Wind Tunnel Competition

Calling all Bedfordshire schools and pupils from Years 7-11

We want you to design a poster and present it to a selection of Aeronautical Engineers. You will be in with a chance to win many prizes, including a place in a workshop to assemble a working wind tunnel!

To enter the competition, you need to form a team, design and produce a poster with one of the following themes then present it to a group of engineers at a poster presentation evening.

POSTER TITLE THEMES
- History of Wind Tunnels
- What Are Wind Tunnels Used for Today
- Our Wind Tunnel Design

BENEFITS OF PARTICIPATING
- Develop presentation, creative design and STEM skills relevant to KS3 National Curriculum
- Hands-on experience of assembling and using a wind tunnel
- Opportunity to ask questions of engineers and aerospace professionals
- Discover more about the world of aerospace and aviation and future potential careers

PRESENTATION EVENING
Poster presentations will take place at ARA in Bedford on the evening of Wednesday 23 March 2016.

PRIZES
Schools and pupils who present the best posters will be invited to attend a tour of ARA’s aerodynamic test site and a workshop week from 4-8 April 2016 where you can help to assemble a working wind tunnel, assisted by aeronautical engineers from ARA, Lockheed Martin UK and the RAeS Bedford branch.

Runners-Up prizes include air show tickets, factory tours and aviation merchandise.

SUPPORTED BY

How to enter
Register by completing the entry form available online and returning to careers@aerosociety.com by Friday 11 March 2016.

Support & Resources
For a list of useful resources, advice on producing your posts and a list of FAQs please visit www.aerosociety.com/windtunnel
Competition Outline
We want you to design a poster and present it to a selection of Aeronautical Engineers. You will be in with a chance to win many prizes, including a place in a workshop to build a desktop wind tunnel!

To enter the competition, you need to form a team, design and make a poster, present it to a group of engineers at a poster presentation evening.

Poster Titles
- History of Wind Tunnels
- What Are Wind Tunnels Used for Today
- Our Wind Tunnel Design

This document will go on to explain the criteria used to judge the posters. The different criteria means there are plenty of ways for your poster to win.

Main Prize
Schools and students who present the best posters will be invited to attend a week where you can help to build a working wind tunnel. You will be assisted by a group of aeronautical engineers from the Aircraft Research Association (ARA), Royal Aeronautical Society (RAeS) and Lockheed Martin UK – Ampthill (LMUK-A) who will help you to develop your ideas and skills.

The workshop will start with a tour of the world-renowned aerodynamic test site at ARA, based in Bedford. All materials and tools will be provided (you will just need to bring some lunch and a well-rested brain).

Runner-up Prizes
There will be a selection of other prizes available, including:
- Tickets for you and your friends or family to go to an air show
- Factory tours, certificates and much more
- Merchandise from ARA, RAeS and LMUK-A

Important dates
Registration for the competition closes on Friday 11th March 2016. Please complete and submit the form at the end of this document to confirm your place.

Poster presentations will take place at ARA in Bedford on Wednesday evening, 23rd March 2016.

The prize of building a wind tunnel, will take place at the ARA in Bedford in the final week of Easter Holidays (4th to 8th April 2016).
Competition Rules

Who can enter?
The competition is open to students from Year 7 to Year 11. Groups can be of mixed age – we will take into account the age of students when judging so do not be put off by older / younger students.

We suggest teams should consist of 3 to 6 members – this means there will be less work for each of you to do. If there are more than six, then split into smaller groups (a bit of competition is healthy). If you cannot find enough people, do not worry, discuss it with your industry contact and they will be keen to assist you.

Can I only enter one poster?
A school can enter as many teams as it wants, but students should only be part of one team. We want each team to concentrate on the topic that they choose, so if you cannot decide as a team – break up into smaller groups to focus on different topics.

What should a good poster look like?
Posters should be A1 size (841 x 594 mm). Bring a physical copy of the poster to the presentation evening.

“A picture paints a thousand words” – we want to see diagrams and pictures describing your ideas. A little bit of text is useful to put across important information (but no need to write an essay).

Please remember to include your names at the top of the poster (We want you to make a name for yourself).

