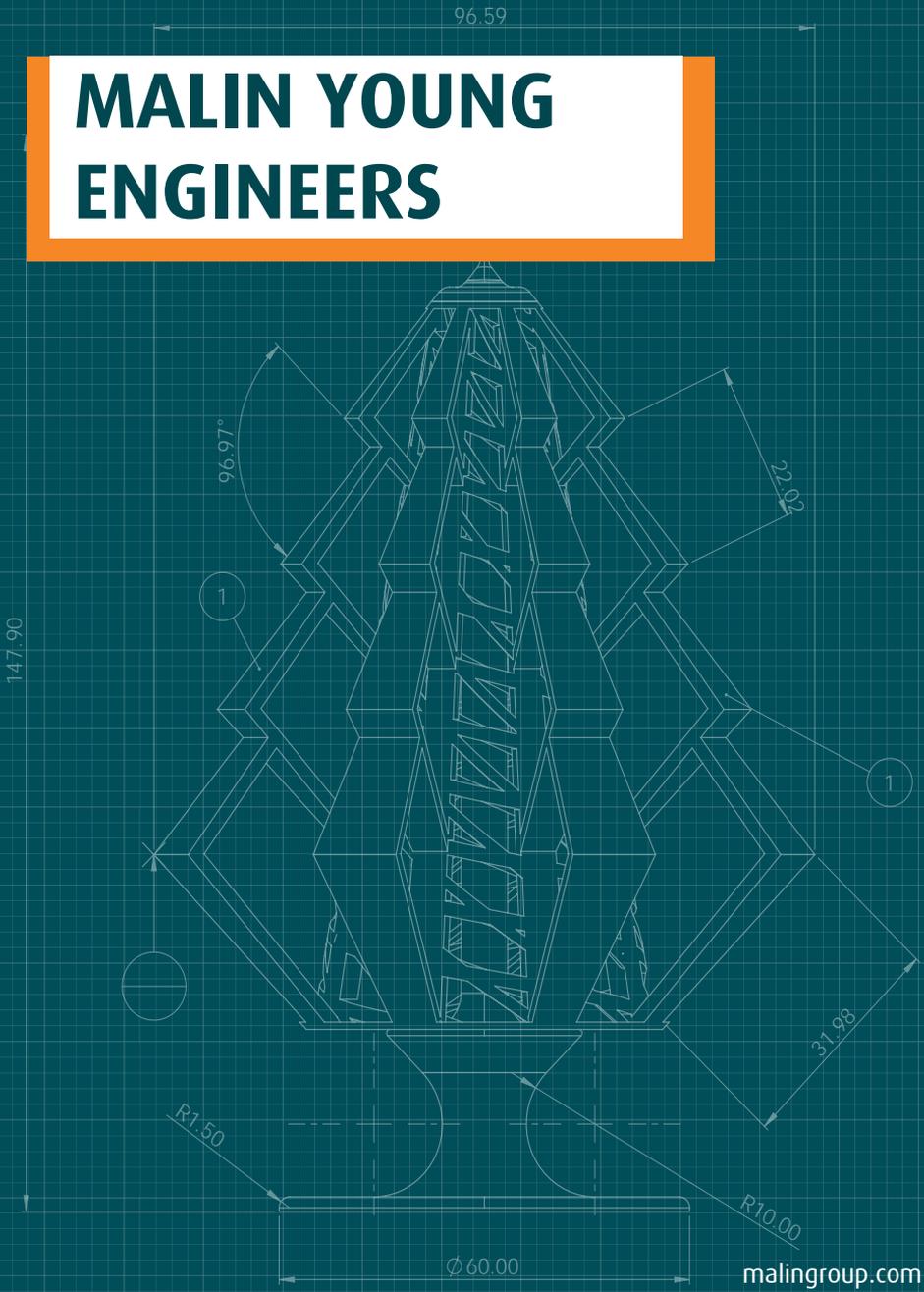
