

Soapbox Group Project



Prifysgol Cymru
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Module: Integrating Project

Module Code: ACHA4008

Assignment 1 of 2

Team Name: Crash Test Dummies

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Team Organisation

Team Leader – Jaydan

Deputy Team Leader – Odin

Chief Designer - Odin

Deputy Chief Designer - Dan

Financial Manager - Suphakit

Deputy Financial Manager – Niall

Materials Manager - Niall

Deputy Materials Manager – Dan

Gantt Chart

#	Objective	Duration	Week 1 06/11/202 3 - 12/11/202 5	Week 2 13/11/202 3 19/11/202 3	Week 3 20/11/202 3 26/11/202 3	Week 4 27/11/202 3 03/12/202 3	Week 5 04/12/202 3 10/12/202 3	Week 6 11/12/202 3 17/12/202 3	Week 7 18/12/202 3 24/12/202 3	Week 8 25/12/202 3 31/12/202 3	Week 9 01/01/202 4 07/01/202 4	Week 10 08/01/202 4 14/01/202 4	Week 11 15/01/202 4 21/01/202 4	Week 12 22/01/202 4 28/01/202 4
1	Organisation (Team Roles)	1 Week												
2	Designing	2 Weeks												
3	Parts List	1 Week												
4	Price List	1 Week												
5	Building Document	3 Week												
7	Finish Document and choose designs	1 Week												

Aims & Objectives

We aim to design a safe and secure soapbox:

- To establish what are and are not suitable materials to use in the soapbox.
- To exhibit good safety features such as seatbelts and a roll cage for example.

We aim to adhere to the Richard Castle Soapbox Derby regulations:

- To demonstrate that we have read the regulations thoroughly.
- To assemble a soapbox that incorporates the regulations.

We aim to design a winning soapbox:

- To construct a lightweight and aerodynamic soapbox.
- To manufacture a soapbox with good handling.

We aim to make a cost-effective soapbox:

- To fabricate a soapbox using a lower budget.
- To outperform other soapboxes with a higher budget.

Background Research

To begin with we started looking at Richard's Castle Soapbox Derby, what sort of designs and soapboxes were being used. This gave valuable information, but for additional inspiration and materials we looked at the much more popular Red Bull Soap Box Race. There were many videos showing the progression of a soapbox build. There was a mixture of materials that were being utilised, mainly wood and metal that could withstand the abuse of the downhill derby. While others were optimistic and used cardboard in their design. We consulted Red Bull's website with tips and tricks to help build a faster soapbox. For example, this included what wheels to consider, "bicycle wheels will work but they tend to buckle easily".

Other YouTube videos helped with seeing the design process, where people competing in the Red Bull Soapbox Race would document their journey and problems they would encounter in their journey. Our designs have taken some inspiration from these, including body design, chassis design and what materials were used to construct them.

During this hunt we discovered the world's fastest gravity racer. This was useful in the case of seeing what brakes, wheels and chassis they used. All the parts were aimed at being as light as possible with the shell being fabricated out of fibre glass and a space frame style chassis. They had used a wishbone style suspension system, like those in Formula 1, which according to them was, "the biggest decision here was whether to have suspension or not!". In our designs we went against implementing suspension as it would keep the cost down and we don't plan on travelling 80mph. The brakes were used as inspiration in some of our designs as they used high end mountain bike brakes. These are small, lightweight and provide a good amount of braking performance for Richard's Castle Soapbox Derby.¹

¹ (Gravity Racer World Record: Design – Engineering Sport, n.d.; How To Build A Soapbox Gravity Racer & What It's Like To Enter The Redbull Soapbox Race - YouTube, n.d.; Soap Box Derby | Richards Castle | Race Your Carts 26th June 2022, n.d.; The World's Fastest 85.6mph Gravity Racer | Guy Martin Proper - YouTube, n.d.)