To help with the design, ask yourself questions such as:

- What is the centrepiece of your poster?
- How will it draw people in?
- Does it display the information clearly and spur on interesting questions?

What should the presentation include?
The “presentation” is more of a discussion. You will have chance to see posters produced by other teams, and display your work to a wide audience of students, employers and engineers alike.

There will also be judges walking around who may have questions for you about your posters and designs. You just need to talk a bit about what you have done. It really will be simple and relaxed but be sure to dress to impress; you may want to consider apprenticeships, internships or graduate placements with these companies in years to come.

How does this benefit my studies & future career?
This exciting project will provide pupils with an opportunity to gain hands-on experience of the wind tunnel build process and the wider STEM subjects involved. Many of the skills practiced will be relevant to the current KS3 National Curriculum.

Conveying ideas in conversation is a vital skill for all engineers and scientists alike. For the poster and presentation evening you’ll get the chance to practice your presentation skills in a friendly and relaxed environment, having a conversation with engineers who are genuinely interested in what you have created – they’ll even ask you questions if you’re not sure what to talk about!

During the build process, pupils will begin to develop the creative, technical and practical expertise needed to perform everyday tasks confidently in an increasingly technological world. It will also be necessary to select from and use specialist tools, techniques, processes, equipment and machinery precisely. Upon build completion, pupils will also be challenged to effectively critique, evaluate and test their ideas and end product.

For teachers, the wind tunnel build project will ensure that their pupils move a step closer to acquiring a broad range of technical and non-technical subject knowledge, drawing on disciplines such as mathematics, science, engineering, computing and art throughout the build process. Ultimately, we hope that the project will encourage
your pupil’s awareness of the aerospace and aviation sectors, demonstrating their economic importance, and the wide variety of related career paths that the sector has to offer.

More information about the topics

- History of Wind Tunnels – We want you to explain how wind tunnels started and how they have progressed through time to the present day.
- What Are Wind Tunnels Used for Today – What types of wind tunnels are there and what do we use them for in 2015/2016?
- My Wind Tunnel Design – Do you think you can design a wind tunnel? Show us some of your ideas on what a wind tunnel could or should look like and how it would work.

More information about how posters will be judged

- Best Poster – Judges will mark posters on their: clarity, professional look, diagrams, novelty and interest.
- Best Presentation – Judges will mark presenters based on: understanding of topics on their poster, understanding of wind tunnels in general and presentation professionalism.
- Most Promising Design – Judges will assess designs on clarity, ease of build, effectiveness when complete and accuracy.
- Best Overall Poster Presentation – The poster that scores the best over all of the above categories will win a big prize.
- Best of Category – There are 3 categories of posters so judges will select a best of each category.

How do I enter?

Register your interest before 11th March 2016 by emailing careers@aerosociety.com so that we can reserve your space at the presentation evening. Fill in the submission form attached to the end of this document. Remember to bring your poster along to the presentation evening.

Can I get more support?

Visit our website at www.aerosociety.com/windtunnel to get your questions answered by engineers. You can also see questions other schools have been asking and what our answers were to them.

Resources to get you started

www.naca.co.uk

www.aerosociety.com/aerodynamics

www.careersinaerospace.com
About the Sponsors

Royal Aeronautical Society

The Royal Aeronautical Society is the world’s only professional body dedicated to the entire aerospace community. We were founded in 1866 to promote the art, science and engineering of aeronautics so throughout 2016 we are celebrating our 150th anniversary with a theme of ‘innovative firsts’ – including this STEM outreach project to inspire pupils to build a working wind tunnel.

The Society’s membership comprises aerospace and aviation professionals from a diverse range of organisations and fields of expertise including engineering, design, aircrew and air traffic control, along with professions that serve the aerospace, aviation and space industries, such as law, finance, marketing and recruitment.

One of our key aims is to inspire more young people to consider a career in the aerospace and aviation industry. We offer a free careers advice and guidance service as well as CV writing sessions so visit www.aerosociety.com to learn more about the aerospace and aviation industry and what we can offer our members.

