THE JAMES DYSON FOUNDATION

IMPROVING LIVING AND WORKING

Design and Technology scheme of work

Key stage: 4

Duration: 8 weeks (approximately 20 hours)

Project overview: Design a prototype that solves a problem encountered in a living, learning or working space.

The James Dyson Foundation is a charity supported by Dyson Ltd.

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OVERVIEW

ABOUT THE SCHEMES OF WORK

The new GCSE for Design and Technology (D&T) was introduced in 2017. It has shifted the focus of the subject towards problem solving in different contexts while remaining relevant for students. It allows D&T to simultaneously engage students' creativity and imagination whilst grounding their learning in mathematics and physics.

Students will learn how to take risks, be resourceful, innovative and enterprising. This scheme of work has been designed to support you in delivering project-based, engaging and relevant D&T lessons that are mapped to the national curriculum. The aim is to introduce your students to design engineering and teach them the skills they need to become an engineer.

LEARNING OBJECTIVES

Objectives
Understand how to use real design techniques to solve real problems.
Analyse and apply iterative design processes.
Identify and master the technical skills needed to produce design solutions.
Produce a functioning prototype that could solve a relevant problem.

ABOUT THE SCHOOLS PROJECT

The UK faces an annual shortfall of 59,000 graduate engineers and technicians

Engineering UK, 2018

Students' closest experience of engineering in secondary education is through D&T. Too often the subject is taught through limited and irrelevant project work. This approach neither promotes student engagement in the subject, nor reflects the exciting reality of an engineering career.

The James Dyson Foundation believes that a D&T curriculum based on iterative design, problem-led and project-based learning is more relevant and engaging to students. As a result, students enjoy D&T more, their perception of engineering improves and more students choose to study D&T and pursue engineering as a career.

Between 2012 and 2018, we worked with five schools in Bath to test this hypothesis. We helped these schools to develop their D&T labs and worked closely with them to develop schemes of work that reflect our beliefs.

Thank you to the teachers and students at Writhlington School, Ralph Allen School, Wellsway School, Hayesfield School and Chew Valley School, who helped to develop the content for this scheme of work.

As a result of our intervention:

32% of students chose to study D&T at GCSE in 2017, against a national figure of 18%.

Over the course of the project, student uptake of D&T at GCSE increased by 37%, whilst the national uptake has decreased by more than a half.

7% of students across all the schools opted to study D&T at A Level in 2017, against a national figure of 1.7%.

Over the course of the project, there was a 156% increase in the number of students who would like to pursue a career in engineering.

Between 2012 and 2018, there was a 300% increase in the number of girls who would like to be an engineer.

TEACHER RESOURCES

TEACHER'S NOTES

Context

We are challenging students to carry out a project which places design firmly within a context. You will recognise the opportunities for your students to explore some deep learning skills while tackling tasks which can draw on their own experiences and concerns.

Students will be asked to tackle problems or frustrations which they identify in relation to their own or others' living and working spaces. It is important that they recognise the range of peoples' differences, and that user needs are not universal. This context should provide a level of authenticity and relevance to their work.

Autonomy

Please note that this project is designed to have open-ended outcomes. It does not set out to define products or systems which might make good designs. Rather it puts emphasis on the students identifying and developing good designs.

The variety of possible solutions enables students to retain a degree of autonomy over their design and making decisions. This may mean that some students create prototypes which do not achieve great functionality. It is important to recognise this as a normal and useful function of the design process.

Scenarios

Design projects usually succeed if students readily identify problems to solve and negotiate approaches with their teachers. Sometimes, though, students can feel inhibited about coming up with problems. If this is an issue, or if you want to channel the project in a particular direction, the scheme of work provides a range of specific scenarios for investigation.

For some students, this can kick start a process of ideas which leads on to design thinking. If scenarios are used they should still allow for students to invent their own solutions from the given areas of interest. The scenarios are backed up by easily available research information which can indicate the range and severity of challenges.

Learning management

As this is an open-ended design challenge, the usual caveats apply about progress, pace and standards associated with practical work. The specified evaluation points enable you to hold students or teams to account for the progress they have made.

