THE
JAMES
DYSON
FOUNDATION

2022

Our mission is to inspire the next generation of engineers

As a society, we are failing to help young people by not connecting the science, design, technology and maths they learn in the classroom with the exciting and important engineering problems and solutions in the outside world.

Sir James Dyson
Founder and Chief Engineer

INSPIRING THE NEXT GENERATION

The James Dyson Foundation works on a global scale to inspire young people about the exciting world of engineering. We work with primary school children through to university students and graduates, to ensure they have the knowledge and support needed to pursue their engineering ambitions. We also support medical and scientific research projects, and charitable causes that are local to Dyson.

We work across 30 countries and regions, with a focus on the UK, US, Japan, Singapore, Malaysia and Philippines. We're a registered charity, supported by Dyson and, to date, James and the James Dyson Foundation have donated more than £140m to charitable causes.

In 2022, the Foundation conducted over 1000 workshops and events across the world reaching 1 million young people. This includes rapid prototyping workshops that challenged students to design and build solutions to air pollution; robotics workshops which saw students coding robots; and large scale events engaging young people with our Challenge Cards. Our downloadable and physical resources reached 1.5 million students. This includes our updated Engineering Box featuring the latest Dyson cordless vacuum technology in the UK and donations of 250 air quality monitoring devices to schools around the world as part of our air pollution educational resource.

We received over 1600 entries to the James Dyson Award, an international design competition for university students and graduates. We also invested £1m in pioneering dementia research being conducted at the University of Edinburgh through the charity, Race Against Dementia. Our total spend for 2022 was just under £3m.

The James Dyson Foundation provides the mentorship, materials and money that budding inventors need so they can get hands-on with problems, think laterally and find solutions.

To date, James and the James Dyson Foundation have donated more than £140 million to charitable causes.

Engineering plays a central role in driving innovation, technological progress and economic growth throughout the world. Yet the gap between the demand and supply of engineers is widening in many countries.

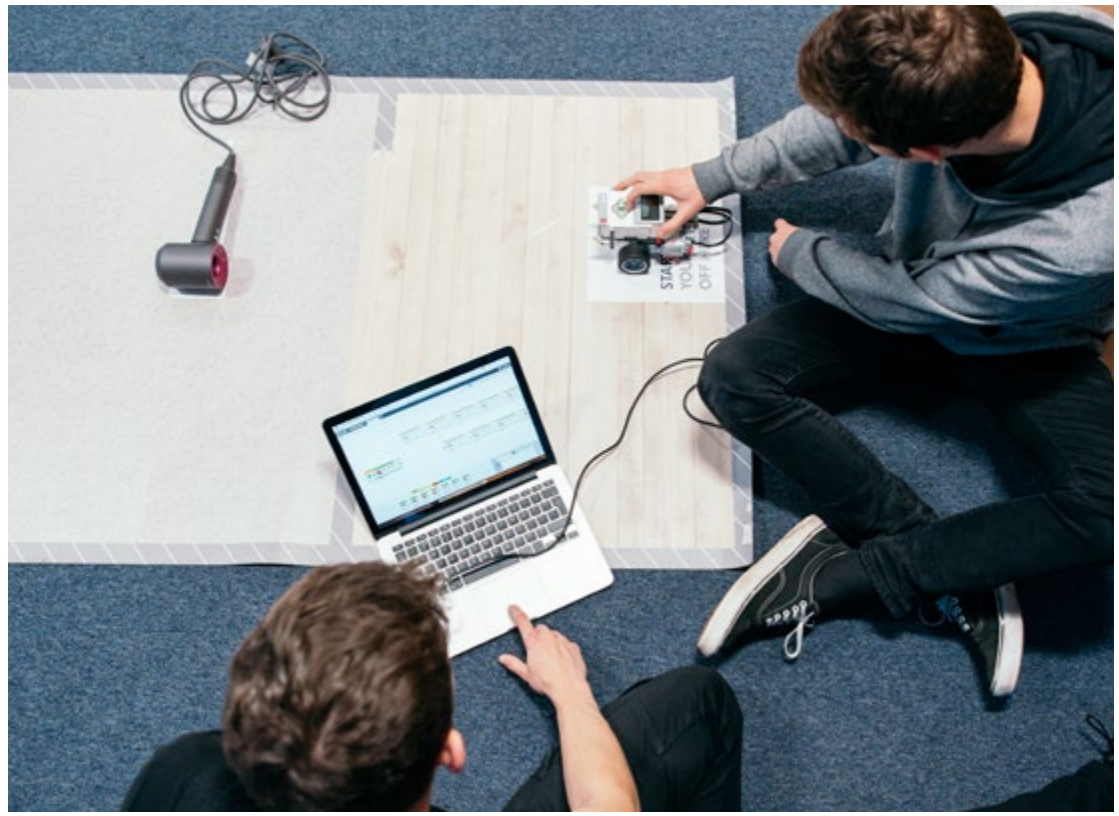
We believe that addressing this global shortage of engineers starts in the classroom.

Working with the James Dyson Foundation has introduced me to lots of interesting, inquisitive young people. It's really exciting being able to talk about the variety of activities I get involved in at Dyson. There are always one or two pupils whose faces light up, realising this is exactly what they want to do for their career. They just didn't know it was an option before.

Dominic
Dyson Mechanical Engineer

In 2022 we delivered over 1000 workshops and events, reaching 1 million students. This includes rapid prototyping workshops that challenge students to design and build solutions to air pollution as well as everyday problems in a home or school environment; robotics workshops that challenge students to code robots to navigate a space; and workshops at universities across 29 countries and regions to inspire students to enter the James Dyson Award.

We also participate in large scale STEAM events challenging young people to get hands-on with engineering challenges. All our workshops and events were supported by over 400 Dyson engineers in 2022.