Methods

Concept 1 by Suphakit Pratt

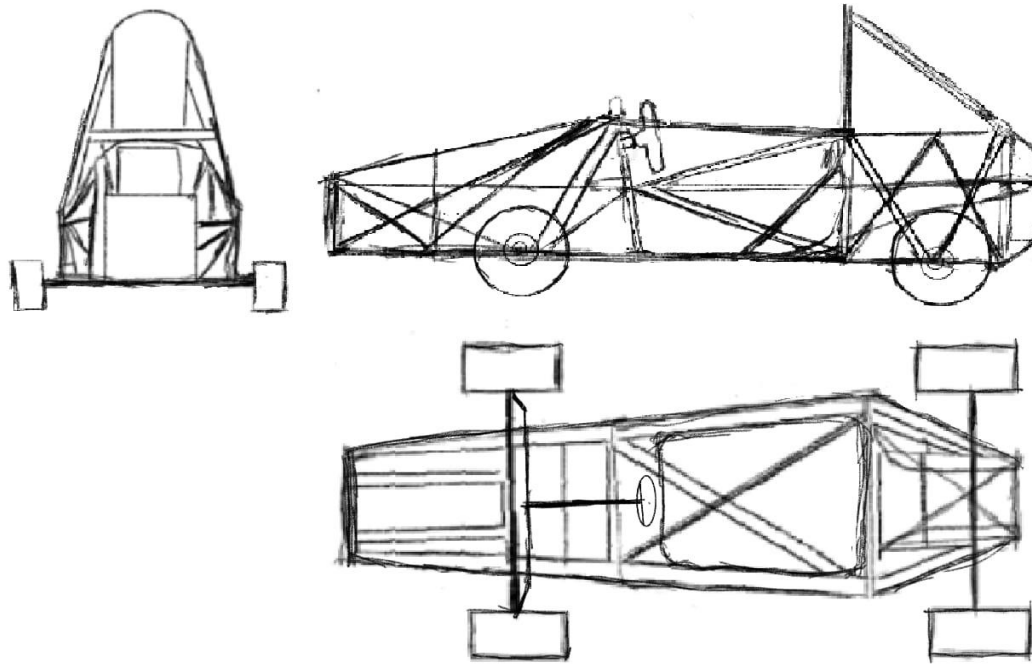


Figure 1 shows a sketch of Concept 1

Using aluminium as the chassis frame for the soapbox car, offers a combination of lightweight construction and strength. Aluminium has a good strength to weight ratio which ensures structural integrity without compromising performance, ideal for soapboxes where weight significantly influences speed and manoeuvrability. The ease of machining aluminium allows for a straightforward fabrication. This in turn allows for an intricate and creative design and enhancing the soapbox car's aesthetic appeal. Inspired by the chassis design from a formula student car and ariel atom, the soapbox incorporates a go-kart steering rack for precision, easy integration and readily available parts. The brakes use a solid rear axle from a go-kart, slowing only the rear wheels. The seat will be a go-kart seat, ensuring proper driving positioning. To cut costs I would buy second-hand parts as they are cheaper and readily available.



Figure 2 shows a formula student kart²

Construction process:

First, I would purchase the materials. This includes: 10m of 25mm/2mm aluminium tubing³, 2.44m/1.33m plywood sheets⁴, go-kart steering rack⁵ and wheel and a go-kart axle kit (including wheels and tyres)⁶, go-kart seat⁷ and other hardware.

Next, cut and shape aluminium tubing to make a frame and front axle. Then weld the aluminium frame to the rear axle securely, ensuring proper alignment. Then fabricate mounts to place the plywood down, allowing the driver to position their feet. Weld the aluminium tubing and go-kart rear axle securely, ensuring proper alignment. Fabricate mounts to place plywood down, allowing the driver to position their feet. Fabricate a roll bar 35mm above the driver's helmet when seated. Attach the go-kart rear axle to the frame securely, using appropriate brackets and welding mounts. Install wheels onto axles, ensuring they are secure and aligned. Install go-kart brakes, attaching the brake calliper to the frame and connecting it to the brake lever. Create a seat mount attached to the kart's frame, drilling holes in the seat for bolting. Paint the aluminium frame for corrosion protection and improved aesthetics.

² Formula Student - Institution of Mechanical Engineers. [no date]. Available at: <https://www.imeche.org/events/formula-student>.

³ 25mm x 2mm Aluminium Round Tube. [no date]. Available at: <https://www.aluminiumwarehouse.co.uk/products/25-mm-x-2-mm-aluminium-round-tube?variant=40195660054716>.

⁴ Hardwood Plywood (L)2.44m (W)1.22m (T)12mm | DIY at B&Q. [no date]. Available at: https://www.diy.com/departments/hardwood-plywood-l-2-44m-w-1-22m-t-12mm/5059340257426_BQ.prd.

⁵ Steering Wheel For 110cc Go Kart Assembly Full Steel Gear Rack Pinion Set. [no date]. Available at: <https://rb.gy/uw4k6v> [Accessed: 26 January 2024].

⁶ Go-kart 740mm Rear Axle Kit 6" Wheels Spindle Hub Electric E-bike ATV Quad Trike. [no date]. Available at: https://www.ebay.co.uk/itm/225605212422?chn=ps&_ul=GB&mkevt=1&mkcid=28.

⁷ Large Size Racing Go Kart Man Sprint Track Seat Kit Moto Racing Kit High. [no date]. Available at: <https://rb.gy/j3y8de>.

Death Trap by Jaydan Carter

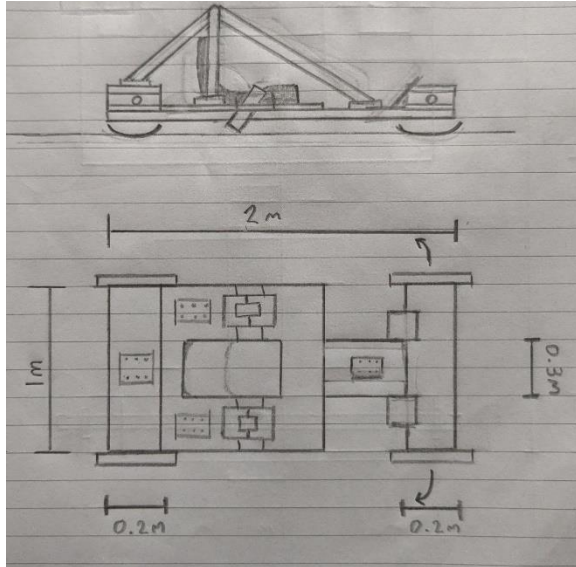


Figure 3 shows different views of the Death Trap, including some key measurements.

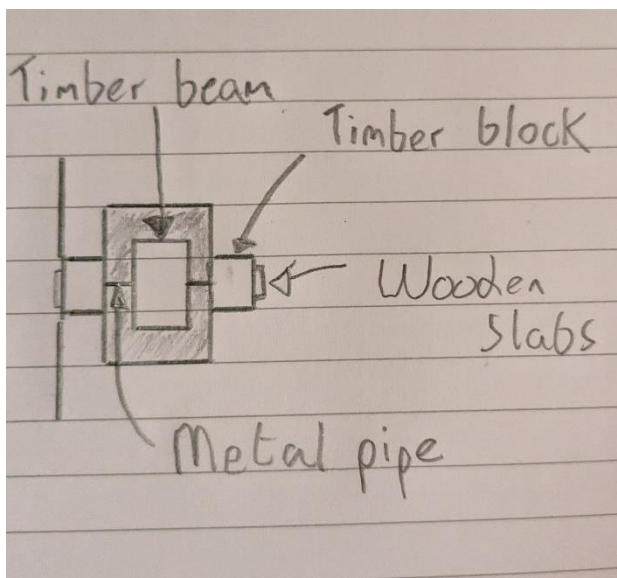


Figure 6 show a bird's eye view of the braking system.