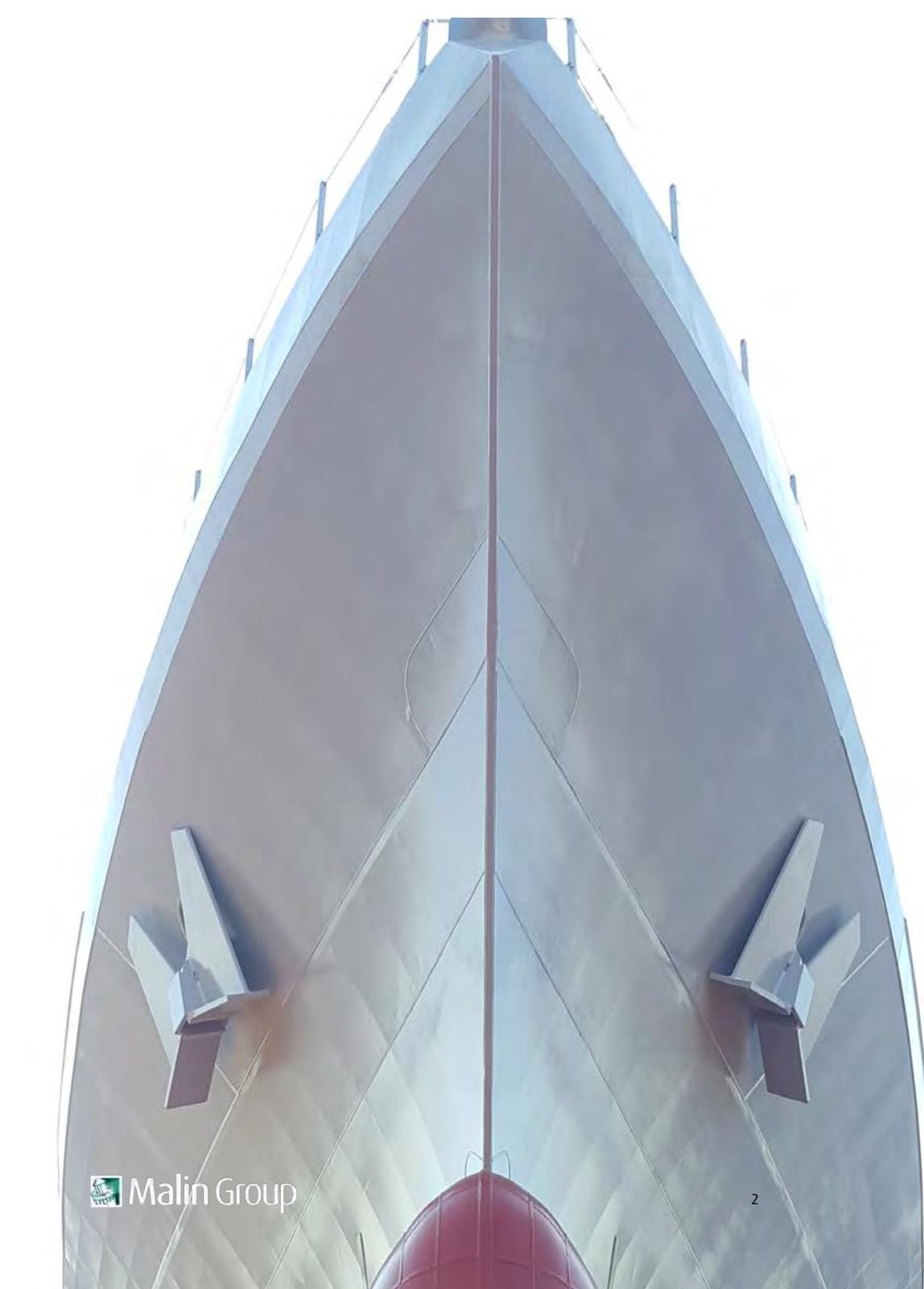