INSPIRES THE
NEXT GENERATION
OF ENGINEERS

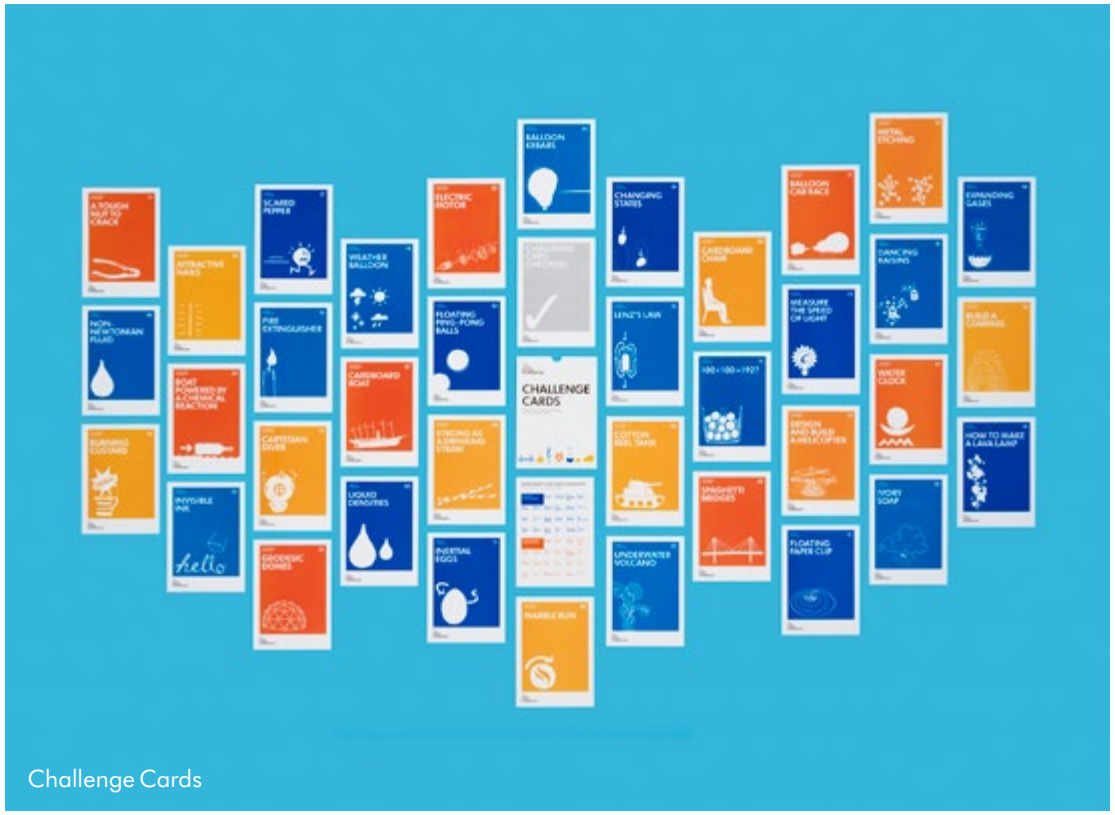
In 2022 we helped inspire 1.5m students across the world about engineering through our free educational resources based on Dyson's approach to engineering.

These resources give an insight into the life of a working engineer. Our resources are free to order and download from our website.

Challenge cards

The Foundation worked with Dyson engineers to develop challenges designed for children to try at home or in the classroom. The cards come in a pack of 40 and are distributed at events and workshops. They can also be downloaded from our website.

The Challenge Cards were particularly useful for supporting at-home learning during Covid-19 lockdowns, particularly in China in 2022.



Challenge Cards

Challenge Card workshop
Malaysia

Our physical resources

We sent out nearly 1600 physical resources in 2022 – getting students hands-on with Dyson technology. These resources reached around 70,000 students.

Design Process box

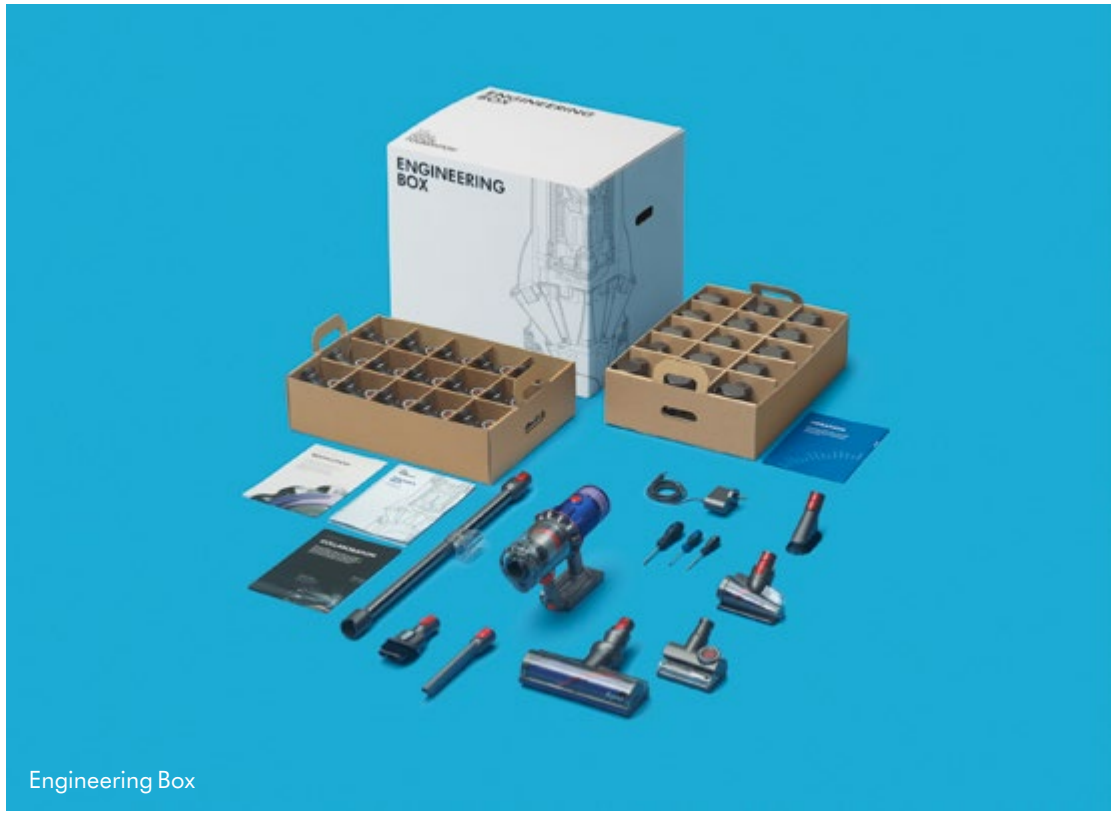
Our primary school resource introduces students to the design process, nurturing problem-solving skills engineers use every day.

The Design Process Box is a free resource to help teachers (non-specialists included) bring engineering into the classroom. Using the Dyson Air Multiplier™ fan as an example, the Design Process Box contains a comprehensive teacher's pack, lesson plans, videos and posters to guide students through the design process. Schools loan the box for six weeks, free of charge – with delivery and collection included.

Engineering Box

Our secondary school resource introduces students to the engineering behind Dyson technology. Students get to think and act like real engineers, taking on real-world problems and building their own solutions. The Engineering Box includes a Dyson V12 Detect Slim Animal™ Vacuum, Tangle-free turbine heads, and Anti-tangle screw heads. Students take these apart, using the screwdrivers provided, to better understand how the technology works. The box also contains a comprehensive teacher's pack, lesson plans, videos and posters. Schools loan the box for four weeks, free of charge – with delivery and collection included.

