Primary Engineer® Impact Report 2022-2023 Primary Engineer®

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WINNER •







## Introduction from our CEO

Welcome to the Primary Engineer<sup>®</sup> Impact Report 2022-23, here you will find among the statistics, the stories of what we have achieved with the support of our partners in schools across the UK.

The project went really well. It was just the right amount to take on for our science week when everyone has so much on and to fit into the timetable. It was easy for people to engage which meant all classes had a go. It has been amazing to have a 'Highly Commended' and a 'Winner' at school. The whole school was absolutely delighted when it was announced in celebration assembly - there were even tears! The whole families of the award winners are going and the head teacher and I are attending too. **3** 

Che pupils showed great communication skills and seeing them work together on a project of their own design was amazing. Pupils also had the idea of creating a Google Site to share and showcase their project, improving their IT and computing skills by uploading pictures and videos to their website.

Oaks Primary Academy

Teachers have continued to recognise the value of bringing engineering into the classroom in a manner that enables their pupils to experience the creativity, problem solving and application of learning with a practical challenge.

It has proved to be a very busy year, with our Programmes, Competitions and Qualifications reaching 79,058 pupils, 3,649 teachers and involving 1,185 engineers – continuing a pattern of year-on-year growth. The increase in numbers directly influenced the increase in the number of events we held across the UK, bringing together pupils, teachers and engineering professionals in England, Northern Ireland, Scotland and Wales, as well as the Isle of Man and Jersey.

Among the highlights, this year marked 10 years of the engineering that will help to shape their future. Leaders Award Competition and asking the questions 'If you were an engineer, what would you do?". Alongside Whatever we do, wherever we go, our passion for engineering in primary schools is front and centre - but none of it would celebrating this milestone at our Awards and Exhibitions across the country, we published a report exploring the happen without the outstanding Primary Engineer® team impact this competition has had on Pupils, Teachers, and and our amazing funders and partners. We can't wait to see Engineers over the last decade. We launched this report at what happens in 2023-2024. the Primary Engineer<sup>®</sup> MacRobert Medal Award Ceremony, Dr Susan Scurlock MBE, Founder & CEO Primary Engineer® hosted at the Institution of Mechanical Engineers in London, along with the first publication of a book containing an aweinspiring selection of entries from over the years.

> Contrainer was so knowledgeable and engaging and gave lots of tips and tricks to make the project easier/more accessible for the children. It was so fun and I can't wait to deliver it to the children in my school. Brilliant day!

We continued our work with the RAF Charitable Trust at the Royal International Air Tattoo where we were joined by volunteers from The University of Edinburgh, Thales, DXC and Boeing as we ran a series of engineering challenges. We also welcomed some amazing speakers on the Inspire Stage, with massive thanks going out to Tim Peake, Dr Alice Bunn, RAF Red Arrows the Saudi Hawks and many more.

This report is always written as we anticipate the year ahead with the publication of impact reports, the next presentation of the Primary Engineer<sup>®</sup> MacRobert Medals, exhibitions and events, celebrations and new ways to engage engineers and pupils all of which aligns to our vision that every primary school pupil will have a meaningful experience of engineering that will help to shape their future.





www.primaryengineer.com

### **BRINGING ENGINEERING INTO THE CLASSROOM**

**C** The children loved taking part in

designing and making a product

so it was great for them to have

resources. One of the organisers

the opportunity to use the

presented the children with a

. medal for teamwork/resilience

children left the event upbeat.

(as they hadn't been able to complete some of activities)

which was very kind so the

Newburn Manor

**Primary School** 

## Programmes

**Our Primary Engineer® Programmes take** several forms - currently Vehicle, Rail, **Construction, Early Years and Fluid Power** - and allow classes in Key Stages 1 and 2 to take part in a practical CPD project, building the confidence of teachers delivering STEMbased classroom activities and raising aspirations in pupils for their future careers. Each School is offered training for two teachers and provided with comprehensive classroom resources, curriculum mapping, links to engineers and kit for 60 pupils.