MALIN YOUNG ENGINEERS





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INTRODUCING MALIN YOUNG ENGINEERS

The Malin Group consists of a varied mix of talented individuals, who span a number of specialisms, from naval architects, design draughtsmen, structural engineers and project managers, to lifting engineers, heavy haulage experts, project managers and marine operations personnel. All have a passion for problem solving and are very creative - and all took a real interest in science, technology, engineering and maths (STEM) at school.

Our team work on designing, building, launching and maintaining ships, as well as calculating how best to move materials from A to B - that may be using a trailer, or maybe a crane. They also test the strength of structures and get involved in 3D modelling. They work on projects all over the world, and work for people such as Rolls Royce, FH Bertling, BP, BAE Systems - even the Ministry of Defence.

We are committed to supporting the next generation of engineers, so have come up with a range of challenges for you - a Malin young engineer - to complete. We hope you enjoy them, and who knows, we may be offering you a job in a few years time!

OUR TEAM WORK IN A VARIETY OF PROJECTS, ACROSS A RANGE OF SECTORS, ALL OVER THE WORLD



young engineers

malingroup.com

CHALLENGE ONE: TIMING

IT'S THE MOST WONDERFUL TIME OF THE YEAR

For this challenge you are going to learn about the importance of timing.

When working on any engineering project, you will have a set project deadline, within which, there will be set targets that need to be met at each step of the way. So why is timing so important? There are a number of reasons:

- to remain within budget for your client - if you take too long, costs may increase
- to ensure that supplies are ready when required - you may need to order in advance and don't want to miss your slot
- to optimise the skills of your team - match the skills in your team to be the most effective in completing the task

THE CHALLENGE

Design and build a system that will 'time' 20 seconds. It may be a marble run, a car following a ramp powered by a balloon, a domino run - or even a cup filling with water that falls over when full at 20 seconds. The possibilities are endless!

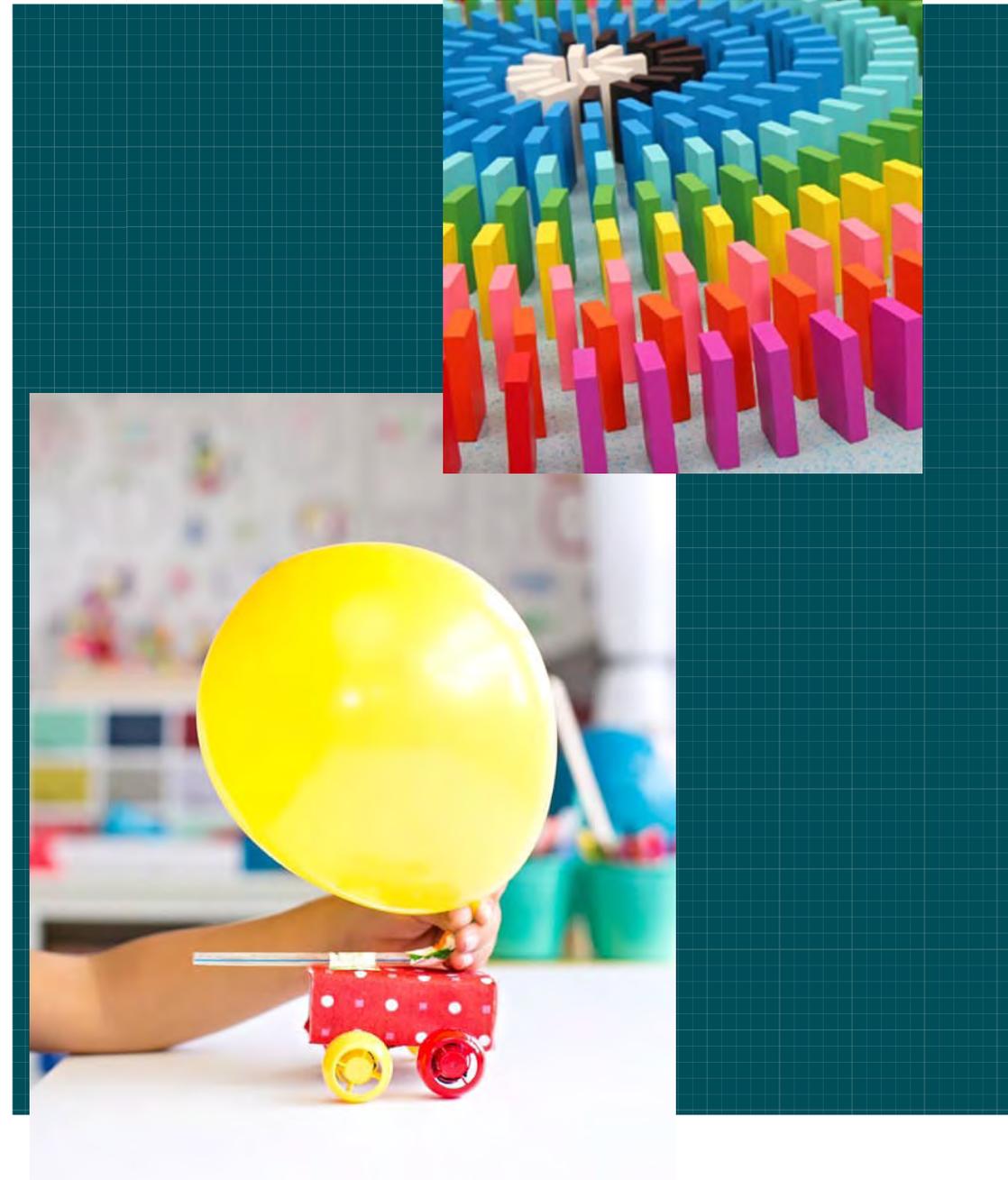
TOP TIP

Think about force and distance - you want to create a system that comes as close to 20 seconds as possible.

