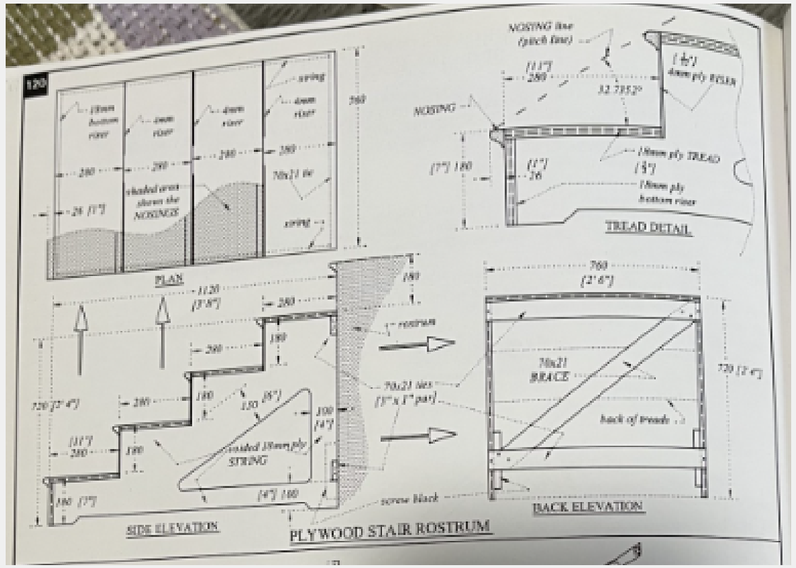
Historically, every theatre would own a set of gate-leg rostra that would be reused. However, with the grwoing popularity of steel rostra, the wooden variety is a dying breed.

Gate-leg rostra are constructed from either 25x75mm or 32x75mm softwood, and built ina similar fashion to a standard timber flat. Each rostrum is made from a number of "flats" that hinge together to form a support for the top or lid of the rostra. The name comes from its appearance as when its constructed it looks like a series of old-fashioned garden gates. The mortises are formed into legs, the rails fit into the legs, with corner tenon at the top and mid-span tenon on the lower rail. Upright toggle-rails should be placed every 600mm to 800mm along the length of the frame.

One advantage of this rostrum is its ability to fold away, but it is critical to hinge the frames together accurately for them to fold away correctly. If it is going to withstand high loads it is advisable to add extra supports or gates to each rostrum. With the rostrum frame constructed, sit the top on it and mark with a pencil the internal positions of the corners of the frame. Then turn the top over and fix triangular corner blocks in position. these blocks hold the top inplace. Once the top is fitted it needs to be fixed down with screws meaning it can be easily removed.

Treads / stairs

Blurton (2001 p. 120)



Plywood stairs rostrum

The strings, treads and the bottom riser are made of 18mm plywood. Thinner ply is used for the risers and timber for the back face adding strength and providing structural bracing. The timber rail that supports the top tread may be used to bolt the the rostrum. The strings are voided to lighten the unit, and feet are cut to prevent rocking. If the stairs were wider, a center string could be added. On very wide stairs there should be strings every 750mm.

Blurton (2001 p.118)

Health and safety

Most areas of the world have regulations on the size and proportions of staircases, covering handrails, balustrades and headroom. The draughtsman must be familiar with reletive local rules. If a person is injured on faulty stairs the legal problems fall on the draughtsman.

Tread proportions. Stairs must foloow ergonomic logic, it must fit with the human bodies natural size and stride. Each tread and riser must be identicle. The maximum pitch angle is 38 degrees.

Nosings are often added to the edge od treads. They must be applied to evry tread including the landing so they dont interfere with the human stride.

Handrails and balustrades. The height of the raking handrail must be 840-1000mm when measuring plumb above the nosing line. This regulation ensures the handrail is at the correct height.

Finger-traps must be avoided on handrails allow a clearance of atleast 40mm between any wall and the handrail.

The 100mm ball rule. This simply means a ball having a bigger diamater than 100mm must not be able to pass through the balustrade, thisprevents things like children getting their heads stuck.

Blurton (2001 p.117)

Theatre trucks

Trucks are wheeled units that carry scenery, people, or both. They can range from simple ”dollies”, use by the stage-crew to assist in shifting awkward pieces of set, to complex, remote-controlled units that can move an entire set, or even an audience.

Castors

Some trucks do not need to be guided along a path. Swivel castors allow the crew to move them where they wish. Swivel castors tend to have “poly-tyres” and can be single or double wheeled. Keeping the truck height low is the common problem, the castor has to be sufficient for the loads it needs to carry. Swivel castors swing in all directions but have some problems. Each wheel is positioned off-centre to its fixing plate, allowing it to rotate into the ideal position. But the consequence of this is that if the truck is pushed in a straight line and stopped the castors have to make a 180 degree turn before the truck can be reversed. Also the truck will move off-line, it will follow a different path when it returns. Some engineers have invented, three-wheeled units called “triplex” castors. Here three swivel castors are fitted into a large “ball-race” under the fixing plate. This makes the truck behave better but is expensive.

Fixed-wheel castors. They allow free movement forward and backward along a certain path only. A truck with these wheels will travel the desired path but with no guiding mechanism it may wander slightly off course. Trucks using fixed castors are awkward for the crew to handle off stage. Sometimes “slave-trucks” are built, the fixed-wheel truck is stored upon a simple truck with swivel castors, allowing both to be moved at will.

Locking swivel-castors. These provide solutions to many of the problems with the other trucks. These are swivel castors that can be locked off by flicking a lever into one of four positions. Hand access is required to each castor to switch each unit from fixed to swivel mode, but this is not always possible. These are more expensive than swivel or fixed castors.