# The culmination of our programmes sees pupils and teachers

come together for a real celebration of engineering. In a morning that can only be described as 'organised chaos and fun', pupils are encouraged to talk to industry professionals about their experience, what they enjoyed most and how they would improve next time. Our celebration events are about showing recognition for the pupils' and teachers' incredible hard work.

We saw 23,709 pupils, 447 schools, 497 teachers and 334 engineers participate throughout the year across all three of our programmes. This came with 57 training events and 28 celebration events across the UK. Each programme takes an average of 15 hours, resulting in an incredible 345,000 hours of pupil engagement with engineering.

Teachers have reported pupils are interested, absorbed and more aware of careers in engineering as a result of our programmes. We are helping to break down engineering stereotypes and are delighted to represent a 50/50 gender split of participants. We have heard incredible, inspiring stories of pupils who ran home to show off their builds to parents, those who want to become engineers when they grow up and how the programme has even helped with pupils' behavioural issues.

Our Rail, Vehicle and Construction programmes are running again in 2024, with hundreds of schools participating across the UK. You can learn more about them here or scan the QR code: www.primaryengineer.com/programmes



## **Overview**

At Primary Engineer<sup>®</sup>, we have developed a range of programmes, competitions and qualifications that bring engineering into the classroom, all of which have been designed to engage teachers and learners in significant ways.

Everything Primary Engineer<sup>®</sup> offers is free to schools thanks to the amazing support of our partners, who we want to thank immensely for helping us bring engineering into classrooms across the UK.

## BRINGI INTO T

**G** We believe it is so important to engage with the younger generation to inspire them to pursue careers in engineering within the railway industry. This partnership will provide the opportunity to reach out and bring engineering into the classrooms of schools in Huddersfield to hopefully inspire the next generation of engineers. **99** Mary Kenny, Chief Executive Officer, Eversholt Rail



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# IF YOU WERE AN ENGINEER WHAT WOULD YOU DO? **Competitions: Leaders Award**

The Leaders Award Competition is a national STEM competition open to all pupils aged 3-19 and asks the question, 'If you were an engineer, what would you do?<sup>®</sup><sup>2</sup>. Pupils are tasked with interviewing an engineer, where they can ask the guestions that matter to them, inspiring them to come up with their own engineering ideas.

They are asked to identify a problem in the world around them and come up with a creative solution for it. They create an annotated drawing of their idea and write a letter to an engineer persuading them to select their idea as a winner. Every pupil who takes part receives a personalised graded certificate, with all submitted entries being read and graded by professional engineers. They are graded based on the quality of the idea, not the art skills or spelling of the letter. Shortlisted entries are then sent to exclusive judging days, where the judges select two winners and two highly commended entries from each region.

WINNER

Teachers, pupils and their families are invited to an award ceremony and public exhibition where shortlisted designs are displayed, and the winners and highly commended are invited on stage to receive their trophies. University and industry partners then select a design from each region to turn into a working prototype the following year in our ProtoTeams activity.

In total, we saw 48,052 pupils, 602 schools, 2,932 teachers and 831 engineers participate in the competition, with a 50/50 gender split among the pupils who took part. We also brought engineers together at 39 grading and judging days and celebrated the pupils, teachers and schools at 23 awards ceremonies and exhibitions across the UK.

This year also saw the release of season two of our 'If You Were an Engineer' podcast. The podcast is produced to share the joy of what it's like to be an engineer, the creativity, the inspiration, and, importantly, what engineers were like as children. We also heard from the young people who participated in the competition, who told us about their engineering ideas. We now have 20 episodes across two seasons available wherever you get your podcasts, with season three coming in 2024.

The competition is now in its 11th year and running in schools across the UK; you can learn more and get involved at www.leadersaward.com or scan the QR code.