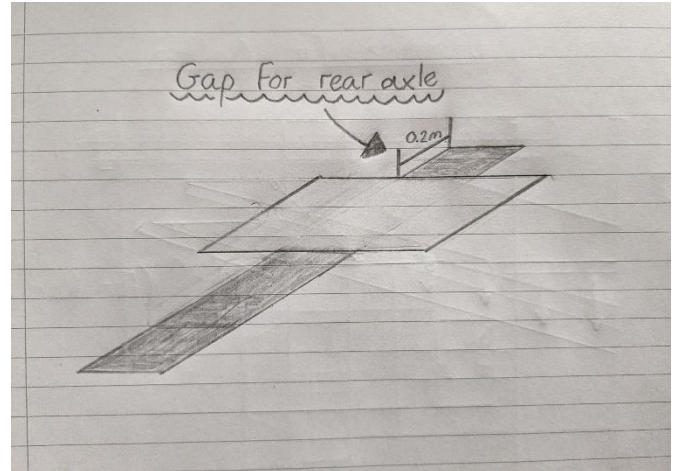


Figure 4 shows a sketch of how I would attach the two planks of plywood.

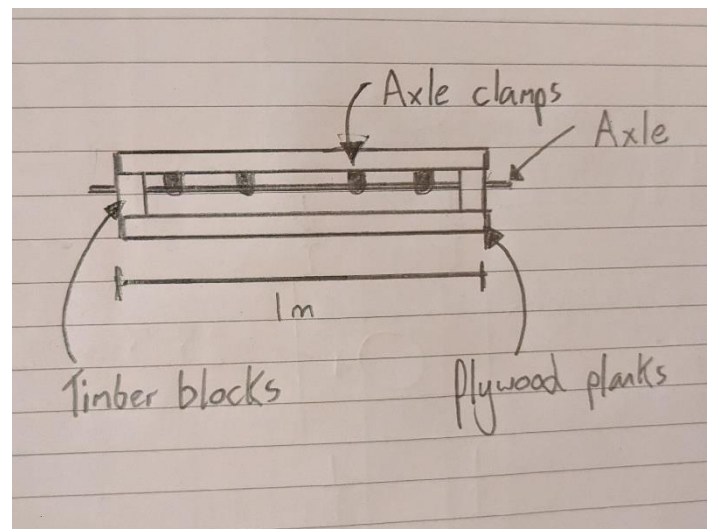


Figure 5 shows the construction of the axles.

Chassis:

I will start off by fabricating a 2m long and 0.3m wide plank of plywood from a 2.44m long and 1.22m wide plank of plywood⁸. This is an essential part of my soapbox design as it acts like the spine of the vehicle. Next, I would fabricate a 1m-by-1m plank of plywood by also using a 2.44m long and 1.22m wide plank of plywood. Then I would attach the two planks, first using wood glue⁹, and second using wood nails¹⁰. But also remember to leave a 0.2m gap from the end, as that is where the rear axle will go.

Axles:

I will start off by fabricating a 1m long and 0.2m wide plank by using a 2.44m long and 1.22m wide plank of plywood. I need two for each axle, so four are needed in total. Then I would attach the axle collars to two of the planks¹¹. Four on each plank so eight in total. Then I would put the axle through the clamps¹². I will put the wheels on at the end of construction¹³. I would then fabricate wooden blocks out of timber¹⁴, to create separation between the top and bottom axle planks. To attach the axle together I will use wood glue and wood nails.

⁸ Wickes Non-Structural Hardwood Plywood - 18 x 1220 x 2440mm | Wickes.co.uk. [no date]. Available at: <https://www.wickes.co.uk/Wickes-Non-Structural-Hardwood-Plywood---18-x-1220-x-2440mm/p/110037>.

⁹ Gorilla Glue, (Accessed: January 24th 2024), Available at Amazon: https://www.amazon.co.uk/Gorilla-Glue-1L-Wood/dp/B008ESKPKA/ref=asc_df_B008ESKPKA/?tag=googshopuk-21&linkCode=df0&hvadid=223170773229&hvpos=&hvnetw=g&hvrnd=5164407195074126499&hvpon=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1007460&hvtargid=pla-385714578675&mcid=710549b2f44e32e8b0f178f99452179d&th=1

¹⁰ Perry 25mm ANNULAR RING SHANK NAILS (1KG) 6048PP025200-010SC | Cromwell Tools. [no date]. Available at: https://www.cromwell.co.uk/shop/fasteners-and-fixings/wire-nails/25mm-annular-ring-shank-nails-1kg/p/APE9490172D?gclid=Cj0KCQiAh8OtBhCQARIsAlkWb68RrIDze8LXOEgMtoci6tIS9qG8BhJUtnOjHYAm6t5tTFk9D9NBYaAm2LEALw_wcB.

¹¹ 120mm x 45mm Cast Iron Axle Collar with a 25.4mm (1") bore. [no date]. Available at: <https://www.rosscastors.co.uk/92mm-x-40mm-cast-iron-axle-collar-with-a-25-4mm-1-bore.html>.

¹² 120mm x 45mm Cast Iron Axle Collar with a 25.4mm (1") bore. [no date]. Available at: <https://www.rosscastors.co.uk/92mm-x-40mm-cast-iron-axle-collar-with-a-25-4mm-1-bore.html>.

¹³ 400mm Puncture Proof Wheels Red Plastic Centre. [no date]. Available at: <https://www.rosscastors.co.uk/400mm-puncture-proof-pneumatic-wheel-red-plastic-centre-roller-bearings.html>.

