

IET Faraday® Challenge Day

2023-2024 Delivery Guide



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OVERVIEW

About this guide

This document is designed to give the reader a simple 'walk through' of the 2023-2024 IET Faraday® Challenge Day.

The guide will:

- Advise ideal timings.
- Advise the resource needed for each section.
- Give tips and suggestions on approach.
- Advise of the essential 'learning points' for each section.
- Suggest certain script points (*in bold italics*).

This guide is not a script, as such, and the timings are advised as ideal. There are certain elements of the day that **MUST** be delivered or adhered to (such as finishing times) and these are highlighted in the guide.



Denotes a PowerPoint click.

Schedule of the day

Time	Activity
09:30	Welcome and introduction
09:50	Project brief, video, marking criteria and tools
10:10	Planning
10:25	Team roles
10:30	Apprenticeship
10:40	Development (following health and safety)
11:00	Break
11.10	Development continued
12.20	Engineering priorities and presentation briefing
12:30	Lunch
13:00	Development continued
13.30	Shop closes
13:50	Presentations
14:45	Award ceremony
15:00	Teams depart

Timing on the day

It is important for the IET Faraday® Challenge Leader (CL) to adhere to the timings, especially finishing at 15:00 (unless otherwise agreed with the host school). Most of the time the host teachers will have looked at the documentation sent to them and are aware of the timings, but this is not always the case. It is advisable to speak with the host teacher as soon as possible on arrival to agree these times, remembering also to check with any visiting teachers. On occasions the host teacher may ask for certain adjustments to suit the school structure. As long as the suggested changes do not undermine the IET Faraday® Challenge Day then these are to be agreed between you. Please do not offer to change times, wait to be asked.

If there are visiting teams attending, you may get a visiting teacher asking for their school to leave early. Acknowledge this but raise this in the teacher briefing just prior to the start so that all teachers involved are aware.

The IET Faraday® Challenge Day cannot start until all schools are present unless there are extreme circumstances. In order for the students to get the optimum time for the day, it must start by 09:40. If a situation arises where you have started and a school arrives late then the students will have to pick up on the briefing from where it is and the CL can reinforce the brief at a later time to that team alone.

Environment

Hopefully the host teacher has looked at the floor layout plan sent to them prior to the event and arranged for the site team to set up the room accordingly. This is not always the case.

In the event that the room has not been set up, you are not required to set it up. The school will need to manage this and arrange for the room to be set up quickly.

It is advisable to ensure the audio visual (AV) equipment is working correctly as soon as possible and the video (with sound) starts correctly. The standard of school's AV equipment varies considerably so it is advisable to use a laptop that has HDMI and VGA connections (use a converter if needed) and also have the presentation on a USB flash drive. Although some schools have a no USB policy so you could also have a copy on a cloud-based account (Microsoft One Drive or iCloud etc).

Student arrival

We advise that you are not alone in the room with the students. This is a safeguarding issue and you may also find you become liable for the behaviour of the students and, therefore, liable if there is an incident.

At this point many of the students have absolutely no idea what they are doing on the day. You may get asked “What are we doing Miss/Sir?”. Keep them guessing but remind them it’s not a lesson!!

Direct all visiting teachers to table 7 advising that this is where they will be all day and you will catch up with them all soon for a briefing.

Ask the students to complete the Student Registration Form.

Teacher briefing

Once all the schools have arrived you should call all adults together in a brief away from the earshot of the students.

Introduce yourself, advise timings on the day and check all is ok, advise that this is about the students and, although the teachers can look at what they are doing and encourage etc, they **MUST NOT** help at all.

Check for any food allergies and ask if there are any students that you need to know anything about (disabilities etc).

Advise that any social media should **NOT** reveal the actual challenge. Any photographs taken must have written consent. The media toolkit link provided by the IET can be a useful place to direct the teachers to.

Check with the host teacher that there is someone scheduled to run the shop. It may be that the teachers need to help here. Direct the teachers back to their table and start the day.

DELIVERY GUIDE

Welcome and introduction (20 mins)

The initial part of the day will send a message to the teachers and the students alike as to what kind of day the IET Faraday® Challenge Day is likely to be. By engaging with the students as they arrive and assisting with getting them settled into their working area the CL is already sending the signal that this is not a lesson; there is no 'fourth wall' between the CL and the students.

Briefing the teachers/adults separately is vital as this is the start of separating the adults from the students in the room. It's also a way of sending a message that the IET Faraday® Challenge Day is being delivered by the CL and the teachers/adults are merely observers.

Each stage of the first hour of the IET Faraday® Challenge Day is designed to transfer responsibility for the project to the students and away from the teachers/adults and that process starts in the Welcome/Introduction.

Within the first minute, it is suggested that the CL indicates that they are to be referred to by name rather than "Sir" or "Miss". This sends an important message that this is NOT a lesson.


By telling them early what they can win and the fact the teachers will not be available to help they will quickly get the idea that it is *their* competition.



These are the first steps in the students creating a sense of **Empowerment**, **Independence**, and **Self Belief**.







Displaying the Project Flow slide engenders a bit more trust. Often they will think there is a test or lots of written work; by running through the Project Flow they will begin to see that this is an activity day.



The "What is engineering?" exercise gets the teams to focus a bit and possibly start liaising between themselves. The object of the session is to get the whole room thinking about engineering, demonstrating verbally the width of the subject.

By the end of this session, a lot of the internal questions the students may have had will have been answered and they are beginning to understand that this is a very different kind of day.