Design Process Box



Engineering Box

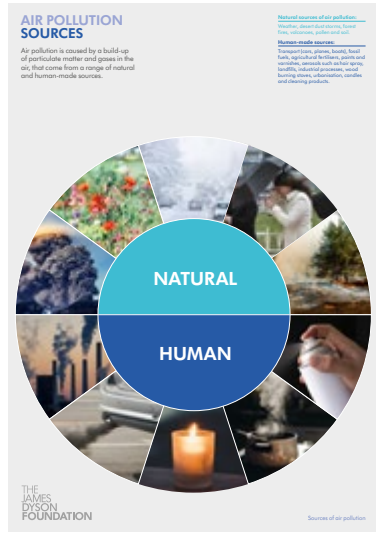
Engineering solutions: Air pollution

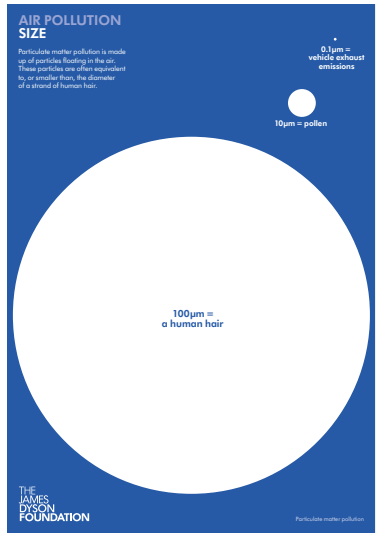
This resource introduces students to air science, the engineering behind the Dyson Pure Cool™ purifying fan and challenges them to design and build their own solution to air pollution.

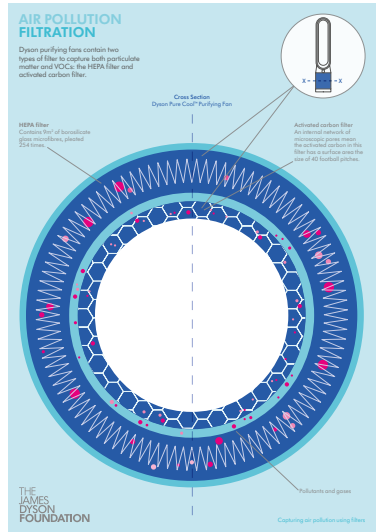
In 2022, Engineering solutions: Air pollution reached classrooms in the UK, US, Singapore, Malaysia, Philippines as well as China, Japan and Italy.

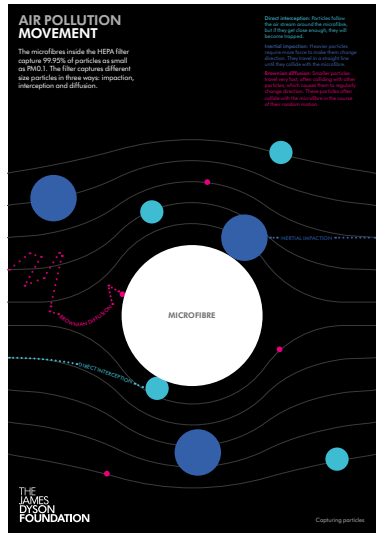
Since the resource launched in 2020 we have donated 500 air quality monitoring devices to schools across the world empowering young people to investigate the problem of air pollution in their school and on their journey to school.

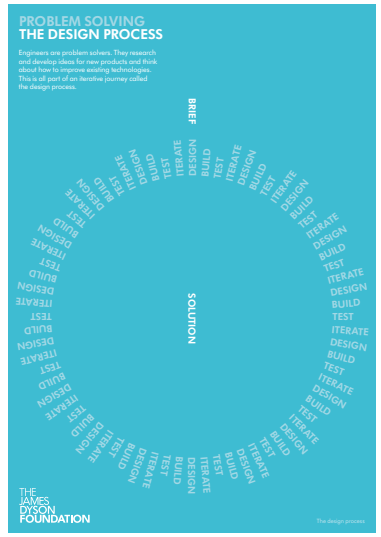
To further support this we have run rapid prototyping workshops in schools challenging students to design and build a solution to air pollution.





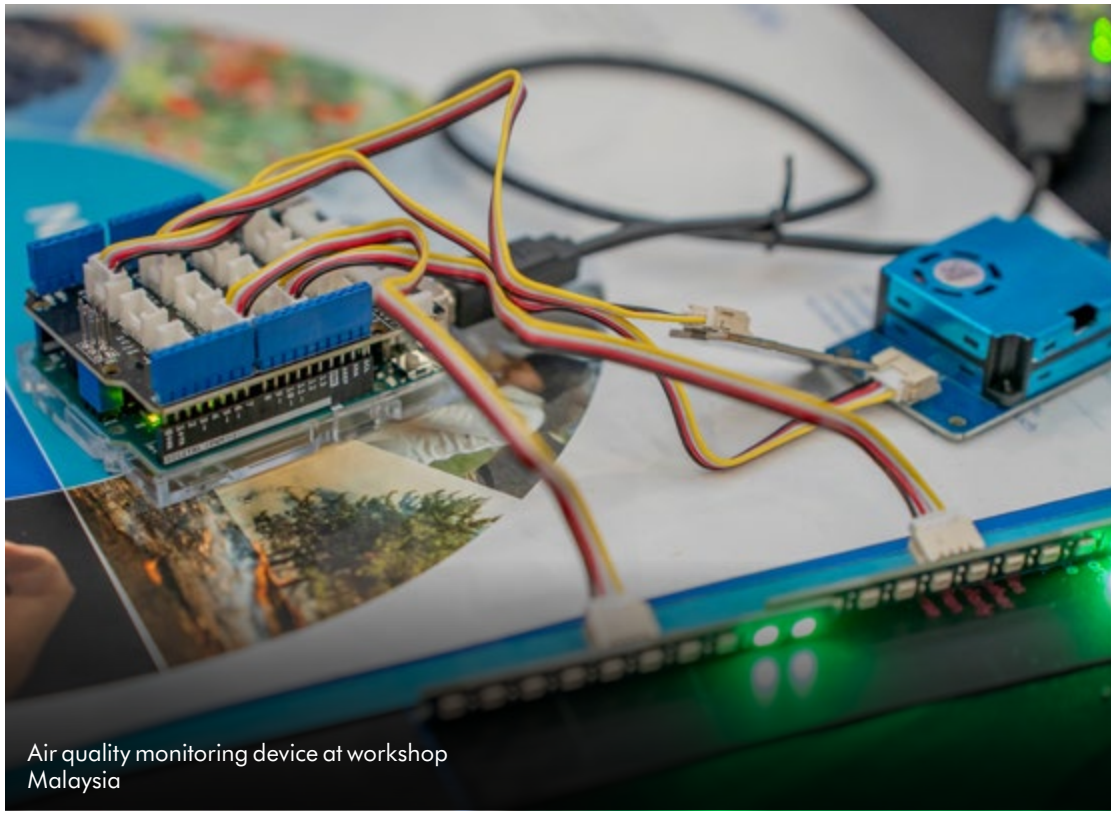






Posters included in Engineering solutions: Air pollution

Students with air quality monitoring device kits
E-ACT City Heights Academy London