¹⁴ Wickes Studwork CLS Timber - 38 x 63 x 2400mm | Wickes.co.uk. [no date]. Available at: https://www.wickes.co.uk/Wickes-Studwork-CLS-Timber---38-x-63-x-2400mm/p/107177?fix_gad_source=1&acs_info=ZmluYWxfXJsOiAiaHR0cHM6Ly93d3cud2lja2VzLmNvLnVrL1dpY2tscy1TdHVkd29yay1DTFMtVGltYmVyLS0tMzgteC02My14LTl0MDBtbS9wLzEwNzE3NyIK&gclid=Cj0KCQiAh8OtBhCQARIsAlkWb6-KaPfPhgmFoLU3NeZW3fOFBhLJitVIDRBqg9h5KuAOl3cQZEMuLzEaAnfuEALw_wcB&gclsrc=aw.ds

Brakes:

I will start off cutting a 0.2m by 0.2m square into the 1m-by-1m plank on each side next to where the seat will be. I will then glue 2 timber blocks on each side of the holes, four in total, as seen in Picture 1. I would then cut a 20mm hole through the centre of all the timber blocks making sure they line up perfectly. I would then get a timber beam and cut a 20mm hole through the centre of it. Next, I would thread a metal pipe¹⁵ with a diameter of 20mm through all the pieces of timber. I will then fabricate four 30mm by 30mm wooden slabs and use wood glue to seal the pipe in on each end.

Seat:

I will start off by positioning the seat¹⁶ where I want it. Then I would use a pencil to mark where to drill the holes in the wood. After drilling holes in the wood, I would align the seat with the holes and put the screws in¹⁷. After everything is bolted together give it a wiggle to see if it is sturdy enough.

Roll Cage:

I will start off by measuring and shaping the roll cage bars¹⁸. Then weld all the bars together. Next, I would connect the roll cage clamps¹⁹ to timber blocks. I would then clamp the roll cage bars into the metal clamps.

¹⁵ Steel Tube 20mm x 3mm, (Accessed: January 25th 2024), Available at Screwfix: https://www.screwfix.com/p/deta-round-steel-galvanised-class-4-conduit-tube-20mm-x-3m/7734J?tc=DA2&gad_source=1&gclid=Cj0KCQiAqsitBhDIARIsAGMR1RjxypDKdLfotdXhhcvT7gV1P97JRCIz0BC70Us38A9nVKUi2kE2_nsaAuSQEALw_wcB&gclsrc=aw.ds

¹⁶ Go Kart seat, (Accessed: January 24th 2024), Available at Amazon: https://www.amazon.co.uk/SILI-Kart-Adjustable-Attachment-REPLACEMENT/dp/B07HGHVBNY/ref=sr_1_5?keywords=go%2Bkart%2Bseat&qid=1705929365&sr=8-5&th=1

¹⁷ Screws & Bolts M6x100mm, (Accessed: January 25th 2024), Available at Screwfix: <https://www.screwfix.com/p/easyfix-bright-zinc-plated-roofing-bolts-m6-x-100mm-10-pack/4964j>

¹⁸ Roll Cage Additional Bars CDS - 40mm bar diameter 1.5m in length 2mm wall thickness. [no date]. Available at: https://www.murraymotorsport.com/custom-cage-roll-cage-additional-bars-cds---40mm-bar-diameter-1-5m-in-length-cusccds40?currency=GBP&gad_source=1&gclid=Cj0KCQiAqsitBhDIARIsAGMR1RgKirqnEteij-K_Ce7NHWYJzFrzGD_NIRZl5fWFmoNC4aQSxs_Xgk4aAhffEALw_wcB

¹⁹ 12400000020 | Rose+Krieger M10 Thread Flange Clamp, 40mm | RS. [no date]. Available at: https://uk.rs-online.com/web/p/feet-castors-base-clamps/3737698?cm_mmc=UK-PLA-DS3A-_-google-_-CSS_UK_EN_PMAX_Catch+All-_-_-3737698&matchtype=&&gad_source=1&gclid=Cj0KCQiAqsitBhDIARIsAGMR1Riq77I9zmRTXdqioCImpLYP9JIZwhg4x1ek4jwGQ9YoBng8c8-lom8aAi4jEALw_wcB&gclsrc=aw.ds

The Sopabox by Dan Morris

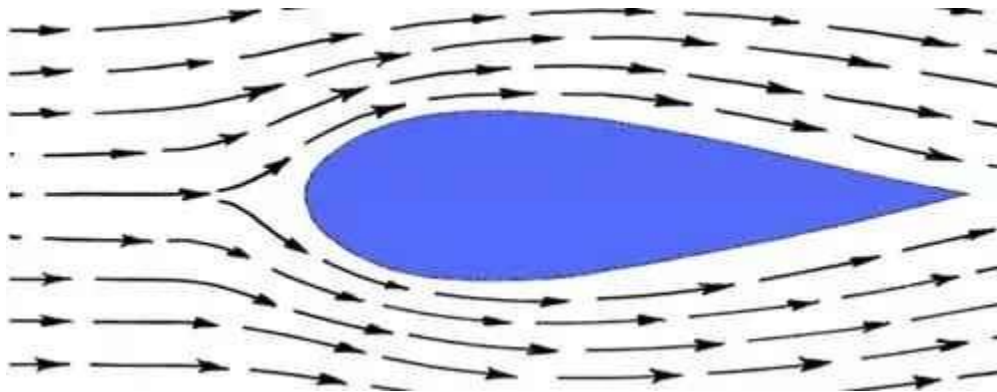


Figure 7 shows the inspiration behind my design.