Blurton (2001 p. 112)

Theatre trucks

Health and safety

Any moving object on stage can act as a risk to staff. Only proffesional cast and crew should perform specific moves on the trucks. Always rehearse movements in full light under the eye of stage management.

Foot-traps must be avoided, it is easy to get your foot stuck under a moving platform. To avoid this you could fit a skirt round the edges of the truck, leaving a 15mm clearance gap or have the structure high enough to not be a danger to feet.

Finger-traps, ensure items such as trap doors, drop-bolts or connecting hinges are positioned where a crew member has no danger of trapping their hand.

Fit safety line where appropriate.

Paging cables can be difficult, surface-mounted drive-cables and pulleys are very likely to be tripped over. Try marking these with coloured tape or alternatively, supply ramps that allow passage over the cables. Ensure the wheels of the truck do not cut the cables, drawings of trucks should include cables to ensure their paging is practical.

Headroom needs to be considered, always allow for extra room as people may be doing things such as,jumping, carrying kids on their shoulders or standing on a chair.

Blurton (2001 p. 113)

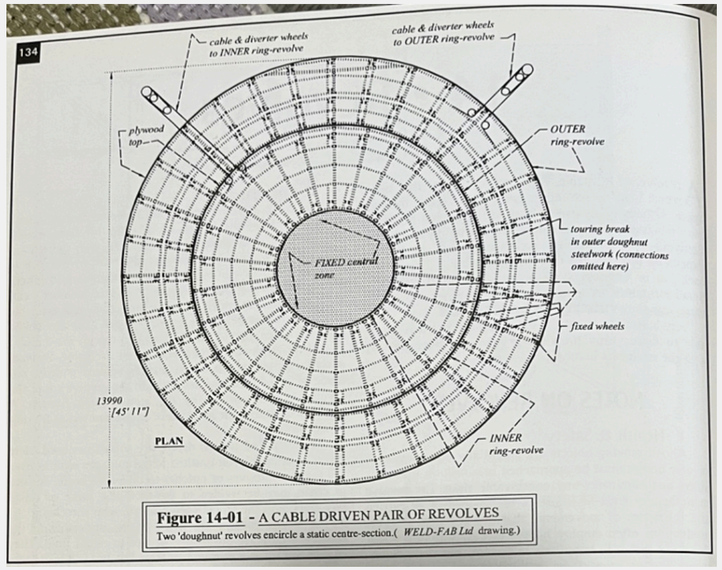
Hazard	How to avoid hazard
A truck on wheels may begin to move freely and hit set or crew.	Add breaks to all wheels and ensure they are on when the truck is not moving.
Someone's foot getting trapped underneath the truck	Put a curtain round the truck with 15mm clearance to avoid feet getting too close or make the truck high enough it wont hit any feet.
Cables sticking out from truck and becoming a tripping hazard.	Put colouful or luminous tape on the cables or if not possible put a ramp over the cables.

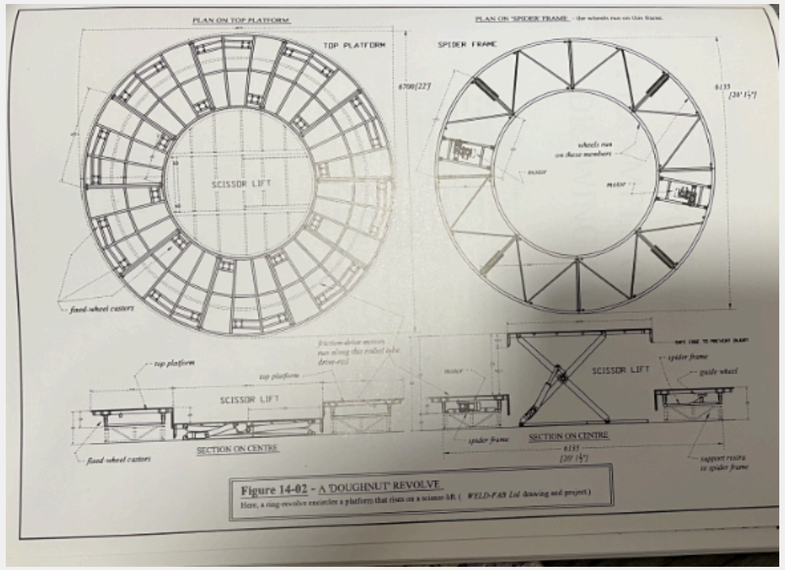
Revolves

Cable-driven revolves. A continuous cable runs' from the drum of a motor (or hand winch) around the revolve structure and back. Diverter pulleys are placed to allow the cable to run where it is wanted. Ideally, the revolve should carry a "V" shaped member, in which the cable runs. This helps the cable to grip the structure, and it set just back and below theouter edge of the overhanging top plywood disc.

Friction-driven revolves. These do not use cables. Instead, there is a static motor-driven wheel pushing against drive rail made of rolled steel and set beneath the revolves top. The revolve is driven around by the motor using friction. There is a mechanism that allows for adjustment of the amount of friction applied.

Rack and pinion drives. Here a static motor driven toothed wheel engaged with a drive rail that had grooves or notches. A form of chain may be welded to the face of a piece of rolled box-steel, the wheels teeth locate the chain. Blurton (2001 p.133)





Diagrams of revolves from Blurton (2001 p.134,135)

I would like you to find 2 references to theatrical or screen design that you find interesting in a scenic construction sense.