Design iteration

While students should aim to create a high-quality final prototype, our goal is for students to practice the nonlinear and iterative design process. They should understand that they need to master technical skills in order to create their design solutions. The scheme of work requires that students produce a number of prototypes from the second week onwards. Making early rapid prototypes with card and glue or through CAD and 3D printing is part of the learning and evaluating process. It ensures that students make improved versions of their designs within the project's time allocation. Carrying out this design/make/evaluate cycle allows students to demonstrate skills in analysis, judgement and synthesis while simultaneously developing their technical skills. The outcomes from students' work may be products or systems, but they will be prototypes and not finished products.

Mapping

This project has been mapped to the OCR J310 GCSE Design and Technology specification, which aligns with the national curriculum. Please note that this mapping is only indicative, but it will act as a guideline for teachers working with OCR or other examination boards. You and your students will use a range of techniques and materials according to the needs of their design ideas, and some content may be covered in more depth than others. You can use your professional judgement as to what masterclasses and other teaching is needed to ensure students can demonstrate their design and technical skills.

TEACHER'S NOTES CONTINUED

Assessment

An assessment mark sheet (page 31) has been provided. This is intended to be optional for formative assessment of process, either by teachers or by students themselves.

JDF project backbone

This scheme of work has been created in line with the format that is applied to all James Dyson Foundation project work. This format is outlined below.

Phase one: Conception
Introduction to the contextual area and identification of problems, issues and user needs
Phase two: Development
Research into evidence and sources
Analysis of risks, scale, impact and affected people
Compilation of the design brief, project plan and evaluation criteria
Compilation of individual sketches and drawings
Phase three: Realisation
Early prototyping of possible solutions
Evaluation and iteration
Taught masterclasses to achieve technical skills
Completion of iterated and developed prototypes
Phase four: Explanation
Presented explanation of the prototype and design process
Portfolio

TOP TIPS FROM TEACHERS

Our resources have been created with the help of our champion teachers in our five Bath schools. Below are some of their hints and tips for running a James Dyson Foundation project.

Shift the focus to the design process, as opposed to assessment and producing a finished product.

If possible, arrange for students to present their work to an external visitor. This allows the students to take ownership over their project.

Teach technical knowledge through practical activities – this way students are more likely to retain this knowledge.

Remember these key words when planning lessons: Risk, failure, autonomy, iteration and prototyping

Teach failure as a technical term, not a criticism or opinion.

Create a habit of constantly documenting students' work.

Test, test, test – fail, fail, fail.

Avoid linear processes.
Avoid fixation.

Be brave!

SCHEME OF WORK

OVERVIEW

Project overview

This project challenges students to work in teams to invent and then design engineering solutions to problems or frustrations that they, or other people, face in their living, learning or working environments.

Students will draw on their own experiences and those of others to create innovative ways to tackle practical and relevant tasks.

All solutions will have a technological or engineering component demonstrating functionality, in addition to design thinking.

Curriculum mapping

This project has been mapped to the OCR J310 GCSE Design and Technology specification.

The specification identifies eight topic areas:

- Identifying requirements
- Learning from existing products and practice
- Implications of wider issues
- Design thinking and communication
- Material considerations
- Technical understanding
- Manufacturing processes and techniques
- Viability of design solutions

The scheme of work uses numbering that corresponds to the specification (e.g. 1.1, 1.2) to highlight which design and technical principles are being covered.

The iterative element of this scheme of work corresponds to the 'Iterative Design Challenge' marking criteria in the specification, covering strands 1 to 5.

OVERVIEW CONTINUED

Success criteria		
All	**Most**	**Some**
Identify a range of problems or frustrations that people face in their living, learning and working environments. Learn how these problems or frustrations affect groups of people in different ways depending on context.	Understand and describe how people in different contexts may experience different problems and frustrations in their living, learning and working environments.	Evaluate how different people experience problems and frustrations in their living and working spaces and how this affects a design.
Describe, share and categorise these problems and frustrations.	Discuss categorised problems and frustrations, considering their scale and severity.	Evaluate and rank problems so as to inform their ideas for design solutions.
Carry out basic primary and secondary research.	Use research to inform design decisions.	Use research from a range of appropriate sources to develop innovative design decisions.
Create a project plan.	Meet the main objectives of the project plan.	Revise and adapt project plans in light of testing the designs and iterations.
Categorise design ideas and know how to develop them through experimental prototyping.	Understand how design ideas can be improved through iteration.	Combine, synthesise and extend solutions into a new project proposal.
Consider the technical functionality of a design.	Explain decisions about the technical functionality of the design.	Justify decisions made with objective arguments and data.
Identify, justify and understand the technical skills required to carry out the project.	Identify and apply the technical skills required to complete the project.	Identify, apply and explain how technical skills have been used to enhance functions and outcomes.
Act as part of a team.	Make an effective contribution to a team and understand the needs of other team members.	Understand roles and strengths in working as a team and make a key contribution to achieving outcomes in a given time frame, taking into account the needs of all team members.
Make a contribution to a presentation.	Make a relevant contribution to a presentation which effectively explains the project process and outcomes.	Make a relevant contribution to a presentation which effectively explains, analyses and justifies the project process and outcomes.

