

extratime for Engineering

Introduction

An engineering club gives young people a practical understanding of how the world around them is developed and constructed. Providing members with a range of fun challenges and problems to solve can help demystify how the Channel Tunnel stays dry, how a plane stays in the air, and so on.

A varied menu of after-school study support activities such as engineering clubs, is a key element of the 'core offer' of extended services that all schools are expected to provide by 2010. Evidence shows that participation in such activities can lead to improvements in young people's self-esteem, achievements, attitudes to learning, classroom behaviour, and school attendance.

For more information on the benefits of study support/oshl, visit www.continyou.org.uk/studysupportetc

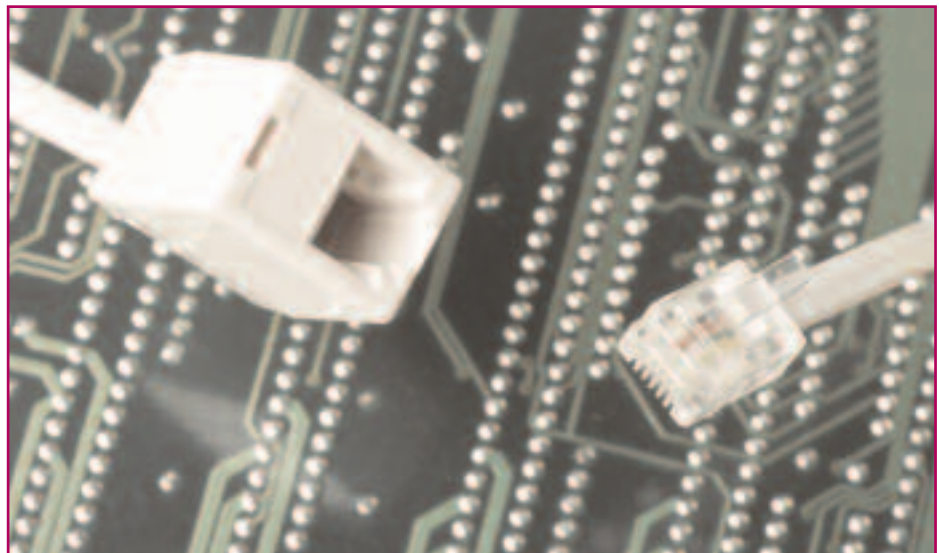
About this guide

This Extra Time Engineering Mini Guide offers advice about setting up and running an engineering club, where members take part in activities designed to inspire young minds and are shown the opportunities that engineering offers. It will give you lots of ideas for introducing engineering to your after-school study support programme.

Top tip!

Ask parents or members of the local community who work in a related field if they would like to be involved in running the club.

Ideally, an engineering club would be run by an adult with specialist science, maths or engineering knowledge, and with a good understanding of the safety requirements of the chosen topics.



Why run an engineering club?

The diverse nature of engineering lends itself to varied and rewarding opportunities. A number of initiatives have been developed to encourage older students to continue studying engineering through further and higher education; however, study support/oshl clubs within schools are currently less common. Running a club will help:

- broaden young people's horizons by showing them what fields of engineering exist
- foster enthusiasm in members for engineering subjects
- show young people the practical applications of maths and science knowledge
- provide opportunities for members to take part in national challenges and competitions
- target specific groups of students, for example, gifted and talented, or those less interested in the formal curriculum.

Top tip!

Offer a range of fun activities; this will help members to recognise and develop a variety of transferable skills that will be of use both in and out of school.

What should your club 'feel' like?

Not everyone will be naturally drawn to an engineering club. However, by using a range of approaches and by recognising how different members prefer to learn, you may be surprised at how many members you attract, and retain!

A study support/oshl club is not like a normal lesson – you can set different rules and boundaries, and develop more informal relationships with members. Over the course of the term, try to offer opportunities for members to work both individually and as part of a team.

Engineering is essentially about testing and problem solving through a process-driven, logical and systematic approach. Among other outcomes, a term of well-planned activities will provide members with the opportunity to:

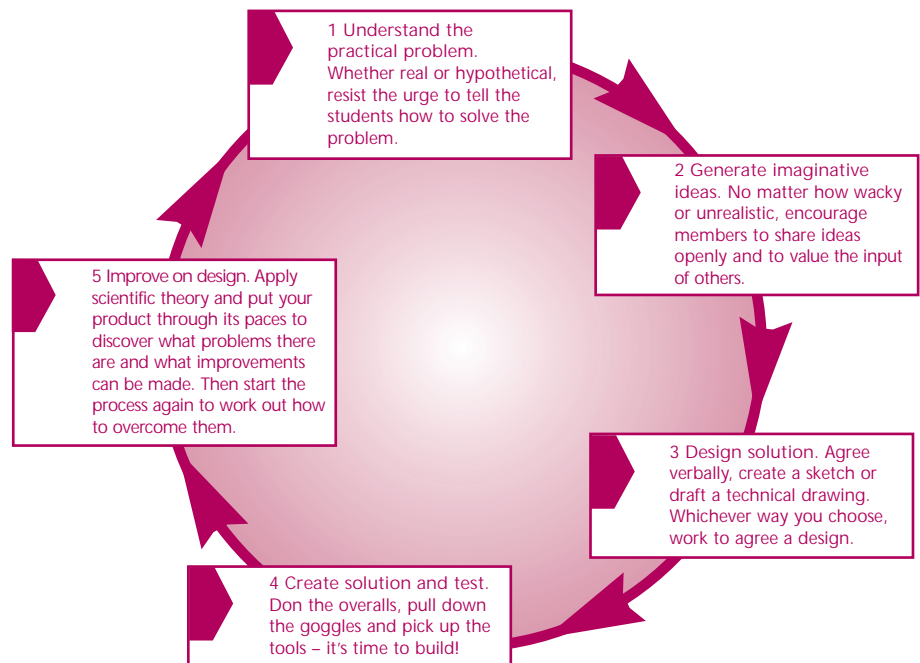
- apply logic and mathematical skills to practical problems, and use their findings to identify solutions
- develop and enhance their ability to work effectively within a team
- understand the benefits of working individually on small tasks, and of contributing to a larger project
- gain a valuable insight into how to combine the above in order to successfully achieve their goal.