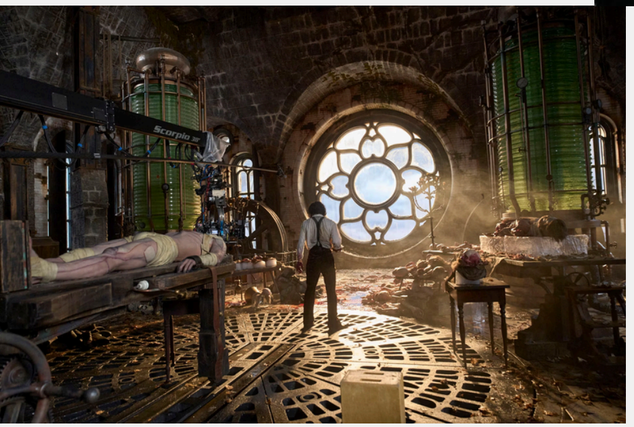


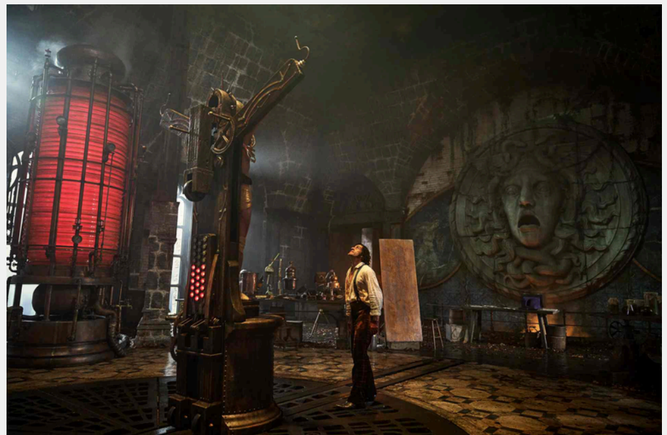


This set is from the musical “ride the cyclone” being performed at Southwark playhouse in London. This is my favorite musical and I find the set really visually interesting. They use a revolving circular stage with a circular flat as the background. This flat has projections on it throughout the show which relate to the different characters during their specific songs. I think this set it really smart and versatile. I find this interesting in a scenic construction sense as i think it would be really interesting to make the revolving stage and make this work with the back flat as that does not move through out the show. I also would like to make circular flats at some point as I think it would be an interesting challenge to make. Rides the cyclone (2025)









Another set I find interesting is the laboratory from the 2025 Frankenstein movie. I find this set so visually interesting and it was definitely my favorite set in the movie, i find it very visually interesting and I find it interesting to think about how this set would have been built. One big feature i like is the medusa head on the wall, I think this would be really interesting to make and sculpt. I also really like the table that Frankenstein's monster is lay on, I think its really interesting visually and I think it would be interesting to make something that would have to lift someone up like that. Frankenstein (2025)

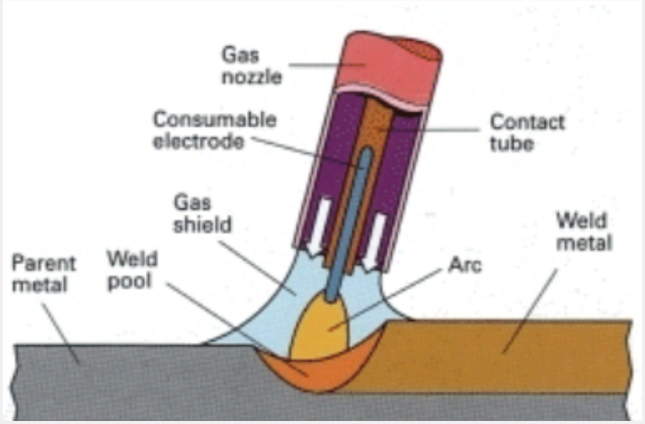
Different forms of metal

Metal can be brought in many forms, such as sheets or lengths. What form you can buy can depend on what metal you are using. To look into metal form I looked at Metal Supermarket:

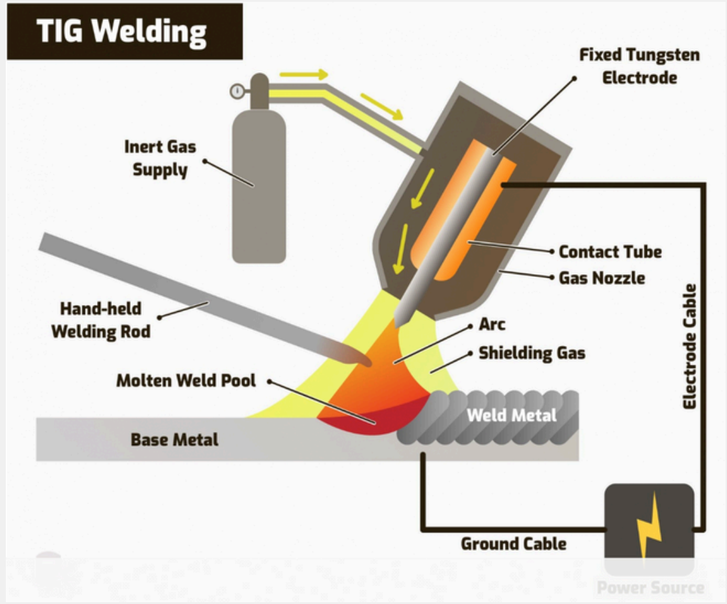
Mild steel lengths: Angle, beam, channel, column, flat bar, half round bar, hexagon bar, oval tube, pipe, rebar, rectangle tube, round bar, round tube, square bar, square tube, tee bar, threaded bar.
Aluminum lengths : Angle, channel, flat bar, hexagon bar, rectangle tube, round bar, round tube, square bar, square tube, tee bar.
Stainless steel lengths: Angle, channel, flat bar, hexagon bar, pipe, rectangle tube, round bar, round tube, square bar, tee bar, threaded bar.
Brass lengths: Angle, channel, flat bar, half round bar, hexagon bar, round bar, round tube, square bar, square tube, tee bar.
Engineering steel lengths: Flat keystock, hexagon bar, round bar, square keystock.
Metal supermarket (2024)

From this I have found a lot of different forms metal can be brought in but also how material can differ what forms are available.