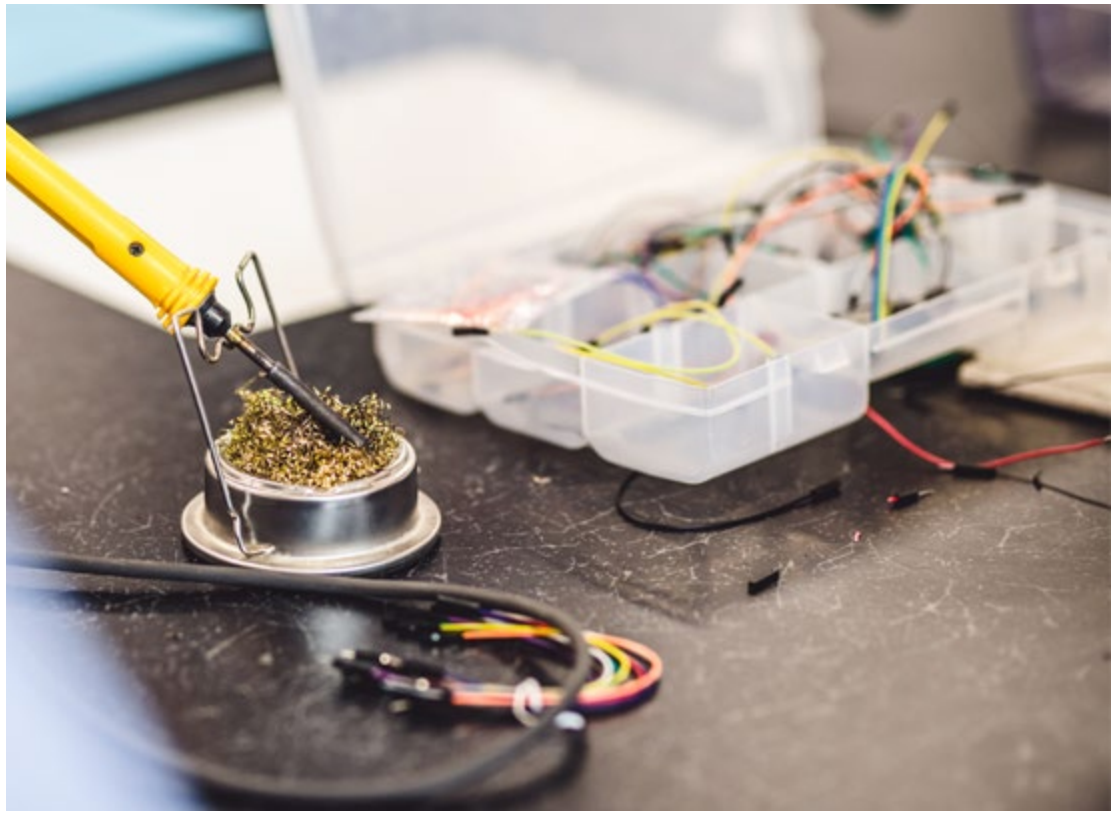
Air quality monitoring device at workshop
Malaysia

Students have been empowered by James Dyson Foundation's air pollution resource. It builds a solid foundation of air science knowledge that informs their ideas about how to solve the problem of air pollution. The hands-on and creative engineering activities allow them to take control of an issue that effects their daily lives.

Mark Martin,
Technology educator at London Southbank UTC

Rethinking Design and Technology – Schemes of work

Design and Technology (D&T) is the subject in the UK education system that most correlates to engineering careers. The Foundation believes that a D&T curriculum based on iterative design and problem-led, project-based learning is more relevant and engaging to students. As a result, students enjoy D&T more and their perception of engineering improves – so more students opt to study D&T at GCSE and A Level. And, in time, more young people choose to become engineers.



The Foundation tested its hypothesis with five schools in Bath, UK, from 2012 to 2018 by working to improve their provision of D&T with industry-standard equipment and schemes of work designed to challenge students to solve real world problems. As a result of the project:

44% more students chose to study D&T at GCSE

Nearly double stated they enjoyed D&T lessons more

Two and half times more students were interested in pursuing an engineering career

Due to the success of this project we have made the lesson plans and schemes of work free to download from the James Dyson Foundation website. You can find out more about the project in our Bath Schools Project report available on our website.

4

OUR WORK STRETCHES BEYOND THE UK

The James Dyson Foundation has representatives in North America and Asia Pacific who work to inspire the next generation of engineers in these regions through workshops, educational resources and the James Dyson Award.

North America

The Foundation reached nearly 2,500 school students through in person and virtual engineering workshops in the US, giving them a glimpse into the exciting world of engineering.

We also donated 30 air quality monitoring device kits to schools in Chicago. And a total $20,000 was donated to Chicago schools providing students with engineering and science enrichment opportunities.

Through Dyson people fundraising and the Foundation's match-funding program, $88,000 was donated to our US charity partner, Project Exploration, and other local charitable causes. We donated $66,000 worth of Dyson machines to charitable organisations funding engineering education or medical scientific research.

The James Dyson Award had 65 entries coming from the US in 2022. The US National winner, Sangyu Xi, a design student from the University of Cincinnati, invented a re-positionable scoliosis brace that adolescent patients can wear comfortably and confidently. The US celebrated the 2022 global winners with a focus on the sustainability winner, Polyformer, as it was developed by a team of design and engineering students in US and Canada.

In total, we reached over 850 Dyson people across the Americas engaging them with our Foundation's educational programs and fundraising initiatives supporting local communities around Dyson offices. This includes participating in the first ever Americas Day of Service where Dyson people volunteered at six local charities across US, Canada and Mexico, attending internal James Dyson Award talks, contributing during in office fundraisers and volunteering at school workshops.

Sangyu Xi, James Dyson Award National winner 2022

Rapid prototyping workshop at Dyson offices Chicago

Dyson people volunteering for Americas Day of Service Chicago

Asia Pacific

Through over 200 engagements across China, Japan, Malaysia, Singapore, and Philippines, the Foundation reached over 700,000 students through primary to tertiary levels. These engagements included prototyping workshops, Challenge Card events, industry talks and James Dyson Award workshops.

The Foundation announced a S$3m charitable donation to bolster Singapore's STEM education landscape. This included funding an engineering exhibition spotlighting Dyson technology and the James Dyson Award at the Singapore Science Centre. The exhibition reached over 1 million school students in 2022.