The design that I have made is largely based off the tear drop shape. As a gravity powered racer it needs to be as aerodynamic as possible to reduce drag and allow it to reach its maximum speed as quick as possible. Knowing this while I was searching for ideas for what my soapbox could look like I decided to first look at what is the most aerodynamic shape possible. The result was the tear drop shape. However, looking at this shape it would be very tricky to create a soapbox in this shape so by doing more research I discovered that the closest shape you could get to the tear drop to make a vehicle would be to slice it in half.

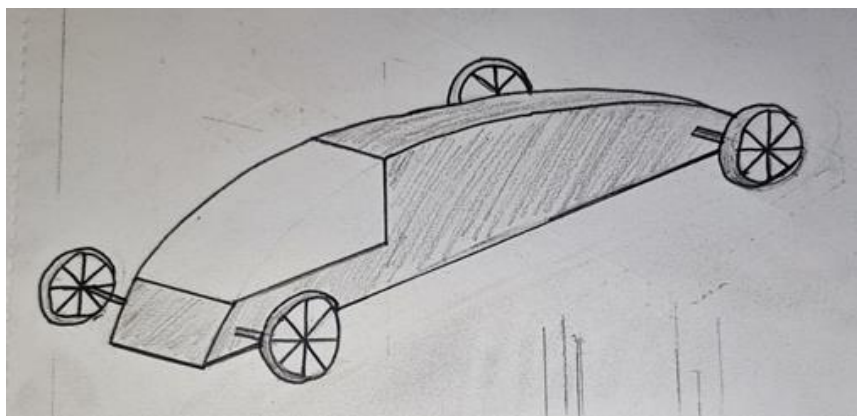


Figure 8 shows my soapbox design.

The steering system I chose to use in the soapbox is a Go Kart Steering System. I decided to go with a Go Kart system as it will give the soapbox a responsive but also handlebar steering system. It will an easy-to-use system that will be reliable and will not through the driver any unpredictable reactions. The use of a steering wheel over that of handlebars or even rope that you often see on soapbox will result in far better control but also the ability to counter steer the soapbox much easier than if handlebars or rope were used which will result in less chance of a crash.

For the braking method of the soapbox, I decided to go with the simple option of a handbrake. The handbrake I've decided to with will be a wooden stick that has a rubber pad attached to the bottom which is used to dig into the ground to try slowing the soapbox down. I decided to with this option as it a very simple braking system that will be easy to implement into the soapbox. It is also a very simple design that has only a few parts, this means that it will be a very cheap brake to use which will greatly help in reducing the overall costs.

As a soapbox is often a one-use item, I decided that durability and endurance of the soapbox wouldn't be a factor when looking at what materials to use paring this with trying to keep the cost of the soapbox as low as possible. I decided that the best material to use would be wood. Therefore, I researched into some different woods that can be viable options and decided the plywood would be the best option. Plywood seemed like the best option as it is easily accessible making it cheap and that I can be purchased in multiple forms. These factors made plywood the best material for the construction of the soapbox. The only parts of the soapbox that won't made from plywood is the steering system which will be made broke prominently metal and the wheels. As I was trying to keep the cost of the soapbox to a minimum, I decided the best type of wheels to use for the soapbox would be standard Bicycle wheels. As bicycle wheels are very common items that have maintained a very similar design over the years, I was able to find some old wheels for free on Facebook marketplace. As the soapbox is one time use and the course is smooth the longevity and durability of the wheels are not an issue. When looking into different wheels that could be used on the soapbox my immediate thoughts were to use go kart wheels as they are much wider than that of bicycle wheels and also can take much larger impacts. The factor that drew me away from the use of go kart wheels is that a set of 4 wheels would cost over £100. Due to this the free bicycle wheels even though they have less durability became the clear choice to me.

Fire Force 3 by Odin Robinson

Prices & Materials:

- **Body panels** (12mm x 44mm) whitewood -£2.08 per meter (£45 for 10 lengths of 2.4m) (Wickes Whitewood PSE Timber - 12mm x 44mm x 2.4m | Wickes.co.uk, n.d.)
- **Chassis rails:** wood- (45 x 95) £3.75 per meter (£9 per 2.4m length) (Wickes Treated Kiln Dried C16 Timber - 45 x 95 x 2400mm | Wickes.co.uk, n.d.)
- **Chassis/body support material-** sheet plywood 12mm thick £10.07 per m² (£30 for 1 sheet of 1.2mx2.4m) (Wickes Non-Structural Hardwood Plywood - 12 x 1220 x 2440mm | Wickes.Co.Uk, n.d.)
- **Wheels-** pit bike wheels £150 for two (WPB BIKES and PARTS - WHEELS & TYRES, n.d.)
- **Stub axle** to fit pit bike wheel- £58.66 (3 Stud Front Steering Spindle Wheel Axle Hub For 125cc 110cc Quad ATV Go Kart UK | eBay, n.d.)
- **Brake kit** for quad bike- £47.27 (200CC 250CC Quad Foot Brake Hydraulic Caliper Brake Disk Disc Pads Assy Brake | eBay, n.d.)
- **Tie rods** for steering assembly- £15 (Set of 2 Tie Rod Assembly with Tie Rod Ball Joints for ATV | eBay, n.d.)
- **Steering column-** £37 (STER17 STEERING COLUMN FOR 110cc 125cc OFF ROAD QUAD BIKE ATV UPBEAT 575MM | eBay, n.d.)
- **Small box section** for seat frame and rollbar- 40mmx40mmx2mm £12.41 per meter (BM Steel) (40 x 20 x 2mm Mild Steel Rectangular Box Hollow Section - BSEN10219: | BM Steel, n.d.)
- **Self-drilling screws-** £13.50 (Self-Drilling Screw - For Light Section Steel - Exterior 5.5 x 50mm Pack of 85 | Wickes.co.uk, n.d.)
- **Wood screws-** £14 (C2 Exterior Multi-Purpose Screw - Exterior 4.0 x 40mm Pack of 350 | Wickes.co.uk, n.d.)
- **Rear axle-** £73.39 (810mm Go Kart Rear Axle Kit Brake Disc Sprocket Hub ATV Quad Buggy Drift Trike | eBay, n.d.)
- **Paint** (colour= Blue, Red, Orange)- £35 per litre (Craig & Rose Artisan Enamel Gloss Spray Paint True Blue - 400ml | Homebase, n.d.)
- **Steering wheel-** £27 (350mm 14inch Steering Wheel Deep Dish 6 Bolt with Horn Button Racing Car | eBay, n.d.)