Welding



MIG (metal inert gas) welding
It is an arc welding process that uses continuous solid wire electrode heated and fed through the welding gun. The base materials melt together and form a join. The gun also feeds a shielding gas (argon or CO2) to protect the weld from airborne contaminants. It is very versatile and suitable for thin sheet and thick section components.
The welding institute (2025)



TIG (tungsten inert gas) welding, this process is similar to MIG welding however, the welding metal is held separately from the welding gun. This metal is usually applied in a circular pattern to increase strength of the weld.
Grill (2024)

Spot welding, or Resistance spot welding (RSW), is a process that joins two or more overlapping metal sheets together using the materials resistance to the flow of electricity. The process included clamping the metal sheets together between two copper alloy electrodes. A high electrical current is then passed from one electrode to the other through the metal sheets. The resistance generates localized heat melting the material in that spot. The electrodes also apply pressure then when the current is switched off the molten metal cools off and solidifies under pressure. Spot welding is significantly different to arc welding processes as it doesn't use any external filler material or require shielding gas.
Premier welding (2025)

JOINING FLATS

Battening

Assures a certain amount of rigidity and is the most common way of creating a wall of multiple flats. To batten flats, place them face down and align the bottom rails. Place 3x1 battens on the rails and toggles. The batten should be at least 1 inch shorter than the flat on each end. The batten can be screwed down and there should be two screws secured into each end of the batten and at least one screw secured into each style the batten crosses. When a wall is battened, carefully raise it by using enough workers to “walk it up” so it is vertical. Flats which are battened should be tightly lashed first to help hold them in place when the battens are attached. Battens can also be temporarily placed on the back of flats to stiffen them. The batten is held in place with keeper hooks on the toggle and often the top rail.

Hinging

Hinges are often used to connect flats into large walls which need to fold for strike or storage. When flats are hinged on the front they can fold easily into compact units. But when they are back hinged there needs to be blocks underneath the hinges for them to fold. Always use enough hinges to keep flats together so they don’t warp away from each other. Usually it is ok if hinges are places 6 inches from the top and bottom rails.

Picture battens

These are necessary when an object needs to be attached to the front of a muslin-covered flat. It is a vertical pieces that can be standardized becasye toggle placement is standardized. Slip it between the two toggles, screw it into lace. It will hold the picture and support the bottom of it and stop it from denting the flat. If you attach anything electronic which must pass through the flat make sure it passes through the picture batten as well.

Lashing

Lashing is quite basic. It involves temporarily tying two flats together, by criss-crossing a lightweight line around metal cleats and fixing that taut line in a knot. Placing lash hardware on a set of flats allows quick and easy makeup of a wall. It is one of the fastest methods of striking one set and erecting another for a multi-set show. However, it is expensive. The best lashline is quatre inch braided cotton road. It can be purchased at any hardware store. It is anchored at the top of the flat on the same side as the corner brace. For placing cleats it is a good “rule” to place lash cleats 1 inch above and 1 inch below every toggle. Attaching them in this pattern makes a good solid lash.

Raoul (2002 p.79 -87)

How you could construct a tree which has cast members climbing on it. How would is befixed to the stage and how coud you make something so prominent not overwhelm the stage.

I would construct the frame of the tree using steel square tube and construct it using MIG welding. This would provide a strong frame that can hold the actors climbing on it. I would make sure the frame included parts that stuck out that the actors would climb onto. I would then use plywood around the frame to cover it and I would make sure it fits around the parts I want the actors to climb so they can see where to step or grab. To fix it to the stage I would use a wooden base that the metal frames is bolted into and this base would cover most or all of the stage to ensure the weight is distributed and the tree doesn’t fall. Finally to make sure it doesn’t overwhelm the stage I would make sure there is a lot of other trees around it these would probably just be made from plywood cut into shape and painted.

WHAT HAPPENS WHEN SOMETHING GOES WRONG?

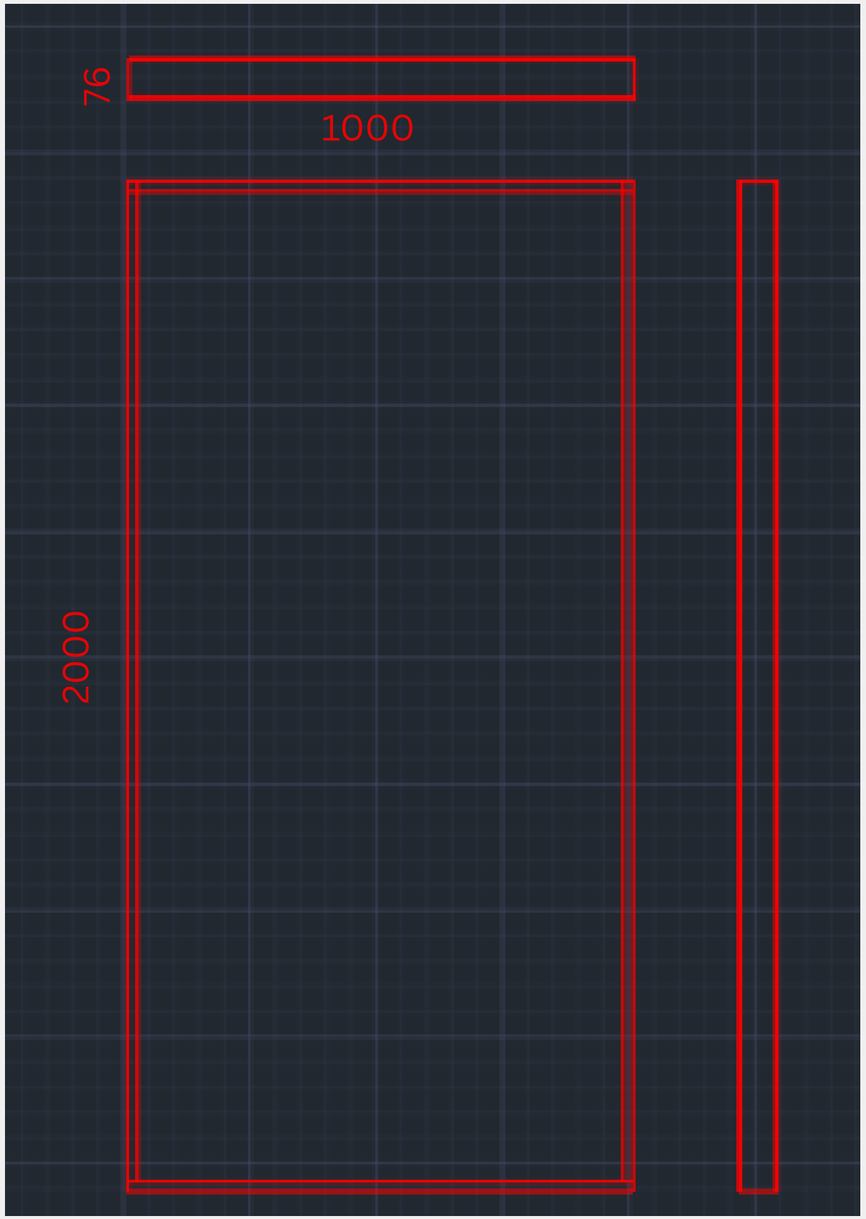
My senario:

You have installed the scenery as per the model and drawings supplied. The director has requested changes be made but this will mean more time and work, what will your reply to the director be?

My answer:

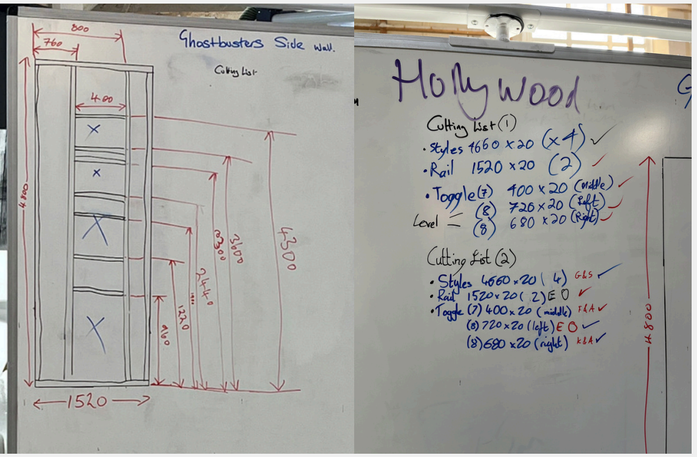
I would firstly see what changes the director was wanting, then see if they are possible within the budget and time frame of the project. If the changes could be made within the time and budget I would make them. However, if the requests where unreasonable I would explain this to the director and either leave the set as is or suggest more reasonable changes that could be made.

16. PRODUCE A CAD DRAWING OF SCENERY. THIS MUST BE A THIRD ANGLE ORTHOGRAPHIC PROJECTION.



My third angle orthographic CAD drawing of out 2000x1000mm Hollywood flats.

Ghostbusters firehouse



Firstly, we looked at the drawing and made a cutting list for both side flats. We decided to cut the all the pieces for the flats before we made them so that we could go from cutting to constructing and not have to change between them loads.

Cutting list

Styles 4660mm X8

Rails 1520mm X4

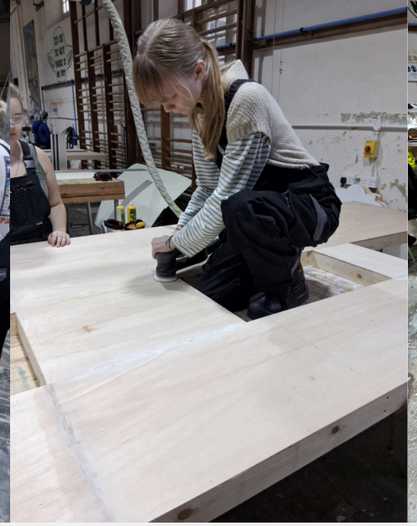
Toggles 400mm 14, 720mm X16, 680mm X16



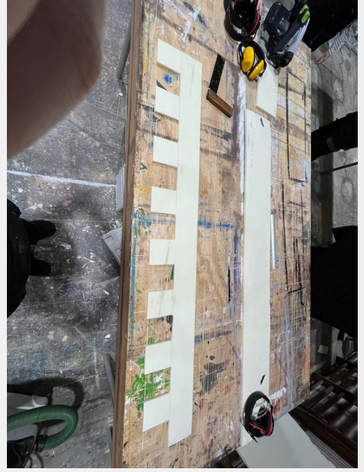
Next we cut out all of the pieces for the side flats. However, when I stood up one of the styles i realized it was grazing the ceiling before we even added the thickness of the rails which would make it very difficult to transport. When we asked out lecturer, we were told to cut 100mm off the height so we cut 100mm off of all the styles.



Once all the pieces were cut out we began screwing together the frames of the side flats. Due to all the deformities in the timber we had to have one group of us either end of the flat to hold the timber in place while the other side was screwed in. Most of the deformations where sorted when we added in the toggles as it mostly straightened out the styles.


Once we had one frame made, one group started making the second frame while the other cladded the front of the first flat with 3mm plywood. Due to the wood being deformed we had to use clamps on the frames while attaching the plywood to straighten out the frame this fully straightened the frame. For the part with the windows we cut smaller pieces that fit between the windows as we though this would be easier than trying to cut out the windows after attaching the ply. Once all the pieces where attached we sanded all the edges with an electric sander and to remove the large amount of excessat the end of the flats we used a router.