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Cathie Barker, STEM Coordinator at the AMRC continues. **99** 

# **Competitions:** CLIMATE CHANG CHALLENGE We d Char links





We offer a national competition STATWARS - Climate Change Challenge, a data project with multiple curriculum links to science, mathematics, computing and engineering, as well as English and geography. The competition empowers and educates pupils aged 8-14 to tackle climate change using data they capture themselves. Pupils use our carbon footprint calculator to calculate their carbon footprint, then use this data to identify three changes they can make in their daily lives to help tackle climate change.

Every pupil who participates receives a graded certificate, and up to £5,000 of eco-prizes are available to schools who take part. Unlike our other competitions, schools also hold in-class debates on their work and submit their team entries to us. Sixty teams were shortlisted for the final judging, which was carried out by the data experts at WPP, who funded the competition for 2022-23. Four winners were selected, two from primary and two from secondary schools.

Schools from England, Northern Ireland, Scotland and Wales all made the final shortlist, and we saw some powerful feedback from teachers about the impact this competition had on pupils:

- 4/5 of teachers reported that pupils better understand data and its importance.
- 90% of teachers reported that pupils better understand climate change and its importance.
- 91% of teachers reported this project had positively impacted pupils' attitudes and behaviour towards climate change.
- 92% of teachers reported running this project inspired pupils to learn more about climate change.

The STATWARS: Climate Change Challenge continues here for the 2023-24 academic year. Get involved below or scan the QR code www.statwarscompetition.com

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## Qualifications

We expanded our qualifications for teachers, educators, and career advisors seeking more research-based professional development. They are designed to enable teachers and practitioners to further their understanding of the engineering sector, engineers' skill sets and career pathways into the industry.

Our Engineering STEM in Your Classroom course was piloted in 2021 and is now being delivered across Scotland, Northern Ireland and Burnley. It focuses on teachers learning more about engineers, engineering and career paths so they are better prepared to advise their pupils and learners. The course features a combination of guided and selfguided study over 16 hours.

In 2022-23, over 70 teachers across the three nations engaged with our Engineering STEM in the Classroom course with asynchronous tasks, research on topics such as 'Engineering Habits of Mind', as well as the current issues of recruitment facing the engineering industry and skills shortages within the sector.

We look forward to introducing new qualifications in 2024, including Engineering a Career. This brand new course is targeted at careers leads in secondary schools but is equally open to teachers in other roles. Its fundamental aim is to highlight how any subject may be linked to engineering, encouraging pupils to see the opportunity of an engineering career linked to their favourite subjects and for teachers to be able to better advise pupils about subject choices and career pathways.



**66** I've left feeling confident that I can deliver this programme in school. What an amazing final product! I would definitely recommend this to colleagues in other schools! 🤧 Westerhope Primary School

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## **10 YEARS OF 'MAKING A RIPPLE'**

Primary Engineer's 'If you were an engineer, what would you do?® Leaders Award Report 2023

**66** Our year 5 pupil, Carter, took his rail model home and continues to adapt it and improve it. He has now returned it to school and asked myself to support him with adaptations. A definite engineer in the making! **)** New Silksworth Academy

- Grees

celebrated 10 years of asking the question, 'If you were an engineer, what would you do?<sup>®</sup>' with **over 257,000** pupils and almost 14,000 pupils having taken part over the years. To mark the occasion, we commissioned a report on the impact we have had over the decade and published a book celebrating some of the touching, hilarious and brilliant ideas we have seen over the years.

The report, which you can find in full on our website (link below), explores the effect the competition has had on learners, teachers, schools and engineers since its launch, drawing on historical evaluation data and reports, as well as new data collected for the competition's tenth anniversary. It explores these impacts and outlines the legacy of support the Leaders Award competition has offered to schools and learners across the UK. It closes with an examination of how these benefits can continue to be offered and developed further through the work of Primary Engineer<sup>®</sup>.

Some of the critical impacts were:

- Learners gained a greater understanding of engineering and its importance and adapted 'engineering habits of mind'.
- Teachers gained greater confidence in their understanding of engineering, making them feel more comfortable teaching STEM-based subjects in class.
- Engineers gained an understanding of their role in inspiring the next generation of engineers.