WEEK 1: CONCEPTION

Overview

Students are split into teams to identify problems and frustrations that are encountered by different groups of people in their living, learning and working environments.

Resources

Opportunity to invite social care professional in to give examples of problems people face in their living environments.

Useful references

IKEA, 'Life at home'
www.lifeathome.ikea.com

RoSPA, 'Safe at home'
www.rospa.com/home-safety/advice/safe-at-home

Planning

Learning objectives	Teaching and learning activities
Understand and identify how people in different situations may face a range of problems or frustrations in their living, learning and working environments. Learn that designs have different user experiences.	Provide stimulus material to initiate discussion. Examples by professionals working in health or care settings are desirable, but videos such as **RoSPA's 'Safe at Home'** can be used. Students draw on their own experiences of frustrations and problems they experience at home or school. They compile an individual list of issues identified during a typical day. **Note:** In situations where personal experiences may be inappropriate, experiences of other people known to students can be equally valid.
Understand that design and normality are concepts that are relative and vary from person to person.	Students work in groups to identify problems that people might face when taking part in everyday activities in these environments. Students carry out initial secondary research to identify common or serious problems. Students follow the research with a classroom discussion to identify the range of people who are likely to be affected by specific problems. Students compile a table listing their findings (this will be the team's source of design challenges): – Problems/frustration – Who is most affected?

WEEK 1: CONCEPTION CONTINUED

Systemically categorise research findings	Students work in teams to evaluate the list.
Understand and apply techniques to identify a specific problem or frustration which is relevant and has the potential for solutions or improvements.	Students systematically identify one problem or frustration they are interested in solving, categorising them by scale, severity and relevance. If problems seem too broad, a range of scenarios listed below can be used to create a narrower focus. – Getting up, meal times, mobility – Falls, burns, medicines – Fire, electrical equipment, DIY and garden safety

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
1.1. Explore a context: a. Considerations for exploring a context should include: i. Where and how a product is used. ii. Identifying user and wider stakeholder requirements. iii. Understanding cultural, moral and economic factors. **2.1. Opportunities and constraints:** a. Initial critique of existing designs, systems and products.		**Strand 1:** Investigate context.

WEEK 2: CONCEPTION AND DEVELOPMENT

Overview

Students work in teams to explore solutions to a specific problem through mind mapping and sketching design possibilities.

Resources

Sketching prototypes

Prototyping materials: card, paper, tape and glue, CAD and 3D printing if available

30-minute masterclass on the creation of design ideas

Useful references

Bill Nicholl, 'This isn't my project' (in Jones and de Vries, International Handbook of Research and Development in Technology Education, 2009)

Keith Sawyer, 'Explaining Creativity: The Science of Human Innovation', 2011

Michael Mikalko, 'Creative Thinkering: Putting Your Imagination to Work', 2011

Biomimicry.net

Planning

Learning objectives	Teaching and learning activities
Analyse the design problem. Simplify the challenge into the key functions and actions required.	Students deconstruct the problem, identifying main components and critical factors.
Experiment and combine ideas to create novel and innovative possibilities for solutions.	Students use a range of techniques to generate initial ideas. These should avoid fixation on given solutions. Strategies could include ambiguity, risk and wrong-thinking. **Note:** Students should be encouraged to use a wide range of creative techniques. **Consider the following creative techniques:** – Analogy – Biomimicry – Attributes analysis – Mind mapping – Morphological analysis