	Action	Resource
<p>09:30 to 09:50</p>	<p style="text-align: center;"><u>Welcome and introduction (20 mins)</u></p> <p>Slide 1 should be showing as the students arrive.</p> <p>Host school/organisation to do introduction to school and hosting (fire alarm and toilets) if required.</p> <p>A loud and dominating “Good morning” shout from you. If this gets a weak response try again to elicit some noise.</p> <p><i>“Welcome to the Institution of Engineering and Technology’s Faraday® Challenge Day.”</i></p> <p><i>“First things first, my name is XXXXXX and not Miss or Sir”.</i></p> <p>Advise the students that you are NOT a teacher and this is NOT a lesson. You are a Chief Engineer and they are all now teams of engineers in a national competition.</p> <p><i>“The IET Faraday® Challenge is a STEM competition held in many schools and organisations for 12-13 years old students and their equivalents across the UK.”</i></p> <p><i>“This year, the IET is working with the Rees Jeffreys Road Fund and National Highways to try and make roads better and safer for all road users.”</i></p> <p><i>“This is a national competition and we are looking for the best engineering teams. All of you will receive a certificate to say you have worked as an engineer for the Rees Jeffreys Road Fund and National Highway’s team.”</i></p> <p><i>“The team which scores the most points will win this trophy”.</i></p> <p><i>“The winning team will also go on our school league table which you can find on the IET Faraday® Challenge Day website. At the end of the year we will take the top five teams to the national final”</i></p>	<p style="text-align: center;">Slide 1</p>  <p style="text-align: center;">Display certificates.</p> <p style="text-align: center;">Display trophy.</p>

	Action	Resource
<p>09:30 to 09:50</p>	<p style="text-align: center;"><u>Welcome and introduction cont.</u></p> <p>Show trophy and advise that there is only one winner, no second, third or fourth place. Advise brief details of the national final emphasising that it is an overnight trip.</p> <p>Allow for a bit of chatter at this before you call for quiet again.</p> <p>At this stage the engineers are still very much ‘in the dark’ about the day and some may start asking questions. Do not get side-tracked – move quickly on to <i>“I am going to tell you how the day is going to work now”</i>.</p> <p>Explain that the first part of the day involves close attention and listening but as soon as the brief is finished there is a lot of activity and a lot less listening!</p> <p> Click to slide 2</p> <p>Walk through slide 2 giving a high level explanation of each section. This must be very brief. Sometimes you will get a reaction to the Presentation idea, continue regardless, part of today is about getting over nerves and simulation of real-life challenges in the workplace.</p> <p><i>“Today you will be working as real-life engineers. “</i></p> <p><i>“You will be following an engineering project flow as shown.”</i></p> <p><i>“We will explain each of these stages when we get to them so you will need to listen carefully to make sure your team completes each section of the project.”</i></p> <p>Once the slide has been explained go straight into the next section without allowing a gap for chatter!</p>	<p style="text-align: center;">Slide 2</p>  <p>The slide titled 'Project Flow' lists the following stages with checkboxes to the right:</p> <ul style="list-style-type: none"> Project brief <input type="checkbox"/> Planning <input type="checkbox"/> Team roles selection <input type="checkbox"/> Apprenticeship <input type="checkbox"/> Development <input type="checkbox"/> Presentation to client <input type="checkbox"/> <p>The slide also features logos for 'IET Faraday Challenge Days' and various engineering-related icons at the bottom.</p>

	Action	Resource
<p>09:30 to 09:50</p>	<p style="text-align: center;"><u>Welcome and introduction cont.</u></p> <p> Click to slide 3</p> <p>This section is designed to get the teams talking and demonstrate the 'width' of the world of engineering.</p> <p>Often the students are very quiet at this stage (especially if they are all from different schools). Do not assume that the students who are from the same school know each other or work with each other, often they don't.</p> <p><i>"We want you to think about being an engineer in the future. Anyone thinking of being an engineer?"</i></p> <p><i>"What do you think engineering is?"</i></p> <p>Try to get a response from each group. Stress the idea that engineering is difficult to define.</p> <p>Ask for one person from each team to give examples of engineering. <i>"What do you think engineering is?"</i> Once you get an example, expand on it, ask for specifics. You may get somebody say "mechanics", ask that team to give examples.</p> <p>Push hard here and do not stop until every team has contributed. If a team is really struggling ask them to say one thing in the room that has involved engineers to create it, this usually gets answers.</p> <p>Once you have all contributions you may want to add your own idea. The iPhone box story is a good one to use. Use an example of a product that the engineers in the room would not normally think as engineering – food packaging? Find your own story to illustrate the point.</p> <p> Click slide to produce definition</p> <p><i>"The IET use this phrase."</i></p>	<p style="text-align: center;">Slide 3</p>  <p style="text-align: center;">What is engineering?</p>  <p style="text-align: center;">Use any props to support your own example.</p> <p style="text-align: center;">Slide 3 click 1</p>  <p style="text-align: center;">What is engineering?</p> <p style="text-align: center;"><small>"The application of knowledge and creativity to the needs of humanity"</small></p> 

	Action	Resource
<p>09:30 to 09:50</p>	<p style="text-align: center;"><u>Welcome and introduction cont.</u></p> <p>Remind the teams they do not have to memorise this as there is no written test today. Walk through the definition quickly.</p> <p>Picking out the word ‘creativity’ may be useful as you can encourage students to use their imagination.</p> <p> Click slide to bring up pictures</p> <p>This brings up everyday pictures – this allows you to explain that engineering is all around us, all the time and always will be.</p> <p>You may be able to reference some of the team’s answers while doing this.</p> <p><i>“There are many different areas of engineering. All require creativity and innovative problem-solving. Engineers use their knowledge and ideas to come up with new products or adapt existing products. They challenge themselves. We want you to do the same.”</i></p> <p><i>“Engineering is not a subject we go to, it’s something we live in all of the time”.</i></p> <p>Thank the students for the contributions and then signpost to the project brief.</p>	<p style="text-align: center;">Slide 3 click 2</p> 

Project brief (20 mins)

The tone changes a bit at the start of this session. The main aim of the project brief is to ensure every student is aware of the task that they need to undertake (but not their ideas yet). For this to happen the CL needs to be very clear with the instructions and the students need to listen hard.

