



***Teamwork is key to success (and key to being a good engineer)!***

*It is important that each team member takes on a specific role to ensure the challenge is completed. Each role is crucial in developing a solution with each role requiring different strengths.*

## **Project Manager - Specialist briefing sheet**

To be successful a team needs to have a strong Project Manager. The Project Manager needs to have a clear overview of what the team is trying to achieve, the budget they have and the time they have available. Your role is to lead and to manage your team effectively.

### **Duties:**

- Check out the assessment information so you know how to score maximum marks.
- Timekeeper - keep an eye on the clock and make sure jobs get completed on time. Use the time plan in the student brief to help you.
- Track the overall progress of the activity of the team to make sure everyone is on task.
- Be flexible and give help where it is needed.
- Prompt the team:  
Have you thought about the size of the Beacon shell and the electronic components?  
How will the two parts fit together?  
What materials will you need?  
What tools will you require?
- Keep your team's reflections up to date. You can do this yourself or delegate to a team member.
- With the support of your team, you will take the lead in organising and presenting the 5 minute presentation to the judges at the end of the day. You will present this yourself or delegate to a team member with strong communication skills.
- You will require good communication skills. You will not only have to communicate with members of your team but you will also have to communicate with the Challenge Leader and judges.

### **Working closely with:**

- All members of the team to ensure that the Beacon comes in on time and budget.
- The accountant to create an engaging presentation.



## Project Manager – Checklist

Below is a checklist of your responsibilities today. You may identify other jobs that you need to do but make sure that the activities below are completed!

- Lead the team in brainstorming possible ideas for the Beacon
- Ensure that a suitable Beacon design is chosen for your Beacon
- Organise the team so that every person has a job to do
- Talk to all members of the team throughout the challenge so that you are aware of how your team is progressing
- Support your team and offer help where required
- Read the marking criteria (page 10-11 of the **Student Booklet**)
- Check the schedule for the day (page 5 of the **Student Booklet**) and ensure that your team will complete their jobs on time
- Ensure that the **Planning and Reflections** booklet for your team is complete
- Design the 5 minute presentation with the Accountant
- Organise your team and lead them in practicing the presentation
- Ensure that your presentation is saved under your team colour on a USB for the Challenge Leader



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## **Accountant - Specialist briefing sheet**

Engineers need to have a good grasp of finances and be able to work to budgets. To be successful you don't just need clever engineering but also great accounting to make sure you don't go over budget.

### **Duties:**

- You must keep accurate records of what has been bought and sold back using the accounting sheet in the engineer rescue team brief.
- Decide what materials need to be bought and do the buying.
- Find the options that will be the most appropriate. Some options do the same jobs however vary in cost.
- Be the expert on the prices of all the materials and advise which are best to use in terms of their cost. Keep looking at alternatives.
- You will get a chance at the end to negotiate with the supply centre to sell back (at a discounted rate) any materials you have not used or any equipment for which you have found an alternative.
- At the end of the challenge you will need to present an accurate final copy of your accounting sheet with any remaining Faradays to the Challenge Leader.
- You will also be involved in designing and creating the presentation.

### **Working closely with:**

- All members of the team to ensure that the Beacon comes in on budget.
- The Project Manager to create an engaging presentation.



## Accountant - Checklist

Below is a checklist of your responsibilities today. You may identify other jobs that you need to do but make sure that the activities below are completed!

- Be involved in the team brainstorming session to identify possible ideas for the Beacon
- Help to develop your final Beacon design
- Ensure that you have the correct amount of Faradays
- Create a shopping list and budget for your Beacon idea
- Purchase resources from the shop
- Sell unused resources back to the shop
- Ensure that an accurate record of your purchases is kept
- Assist the Project Manager in completing the **Planning and Reflections** booklet for your team
- Develop a name and marketing strategy for your Beacon
- Design the 5 minute presentation with the Project Manager
- Ensure that your presentation is saved under your team colour on a USB for the Challenge Leader



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## **Electronic Engineer x 2 - Specialist briefing sheet**

As the main purpose of the Beacon is to communicate with cyclists using electronics there is the need for two electronic engineers in the team. Your role is to ensure power and the correct voltage is supplied to the prototype. You need to design and construct circuits to respond to external conditions. Understanding what will work and what won't is key to solving the problem.

### **Duties:**

- Lead the team in engineering electrical circuits. Your final solution must include an electrical component otherwise marks will be deducted.
- Inform your team's decision about the purchase of electronic components – do you need the circuit kits, breadboard kits or individual components?
- Understand how different sensors work to produce the outcome that you want for your Beacon.
- Keep in mind different solutions require different amounts of power to function.
- Determine how you will supply energy to your solution.
- Ensure, where possible that the most sustainable way to power your solution has been used.
- Remember to be resourceful with materials and always be on the lookout for cheaper alternatives.
- Be creative with your solution.