We also worked closely with Singapore's Ministry of Education running a country-wide STEM campaign encouraging local students to post videos of themselves completing our Challenge Cards. The winning teams were invited to a workshop with Dyson engineers at Dyson's offices in Singapore.

Finally, as part of this commitment we provided S$1 million to support a five-year partnership with the Singapore University of Technology and Design (SUTD), launching the Dyson-SUTD Innovation Studios. Read more about this on pages 38–39.

The Foundation worked closely with local charities in the Asia Pacific region, this includes National Cancer Council Malaysia and National Healthcare Group Fund Singapore. In 2022, Dyson people raised over £27,000 for these charities to support their mission to improve livelihood of patients through medical research.

Students taking part in a workshop at Dyson offices Singapore

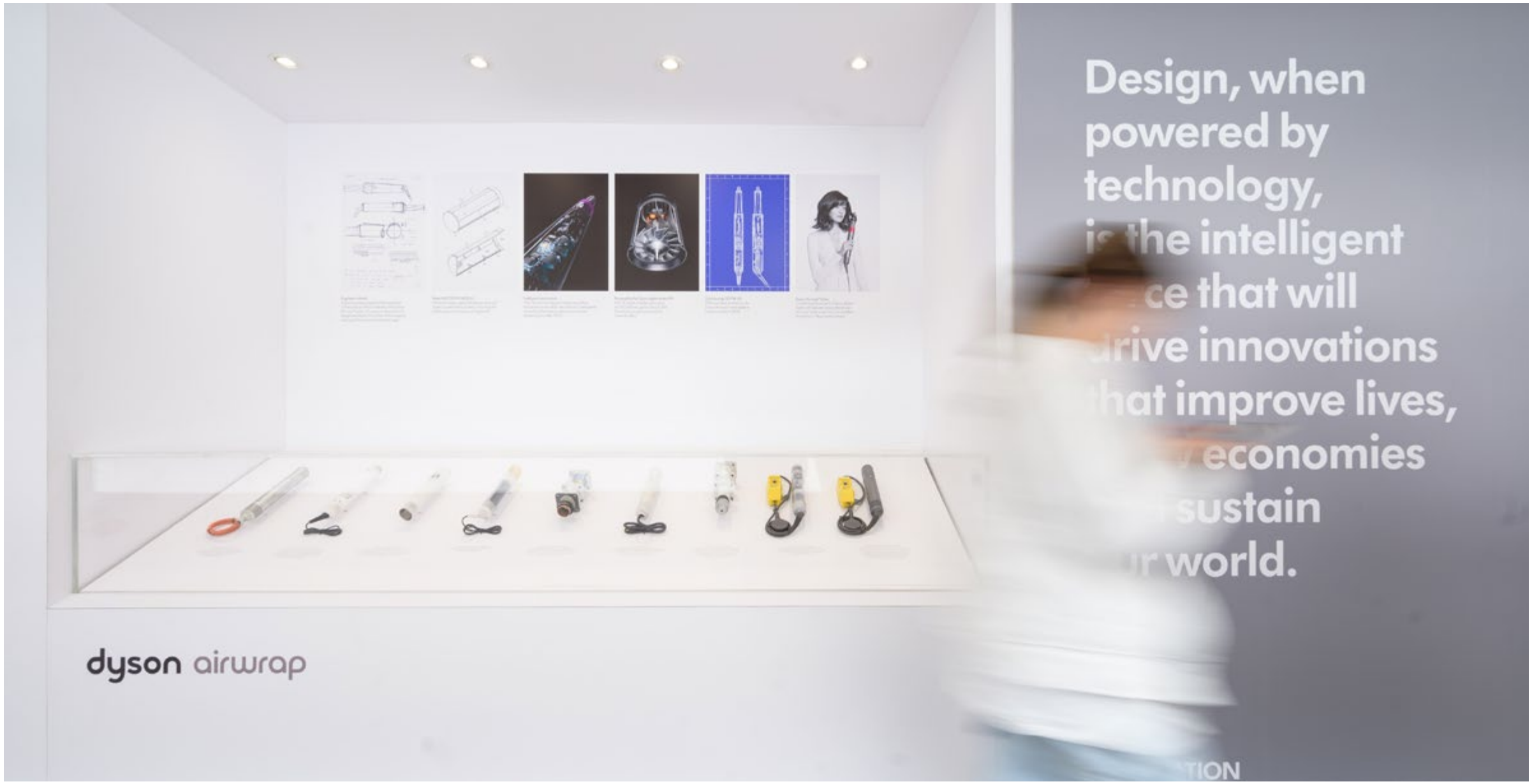
Engineering exhibition at Singapore Science Centre

Dyson – SUTD Innovation Studios

Funded by a $1 million donation from the Foundation, the Studios at the Singapore University of Technology and Design, will offer students the opportunity to work in a multidisciplinary engineering environment and be mentored by Dyson engineers.

The Studios also function as a community space to inspire public interest and participation in STEAM activities, hosting workshops that aim to expose the wider community to STEAM-related fields in Singapore.

The opening of the Studios took place in November 2022 officiated by Sir James Dyson, Professor Chong Tow Chong, President of SUTD, and Dr Beh Swan Gin, Chairman of the Singapore Economic Development Board.



A platform for great minds with great ideas

The James Dyson Award is the James Dyson Foundation's international design competition. It celebrates, encourages and inspires the next generation of design engineers. It's open to current and recent design and engineering students.

£220,000 is awarded in prize money with national winners receiving £5,000, £30,000 going to the international winner, and an additional £30,000 prize for the sustainability winner, to reward a new environmentally-conscious technology.

In 2022, the James Dyson Award ran in 29 countries and regions, receiving over 1600 entries.

SmartHEAL International winner

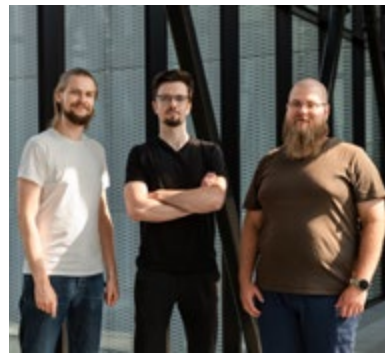
SmartHEAL is a smart sensor for dressings which indicates how well a wound is healing by measuring its pH level, invented by students from Warsaw University of Technology, Poland.

"This and will be a great opportunity for us to become part of something bigger, something we hope will change the world. We will work to perfect our prototype, obtain a patent and pass the necessary clinical trials to market SmartHEAL. We have been honoured to be welcomed by Sir James Dyson himself. His words: 'Congratulations! You are the International winners of the James Dyson Award' still ring in our ears – we're still in disbelief, joy and happiness"

SmartHEAL team, James Dyson Award International winner 2022

The problem –
When covered by a dressing, it is very hard to know how well a wound is healing. The most common mistake in wound healing is changing the dressing too often, which can lead to infections and tissue disruption.