During the research for the report, we found that a teacher in Scotland had run the competition in her school for all 10 years. Jenn McEwan, the lead science teacher at Doonfoot Primary School, has been a beacon of inspiration for her pupils. She has seen multiple winners from her school over a decade of running the competition.

SCAN ME!

### www.leadersaward.com/10-year-report/



them to consider engineering as a career.

Jenn's commitment to bringing engineering into the

classroom led to her receiving the David Clarke Prize

10 Years of asking the Question

Innovate

UK

of UK school pupils. A journey through 10 years of the competition, the book captures the incredible ideas that school pupils come up with when they answer the question, 'If you were an engineer, what would you do?®'.

The book is now proudly for sale on our website, and you can get your copy at

www.primaryengineer.com/book or scan the QR code provided







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## **10 YEARS OF 'MAKING A RIPPLE'**

Primary Engineer's 'If you were an engineer, what would you do?® Leaders Award competition over the last 10 years.



**Project Timeline** 

16

Total number of pupil submissions:

### IF YOU WERE an ENGINEER WHat WOULD YOU DO?"

257,224

# The Royal International Air Tattoo

This year, we were back at the Royal International Air Tattoo (RIAT) with the Royal Air Force Charitable Trust, a national partner for our Leaders Award competition, where we hosted speakers at the Inspire Stage and ran a series of engineering challenges.

Over 200,000 people attended the event over the weekend, and we welcomed thousands of young people to celebrate the power of engineering.

Tim Peake, Dr Alice Bunn, RAF Red Arrows, Saudi Hawks, the Department for Transport Young Aviation Ambassadors and others took the stage to engage our audience and show them the exciting possibilities of a career in engineering and aviation.

The Princess of Wales also visited the Inspire Stage to meet young people interested in engineering and aerospace.

Our engineering activities were a huge hit, with visitors receiving Mission Badges for completing a series of challenges. On display were a variety of prototypes, including the Shimmy Shimmy Shower and the Solar Powered Train, both created by The University of Edinburgh and the Face for a Plant, which our national partner Thales created. Behind each prototype was the heartwarming story of a pupil who had entered the competition and had their idea turned into reality. It was a perfect example of how pupils can inspire engineers.

We were joined by volunteers from The University of Edinburgh, Thales UK, DXC Technology and the Boeing Company who all helped us run these activities and inspire young people.

We look forward to building our relationship with the Royal Air Force Charitable Trust through 2023-24.

**66** We participated in a live event with a female astronaut. One pupil (who is super mad on space and science) got a question answered and his face lit up the room. It made his day! We took photos and these are all on show on our school website and Facebook page. 🌖



HE & PRESIDENT OF UKSPACE

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Primary Engineer<sup>®</sup>







## Primary Engineer<sup>®</sup> MacRobert Medal

In November 2023, we hosted the official Primary Engineer<sup>®</sup> MacRobert Medal Ceremony, which celebrates the people who have turned the ideas of school pupils into reality by creating a prototype. School pupils, teachers, university students and engineers travelled to London for the prestigious event hosted at the Institution of Mechanical Engineers.

Each year, our university and industry partners choose from the tens of thousands of entries pupils submit to turn one into a prototype. They then form **ProtoTeams**, who work with the pupil who originated the idea to turn their design into reality. The Primary Engineer<sup>®</sup> MacRobert Medal was created in partnership with The MacRobert Trust and Weir Group, and the judging panel consists of some of the leading figures from the industry.



Jon Stanton – Chief Executive Officer at WEIR Group PLC – was on the judging panel and presented the gold medals at the award ceremony.

"It's a fantastic initiative that harnesses the imagination and creativity of school children and showcases what can happen when you engage children in engineering from a young age. Weir is a longstanding industry partner of Primary Engineer, and I was honoured to be part of the judging panel. We're delighted to celebrate the winners who have demonstrated the very best in engineering and the potential to make an impact in the real world. Congratulations to you all."