WEEK 2: CONCEPTION AND DEVELOPMENT CONTINUED

Illustrate potential solutions.	Please refer to the useful references section above to find out more about these techniques. Teams agree on a shortlist of 2–4 possible design solutions. This may include ideas which do not appear practicable. These should not be rejected at this stage. The making and prototyping of these designs will help students evaluate their ideas. Students create individual sketches.
Compare and interpret selected ideas through making.	Students create rapid (30–40 mins) design prototypes to demonstrate main features of the designs.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
4.1. Communication of design solutions: a. Use of graphical techniques including: – 2D/3D sketching – Sketch modelling – Flow charts **4.2. Information and thinking when problem solving:** a. Awareness of different design approaches. b. Collaboration to gain specialist knowledge.	**5.2. Select appropriate materials:** b. Physical and working properties. **6.1. Structural integrity:** a. Reinforcement to withstand stresses and forces.	**Strand 1**: Design brief. **Strand 2:** Generation of initial ideas. **Strand 5:** Analysis and evaluation of sources.

WEEK 3: DEVELOPMENT

Overview

Students create a plan that will guide their project. They also evaluate their designs and initial prototypes to choose which ideas they will carry forward.

Resources

Project plan template (page 24)
Testing and measuring equipment, CAD simulation, if appropriate
Sketching materials
Prototyping materials

Planning

Learning objectives	Teaching and learning activities
Describe, test and evaluate shortlisted ideas.	Students carry out an evaluation and critiquing session. Students use a range of techniques to evaluate the potential of each design and prototype. Students should consider: – A range of tests with peers/users or experts – Analysis techniques such as: COCD Box analysis or 'New, useful, feasible' (NUF) tests. – Basic product analysis.
Select a design and prototype to develop.	Each team identifies one preferred design solution for further development.
Design a plan to achieve agreed objectives within the given time (6 weeks according to this timeline). Understand the role of the plan as a working document.	Students complete **Project plan template** (page 24) to list tasks, roles, timelines, deadlines, resources needed and skills required.
Propose a design solution and negotiate project planning with teachers.	Students produce individual sketches of a prototype of the chosen product or system. The prototype should demonstrate intended technical functionality.
Identify key characteristics of proposed design solution.	Students categorise the following: function, purpose, possible materials, possible components, methods of making and initial comparison with existing solutions and products.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
1.1. Explore a context: a. Considerations for exploring a context should include: ii. Identify user and stakeholder requirements.	**1.2. Userability:** a. Userability interaction: ii. Ease of use and inclusivity of design solutions.	**Strand 1:** Investigate existing products. **Strand 2:** Design developments.

WEEK 4: DEVELOPMENT AND REALISATION

Overview

Students start to master the skills required to build their prototype and begin their first iteration.

Resources

Project update template (page 24)

Masterclasses in various skills, set up according to demand from students. Possible classes could include: CAD/CAM, 3D printing, electronics and control, material categories, properties and structures.

Range of materials (may need access to a range of polymers, composites, alloys, fibres and fabrics).

Hand, power and specialist tools.

Planning

Learning objectives	Teaching and learning activities
Identify skills required to achieve a design outcome.	Students identify what skills are required to make their prototypes in **Project plan template** (page 24). Negotiate masterclasses to support the learning of these skills.
Apply skills necessary for prototype to function.	Students commence the first iteration of their prototype.
Summarise design ideas.	Students complete **Project update template** (page 24).
Revise and update project plan.	Students revise and update their project plans to identify further skills that might be required to build their prototypes.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
7.1. Materials and processes	**5.2. Selecting appropriate materials:** a. Characteristic properties of materials including density, hardness, durability, elasticity, resistance, as appropriate. **6.4. Electronics systems providing functionality:** a. Response of sensors and control devices. b. Use of devices to produce outputs. c. Programmable components. **7.4. Digital design tools:** a. Use of 2D and 3D digital technology: – Rapid prototyping – CAD/CAM **7.2. Manipulate and joining materials.**	

WEEK 5: REALISATION

Overview

Students learn the process of design iteration by presenting their first prototypes and providing peer feedback.