The solution – SmartHEAL is a precise, affordable and scalable smart pH sensor for dressings. By using Radio-Frequency Identification (RFID) communication systems and monitoring the pH of a wound, SmartHEAL can assess the wound's condition and detect infection without removing the dressing, and without disrupting the tissue. Medical professionals can subsequently analyse the data and prescribe the appropriate treatment for the wound.



Polyformer Sustainability winner

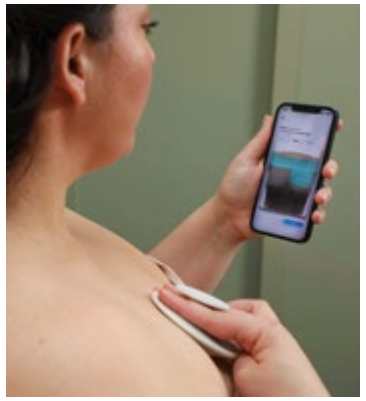
Polyformer is a machine that recycles plastic bottles into affordable 3D printer filament for developing nations, invented by students from McMaster University, Canada.

"It is a great honour to be the James Dyson Award 2022 Sustainability winner. We are using the prize money to deploy several Polyformers and Polyformer-Lites at our partner makerspaces in Rwanda. With these machines, local students, designers, and makers in Rwanda will have access to low-cost 3D printer filament. This means they can use their community's 3D printers more frequently."

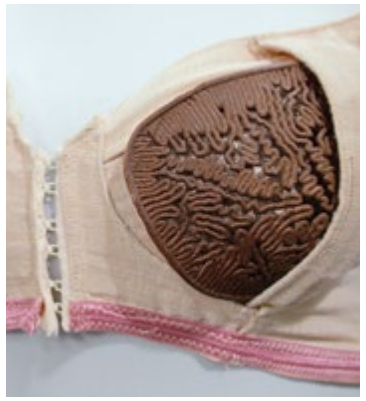
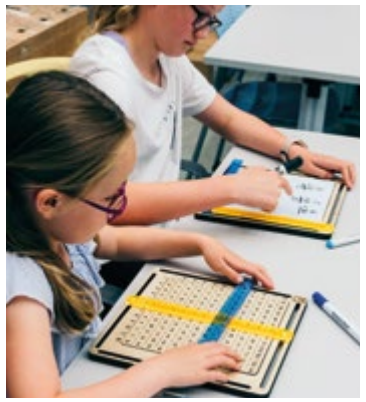
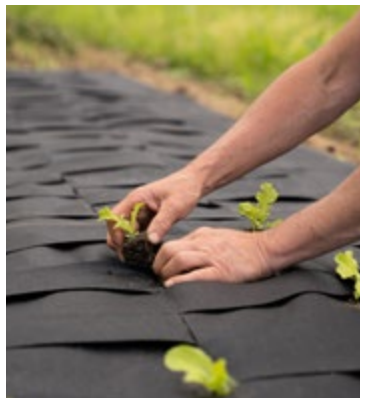
Swaleh Owais and Reiten Cheng,
James Dyson Award
Sustainability winner 2022

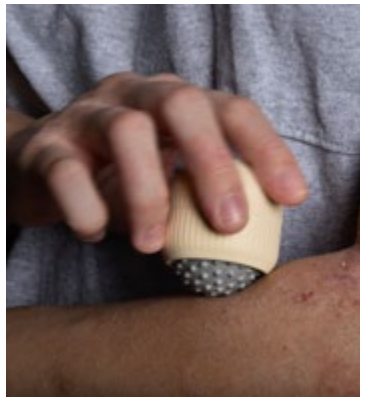
The problem – While working at a makerspace in Rwanda, Swaleh and Reiten learned that many locals could not use the makerspace's 3D printers due to the high price of importing filament into the country. They also observed the lack of infrastructure to recycle plastic bottles in Rwanda.

The solution – Polyformer is a low-cost machine that turns plastic bottles into 3D printer filament. Polyformer cuts plastic bottles into long strips that are fed into an extruder. The strip is then thermoformed into 1.75mm filament, as it goes through a nozzle. The filament is passed through vents to cool the plastic before it is wrapped around a spool, ready to be inserted into a 3D printer.







The competition gathered global interest from the press, with coverage in major media outlets such as Reuters, Evening Standard, Design Week and Poland's Polsat television channel. In total, we saw more than 2,000 pieces of coverage reaching over 300 billion people – a powerful way to expand the positive message of engineering.

Past winner success stories

Winning the James Dyson Award can help propel James Dyson Award past winner's ideas. Over 70% of International winners are commercialising their invention.

Dan Watson, inventor of SafetyNet Technologies, was the James Dyson Award 2012 International winner. SafetyNet is a light that fits onto fishing gear to combat unwanted fish and marine creatures trapped in commercial fishing nets. Casting the net wider, he's founded his company SafetyNet Technologies, delivering pioneering technology and support to build a better, sustainable fishing industry.

"SafetyNet is global now, we work all over the world. We're starting to lead in the fishing industry"

Dan Watson, Co-Founder and CEO of SafetyNet Technologies

The brightest minds and best ideas don't always have the support they need to flourish. And studying at university is an expensive venture – especially for a practical engineering course, where students need access to materials and equipment.

The James Dyson Foundation provides engineering students with bursaries, scholarships and project funding. It's just one way to make their path to a future in engineering easier.

Dyson Scholarships

In 2022, we awarded Arzina, Dulcie, Quiyan and Sharon, from Murray Edwards Collage at the University of Cambridge, with a £2,500 Mary Dyson Scholarship. These scholarships, named after James' mother who studied at the college, provide financial support to female engineering students.

We also provide scholarships to support of PhD students at Corpus Christi College at the University of Cambridge who are researching Agri-Robotics – the Alec Dyson Scholarship, in honour of Alec Dyson who studied at the college. The scholars are researching how robotics can advance agricultural practices and secure the future of food. Currently, this scholarship supports three PhD students.

Sharon is currently in her third year of studying Mechanical Engineering, with an interest in Mechanics, Materials and Bioengineering. Sharon wishes to use the Mary Dyson Scholarship to support with purchasing equipment and subscriptions to online courses, following on from the 10-week data analysis internship which enabled her to expand her coding skills.

Arzina is in her second year of studying Mechanical Engineering, with an interest in Structural Mechanics and Materials Engineering. She plans to use the Mary Dyson Scholarship to support with developing a prototype that automates agricultural processes.