BONUS QUESTION

What are some of the issues that come with not following set timings within an engineering project?

GOOD LUCK AND GET ENGINEERING...



CHALLENGE TWO: SYMMETRY

THE IMPORTANCE OF SYMMETRY

For this challenge you are going to learn why symmetry is an important concept within engineering, especially marine engineering where it is a benefit to have structures react in similar ways regardless of the direction of forces that will act upon them.

SYMMETRY AND THE DESIGN OF STRUCTURES

In simple terms, symmetry can help to make items stable. If an offshore jacket (a platform in the ocean or sea) is symmetrical, then no matter what direction waves strike it, it will react in a similar manner. If vessels are symmetrical about their centreline, then they will sit upright in the water without the need to add additional weight.

THE CHALLENGE

Design and make a symmetrical Christmas tree from card or paper. The tree may be 2D or 3D, but it must stand unaided. Think when designing your tree, how you may help to make it symmetrical. You can then decorate your tree in whatever way you like, and test to see if this has any impact on the stability. What happens if you put more decorations on one side than the other?

TOP TIP

Think about height relative to width and how it aids balance and stability.

BONUS QUESTION

In what year was the first design for an artificial tree engineered?

GOOD LUCK AND GET ENGINEERING...



CHALLENGE THREE: ITS COLD OUTSIDE



THE IMPORTANCE OF ICE

For this challenge you are going to learn how water changes as it gets colder. As water freezes, it expands meaning that it takes up more space.

WHAT IMPACT MAY ICE HAVE?

When water expands as it turns to ice, it can often grow by as much as 9%. This means that if frozen, water levels may go up, or if on land, soil levels may swell as the water in the soil also freezes. Known as frost heaving, this can impact on surfaces causing cracking and damage building foundations. Also as steel gets warmer it expands. This means steel bridges can change their length by many centimetres between hot and cold days and so must be able to “flex” without cracking their foundations. This means engineers must consider temperature changes when designing structures.

THE CHALLENGE

Design and create an ice lantern. All you need are two plastic cups (one slightly smaller than the other), some items to decorate your lantern, water and tape. Place the smaller cup inside the larger, then use your items to drop into the space between the two cups. Carefully start to add water - you should add a few stones into the smaller cup to keep it from rising as the water goes in. Stop a few centimetres from the top and carefully place some tape across the two cups. You can add some food colouring if you like, then freeze. When you remove from the freezer, you will see the inner cup is higher and the water is all the way to the top of the large cup. Can you explain why?

TOP TIP

Pipecleaners make a great decoration as you can wind round the cup before adding the water.

BONUS QUESTION

There are lots of different names for ice, including frazil and pancake ice. Can you name any others?

CHALLENGE FOUR: PROTECT THE BAUBLE

THE IMPORTANCE OF STRUCTURES

For this challenge you are going to learn how to create a stable structure. When engineers are designing structures, whether floating or on land, they need to think about stability.

WHY DOES STABILITY MATTER?

Stability is one of the most important safety considerations for any designed structure. Anything an engineer designs must be able to remain upright either under its own strength or with support from its surroundings. The higher and heavier a structure is, the more critical this becomes.

THE CHALLENGE

Design and build a structure that will hold a Christmas bauble without toppling over. You will use only straws, along with either tape, glue, bluetack or string, to create a frame that will hold the weight of the bauble securely. You must think about how best to secure the bauble to your structure, is it tall enough to let the bauble swing free and is it stable enough that when you add your bauble, it doesn't topple over.