Once the flats where fully cladded, we used celotex to add the brick details around the windows. We first measured on the scale model the spacing of the bricks up the side of the windows. Once we knew how big all these pieces needed to be we marked them out and cut them with blades. We also had pieces that went between the windows and across the whole flat, we cut these with a rail saw. To connect them we used expanding foam. To do this we marked out where the piece sat then sprayed this with water and expanding foam. We then used wooden planks and heavy items to weigh it down to dry overnight. Finally we used filler to fill in any gaps caused by the expanding foam pushing the pieces up.

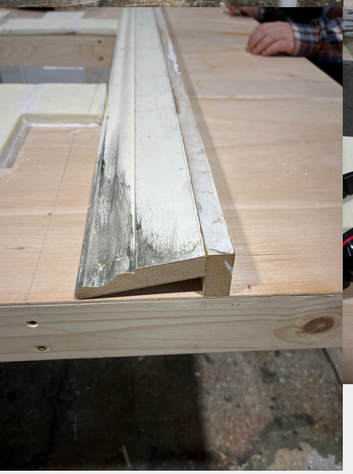










For the rim round the top of the building we used old skirting board. We where initially just going to lie the board flat on the flats, however, we decided it would look better angled downward so we took the excess from trimming the skirting boards to give the trim height. We used the table saw to cut the board at an angle so it would sit flush with the back piece then connected these pieces with a staple gun. Finally we connected these to the flats using glue and screws.



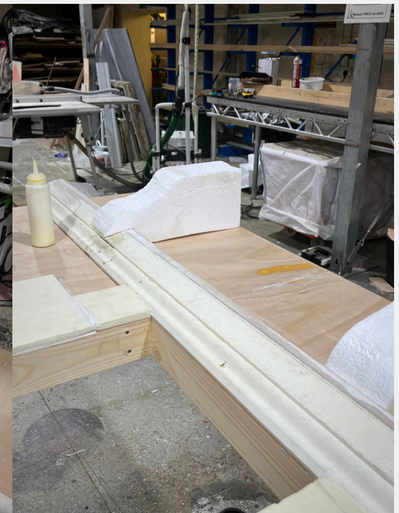


This is how the flats looked once all of these details where added.

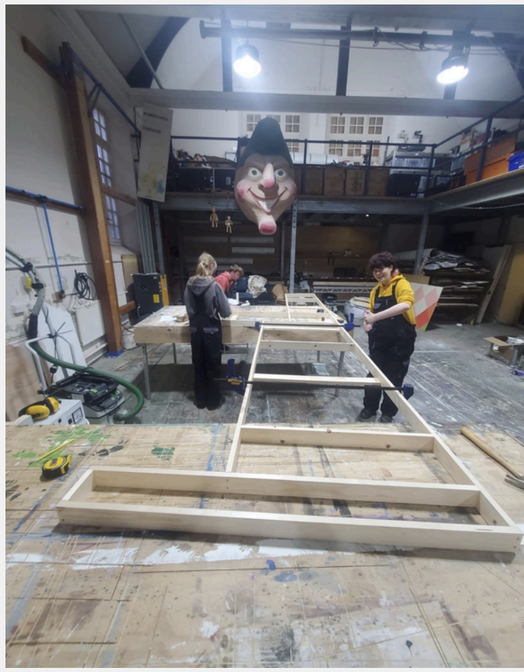
The final detail for the side of the flats was the blocks that sat above the rim. To make these we made a former to the shape we wanted then cut foam blocks with a hot wire. Once we made these we put them on the flats and decided to cut a block out the bottom of then so they would fit over the rim.