**Over 150 people attended the ceremony;** school pupils from Edinburgh, Kinross, Linlithgow, Livingston, Liverpool, Newcastle and Sevenoaks made the trip, as well as the ProtoTeams, which consisted of engineers and students from Edge Hill University, Glasgow Caledonian University, Thales, the University of Edinburgh and the University of Sunderland.

The complete list of winners can be found here or scan the QR code below: www.primaryengineer.com/primary-engineer-macbobert-medal-2023/

**SCAN ME!** 

 We're delighted to celebrate the winners who have demonstrated the very best in engineering and the potential to make an impact in the real world.
Jon Stanton, Chief Executive Office at

## What have teachers told us in 2022-2023?





of teachers report an increase in their understanding of engineering following our training







of teachers agree or strongly agree our activities spark a powerful understanding of engineering's that they are now more confident with the subject of engineering in value, with 89% of teachers the classroom

observing a clear change in their pupils' perspective 81%



of teachers would deliver the project again

93%

of teachers report a better understanding of the diversity challenges in engineering and the belief that they can make an impact on career aspiration



### nearly three out of four

teachers delivered activities in a way that included the entire class or more

66 Engineering plays a vital role in our communities so it's rewarding to see children showing interest from such a young age. I was delighted to see how Baxi is working with Primary Engineer to help raise awareness of engineering and the career opportunities it offers, helping to build a diverse generation of future engineers. helping to build a diverse generation or future engineers It was also amazing to see how inspired the children were by the projects and the imagination and creativity that went into their builds. **99** Councillor Yakub Patel, Mayor of Preston

and an and an



91%

STEM

89%



of teachers reported that our projects are of high value to teaching STEM generally

of teachers agree or strongly agree that their pupils have enjoyed taking part in the project and found its content interesting



nearly every teacher, would give their enthusiastic thumbs-up to taking part

80%





strongly agree that pupils feel that engineering is a career anyone can pursue after involvement



### almost half of teachers

taking part of Teachers taking part in our activities have no STEM teaching Specialism

## **Outcomes of** 2022-2023

### eesa

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can successfully build a moving vehicle is inspiring, helping to build confidence and ambition in the

**CC** "It works!" That moment when a child connects everything up and the train starts moving for the first time is very special. The realisation that they

a2+b=c

Nether Currie Primary School University

**66** Connecting with the community local to us at Long Marston is important and so we Were proud to support nearly 800 students Were proud to Support inclusion of states were with STEM engagement last year. We're looking forward to extending this into 2024 and helping to encourage a diverse Ben Ackroyd, Porterbrook Chief Operating Officer

**66** It's very important to support competitions like this and children's ideas, which have no limits. Our work can help show them how their ideas can be made into a reality. I hope it shows that anyone can be an

Canterbury Christ Church University

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Breeshea Robinson Senior Specialist Technician at

66 I just loved seeing the children working I JUSL IOVEU SEEINE UIE CIIIUTEII WORKIIE SO Well together. They were so engaged so well together. They were so engaged and helped one another throughout. We and neiped one another throughout, we had a celebration event where we invited nad a celebration event where we invited parents/carers in to see their projects and parents/carers in to see their projects and the kids received awards and were able the kids received awards and were able to take part in STEM activities with their to take part in STEM activities with their grownups. They loved this & were keen to show off their models. ?? Dykehead Primary School

**C** The children in my class had very little D&T experience and very little experience of using any tools safely. The children were so keen to participate in the D&T activities and listened intently to the safe use of each tool. It was fabulous to see

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their confidence growing and blossoming as they became more skilled in using the tools and seeing their project starting to take shape. The level of collaboration and team work was impressive. Children showed and resilient and focused they could be. They were motivated throughout the project, even when faced with problems they persevered. All the key qualities are important for our children to experience. We learn through failures. **99** Herbert Thompson Primary School