### **Working closely with:**

- 3D Design Engineer to ensure that the electronics fit within the Beacon and that they are able to function correctly.
- Accountant to ensure that the correct materials are purchased.



## Electronic Engineer - Checklist

There are different options for the electronic component of your Beacon. The circuit you require will depend on what information you want your Beacon to communicate and how it is going to do this e.g. different coloured lights having different meanings that the cyclists understand.

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- Be involved in the team brainstorming session to identify possible ideas for the Beacon
- Help to develop your final Beacon design
- Identify the information you want to communicate to the cyclists
- Design a circuit that will communicate this information to the cyclists. You can do this in a variety of ways:

Create a simple circuit incorporating one electric component to show what would happen if conditions changed along the route

OR

Create a circuit which includes one sensor but is not fitted into your beacon design

OR

Create a circuit which contains one more sensors and is housed within your beacon as it would be in real life.

- Create the circuit that you have designed
- Assist the Project Manager in completing the **Planning and Reflections** booklet for your team
- If you have time you can help the Accountant to develop a name and marketing strategy for your Beacon
- Feed into the 5 minute presentation that your Accountant and Project Manager are creating



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## **3D Print Engineer - Specialist briefing sheet**

Engineers are required to work closely with new technology. It is your role to ensure that your design is suitable for the printer being used. You will also need to ensure that the correct printer setup is chosen and so that your team does not incur any weight or time penalties.

### **Duties:**

- Familiarise yourself with how the 3D printer works.
- Understand the limits that the 3D printer puts on the Beacon shell design.
- Ensure that the 3D design is suitable for the 3D print system e.g. it fits within the print dimensions.
- Familiarise yourself with the printer software and ensure that the correct print setup is chosen when sending your design to print.
- Consider if your shell design is suitable for the electronic components being used in the circuit.
- Record the time that your print takes and calculate the associated cost.
- Ensure that your Beacon shell will be within the weight limit before printing.
- Record the weight of the printed Beacon shell and calculate any cost penalties to be added to the accountancy sheet.

Collect audio and visual materials for the presentation.

### **Working closely with:**

- 3D Design Engineer to ensure that the Beacon design can be printed successfully and time effectively (remember that print time comes at a cost).
- Accountant to ensure the correct materials are purchased.



## 3D Print Engineer - Checklist

Today you will be working closely with the 3D Design Engineer.

There are three Blueprints available for you to use, check out the blueprints in your team brief and decide which one is most suitable for your team. You will gain additional marks with increased level of complexity of your beacon and so you should modify the blueprint to improve it in any ways possible, think about how it will look in its surroundings, how it will case the electronics and how cyclists will see it. Remember to stay within the dimensions given though!

Below is a checklist of your responsibilities today. You may identify other jobs that you need to do but make sure that the activities below are completed!

- Be involved in the team brainstorming session to identify possible ideas for the Beacon
- Help to develop your final Beacon design
- Identify the information you want to communicate to the cyclists
- Help the 3D Design Engineer to design the Beacon shell. Ensuring that it fits in the dimensions specified on page 6 of the **Student Booklet**. You can do this in a variety of ways:
  - Use one of the blueprints available with no adaptations
  - OR
  - Adapt a blueprint to enable your beacon to show how it could be used
  - OR
  - Design and create your own Beacon without using a blueprint.
- Remember to save your design into a folder with your team name
- Follow the instructions given in the Print Booklet to save your design ready for opening with the printer software
- If you have time you can help the Accountant to develop a name and marketing strategy for your Beacon
- Feed into the 5 minute presentation that your Accountant and Project Manager are creating





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## **3D Design Engineer - Specialist briefing sheet**

This role requires you to lead the Beacon shell design. You will be responsible for using the laptop and 3D design software to design the Beacon before sending it to print.

### **Duties:**

- Learn how to use the 3D design software.
- Inform your team's decision about the purchase of Beacon blueprints – do you need the basic, standard or advanced blueprint?
- Consider the shape, size and weight of the Beacon.
- Make sure that your Beacon is within the maximum dimensions.
- Ensure that the Beacon shell will fit with the electronic components used by the electronic engineers.
- Ensure that a high quality design is maintained throughout the build.
- Be creative in your design.

### **Working closely with:**

- Electronic engineers to ensure that the electronics fit within the Beacon and that they are able to function correctly.
- 3D Print Engineer to ensure that the Beacon design can be printed successfully and time effectively (remember that print time comes at a cost).
- Accountant to ensure the correct materials are purchased.



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- Follow the instructions given in the Print Booklet to save your design ready for opening with the printer software
- If you have time you can help the Accountant to develop a name and marketing strategy for your Beacon
- Feed into the 5 minute presentation that your Accountant and Project Manager are creating