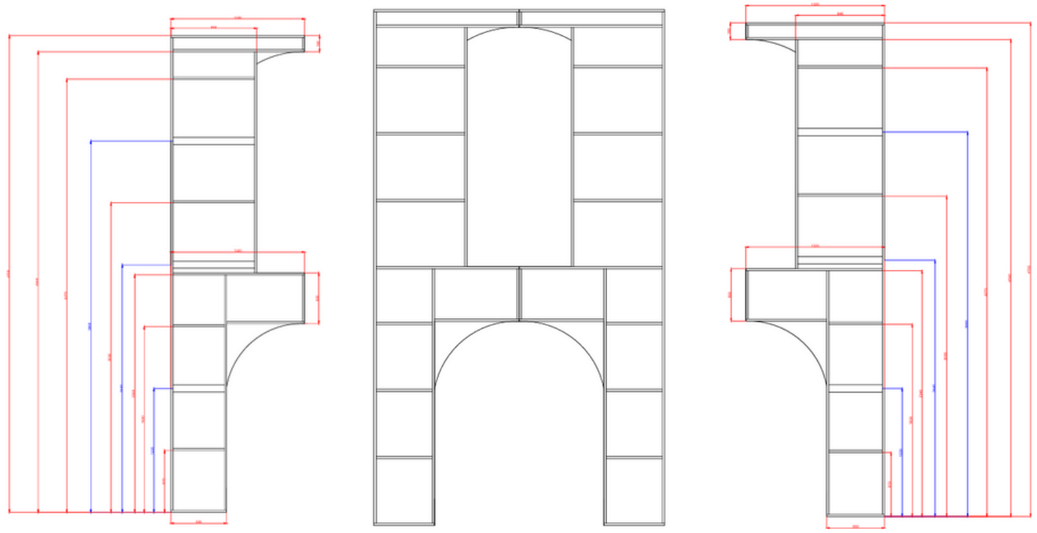


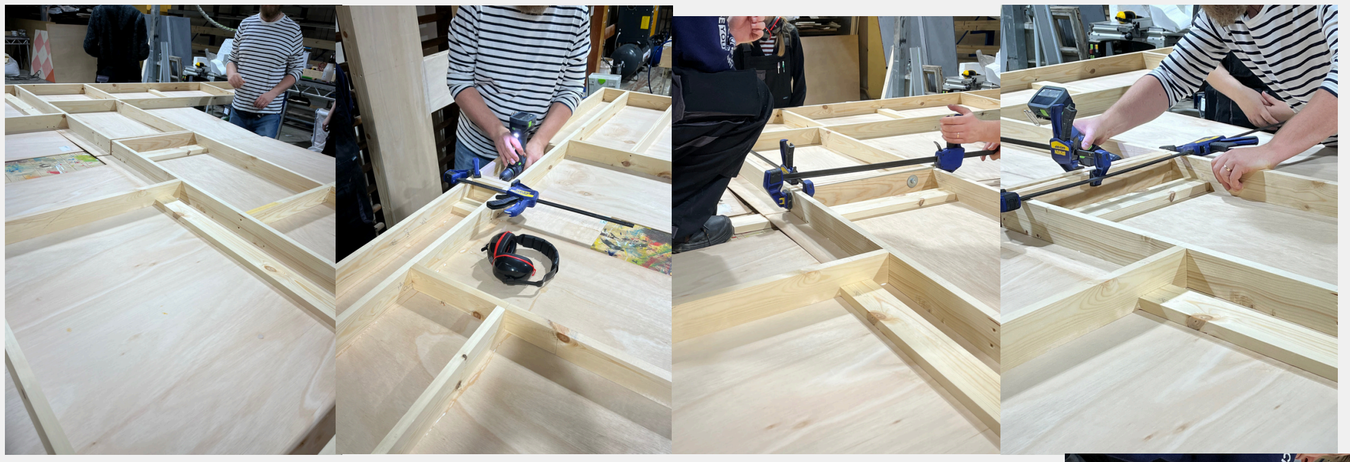


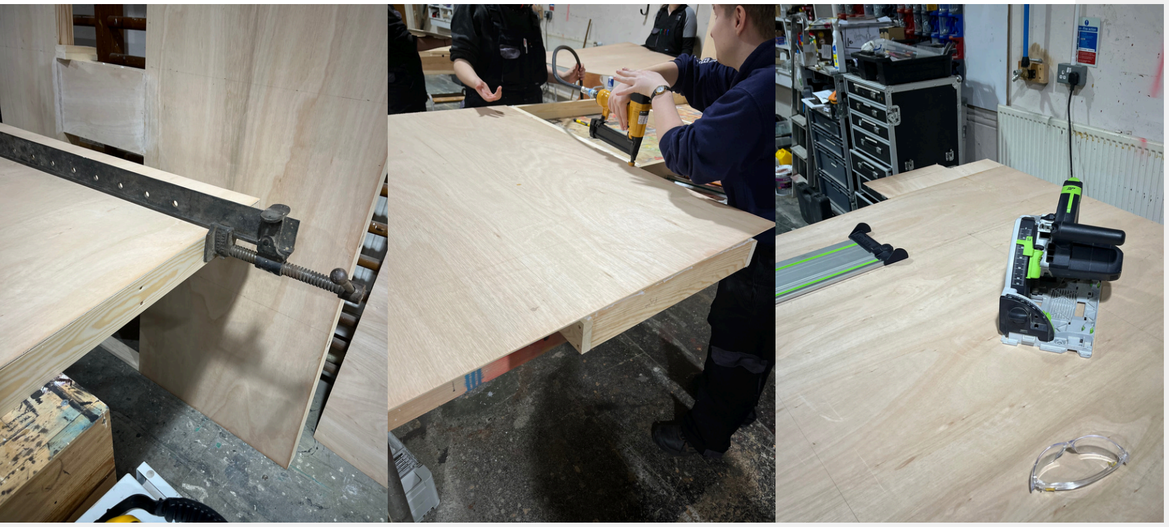


Unfortunately, i was not in lesson when they made the frames for the front flats. However, they split the front flat into two pieces that can be bolted together. We had to do this as if we made the full sized flat there would be no way to physically get it out of the workshop.

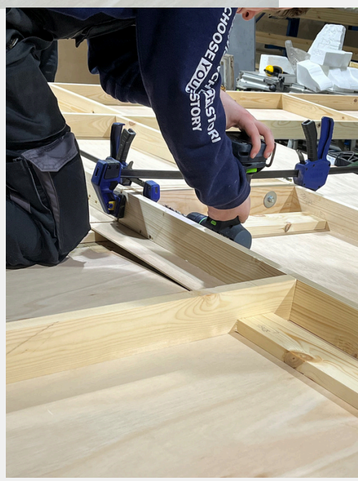




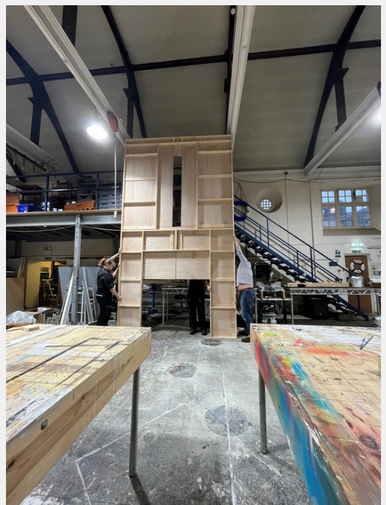


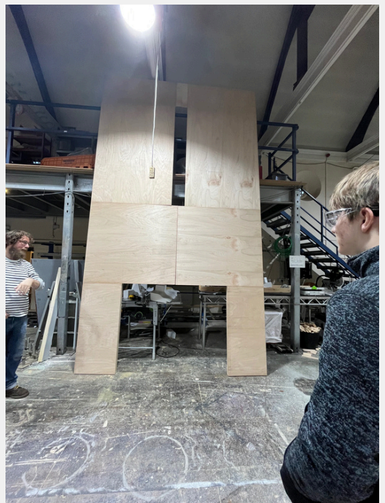


When we brought the two parts together they fit together perfectly. To connect them we clamped the pieces together then drilled straight through the two pieces and used an M10 bolt with washers both sides and a nut on one side to connect the two parts. On the top connection we only put in one bolt and we put two in the bottom. For strength we changed which way the bolts where facing each time so that the flat didn't lean too far one way.