It may be prudent for the CL to mention again that it is not a lesson where they may be told information several times in differing formats and, if they put their hand up and ask, they are told again. It may be good for the CL to advise that they will say the information once and once only.

As the CL progresses with the Project brief they may notice that some of the students still look a bit confused and unclear as to what is expected of them. This is understandable as much of their work is about correct answers or defined routes to a solution. They are rarely in an environment where they have to do so much thinking for themselves, where they are not going to be drip fed information and there is not a right or wrong answer.







It's good practice to speak of imagination and creativity and mention that they are in an environment where they can get things wrong, where they can "give it a go" without judgement and experiment as a team.



On delivery of the Assessment criteria and Project tools the CL should expect total attention from the students. Remind them that you will not be repeating ANY of this information.





Where many students sit up and take notice is when the CL introduces the 'How to' sheets. They see this as a route to getting some kind of instruction or help so shouting out some of the detail of the headings of the sheets is a good idea.







Before Planning it may be prudent the CL to reminds them of the brief again.






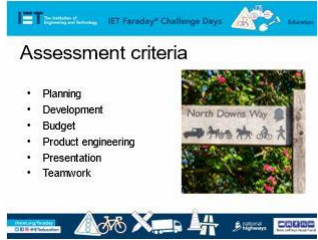
By the end of this session the teams may still be a bit unsure of the task (they have not conferred yet) but are a lot clearer about the day and ready to go to Planning.



Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief (20 mins)</u></p> <p> Click to slide 4</p> <p>Explain that you are now going to start the Project brief and it is vital that every part is listened to closely.</p> <p><i>“The first step in our project flow is the brief from our client, in this case the Rees Jeffreys Road Fund and National Highway’s team.”</i></p> <p>Explain that there will now be a 6 minute video – <i>“Watch it carefully it will help you decide what to do”.</i></p> <p>Check if there is a chance to dim the lights. Ensure the screen can be seen by all students and encourage them to move if not.</p> <p> Click Slide 5 to start video</p> <p>While video is playing, stand to the side or the back of the room to observe teams and note anyone not paying attention, etc.</p> <p> At the end of the video, click to slide 6</p> <p>It is crucial that the teams listen and understand this slide as it sets up the rest of the day. Insist on quiet and maybe mention that there are only a few slides left and very soon they will be working in their teams. They must listen hard to the next 10 minutes or so.</p>	<p style="text-align: center;">Slide 4</p>  <p style="text-align: center;">Slide 5 (video)</p>  <p style="text-align: center;">Slide 6</p> 



Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p> Slide 6 click 1</p> <p>Give an overview of the brief and some possible suggestions of what they could do. The focus could be on something in their local community or it could be larger road networks.</p> <p>Alternatively, it could be something which protects people building or maintaining roads, etc. Be careful of giving too many ideas. Better to let them get talking and thinking of their own.</p> <p>Your design will be a prototype.</p> <p>Ask for hands up <i>What's a prototype?</i> (Seek responses from students and emphasize that their design may not be the finished product but should do something of what was intended).</p> <p>Encourage input, ask <i>“Why do we need prototypes?”</i> Explain that what they build today is to be tested at the end and it may not work as well as they hoped, however, if their response to that is positive they can still get enough points to win. It's about the engineering journey. Use examples of when prototypes would have been produced such as the school chairs – <i>“The manufacturer would not have made 10,000, they would have made 5 or 10 and sent them out for testing, what would they be tested for?”</i></p> <p><i>“Let's think about how the world is going to look in 5, 10 or even 50 years, how can we develop ideas now to be ready for the future?”</i></p> <p><i>“Do not just think of what you know now, try and open your minds to how life may change or how your idea may help to drive that change.”</i></p> <p>Point out how quickly new ideas get developed. Use an example of something in everyday use that was just a simple idea a short time ago.</p>	<p style="text-align: center;">Slide 6 click 1</p> 

Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p>Remind the teams of the section of the brief that highlights assisting those who are building new projects – can this be a safety device?</p> <p>Point out that the prototype or development must have at least one working electrical component in it but emphasise that it's important to push themselves beyond the minimum brief. They will get more marks if their prototype does more than one thing but these could be electronic and mechanical. Inform them that if they are not 100% sure about the electronics not to worry, we will make sure that this does not put them at a disadvantage.</p> <p> Slide 6 click 2</p> <p><i>“Engineering is not just about the end result. The journey to this is just as important and recording that journey is vital in any project.”</i></p> <p>Emphasis that the best prototype may not win if the journey is not good. There are no laptops, tablets or smartphones to help do this.</p> <p><i>“We will explain this further a bit later.”</i></p> <p> Slide 6 click 3</p> <p><i>“All teams will be doing a presentation at the end of the day.”</i></p> <p><i>“Engineers need to be able to tell people about their ideas so that they can be used in the real world. We will brief you about what should be in your presentation later so don't start writing this until then.”</i></p> <p>Explain that the whole team will need to be involved in the presentation.</p>	<p style="text-align: center;">Slide 6 click 2</p>  <p style="text-align: center;">Slide 6 click 3</p> 

Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p>Advise that we will brief them before lunch on the requirements of the presentation.</p> <p>Advise that they will get time later to write and practice this.</p> <p>Advise that the presentation is not a show – it is an opportunity to show to the judges what they have built, what went well, what didn't go well, what you would do differently or if you had more time etc. Direct the team to their student booklets for more information about the presentation.</p> <p>Briefly repeat the main brief once more as a summary.</p> <p> Slide 7</p> <p>Explain what is meant by a 'consideration'. Point out that if the development does not obviously show one or more of these considerations it should be highlighted and explained in the presentation.</p> <p> Slide 7 click 1</p> <p>Briefly expand on what is meant by 'Social value'. Emphasise the engineers do things to help people.</p> <p> Slide 7 click 2</p> <p>Point out that ALL new developments in this area would have to consider the safety issue. This must be evident in all developments.</p>	<p style="text-align: center;">Slide 7</p>  <p style="text-align: center;">Slide 7 click 1</p>  <p style="text-align: center;">Slide 7 click 2</p> 

Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p> Slide 7 click 3</p> <p>Briefly suggest that the materials being used today are not the materials that the actual prototype will use, the teams may want to explain what materials they will use and any impact on the environment when the development is finally built.</p> <p> Slide 7 click 4</p> <p>Alert the teams to the importance of this subject. They may be asked questions about this at the end so, if relevant to their design, suggest that they incorporate provisions to allow maximum access and inclusion.</p> <p><i>“The brief is on page 4 of your Student Booklet if you need a reminder of these.”</i></p> <p> Click slide 8</p> <p>Call for silence on this slide – advise that this is the downfall of many teams. Walk through the criteria very briefly advising that they will get a certain number of marks for each section – DO NOT TELL THEM THE MARKS but advise then they can find the run down in the Student Booklet as well as the measures you use to mark each team.</p> <p><i>“It isn’t just about your finished product; engineering is a journey and we want to know how you have arrived at your final prototype.”</i></p> <p>This is another good place to reinforce that we are looking for all round engineers and not teams that are good at just one element.</p> <p><i>“You do not get marks for having money left at the end of the challenge, but we are looking at how you have spent your budget. You cannot trade between teams.”</i></p>	<p style="text-align: center;">Slide 7 click 3</p>  <p style="text-align: center;">Slide 7 click 4</p>  <p style="text-align: center;">Slide 8</p> 

Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p>Tell them they will get more points if they make their prototype do more than one thing so they may need to think about how they are going to do this. Stress that pushing themselves beyond the minimum brief will get them extra points. Mention that we are not interested in how 'pretty' it looks.</p> <p> Click slide 9</p> <p>This section requires energy and a fair bit of walking around the room (or running) from the CL. By now some of their heads may be dropping – this is where we pick them up – remind them it is just two more slides and then action.</p> <p>Take each section in turn.</p> <p>Move to Engineering Shop – call out some of the items available in the shop <i>“We have buzzers, motors, wheels, axles, craft materials and much more”</i> to give them a flavour of the shop. Remind them that they should have 120 Faradays on their desks to spend but supplies are limited.</p> <p><i>“Details of what is available to buy are in your Student Booklet. You MUST read this as it tells you important information and will prevent you buying things you cannot use.”</i></p> <p><i>“If you buy something you don’t need/want you can sell some of these back to the shop for half price as long as it is unused but we will be looking at how often you do this as it tells us how good your team is at planning.”</i></p> <p>Move to the cutting station and display each tool and explain that there are some strict rules that will be advised later.</p> <p>Advise that any adult in the room can assist with cutting if needed and no points will be deducted.</p> <p>Explain the Hire card system and show the room the Hire cards. Most of the students will not be able to see what is in the Hire centre so please call out all items.</p>	<p style="text-align: center;">Slide 9</p>  <p>Visit engineering shop.</p> <p>Visit cutting station.</p> <p>Show hire card available from shop/visit hire centre.</p>

Time	Action	Resource
<p>09:50 to 10:10</p>	<p style="text-align: center;"><u>Project brief cont.</u></p> <p>Advise that they cannot take items from their bags such as glue or Sellotape.</p> <p>Go to the How To Sheets table - advise the teams can take up to three of these at any one time. Call out titles of a few examples as this may help with their planning.</p> <p>Refer the engineers to the Student Booklet which, <i>“....in a nutshell, tells the team everything they need to know to win”</i>.</p> <p>Explain the CL role and include any STEM Ambassadors in this. We will not help – we will guide and encourage! Warn them that if an individual asks for help they are saying the whole team needs help. Advise them to check with their team before asking.</p> <p> Click slide 10</p> <p>Show that they have now completed the Project Brief</p>	<p>Visit how to sheets.</p> <p style="text-align: center;">Slide 10</p> 

Planning (15 mins)

This is the first bit of teamwork on the day. Sometimes you may assume that, as the students are all from the same school on a given team, they know each other. Often they don't and this session is a bit of a team build as well as a practical planning session.

After this session the students will be choosing their Project Manager and Accountant (among other roles) and this session will help them identify the different skills, characters and personalities on the team.

Real **Independence** is being developed here. Often the teachers will try and help or stand close to their teams, this needs to be managed.




A lot of students will still try and rely on someone else to tell them what to do and will often ask the CL to suggest something. The best response is to get them to speak to their teams. Once the students realise that they are NOT going to get someone to make their minds up for them they normally re-focus and come up with an idea.



Once all teams have come up with an idea with little or no help, then the **Ownership** is being developed. The teams have discussed ideas, designed a prototype and already thought about how they are going to build it on their own from their own imagination.




It is good practice for the CL to advise the teachers that all teams have ideas to work on. This action not only serves to keep the teachers away, but it also satisfies those teachers who feel their students may not 'keep up' with the others. It may also be a good time to reassure all teachers that all teams will have a product to show at the end of the day.

The teams rarely complete the required paperwork in the time allowed. This is fine as the CL can remind them that the paperwork sheet will remain on their tables until the time advised so they can add to it throughout the morning.

By the end of Planning, the teams will have already started to develop the **Independence** and **Ownership** required.