Total cost Est- £785



Soap box design (Fire Force 3)

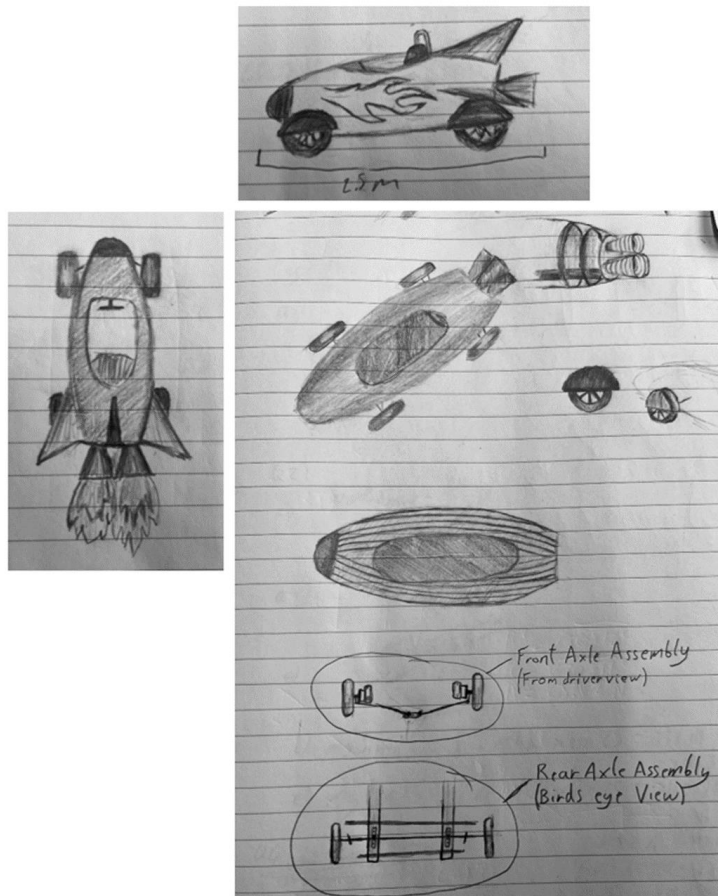


Figure 9 shows sketches of Fire Force 3

Pros and Cons

Pros:

Robust- can withstand the speed and stresses of the course.

Utilises ready made parts for easier assembly.

Has good aerodynamics meaning it can get down the track faster.

Utilises bearings to ensure smooth operation.

Cons:

Expensive- using ready made more robust parts ups costs.

More potential points of failure due to its increased complexity.

Design flaws when it comes to front axle support to the body work inhibiting support for the outer parts of the axle.

Materials

Chassis-a steel box section would be ideal as it allows the steel front and rear axles to be more easily secured and providing a robust fitting but due to costs and weight, I have chosen to go with 45x95mm wood chassis rails, these should ensure proper stability to support the stresses put on them from the course and are much more cost effective. They will also have the support of the 12mm ply which will act as the frame for the body. As mentioned above the front and rear axles are made up of steel, the front axle is comprised of two stub axles which allow the wheels to be steered, they will have a trailing arm that will act as extra support for the wheels, which will be connected to a subframe also constructed out of steel.

Drivetrain- Using pit bike wheels will provide a lower friction because of the width of the tires while still providing strength against lateral stresses from sharp turns, where using a thinner wheel like a bike tyre has the potential to buckle under sharp cornering. Utilising a similar steering system to a quad bike, that has an offset pivot allowing some mechanical advantage that should be more than sufficient as the vehicle is not that heavy so does not require much mechanical advantage. For the axle material it will be made from steel box section, but this is where there is potential for failure, because of the body, it requires there to be a substantial length of the axle unsupported so needs to be stronger to accommodate the weight of the driver and soap box, if it were not strong enough then it may bend/buckle during the course making it immobile.

Driver controls- It utilises a standard steering wheel design with the steering system as mention above, whilst the brakes are controlled by a foot pedal which connect to a single brake disc and calliper on the rear axle, this brake calliper should be more than sufficient to bring the vehicle to a stop and provides the simplicity of only needing one brake line to the rear as opposed to having one split into two or two master cylinders which would considerably reduce costs. The driver's seat will be comprised of a steel box section frame, which in turn will provide support for ply in the centre, this is manly designed to reduce costs as we can use leftover materials from other parts of the build.

Building practice:

The chassis is comprised of wood, this is an easy material to handle, and we would implement, a few techniques for building the soapbox, the main body supports will be joined together using either wood screws and/or wood glue. The front and rear axles are comprised of steel so require a sturdier method to attach them. The rear axle will be attached with larger lag bolts, whilst the front axle will utilise a similar method but instead with a metal subframe to support the steering system. This will be constructed of steel box section, that will have to be welded together using MIG, this is straight forward with the only concern being that the tracking may affect handling if not done right. This frame will then be attached to the main body using the same methods as the rear axle with the lag bolts. The roll bar will also use box section, we can achieve this by making V shaped cuts in the metal so we can bend it into shape, and this will then be screwed to the chassis.