Resources

Sketching materials

Prototyping materials

Design engineering and iteration (page 26)

Top tips from Dyson engineers: Giving presentations (page 28)

Top tips from Dyson engineers: Providing peer feedback (page 29)

Presentation media

Planning

Learning objectives	Teaching and learning activities
Recognise the cyclic process of design iteration. **Note:** Iteration is the cyclic process of prototyping, testing, analysing and refining a product. Testing of a prototype prompts changes and refinements to the design.	Refer students to **Design engineering and iteration** (page 26) to help them understand the importance of iteration to improve their designs.
Analyse key environmental impact.	Students continue the development of prototype and carry out brief environmental lifecycle analysis of proposed solution.
Justify and explain development to date.	Students review progress and present development to date in 5-minute presentations. Refer students to **Top tips from Dyson engineers: Giving presentations** (page 28).
Debate strengths and weaknesses of proposed design prototypes and provide constructive feedback.	The whole class provide feedback to each team based on their presentations. Students can refer to **Top tips from Dyson engineers: Providing peer feedback** (page 29).
Reflect on feedback.	Students revise and update project plans to develop the second iteration of their prototype based on feedback.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
2.1. Opportunities and constraints: a. Initial critique of existing designs, systems and products. vi. Impact on the environment, life cycle assessment.	**5.3. Origins of materials:** e. Consideration of recycling, resue and disposal of materials.	

WEEK 6: REALISATION

Overview

Students reflect on the feedback they have received and complete further iterations of their prototypes.

Resources

Sketching materials
Mechanisms and programs for control and movement, if appropriate
Components
CAD and 3D printing

Planning

Learning objectives	Teaching and learning activities
Make judgements from received feedback on appropriate use of concepts, design and making processes.	Students agree design criteria for further iteration of prototype. **Note:** Iterated version must be different or improved from previous iterations. Students incorporate structural integrity and strength into their material choices for their prototypes. Students identify evaluative methods in terms of users, peers and experts. Students adapt prototypes to meet new requirements and match design attributes back to original design brief. They should also conduct final checks on functionality.
Evaluate and justify own performance against criteria.	Students continue design iteration and develop their final prototype.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
8.1. Cost and availability of materials: a. Significance of the cost of specific materials.		**Strand 4:** Quality of planning for making the final prototype. Use of specialist techniques and processes. Use of specialist tools and equipment.

WEEK 7: PRESENTATION

Overview

Students reflect on the feedback they have received and complete further iterations of their prototypes.

Resources

Top tips from Dyson engineers: Giving presentations (page 28)

Top tips from Dyson engineers: Providing peer feedback (pages 29)

Appropriate setting for presentation and demonstration of student prototypes

Planning

Learning objectives	Teaching and learning activities
Present, explain and justify their final iteration.	Students prepare a presentation of their final prototypes. Students present this to an audience. **Note:** It would be helpful if this is a third-party audience, especially if it includes professionals, as it provides opportunity for interactive discussions. If this is not possible, it is helpful if school staff, including leaders, can experience the presentations and provide feedback. Refer students to **Top tips from Dyson engineers: Giving presentations** (page 28).
Provide constructive feedback to peers.	Refer students to **Top tips from Dyson engineers: Providing peer feedback** (page 29).

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
4.1. Communication of design solutions.		**Strand 2:** Development of final design solution.

WEEK 8: EVALUATION

Overview

Students reflect on the project and evaluate the success of their prototypes.

Resources

Assessment mark sheet (pages 31–33)

Planning

Learning objectives	Teaching and learning activities
Demonstrate understanding of key outcomes of evaluation.	Students complete the evaluation criteria outlined in **Assessment mark sheet** (pages 31–33). **Note:** Evaluation can take multiple forms and does not need to rely on the assessment mark sheet. Teachers could use this as an opportunity to incorporate their examining board's marking criteria into student evaluation.

Curriculum mapping

Design skills	Technical skills	Assessment of iteration
		Strand 3: – Quality of chronological progression. – Quality of final design solution.

STUDENT WORKSHEETS

PROJECT PLAN TEMPLATE

Task	Person	Resources	Skill	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6	WK 7	WK 8
Conception: Creating ideas											
E.g. Investigate existing solutions	Design team	Computer Internet	NA								
Development: Research and analysis											
Realisation: Prototyping and evaluation											
Presentation: Presenting and justifying											

PROJECT UPDATE TEMPLATE

These prompts provide a suggested outline for you to record your project progress. However, you are encouraged to include any and all relevant information, whether or not it fits into the framework below.

The goal of our project is to develop...
Progress we have made… (describe what work you have accomplished or started, i.e. project plan, research, sketches, prototyping, etc.)
Things in the project that are going well are…
Things in the project that we found challenging are...
Things in the project that we have questions about are...
Our next steps are...

DESIGN ENGINEERING AND ITERATION

Design engineers are problem-solvers. They research and develop ideas for new products, and think about how to improve existing products.