Time	Action	Resource
<p>10:10 to 10:25</p>	<p style="text-align: center;"><u>Planning (15 mins).</u></p> <p>★ Click slide 11</p> <p>Show that they are now going to start Planning section.</p> <p>★ Click slide 12</p> <p>Advise of the importance of planning and also remind the teams that Planning has its own section in the marking criteria. Advise they may want to refer to the Student Booklet to see how to get most points.</p> <p><i>“We have seen many teams have great ideas and rush into developing them, only to realise that they won’t work, they don’t have enough Faradays or they simply don’t have the time to develop them.”</i></p> <p>★ Click slide 13</p> <p>Direct their attention to the task list and explain the 15-minute countdown clock.</p> <p>Hold up an A3 Planning and events log and ask the teams to locate theirs.</p> <p>Explain that they have 15 minutes, to work as a team to:</p> <ol style="list-style-type: none"> 1. Explain how their idea will help the Rees Jeffreys and National Highway’s teams and direct the engineer’s attention to where you want that written which is at the top of the A3 sheet. 	<p style="text-align: center;">Slide 11</p>  <p style="text-align: center;">Slide 12</p>  <p style="text-align: center;">Slide 13</p>  <p style="text-align: center;">Show one of the team’s planning and events log.</p>

Time	Action	Resource
<p>10:10 to 10:25</p>	<p style="text-align: center;"><u>Planning cont.</u></p> <p>2. Draw a detailed drawing with labels if required of the team’s proposed development and direct the engineers attention to where you want that drawn which is on the left of the large Planning box on the A3 sheet (as you look at it). State that you are not marking writing, spelling or drawing skills.</p> <p>3. Draw a circuit diagram (or you may know it as a wiring diagram) of the circuit you propose to include and direct the engineer’s attention to where you want that drawn which is on the right of the large Planning box on the A3 sheet (as you look at it). Mention that there are some useful symbols on the back of their team numbers.</p> <p>Explain that the Planning Sheet will be taken in at lunchtime, 12:30, for marking. State VERY CLEARLY that they are NOT going to be reminded of this. If it is not finished by lunchtime, then it will be marked as it is.</p> <p> Start the clock by Slide 13 click 1</p> <p style="text-align: center;">DO NOT CLICK THIS SLIDE WHILE THE TIMER IS COUNTING DOWN AS THE TIMER WILL STOP AND IT WILL JUMP TO “TIMES UP”.</p> <p>Remind students of the importance of the four ‘considerations’ in their design (which are now showing).</p> <p>The teams may take one or two How To Sheets as a prompt. Remind the teams that the stock list for the shop is in the Student Booklet.</p> <p>Call out 5-minute reminders. Walk around the teams encouraging them and affirming any good ideas. Assist with consolidating ideas if you feel it’s necessary.</p>	<p>Slide 13 click 1 starts the clock</p> 

Time	Action	Resource
<p>10:10 to 10:25</p>	<p style="text-align: center;"><u>Planning cont.</u></p> <p>WARNING – this is a prime time for teachers to go to their teams and try and help or simply ‘hover’. Redirect the teachers back to their table as the simple fact of an adult standing there can suppress the students. Tell the teachers that you need to get them beyond asking “what shall we do?” to saying “look what we are doing”.</p> <p>Call “Time is up”.</p> <p>Call for quiet and remind the teams they can return to that task any time up to when they are due to be taken in for marking.</p> <p> Click slide 14.</p> <p>Show the Planning section is now complete.</p>	<p>Slide 13 (after 15 mins)</p>  <p>Slide 14</p> 

Team role selection (5 mins)

This is a short but vital session. It is important for the CL to point out that everyone in the team has the role of Engineer, however, some students will have an additional role within the team. This does not make any student more important but helps structure the team.





The previous session, Planning, would have given the teams an insight into their colleagues. This helps them decide who they want to be the Project Manager. Often voting will be seen as this helps if two students are pitching for a role.





The Accountant is normally chosen by the teams very quickly.

The slide allows for other roles to be decided on but the only compulsory ones are the Project Manager and the Accountant.

There is no need for any input from the CL in this session.

This is another tool for separating the students from anyone else in the room. By now they have thought of their own idea, decided how they are going to make it and now structured their own team.

Time	Action	Resource
<p>10:25 to 10:30</p>	<p style="text-align: center;"><u>Team roles selection (5 mins)</u></p> <p> Click slide 15</p> <p>Display that the next section is Team Role Selection. Without clicking further forward explain how important it is to have different roles allocated in the team.</p> <p><i>“This does not mean any individual is more important than another, however, it does mean the team works better together.”</i></p> <p><i>“Soon I will be giving you time to select different role within your team”.</i></p> <p><i>“Remember how you did this as it may give you something interesting to talk about in your presentation later”.</i></p> <p>Explain that there are two roles that you definitely want every team to have.</p> <p> Click slide 16</p> <p>Explain that each team must have a Project Manager. The Project Manager does not tell everyone what to do and do nothing themselves (like adult Project Managers do!). They are there to ensure that teams work together, that they work on what can score points and to mediate any conflict that may be limiting progress.</p> <p>The other essential role is Accountant. Explain that the Accountant is the only person who can go to the shop with ONE other member of the team. The Accountant does not choose what is going to be purchased, the team do. The Accountant is also responsible for the completion of the Accounts Sheet which is within the paperwork on their desks.</p>	<p style="text-align: center;">Slide 15</p>  <p style="text-align: center;">Slide 16</p> 

Time	Action	Resource
<p>10:25 to 10:30</p>	<p style="text-align: center;"><u>Team roles selection cont.</u></p> <p> Slide 16 click 1</p> <p>You may wish to choose other roles and tell the judges how this worked in your presentation later – this may attract more teamwork points.</p> <p>You have 4 minutes to complete this and I am displaying some suggestions now.</p> <p>You may want to state that the Stress Engineer does not manage stress!</p> <p>Allow 5 minutes. If you see the teams have done the task before this time then cut the session short. Do not allow engineers to go to the shop or the How To Sheet table at this stage.</p> <p> Click slide 17</p> <p>Show project progress now that Team Role Selection has been completed.</p>	<p style="text-align: center;">Slide 16 click 1</p>  <p style="text-align: center;">Slide 17</p> 

Engineering apprenticeship (10 mins)



Another very important session, not only for the students but for the CL too. Once the components have been handed out, it is a good idea for the CL to pull away for a few minutes (and ensure the teachers do not jump in to help). Often the teams will work this out for themselves.





Sometimes the initial reaction from the student is “we don’t know how to do this” and directing them to the relevant page in the Student Booklet helps move them on.