**STEM** outreach is at the heart of Howden's Bright Futures Communities programme. Primary Engineer's Leader's Award competition ignites so much enthusiasm from the participants, it was a pleasure to be involved with last year and a no brainer for Howden to sign up to get involved with the competition again for the 2023-2024 academic year. I am looking forward to involving even more of our STEM ambassadors in on-site visits, school visits and grading days. Seeing the spark of ingenuity from the children is very rewarding, as they solve problems that will help others and make the world a better place. The next generation of engineers are out there. I am proud that Howden are involved in inspiring them through this great competition! **99** Joanne Moore, Product Development Manager and STEM Bright Futures Volunteer at Howden

Aisha Siddique, a Mechanical Engineer Degree Apprentice at Baxi

66 Engineering covers such a broad area that my friends still ask me to explain what I do!" she said. "We need to educate children on what an engineer does, and the wide variety of career paths open to them from an early age. Understanding why we've chosen this career and bringing real-world engineering into the classroom is so valuable. The project helps to develop essential skills like visualising, creative problem-solving, testing and evaluation, improving and adapting, along with teamwork and communication – all of which come into

ZN

**66** The children really engaged with the process, particularly as we targeted process, particularly as we targeted children that do not always receive awards as they find academic work tricky. awards as they find academic work uncky. it was lovely to see how proud they were. **??** 

**66** We're thrilled to be involved in this Primary Engineer Programme. The rail industry is facing a skills shortage and proactive, educational a skills shortage and proactive, educational interventions like this are part of the solution! Creative, hands-on challenges are a great way of capturing young people's imaginations and breaking down barriers to participation, especially for pupils who may never have ESpecially for Pupils with they for the selves as engineers before. **33** Andy Hassall, Associate Director at Morson Projects

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**G** Brilliant trainers as they kept everyone engaged and motivated which can then be applied to the classroom. Really easy to follow and I feel confident now to deliver this to my class. Thank you so much! **)** St Martins School



**66** The range of resources available was fantastic, as was the organisation of each. This helped aid the location of parts required throughout the session. **99 Craigton Primary School** 

> **66** Children were so engaged after the initial assembly to launch the project. Some of our pupils who sometimes disengage from learning wanted to take part and were inspired. **99**

**G** We are delighted to formally launch this exciting partnership between Primary Engineer and the Global Centre of Rail Excellence and to outline the work we will be doing with local primary schools in the area. We want the Global Centre of Rail Excellence to have a positive impact in the local community and we feel very strongly about our responsibility to give young people living near our site the opportunity to build a future and a career at our facility. That means working with schools and pupils from the earliest ages, encouraging them to take an interest in STEM subjects and inspiring the next generation about engineering and GCRE. We hope this project with Primary Engineer will do just that. **99** Simon Jones, the Chief Executive of the Global Centre of Rail Excellence

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**66** The wide range of prerecorded interviews was widely used by the pupils (especially in Years 5&6) who had opportunities to choose and watch them in school. Some pupils spoke enthusiastically about ones they had watched at home and persuaded their friends to also watch the same prerecorded interview. Having them all available on YouTube is brilliant. The opportunity to analyse previous entries sparked intense debates and discussions in class. Interestingly, it was the Year 3&4 pupils who sparked ideas off each other more readily and could openly discuss amendments and improvements to designs. **99** 

**66** Really enjoyed the course. Loved the practical element to it and I have lots of ideas to take with me back to the classroom. The trainer was very informative, patient and helpful in demonstrating and helping us to create the train model. Thank you. 🌖 Kingsway Primary School

**66** Reaching out into the community and working with local primary schools to get young people interested in STEM and build an interest in engineering is part of the long-term ambition of GCRE to ensure the development has a positive impact on the areas around the site. GCRE offers an important economic and regeneration opportunity for the valleys nearby and its through building these kinds of long-term partnerships with schools that we can help the next generation access the high quality jobs and opportunities offered by the facility. This project, linked to the new Curriculum for Wales, is a great start to that Kirsty Williams, Chair of the GCRE Community Committee

## With thanks to our supporters...







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