Everything around you has been designed, from the smart phone in your pocket to the pen in your hand. Design engineers work on lots of different products. Their day-to-day job is varied but centres around the design process. Tasks may include brainstorming, sketching, computer-aided design (CAD) or prototyping new ideas.

An important design process is iteration. This is the repetitive method of prototyping, testing, analysing and refining a product.

Consider Dyson's vacuum cleaner tools.

Dyson engineers noticed that the spinning action of the brush bar on Dyson's Carbon Fibre Turbine Head could cause hair or other long fibres to wrap around the bar, slowing it down or stopping it altogether.

Instead of ignoring this problem, Dyson engineers set out to design a solution. The design brief: Create a cleaner head that doesn't tangle hair or fibres.

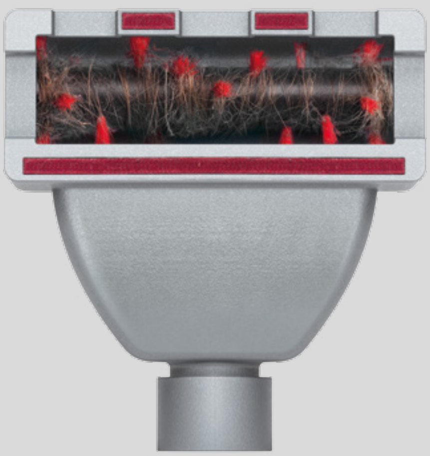
Design engineers thought about the fact that rubbing hair in a circular motion creates a ball – easy to suck up and no tangles. With this theory in mind, they tested dozens of ways to simulate the circular motion. The result was two counter-rotating discs, each with sturdy bristles, enclosed in polycarbonate casing. The spinning discs ball the hair, then it is sucked straight into the vacuum cleaner bin. Hygienic – with no mess.

Iterative design processes result in better solutions and better technology.

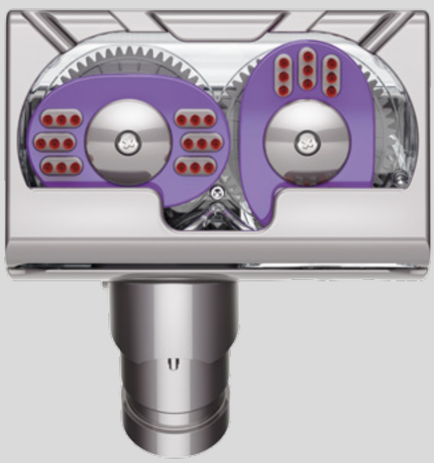
Repeat:

1. Explore
2. Create
3. Evaluate

Regular brush bar.
Tangles.



Counter-rotating discs.
No tangles.