Beware of a single student completing this alone and encourage all students to get involved.

Once all teams have completed the task and the CL has announced that all teams have completed the Engineering Apprenticeship then the day can move on to Development.

By this time the teams would have developed a sense of **Achievement** and **Self Belief** to their **Independence** and **Ownership**.

Time	Action	Resource
<p>10:30 to 10:40</p>	<p style="text-align: center;"><u>Engineering apprenticeship (10 mins)</u></p> <p> Click slide 18</p> <p>Introduce final section before Development – Engineering apprenticeship.</p> <p><i>“Project Managers, this is the first time you will see your team working together so make sure everyone is involved and doing nothing else at this point.”</i></p> <p>The Engineering apprenticeship has a few roles. It gives the CL an idea of the existing knowledge on the teams. It also helps to give some confidence to those teams who are convinced they cannot do circuits. It will also show up those individuals who are going to dominate or those only too happy to ‘hide’. It is important the CL takes a careful note of these behaviours.</p> <p>There are no marks for this exercise so the amount of help you give is up to you as you can see the progress (or lack of progress) of the teams. It does build confidence if you allow teams enough time to work it out giving them little hints if they are struggling.</p> <p>The teams will need to build a circuit in accordance with the guide in their Student Booklets. Once they feel they have completed this they need to advise you and you can go to their table with the torch and test it.</p> <p><i>“You will need to use everything in the circuit and you must show me your circuit when you have successfully completed it.”</i></p> <p>Explain to the teams the simple task, direct them to their Student Booklets, tell the teams that ALL team member must take part, there is no time limit and advise them to call out when they think they have completed it.</p> <p>Once all teams have finished, discuss resistance with them and point out the ‘How to’ sheet on parallel circuits. Caution them on buying another battery pack or solar panel each time they add another component.</p>	<p style="text-align: center;">Slide 18</p> 

Time	Action	Resource
<p>10:30 to 10:40</p>	<p style="text-align: center;"><u>Engineering apprenticeship cont.</u></p> <p>Watch out for them splitting into boys groups and girls groups during apprenticeship – you may want to point out that each member of their team brings strengths and they should all contribute to all aspects of the Challenge.</p> <p> Click slide 19 to start the Engineering apprenticeship</p> <p><u>Common errors the team make on apprenticeship:</u></p> <ul style="list-style-type: none"> • Batteries the wrong way round. • Completing circuit to make the buzzer sound without the Light Dependent Resistor (LDR) in the circuit. • Red lead from battery not going to red lead on buzzer. • Thinking crocodile leads need to be red or black. • Thinking the LDR needs to light up. • Not including power pack. <p>If a team finishes before others, the likelihood is they will start wandering towards the shop. Stop this as soon as you can and suggest they review their Planning Sheet while they are waiting or start drawing up an initial shopping list.</p> <p>Once all teams have been checked you can celebrate their achievement with a round of applause.</p> <p> Click slide 20</p> <p>Display progress in project flow.</p>	<p style="text-align: center;">Slide 19</p>  <p style="text-align: center;">Slide 20</p> 

Development (20 mins to break, 80 mins break to lunch, 30 mins after lunch)

During the Development session the CL takes on many roles. At the start of the session when the shop opens, some students know exactly what they plan to do. The CL will see some teams racing to the shop buying as many components as they can and some will go back to continue planning.

As this session is the main part of the day, there is no real rush to see 'action' on the team tables, often it will take a while. Usually, standing back for 15 minutes or so but being available for questions, can be good as not only are the teams deciding how to approach the building of the prototype, they are also beginning to understand the team dynamics.

Again, the CL needs to be aware of teacher intrusion. They have been sitting down for a long time too and often wander over to their teams.

As Development progresses and the CL has introduced the first Event Log the teams should be well on their way to building their prototype. The CL may observe the teams splitting into sub-groups with girls doing the writing and boys doing the practical side. This needs to be managed as it is not conducive to good teamwork marks.

Once it becomes clear that the teams are moving on with their designs there is no problem with allowing the teachers to see what they are doing and encouraging them, etc., as long as they don't help!





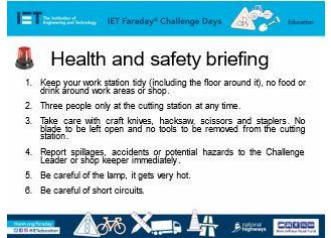

Often a CL will be asked to assist a team, this is fine as long as the CL is not giving the team direct answers to a problem. For example, if a team has problems getting an LED and buzzer to work on the same circuit and you can see that a parallel circuit is the answer, direct them to the 'How to' sheet rather than showing them. The CL may need to demonstrate a circuit, this is also fine, but a good idea is to take it all apart afterwards for the students to reconstruct it.






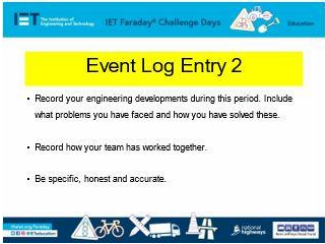
If a CL sees a team that is struggling a lot and not making progress at all, the CL assisting them to get them on their way is fine.


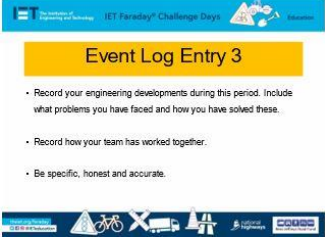


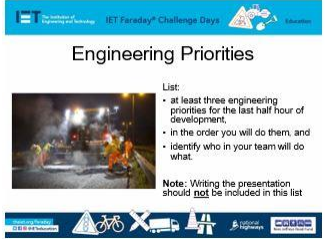

Towards the latter stages of Development, a CL may see a team who are clearly not going to be in a position to win but by the CL giving them a bit of help, they will have something to demonstrate and present and thus have a good day.