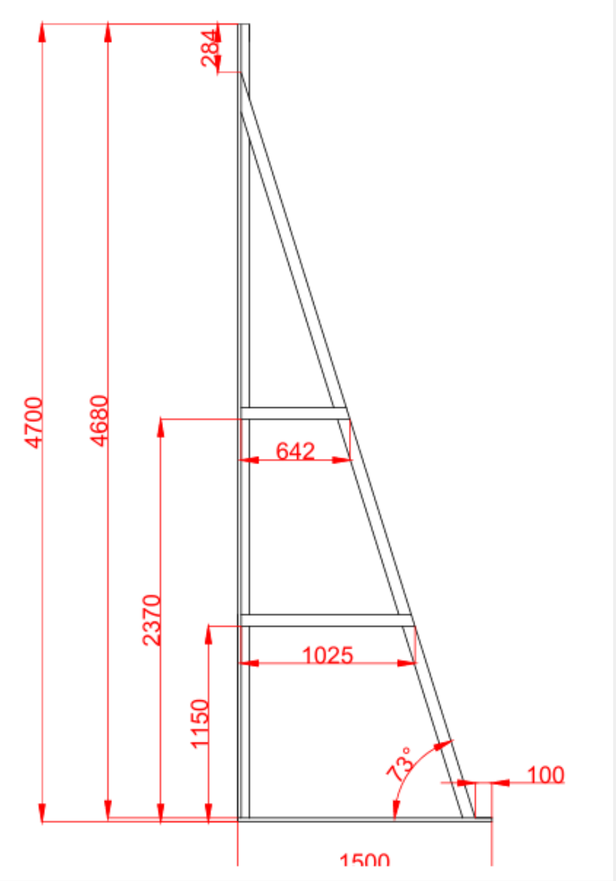


Once the frames were, built we cladded the two front flats. To do this we used a clamp to ensure the frames where straight with the plywood. Once the fronts where cladded there was a piece of excess on the part where the tops connect to we had to remove this with a rail saw.









Cutting list

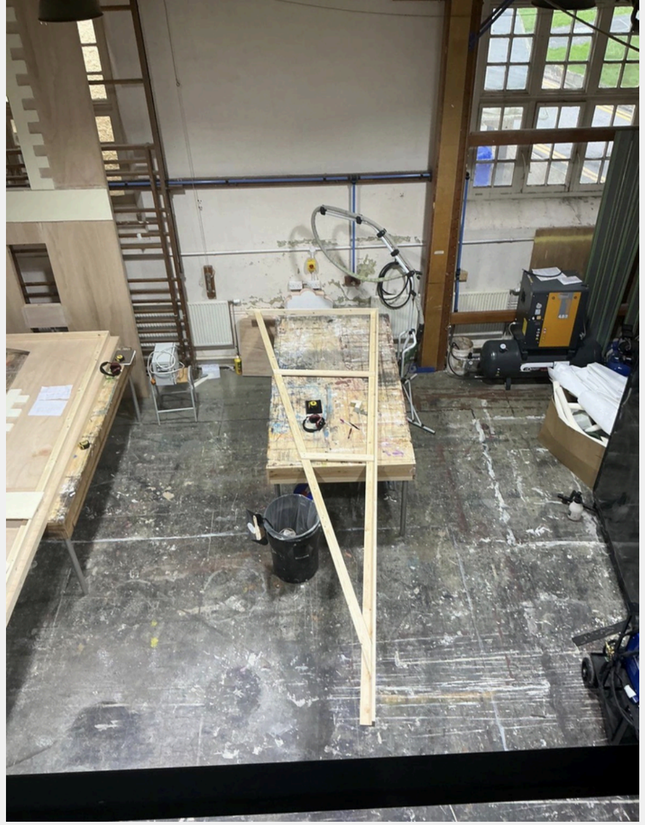
4680-mm X2

1500mm X2

1025mm X2

642mm X2

Diagonal piece





To make the braces we firstly made a cutting list for all the lengths we knew. Then we cut allof these pieces out. Once we had these we assembled the right angle part of the brace, once we made this we could measure the diagonal piece on the brace. We cut the bottom of this on the chop saw, but had to use the rail saw for the top part as it was too big for the chop saw. We then used screws to connect all of the pieces and stood them next to the flats.

Overall, I think this project went well. However, if i where to do it again i would plan our time better so that we could have finished making the firehouse before the end of the module.

My personal evaluation

I really enjoyed scenic construction. I have never made anything as big or as detailed as our final project and i was really impressed in how well we made it. I am very happy with the skills i have learnt and I think i have really improved and learned a lot of new skills on the module. As well as my practical skills i think I have improved how I work in groups and communicate with other. I really liked how we were all given the basic skills then the independence to make our own decisions and mistakes. I think i need more practice using the jig saw as it is the one tool i would say i am still not very confident with, so I would like to go practice with this more in the future. Another area I need to improve in is my time management, I think i need to plan my work better in the work shop and not get distracted by conversation as welk as keeping on top of my process work books. I have learned many useful skills in this module that i will definitely use again such as, my new skill set and using all the tools, working effectively as a team, being resourceful, problem solving but also that it is ok to make mistakes.

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