Dulcie is currently in her third year of studying Mechanical Engineering, with a keen interest in programming. She plans to use the Mary Dyson Scholarship to support with the cost of a more durable and powerful laptop to enable her to work on CAD models and renderings for projects that she is designing throughout her studies.

Qiuyan is in her third year of studying Mechanical Engineering, with an interest in Electrical and Information Engineering. Qiuyan will use bursary to support maintenance costs and travel costs to conferences.

Having commenced her PhD in 2020, Haihui is researching robotic soft fruit harvesting and how you can use machine learning to teach a robot to only pick the perfect berries without damaging the fruit.

Having started his research in 2020, Jack is researching the digitalisation of environmental and crop-specific data to identify crops at different stages of growth, to allow farmers to obtain the highest yield and greatest quality produce.

Starting his research in 2022, Garry is researching the application of robotics to identify links between supply chain design and nutrition losses with the aim to create a nutrition management tool.

Building inspiring spaces

The James Dyson Foundation has made a number of major donations to universities, resulting in new engineering departments and teaching spaces. These partnerships with academic institutions allow us to impact engineering education for even more young people.

Imperial College London

We are grateful to the James Dyson Foundation for supporting our vision for Design Engineering at Imperial. It allows us to provide students with the skills and knowledge to become design engineering pioneers of the future. It has also helped us to continue inspiring and teaching our students through the pandemic.

Professor Peter Cheung
Head of the Dyson School of Design Engineering

In 2014, a £12 million donation was made to Imperial College London to open the Dyson School of Design Engineering. This helped to purchase and transform the old Post Office building on Exhibition Road into a fitting home for the new design-focused engineering department. It has state-of-the-art design studios, research labs and collaborative working spaces.

Since 2015, the Dyson School at Imperial has offered a four-year master's degree in Design Engineering.

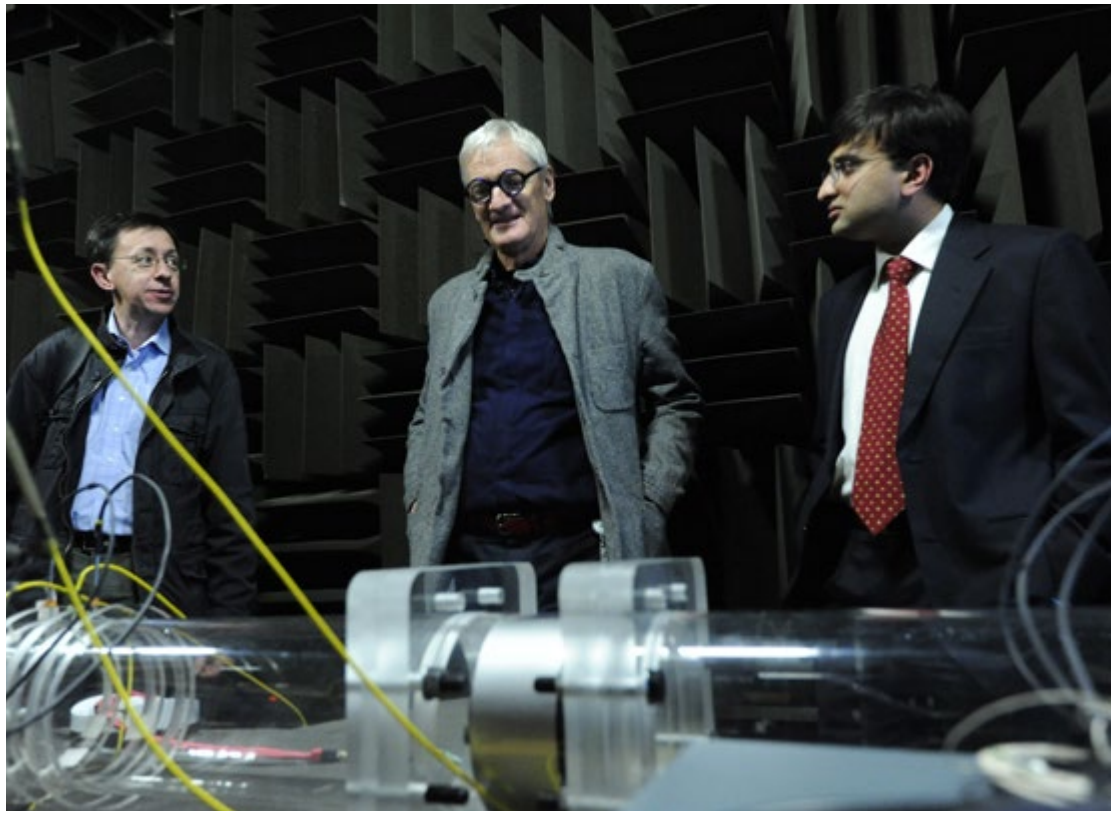
The school has 47 staff and nearly 600 students, and has a 43% female cohort (compared with a national average of 21% according to Engineering UK 2020).

University of Cambridge

The James Dyson Building at the University of Cambridge opened for use by PhD research students in May 2016, following a £6 million donation from the James Dyson Foundation. Now used by over 1000 postgraduate engineers, there have been some exciting discoveries and world-leading research conducted in the new space.

The Foundation also gave £2 million to set up the Dyson Centre for Engineering Design – a prototyping lab that's open to all undergraduate engineering students at the university.

The Centre is a space in which students have the freedom to turn their ideas into physical prototypes as well as apply the theory learnt in lectures into practical projects. It also hosts clubs, societies and James Dyson Undergraduate Bursary projects. This practical space helps to equip students with the skills they need to kick start their engineering careers.



The Dyson Centre for Engineering Design is in turn the beating heart of the Department. Students gravitate to it to transform their ideas into realities, exploring concepts learned in lectures through activities and projects that feed their particular engineering passions.

Professor Richard Prager,
Head of Department of Engineering

Gresham's School

James Dyson donated £18.75 million to Gresham's School in Holt, Norfolk, where he studied himself, to build a new centre for Science, Technology, Engineering, Arts and Mathematics (STEAM) education. The Dyson STEAM Building was completed this year and opened for student learning in September.

The building is located at the heart of Gresham's Senior School. It is the first of its kind in the UK and will encourage new approaches to teaching STEAM subjects in a collaborative, hands-on approach.

The teaching spaces contain the latest technology to increase the breadth of STEAM learning at the school – from robotics and programming, to Artificial Intelligence (AI) and machine learning, all with the objective of encouraging the uptake of engineering and science subjects.

The building also provides an opportunity for Gresham's to build its school outreach programme – hosting over 1000 students from 25 local schools in 2022 as part of a STEAM outreach programme which utilised the James Dyson Foundation Challenge Cards.

This is by far the largest donation the school has ever received and the new spaces will have an immense impact on the quality of STEAM education our students receive, now and for decades to come.