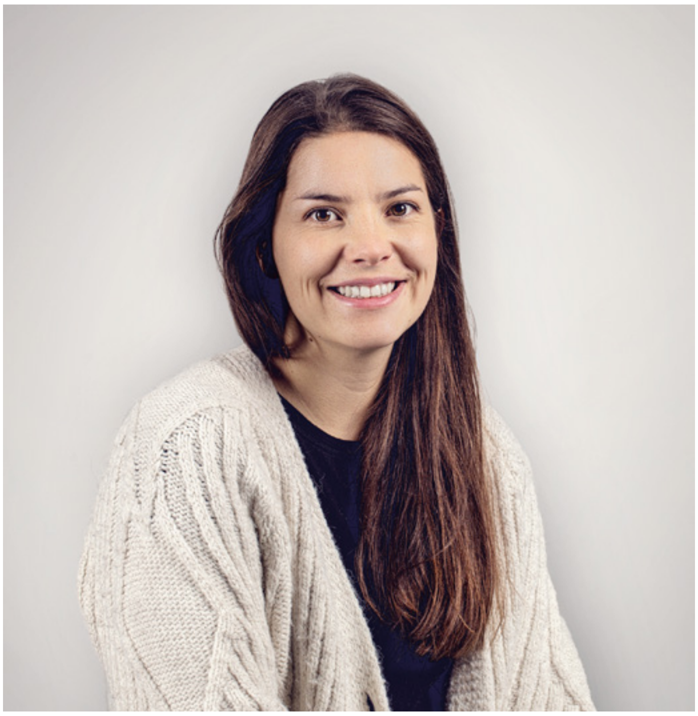


MEET THE DYSON ENGINEERS

Laura

Design Engineer at Dyson

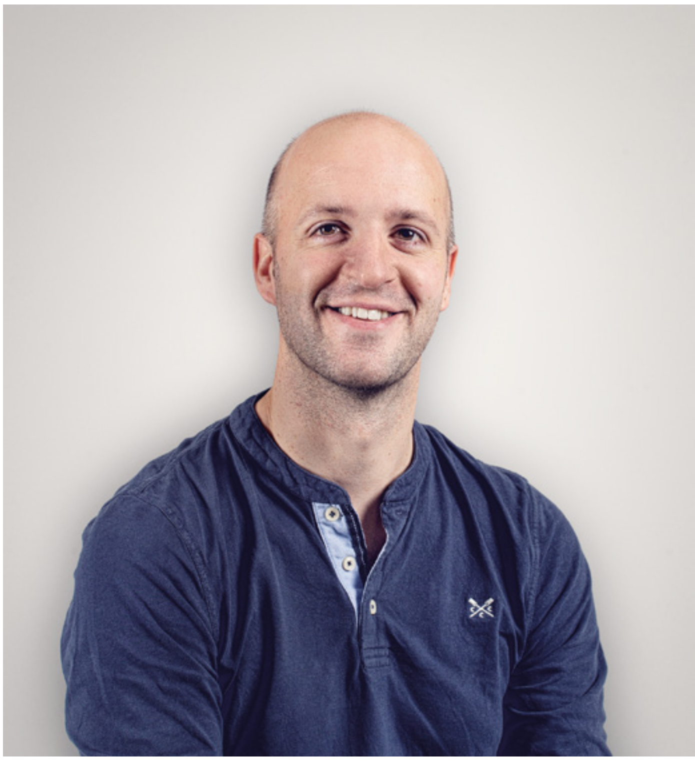
I found engineering through a combined enjoyment of art and maths. While I loved both, I didn't want to spend my time solely doing one. Engineering is a great combination of the two, with the logic of maths but the creativity of art. I wasn't aware of engineering as a potential career option until I applied to the Arkwright Scholarship as a teenager. At this point, I realised how many different engineering specialities there were to choose from – some of them technical, but some much less so than I had originally thought. The wide range of possibilities available through engineering became clear, and I saw the potential to make a real difference to the world. Dyson gives me the opportunity to be creative, whilst still being backed up by the logic of maths and physics.



George

Senior Design Engineer at Dyson

When I started secondary school, my Grandfather took me to Coventry Transport Museum and I saw Thrust SSC (the current holder of the World Land Speed Record and first to break the sound barrier). I was fascinated by its design and aerodynamics. I started researching engineering feats: The Shinkansen (Bullet) train, Concorde, International Space Station and more. I wanted to find out everything about them – how they work and what technologies they use. I can't think of any other profession that would give me the freedom to design and build multiple prototypes, to learn through failure and success, and to create iterative changes and see their effects first-hand. Engineers are always pushing the limits, finding new materials, technologies and methods to solve problems that are important to society. I wanted to be a part of that community, inspiring through STEM (and design!) and making a difference with my career.



TOP TIPS FROM DYSON ENGINEERS

Giving presentations

Laura, Design Engineer at Dyson

Being able to present your work is an incredibly valuable skill for engineers. It allows engineers to explain how their ideas have developed and how their prototype will function. This then prompts feedback from the stakeholder on the work done so far. This guide will help you to present your work successfully to your stakeholders.

Tip	Actions	Examples
Make your presentation attention-grabbing.	Welcome your stakeholders with a thank you. State how you would like to deal with questions. Maintain eye contact and smile.	'Hello, welcome and thank you for joining us today!' 'We would like you to ask questions at the end of the presentation.'
Clearly state the purpose of your presentation.	Summarise the aims of your presentation in one or two sentences. Your presentation must make sense to anyone who watches it.	'We're going to present our prototype…' 'It solves the problem in this way…'
Be concise.	Follow a simple structure. Organise who is speaking and when.	'We chose this **design** because…' 'We used these **techniques** to develop it…' 'Our prototype **functions** in this way…'
Be confident.	Practice beforehand to ensure you are clear on what you want to say and can deliver it with confidence. Speak loudly and clearly. Believe in your design and prototype. If you are using PowerPoint, use pictures rather than words to make sure you are talking to your stakeholders, instead of reading your PowerPoint out loud. Keep on topic! Time yourself, practising your presentation to make sure you don't overrun.	