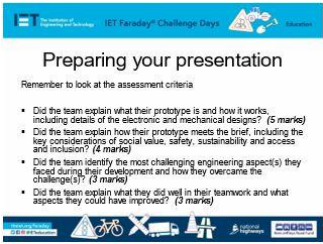
Reminding the teams of their paperwork is useful prior to lunch.





At the end of Development, the teams would have increased **Independence, Self Belief, Empowerment** and **Ownership**. Many would have developed a sense of **Achievement** too.

Time	Action	Resource
<p>10:40 to 11:00</p>	<p style="text-align: center;"><u>Development</u></p> <p> Click slide 21</p> <p>Explain now that we are going to open the shop shortly and start Development.</p> <p>Explain that no project can be started properly until Health and Safety has been explained.</p> <p> Click slide 22</p> <p>Ask for total silence and walk through the slide. Suggest you stand at the Cutting Station when explaining the rules there. Remind the adults that they can help with any cutting.</p> <p style="text-align: center;">Important – this relates to risk assessment and cannot be missed.</p> <p>Cutting Station - Walk through the tools on the cutting station:</p> <ul style="list-style-type: none"> • Mention that only three engineers can be at the station at any one time. • Explain that they can ask any adult in the room at any time for help with cutting without losing points. • Ensure teachers' table heard this. • Warn that all blades must be retracted when not in use and if a blade is seen exposed when it is not in use the cutting station will be closed for the day. <p>If you have not already done so, collect in the Apprenticeship materials. Remind them that working as a team is important and they need to keep themselves and everybody else safe.</p> <p>Highlight tips for safe working.</p> <p> Click Slide 23</p> <p>Announce the shop is now open.</p>	<p style="text-align: center;">Slide 21</p>  <p style="text-align: center;">Slide 22</p>  <p style="text-align: center;">Visit cutting station.</p> <p style="text-align: center;">Slide 23</p> 

Time	Action	Resource
10:40 to 11:00	<p style="text-align: center;"><u>Development cont.</u></p> <p> Click slide 24</p> <p>Explain to teams that this is a working break – we advise the shop closes for 5 minutes so everyone takes a comfort break. Advise no eating or drinking at the tables or around the shop. Engineers can continue building during break if they have finished eating/drinking.</p>	<p style="text-align: center;">Slide 24</p>  <p style="text-align: center;">Morning break</p>
11:10	<p> After break, click slide 25</p> <p>After break, Event Log 1 (Slide 25) will be accompanied by a drum roll. Ask for quiet in the room (the engineers do not need to sit or come away from the shop) as long as they listen.</p> <p>Explain that as Development progresses, they will be reminded to do Event Logs 2 and 3. These logs are like a diary entry of the last period of time, what has happened on the team, with the development etc. The best way to describe it is:</p> <p><i>“If all of your team were out of the room and I picked up your event logs, would I know enough about your project to carry it on myself?”</i></p> <p><i>“Recording problems and solutions allows us to understand what has been tried and moves us on to try other things.”</i></p> <p>Suggest the team members get on with Event Log 1 now and do 2 and 3 when reminded. The slides will appear with a drumroll as Development continues. These must be completed by lunchtime.</p>	<p style="text-align: center;">Slide 25</p>  <p style="text-align: center;">Event Log Entry 1</p> <ul style="list-style-type: none"> • Record your engineering developments during this period. Include what problems you have faced and how you have solved these. • Record how your team has worked together. • Be specific, honest and accurate.
11:40	<p> Slide 26</p> <p>This is simply a reminder for the teams to do Event Log 2. Call out to make the announcement but no need to explain anything further.</p>	<p style="text-align: center;">Slide 26</p>  <p style="text-align: center;">Event Log Entry 2</p> <ul style="list-style-type: none"> • Record your engineering developments during this period. Include what problems you have faced and how you have solved these. • Record how your team has worked together. • Be specific, honest and accurate.

Time	Action	Resource
12:10	<p style="text-align: center;"><u>Development cont.</u></p> <p> Slide 27</p> <p>This is simply a reminder for the teams to do Event Log 3. Call out to make the announcement but no need to explain anything further.</p>	<p style="text-align: center;">Slide 27</p> 
12:20	<p> Click slide 28</p> <p>Call teams back to their tables. Explain that they have more time for Development after lunch so no need to panic. They must listen for the next 5 minutes.</p> <p>Direct the teams to their Planning Sheets and the section called Engineering Priorities. Tell the teams that the 30 minutes after lunch are very busy and time seems to go very quickly. Explain that it's important to complete, in priority order (or numbered in priority order) the 3 things they need to do in the period after lunch. Also, identify who will do what in the teams. This must be done NOW!</p> <p>Engineering priorities should not include writing the presentation.</p> <p> Click slide 29</p> <p>Walk through the Presentation details. Stress that it's NOT "Romeo and Juliette" but the presentation will attract more points if it is well rehearsed. There will be 15 minutes of rehearsal time after Development.</p> <p>Suggest they write notes, particularly about their own part in the day.</p> <p>Suggest that one or two team members are selected to be in charge of the presentation but note that everyone should speak, or at least have a role.</p>	<p style="text-align: center;">Slide 28</p>  <p style="text-align: center;">Slide 29</p> 