Douglas Robb, Gresham's Headmaster

Beyond inspiring the next generation of engineers, the James Dyson Foundation supports medical research and charities local to Dyson.

The Malmesbury community

The James Dyson Foundation offers financial and educational support to local projects, schools and charities in Malmesbury, where Dyson's offices are based in the UK. In total, we donated £30,000 to the local community in 2022. This includes funding engineering equipment for local schools, donations to local youth organisations, Malmesbury Foodbank, hospitals, and events such as Malmesbury Carnival and Malmesbury in Bloom.

Global charities

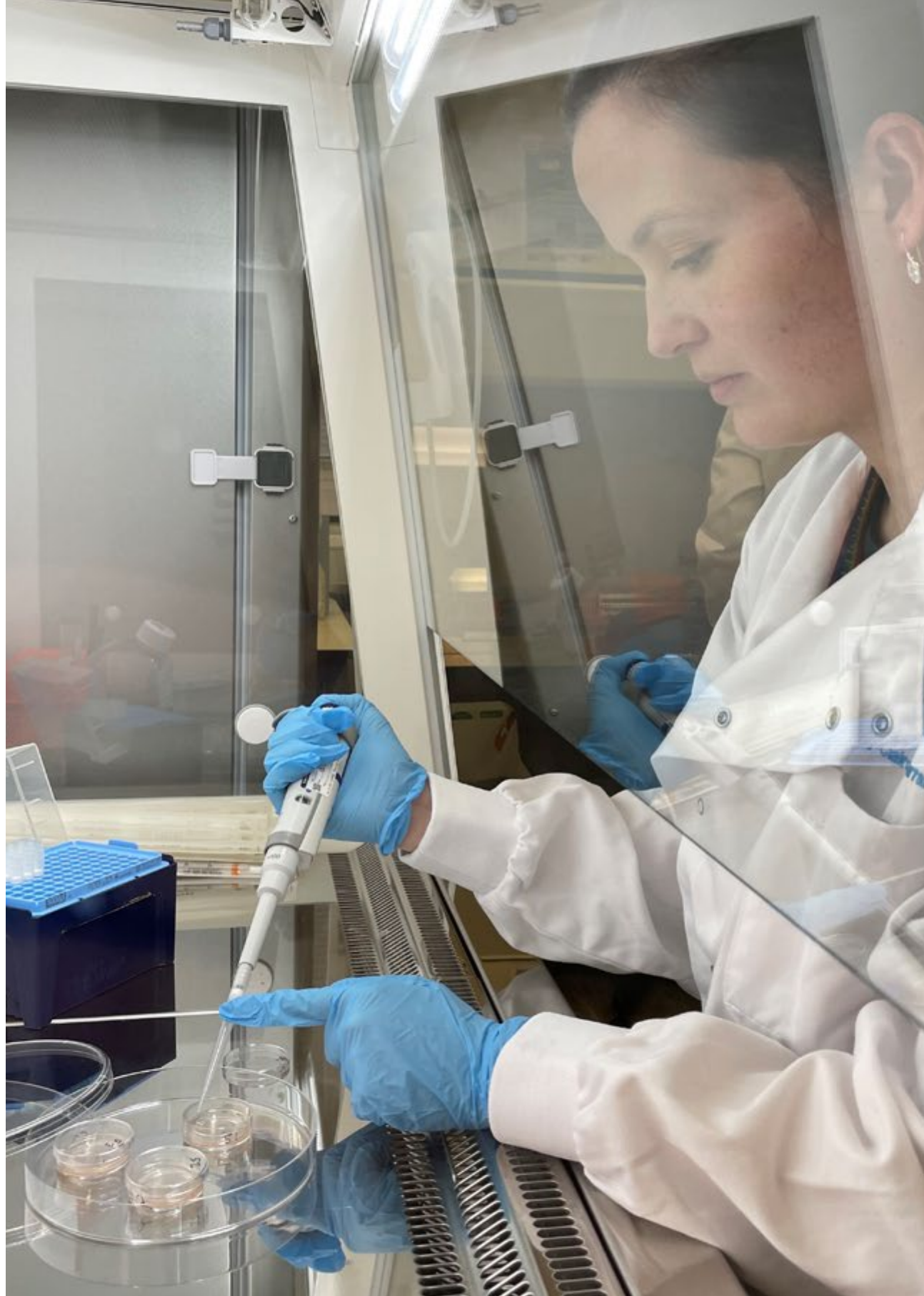
Globally we donated £200,000 worth of Dyson machines to charitable causes. We also supported Dyson's chosen charities through our match-funding programme. In 2022, we helped raise over £220,000 for a number of charities including Alzheimer's Research UK, Project Exploration (Chicago), National Cancer Council Malaysia and National Healthcare Group Fund, Singapore.

Race Against Dementia Fellowship

The James Dyson Foundation has committed funding to the charity Race Against Dementia to fund a research fellowship into Alzheimer's disease. Dr Claire Durrant, is investigating the role of Tau, a protein in the brain, in keeping the connections between brain cells healthy, and how these change in Alzheimer's disease. As part of the support she will receive mentoring from Dyson engineers and other industrial partners, such as Formula One, with the aim to facilitate more rapid progress in Alzheimer's research.

In 2022 the Foundation committed a further £1 million donation to accelerate Dr Durrant's pioneering research investigating the effect of drugs and other factors on dementia using waste human brain tissue samples obtained, with the permission of the patient, from brain tumour operations.

This further funding will allow Dr Durrant to hire support staff and advanced equipment to increase her access to human brain tissue samples and maximise her analysis of these samples over a three year period.



The Royal United Hospital, Bath

We are funding the construction of the Dyson Cancer Centre at the Royal United Hospital, with a donation of £4 million. This will support state-of-the-art medical equipment and dedicated research facilities, as well as art and pastoral gardens. It's due to open in 2023.

We helped build the Dyson Centre for Neonatal Care at the Royal United Hospital in Bath. Following a £750,000 gift from the James Dyson Foundation, the hospital was able to construct a new sustainable building for premature and sick babies.

It was designed to enhance natural light to help the babies develop, and to be a more efficient space for staff. The centre opened its doors in 2011, and has since cared for more than 5,000 babies and their parents.

Our vision for 2023 is to continue to inspire the next generation of engineers through our resources, workshops and projects.

We will deliver the air pollution resource in the UK, US, Singapore, Malaysia, Philippines, Japan and China, growing the resource into Australia and South Korea.

We will also make our resources more widely available and ensure they build students' technical engineering skills.

We will continue to support medical research charities and communities to local to Dyson offices.

Finally, we will continue to support great minds through the James Dyson Award. We can't wait to see the next ingenious inventions.

You can find out more about James Dyson Foundation educational resources online at www.jamesdysonfoundation.co.uk

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

dyson