TOP TIPS FROM DYSON ENGINEERS

Providing peer feedback

George, Senior Design Engineer

Giving and receiving feedback is incredibly valuable for engineers. Constructive criticism offers insight that the designer may not have considered and provides direction for future iterations. This guide will help you prepare your insights and suggestions so that they are well received and highly valuable to your design team.

Tip	How to...	Examples
Ask questions!	Prepare as many questions as possible. Make sure to begin by praising the team for their efforts. If you are struggling, think about how you would do things differently. Ask what their next steps are.	**Don't:** 'We don't think the prototype works very well.' **Do:** 'Please could you explain to us how your prototype functions? Have you thought about another way it could function?'
Put yourself in their shoes.	Think about how and why they may have done things a certain way.	**Don't:** 'You should have done it like…' **Do:** 'Why did you choose to do…?'
Prioritise your feedback.	Focus on the most pressing issues first. Don't look to show up the designers. Instead, ask questions and offer solutions.	**Don't:** 'What colour is the on/off button going to be in the final prototype?' **Do:** 'The user said she can only carry up to twenty pounds at a time, so how can you make your design lighter?'
Feedback should be informative and educational.	Give specific examples and, when possible, context for what you like or dislike about a design and why. Use the word 'because'.	**Don't:** 'I don't like this.' **Do:** 'I don't think this will work because…'
Don't focus on only the positive or the negative.	Be sure your critique of the team's work is balanced and sensitive.	**Don't:** 'This looks ugly' or 'this looks good.' **Do:** 'I like the changes you made to the handlebars, but I think a different material might make the grip more comfortable and look better.'
Provide constructive criticism.	Don't use words like 'always,' 'never,' 'best,' 'worst,' etc.	**Don't:** 'This feature will never work.' **Do:** 'The Wi-Fi-activated alarm wouldn't work well, because it means you need to have access to Wi-Fi at home, which some people don't.'

ASSESSMENT

ASSESSMENT MARK SHEET

Generation of initial ideas	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
A wide range of solutions were investigated.	1	2	3	4	5
Designs were innovative or provided novel improvement to an existing design.	1	2	3	4	5
Complex design solutions were attempted.	1	2	3	4	5
Ideas were relevant and addressed the identified problem.	1	2	3	4	5
Comments:					

Design developments	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
First ideas were explained and improved into better potential solutions over the course of the project.	1	2	3	4	5
Refined ideas still met technical requirements.	1	2	3	4	5
Next steps were clearly defined.	1	2	3	4	5
Work was completed in a collaborative manner, combining methods and ideas.	1	2	3	4	5
Comments:					

Materials	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
A wide range of possible materials were considered.	1	2	3	4	5
The most appropriate of the available materials were selected to create prototypes.	1	2	3	4	5
Comments:					

ASSESSMENT MARK SHEET CONTINUED

Quality of the presented prototype	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Realistic choices were made when selecting materials.	1	2	3	4	5
Best possible making techniques were used to make an effective prototype.	1	2	3	4	5
The prototype demonstrated how it would work.	1	2	3	4	5
A range of techniques were used that were appropriate to materials/components.	1	2	3	4	5
The prototype showed exactly how the solution to the problem would function.	1	2	3	4	5
Comments:					

Use of tools and equipment	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The right tools and equipment were selected to make the most effective prototype.	1	2	3	4	5
Design software was applied to enhance the designing and making process.	1	2	3	4	5
Comments:					

Functionality of the final prototype(s)	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
The key technical functions were clearly demonstrated.	1	2	3	4	5
Comments:					

ASSESSMENT MARK SHEET CONTINUED

Testing and evaluation	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Evaluation of design decisions was carried out throughout the project.	1	2	3	4	5
Tests and evaluations helped refine and improve design solutions.	1	2	3	4	5
Systematic and evidence-based reviews were used to identify problems.	1	2	3	4	5
Feedback was used to inform design improvements.	1	2	3	4	5
Comments:					

Design communication	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Designs and prototype/s were well presented. They accurately demonstrate how the prototype solves the identified problem.	1	2	3	4	5
The iterative design process was evident in the work presented.	1	2	3	4	5
Comments:					

Final Score	/ 120
Overall comments:	