Aircraft Research Association – Bedford

ARA is an independent research and development organisation providing a range of specialist services to the aerospace industry; including high speed wind tunnel testing, Computational Fluid Dynamics and high precision wind tunnel model design and manufacture. These three capabilities provide our customers with a complete aerodynamic service from initial aerodynamic design and analysis through model design and manufacture to wind tunnel testing.

ARA’s Transonic Wind Tunnel (TWT) is the most productive transonic tunnel in Europe and we also have the largest independent design and manufacture capability in Europe. This TWT has had a hand in developing many civil and military aircraft from 1952 to the present day, and continues to be used on future aircraft programmes. In addition to services for the aerospace industry, ARA’s aerodynamic expertise in both experimental testing and computational analysis provides specialist input to motor vehicle and wind turbine development.

Based in Bedford, 50 miles north of London, ARA has worked on many prestigious projects for the World’s major civil aircraft and defence system manufacturers. Our expanding global customer base extends from the west coast of America, across Europe, to the Far East of Asia.

ARA is part of the UK Aerodynamics Centre and the new services and facilities developed since 2012 are available for the benefit of all our customers.

Performance through technology  

ARA

The company is delivering multi million pound state of the art upgrades to the British Army’s armoured vehicles and the Royal Navy’s Merlin helicopters. Innovative technology and software designed by Lockheed Martin are also helping to train future combat aircrews. In the commercial sector, Lockheed Martin’s systems not only provide critical IT and cyber security services to the UK government and energy sectors, they also help NATS safely manage more than 2 million flights across UK skies every year and enable more than 50 million items to be delivered to UK homes and businesses each day.

Lockheed Martin UK Ampthill is the largest UK wholly owned site and employs around 900 people. The Ampthill site comes under the ‘Missiles and Fire Control’ business area.

Lockheed Martin is committed to helping inspire the next generation of highly skilled engineers through an education outreach programme with a particular focus on science and technology, engineering and maths. Activities include engaging with young people to raise awareness of the opportunities available in engineering; offering apprenticeships and graduate career programmes to attract and retain the workforce of tomorrow; and academic partnerships, which give students an opportunity to work with Lockheed Martin engineers on innovative, practical projects.
Some Examples of Posters

Posters are a common form of communication of proposals at universities. This is also something that happens in industry, where companies share their ideas with potential customers. This competition will give you a good chance to develop these skills from an early age and will look great on a personal statement, no matter what opportunity you are chasing.

Below are some examples of posters, this is just to get you started – do not feel constrained by what you see here!
Accelerated temperature mapping for mission critical components

Silvia Aragones Rodriguez (Postgraduate)
Skills for Shipbuilding – enabling technology to reduce CO2 emissions

How it works

This project involves the development of novel Thermal History Paints (THPs). These coatings are able to deliver offline temperature measurements using smart materials. They are composed of semi-earthen ceramic pigments in a binder. The coating experiences permanent changes in its luminescence behaviour depending on the exposure temperature. After cooling, these changes are measured with an optical device and linked back to the maximum temperature of exposure. Benefits over existing technologies include:

- Portable, objective measurement system
- Automated surface measurements
- Non-invasive, durable coatings (IRE16N compliant)
- Coating has survived engine tests in IQK and IUS

Technology Drive and Applications

The aviation industry aims to reduce CO2 emissions. A key aspect of improvement will be the area of propulsion. It is critical to have a detailed, accurate knowledge of component surface temperatures in order to run engines more efficiently. This innovative technology finds applications in several key areas, including:

- Component design and development: THPs allow for rapid evaluation of temperature conditions, providing faster, more accurate (±3°C) results than current technologies
- Improved maintenance procedures for long-term applications e.g. optimised maintenance schedules
- Warmer tool for overheated components
- NDE – early failure recognition

Acknowledgements: the author would like to thank the Royal Commission for the Exhibition of 1851 and National Manufacturing Technology Exploitation Programme (NMTPE) for their support.
Wind Tunnel Poster Competition
Registration Form

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Submit this form to careers@aerosociety.com before the deadline, Friday 11th March 2016.

Your teacher will receive an e-mail or phone call confirming your registration.

We look forward to seeing you at the presentation evening.

(Address and further details to follow upon successful registration)