Time	Action	Resource
12:30	<p style="text-align: center;"><u>Development cont.</u></p> <p> Click slide 30</p> <p>Before you send the teams to their lunch, ask them to disconnect any batteries. Advise them that they must be back by 13:00. Explain (preferably in host teacher’s earshot) that if there is no teacher here at 13:00 they will need to wait outside until there is.</p> <p>Nobody can work through lunchtime.</p> <p>If the engineers are to stay in the room for lunch. they MUST NOT work or “5 points will be deducted from any team I see working.”</p> <p>Collect in and mark Planning and Event Logs.</p>	<p style="text-align: center;">Slide 30</p> 
13:00 to 13:30	<p> Click slide 31 just prior to engineers’ return.</p> <p>As teams reassemble, open shop and remind everyone that there is only 30 minutes left.</p> <p>Walk the room and identify any teams that may need help. If there is a team that are clearly not going to win but you see that with a bit of extra help they can have a far better experience then go ahead and help them.</p> <p>Remind the teams that they should also be writing their presentations.</p> <p>“The shop will close at 13.30 so make sure you have bought or sold back any items. You must be ready to submit your accounts sheets to the shop when it closes.”</p> <p> Click slide 32</p> <p>This slide remains visible for the period while they are writing the presentations and completing their developments. You may wish to draw attention to it and also point out that this is also in the Student Booklet.</p>	<p style="text-align: center;">Slide 31</p>  <p style="text-align: center;">Slide 32</p> 

Time	Action	Resource
13:30	<p style="text-align: center;"><u>Development cont.</u></p> <p> Click slide 33</p> <p>Call out that the shop is now closed.</p> <p>Call teams back to their tables and ask for silence. Explain that there are jobs to do and, when they are finished, the teams can then practice their presentations. The jobs that need to be done are:</p> <p>All Accounts Sheets and leftover Faradays to be put on the shop table.</p> <p>All items from the shop (including Hire Cards) that are not being used in the presentation to go back to the shop.</p> <p>All rubbish in the bin.</p> <p><i>“All that should be left on your tables when I inspect in 5 minutes is anything you are using in your presentation.”</i></p> <p>Oversee these jobs and allow teams to practise their presentations.</p> <p>You can now pack the shop away and collect in team number signs.</p> <p>Call the teams back to their tables.</p> <p> Click slide 34</p> <p>Show how far the teams have come today.</p> <p>You may find that the room is particularly quiet now – this is normal as nerves are building as the presentation get closer. This is a good real-life experience for the students – do not minimise this.</p>	<p style="text-align: center;">Slide 33</p>  <p style="text-align: center;">Slide 34</p> 

Presentations

The students will take this as a very serious part of the day and the CL should set it up that way. A reminder of what can be won is good here.

It is important to insist on quiet in the audience and threatening a penalty if anyone is seen talking can help.

Year 8 (or equivalent) students are not normally used to public speaking. This can be a huge challenge for them. Often, they will turn their backs to the audience or whisper when it is their turn to speak. Assisting them through these problems is not a problem. Although it is important that they have practised their presentation, the CL is not marking their presentation skills, it is much more about what they say.

Another really important part of the day is the questioning session after each presentation. This is the CL's opportunity to instil a real sense of achievement in the teams.

A point that the CL must get across to all teams is the CL will not take points away if a team cannot answer a question correctly; the CL will add points if they get a question right but not the other way around. It's a no-lose situation.

The questions should only be about their product or their team.

Sometimes, if the CL asks a question like "**Can you tell me three things you would do to your product if I gave you another hour?**", the CL may want to give the teams 30 seconds or so to confer, in a huddle, where they were presenting. This is a great way of developing a feeling of team success. The audience must keep quiet though!

If a product does not work quite as well as it should and the CL can see that it is easily fixed, allow the team to fix it as a challenge in place of a question. As long as it does not take long then this can give the CL vital evidence as to how well a team works together.

Remember, although the CL is looking to reward the best engineering team on the day, the should also be aiming for **every** team to develop a sense of:





Ownership






Empowerment

Achievement

Self-Belief

Independence

<i>time</i>	Action	Resource
13:50	<p style="text-align: center;"><u>Presentations</u></p> <p> Click slide 35</p> <p>Advise that the next stage is Presentations.</p> <p>At this point you will need to rearrange the room so that there is an 'audience' for the presentations. All bags need to be at the side of the room. All developments to be left on the tables and the tables moved away. Students can pick up their developments and paperwork as they come up to do their presentations.</p> <p> Click slide 36</p> <p>Once the room has been changed and your seating position established you will need to address the audience giving them instructions about how the presentations are to work. This must cover:</p> <ul style="list-style-type: none"> • You will call a team number and they must get ready as soon as they can. • You will be timing each presentation and will stop any presentations at 5 minutes (30 second warning at 04:30). • At the end of each presentation there are questions from the CL (we advise no questions from the students). These are designed so the CL can allocate more marks, not to trip the engineers up! • The students should leave their prototypes on their tables along with any paper they need for their presentations. They can pick these up when they are called. They must not add anything to their notes while others are presenting. <p><i>“Telling others about your ideas is fun. There may be problems or issues with your prototype but it is important to be relaxed! Remember I am marking on a number of different things and the competition is not won or lost on the performance of the prototypes. I am using all of the sections of the marking criteria to award marks.”</i></p>	<p style="text-align: center;">Slide 35</p>  <p style="text-align: center;">Slide 36</p> 

<i>time</i>	Action	Resource
14:45	<p style="text-align: center;"><u>Presentations cont.</u></p> <p>Start presentations. At the end of the presentations, ask two students to help hand out feedback cards to all students. You can hand the teachers ones to them directly.</p> <p>Take prototypes at the end of each presentation and pack them in a bag ready to unpick later remembering to remove the batteries to avoid a short circuit.</p> <p>While these are being completed you can be adding up your scores and securing the winner.</p> <p style="text-align: center;"><u>Closing the day</u></p> <p> Click slide 37</p> <p>You have now completed the whole project and worked in the way engineers work in real-life. Well done to all of you. You should be very proud of your achievements.</p> <p>You can ask for a show of hands about who would consider engineering as a future career to see if there has been any change during the period of the challenge. This could be followed up by pointing them towards careers' resources from the IET.</p> <p> Click slide 38</p> <p>Remind the teams that there is no second or third place. Announce the winners asking them to join you. Present trophy and check with teachers if they want to take photos.</p> <p> Click slide 39</p>	<p style="text-align: center;">Slide 37</p>  <p style="text-align: center;">Slide 38</p>  <p style="text-align: center;">Slide 39</p> 