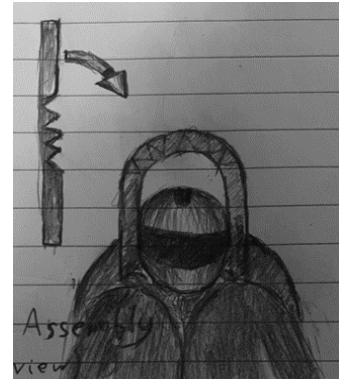


Figure 10 roll bar.

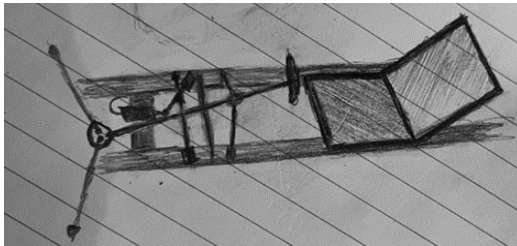


Figure 11 chassis

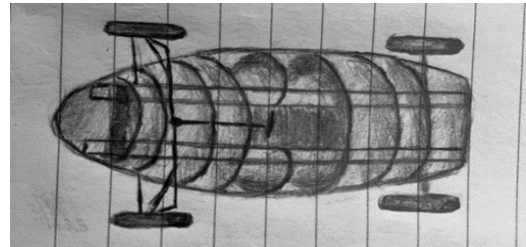


Figure 12 chassis

The driver's seat will be constructed from plywood and steel box section the steel frame will be constructed using the same MIG welding as the sub frame. On the inside of the frame there will be additional tabs to attach the ply board in the centre for back support. The steering wheel will also have supports to attach to the chassis rails using wood screws. The brake pedal however requires a pivot, for this we can make a hinge in the shape of a U with a steel rod through the middle to attach the brake pedal this can then be bolted to the master cylinder.

The body will also be constructed of wood, using small wood tacks and wood glue will be the primary way of securing the body panels as they are constructed of a lighter thinner wood to reduce weight. This will then need to be sanded down using either sanding blocks or an orbital sander to speed up progress. This will prepare the surface for paint which will require a filler primer to remove any light imperfections and create a smooth and neutral colour for the topcoat to adhere to.²⁰

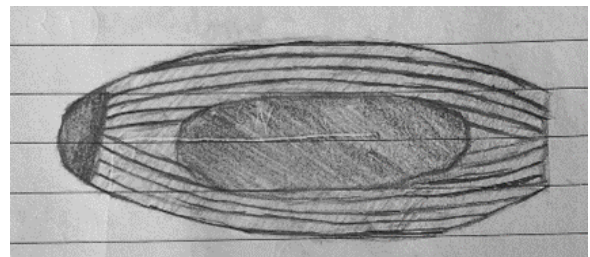


Figure 13 chassis

²⁰ (Gravity Racer World Record: Design – Engineering Sport, n.d.; How to Build a Soapbox Car: The Ultimate Building Guide, n.d.-a; How to Build a Soapbox Car: The Ultimate Building Guide, n.d.-b; How To Build A Soapbox Gravity Racer & What It's Like To Enter The Redbull

Niall Hindmarch- The Holey Grail



Figure 14 shows a sketch of the Holey Grail

Pros

- Cheap
- Easy to handle.
- Room for creative design

Cons

- Not secure
- Box looking
- Not durable
- If heavily raining it would split apart

Chassis- The chassis is made of 18mm thick plywood, this should be strong enough to support the weight of the driver. The soapbox has an overall length of 2.2m. The front and rear axles are constructed of 4mm by 1m steel, which will also be used to align the front and rear axles. The front axle will pivot to allow steering. The steering column will be made from the same steel pole as the front and rear axle, this will be

welded to the front axle. For the wheels I chose are 1s, which will be light and allow it to be more agile.

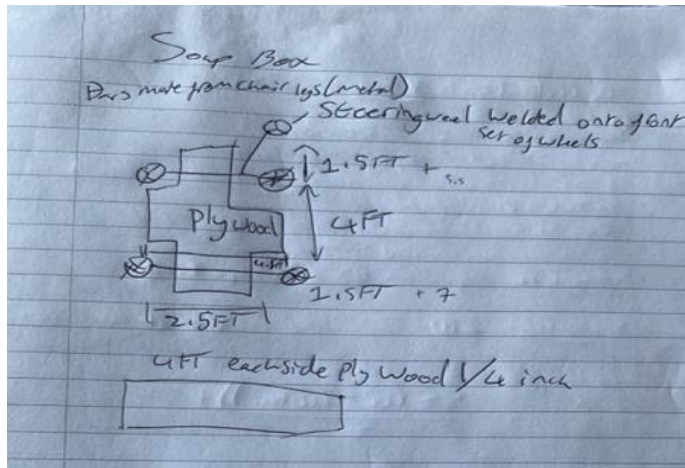


Figure 15 shows a sketch of the Holey Grail

Brakes- brakes will use 38 x63mm wood this contact the track surface to provide braking, it will have a rubber on the end to help braking performance, this will pivot and located as a foot pedal, there will be a spring to return the lever after use.

Exterior- For the exterior we will do the same for the chassis however there will be a curve from the front to the main body, almost like a wave, with plywood being 1ft from the top of the soap box to the bottom of the soap box. This means the person who goes into the soap box will have to be short as they would only have 1ft of space to push their legs up. As an optional design we can get some plastic plumbing pipes (6) to make some grills in front of the soap box, but it isn't a necessity.