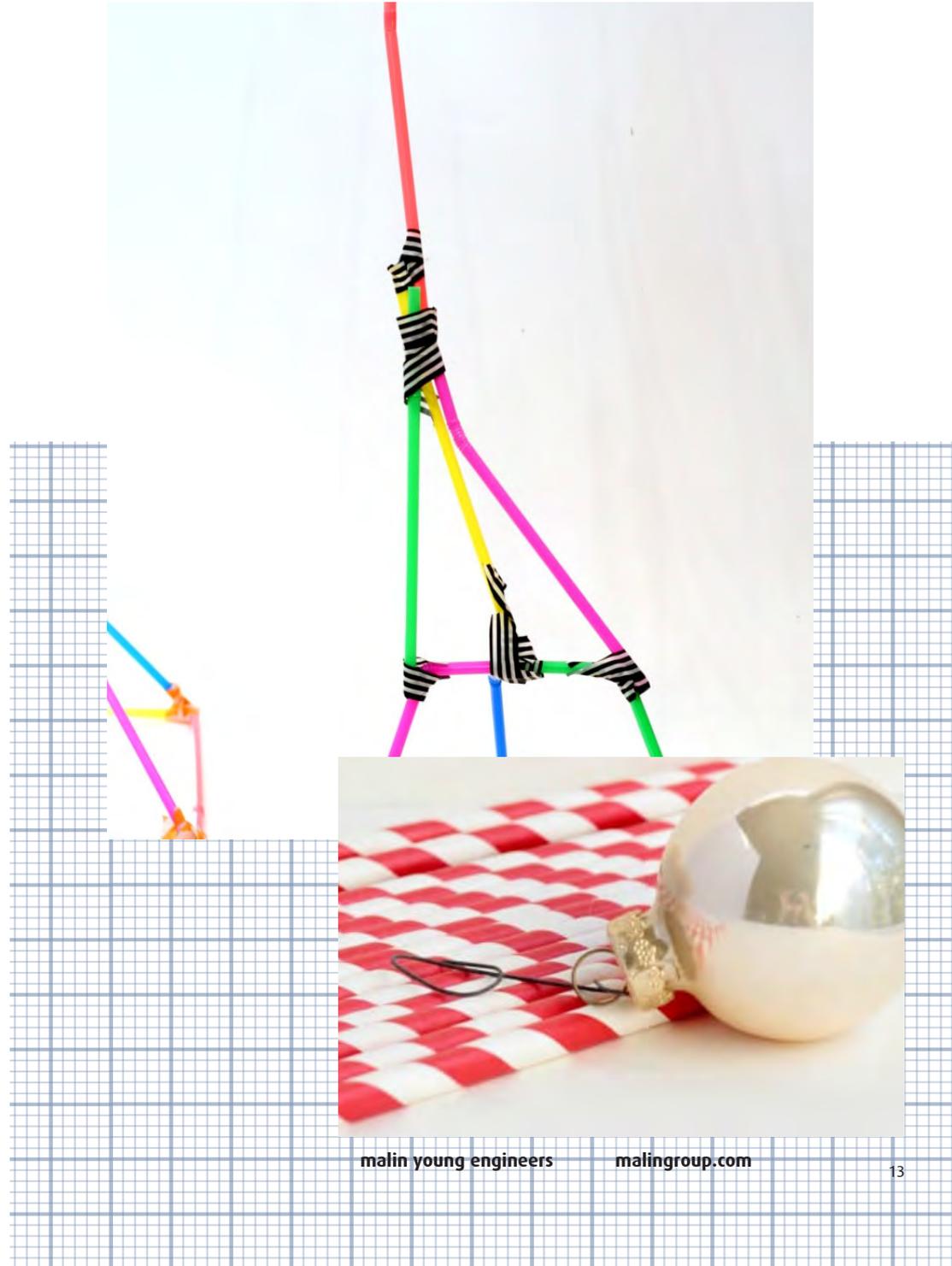
TOP TIP

Think about the height of your structure, weight of the bauble and its connection point relative to the width of the structure. Do you want your bauble to touch the structure or hang free? All of this will feature when considering your design.

BONUS QUESTION

What are all the ways you can think of to make your structure more stable?

GOOD LUCK AND GET ENGINEERING...



WORKING WITH US

THE MALIN GROUP OFFERS YOU AN EXCITING RANGE OF EMPLOYMENT OPPORTUNITIES, FOR THE FUTURE, SPANNING A VARIETY OF SPECIALITIES.

With the Malin Group, you are not just joining a team, you're becoming part of a family. Our headquarters, based in the South Rotunda, Glasgow, reflect our group and culture - heritage teamed with innovation and creativity. Inside this historic building, classic features are teamed with modern facilities for our staff to enjoy - including pool table, ping pong, communal lounge area with fresh fruit and snacks, PS4 and a climbing wall. Our conference room also allows a 360 view of the city centre. We have regular social events, including First Friday Drinks, client football matches, and an Annual Ceilidh - plus we have a few office dogs on occasion, which is always a nice addition!



 Malin Group

YOUR NOTES



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