Total price- £200-250

Conclusion & Reflection

In conclusion we have come up with some feasible ideas about, what is a considerably robust soapbox design. We have made pros and cons, which will help us conclude on the final design, we also looked at costing and what the soap box is constructed out of. After research what are the popular materials, our soapbox's, have good styling, whilst also considering practicality, with an aero dynamic design they have a good chance of being a top soap box. We also learnt a lot about materials and construction methods whilst also learning about how to apply these methods. The designs still require further research to be perfect and final dimensions to be confirmed. In the continuing project we will create a more in-depth overview of the soap box and structure of the team.

Upon reflection, I feel like as a group we started too late because at the beginning nobody knew each other, and everyone was too shy to contact other members of the group. Therefore, in a future project we will start earlier as we all know each other now. Another critic about our group is that not everyone was pulling their weight. For example: not everyone (Dan and Niall) completed tasks that were set out on time. Therefore, in future projects I will report them to a lecturer and explain the situation. Moving to a positive note, I feel that our designs were unique. Especially with some of the methods and systems we incorporated into our soapbox designs.

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Minutes of Meetings

Tuesday 7th November – Library near IQ Campus

14:45pm: Jaydan, Dan, Sky and Odin arrive at meeting location

14:46pm: We all start talking briefly about roles within the group

15:11pm: Niall arrives

15:12pm: Now that everyone was present, we discussed who was responsible for each roll. We decided that each member was to design a soapbox. Along with a parts list and a price list for their chosen materials.

15:46pm: We arranged another meeting for next Tuesday. As everyone is available on that day.

15:48pm: Everyone leaves.

Tuesday 14th November – Library near IQ Campus

14:29pm: Jaydan, Dan, and Sky arrive at meeting location

14:32pm: Niall and Odin arrive at meeting location

14:33pm: We all catch up and see how everyone's soapbox design is coming along. We agree to finish the design process by our next meeting, so we can start making a parts list and price list

14:48pm: We arrange another meeting for next Thursday

14:50pm: Everyone leaves

Thursday 23rd November – Library near IQ Campus

13:12pm: Jaydan, Sky and Dan arrive at meeting location

13:14pm: Odin arrives at meeting location

13:16pm: Niall arrives at meeting location

13:17pm: We all show off our designs to each other and briefly explain the mechanics and materials used

13:34pm: We arrange a meeting for next Tuesday

13:35pm: Everyone leaves

Tuesday 28th November – Library near IQ Campus

14:52pm: Jaydan, Dan, Sky and Odin arrive at meeting location

14:54pm: Niall arrives at meeting location

14:55pm: Now that we have all completed the parts list, we begin to find prices for our respective soapbox cars

15:36pm: We finish for the day and agree to finish the price list by next meeting

15:37pm: We arrange a meeting for two weeks' time as not everyone is available next week

15:39pm: Everyone leaves

Wednesday 13th December – Library near IQ Campus

13:02pm: Jaydan, Dan, and Sky arrive at meeting location

13:05pm: Niall and Odin arrive at meeting location

13:07pm: We all share our pricing for our soapbox cars and see if there are any similarities or differences between each other

13:41pm: As this is our last meeting before Christmas, we all agree that we will start the document part of the assignment after Christmas

Tuesday 16th January – Library near IQ Campus

12:54pm: Jaydan and Sky arrive at meeting location

12:57pm: Odin arrives at meeting location

13:01pm: Niall arrives at meeting location

13:09pm: Dan arrives at meeting location

13:10pm: We start to piece together the document, for example: Dan oversaw the Gantt chart with some assistance from Sky. Jaydan oversaw the minutes of the meeting and starts to create a document about it

13:46pm: We arranged to meet again at the end of the week to continue working on the document

13:48pm: Everyone leaves

Friday 19th January – Student Roost Block F Study Room

13:16pm: Sky and Dan arrives at meeting location

13:17pm: Jaydan arrives at meeting location

13:18pm: We continued working through the document going through the aims and what we would do to meet those aims

14:11pm: We arranged a meeting for next Monday

14:13pm: Everyone leaves

Monday 22nd January – Student Roost Block F Study Room

12:57pm: Odin arrives at meeting location

12:59pm: Jaydan arrives at meeting location

13:00pm: Jaydan continues to work on the document, whilst Odin goes over his soapbox design as his will be our final design choice

16:18pm: We arrange another meeting tomorrow for the same time

16:20pm: Everyone leaves

Tuesday 23rd January – Student Roost Block F Study Room

13:04pm: Odin arrives at meeting location

13:05pm: Jaydan arrives at meeting location

13:07pm: We continue working on the document

13:30pm: Sky arrives at meeting location

14:06pm: Sky leaves the meeting due to technical difficulties.

15:14pm: We arrange a meeting for tomorrow

15:15pm: Everyone leaves

Wednesday 24th January – Student Roost Block F Study Room

12:02pm: Jaydan arrives at meeting location

12:08pm: Odin arrives at meeting location

12:09pm: We continue to work on the document

15:28pm: We arrange a meeting for tomorrow

15:32pm: Everyone leaves the meeting

Thursday 25th January – Student Roost Block F Study Room

13:02pm: Jaydan arrives at meeting location

13:04pm: Odin arrives at meeting location

13:05pm: We continue to work on the document

15:31pm: We arrange a meeting for tomorrow

15:35pm: Everyone leaves

Friday 26th January – Library near IQ Campus

12:50pm: Odin and Dan arrive at meeting location

12:53pm: Sky and Jaydan arrive at meeting location

12:56pm: We discuss what is left to do in the document

13:11pm: Niall arrives at meeting location

13:12pm: Jaydan gives everyone instructions of what to do

13:39pm: Niall leaves the meeting to continue working on his method

Saturday 27th January – IQ Campus 006

13:00pm: Jaydan, Odin and Sky arrive at the campus

13:02pm: We work on the document for the last time and then we hand it in

18:36pm: We leave the campus