Top tip!

Try varying the approach your club takes, the activities it offers, and the ways in which sessions are led; this will help you to attract a greater number of members and keep them coming back for more.

Including the principles of engineering in your club

There are several key steps that should be followed when setting engineering challenges.



What activities should you provide, and how?

The kind of activities run in an engineering club will be dependent on the facilities/equipment at your disposal, the skills or interests of the staff running the club, and the interests of the members.

Before embarking on a project, you should decide where you will get your materials from, both immediately and in the future. Don't be put off from tackling a project because of concerns about costs or resources. There are many ways in which to maximise available resources. For example:

- utilise spare/leftover school resources and materials, such as metal, wood and plastic
- ask members and families for materials to recycle, including children's construction kits that are no longer played with
- invest in one of the many model kits that are available – the market is huge and with prices ranging from £1 to £13,000 there is something for every budget
- approach local businesses to 'sponsor' the club – they may be able to offer materials and a space to work, or they may even volunteer time.

Tried and tested ideas

Listed below are some activities grouped according to different types of engineering. Each activity could be the focus of a one-off project, or a term's worth of activities. Information about the organisations mentioned below can be found on page 7, as well as suppliers' contact details.

1 Aerospace

Introduce free flight at a basic level by building rubberband-powered models, or embark on a longer-term project to make a larger glider. Targets such as the furthest flight, highest altitude and longest flying time can be set, with teams having to design and build models to achieve these targets. For the more 'space-aged' members, building and launching rockets can be a good 'way in'. You could also decide to compete in one of the international competitions that exist.

2 Automotive

Many different radio-controlled car kits are sold in model shops, with varying levels of complexity. You could buy a number of components and make cars of different configurations, depending on the challenges offered by different terrains or track designs. Electric motors offer a quiet solution, but for speed go for models with internal combustion engines.

3 Civil

Working in teams to build bridges and cranes can provide a fun way of exploring the principles of civil engineering using different materials. Set challenges where the bridges have to span two desks, or introduce the concepts of counterbalance by testing to see whether the cranes can lift a given weight from one position to another. Challenges can be made more interesting by adding a trading element, where members can buy and sell pieces and have to complete the project to a budget and on time.

4 Electrical and electronic

Making the most efficient motor, or developing one to move a particular load, lend themselves to team and individual projects. Members could develop the activities further and build circuits with special properties (your science department may have an OpAmp or two that the club can use), such as lighting a bulb when it gets dark. For details of a website showing circuit diagrams using other components, see page 7.

5 Manufacturing

Young engineers will enjoy the challenge of developing their own manufacturing business, where they are responsible for making and selling their products. Whether it is jewellery, candles, soap, badges or greeting cards, your members will have fun experimenting with design and production techniques before deciding on how to market and sell their goodies. Members should decide what happens to any profit that is made from their enterprise.

6 Marine

Do you have a school pond or are you near a park area that does? If so, model boats are an interesting alternative to land-based vehicles! If space or travel is an issue, why not build smaller models, looking at the factors affecting buoyancy and what would be the affects of translating the model into a full-size vessel.

7 Mechanical

Using the London Eye's website as a starting point (see page 7), work with your members to design and make a collapsible ferris wheel. How can the engineers be sure it won't collapse during operation, but that it will fold effectively and be lightweight enough for transportation?

8 Robotic

Building robots and then setting associated tasks can make for a fun and interesting club. Creating a maze to navigate, or challenging your opponent to a head-to-head sumo-style 'battle', will capture the enthusiasm of members. Many of the members will be familiar with the television programmes 'Robot Wars' and 'Techno Games', and this could be a great starting point.

Case study

Eastbourne Technology College hosts an engineering club, set up in partnership with Eastbourne and District Chamber of Commerce, SETPOINT Sussex, and Eastbourne Education Business Partnership.

The purpose of the club is to raise awareness of, and excite young people about, careers in engineering through practical projects, visits and, in particular, contact with local engineers.

The launch event featured an engineering challenge where students had to make and demonstrate something on the night with no prior notice or preparation.

The engineering club secured the commitment of several key patrons, including the local MP, councillors, and managers and directors of local engineering firms. Funding for the club will come from SRB6 'Pooling Our Resources', Sussex Education Business Alliance, Sussex Learning and Skills Council, and the organising partners.



Essential checklist

Below is a summary of all the main issues you will need to consider as you set about planning your study support/oshl engineering club. Taking the time to get everything right before you start really will help to sustain your club.

Find out what's needed

- What gaps are there in your existing provision?
- What do you want to achieve through your club?

Find the right time for your club

- If you are introducing a new club, when is the best day/time of day and what is the best frequency to attract members?
- What might affect pupils' ability to come to your club, for example, transport, other clubs, and community commitments?

Find the right staff

- Who is the best person to run your club, and how many staff will you need for each activity?
- Can you use older pupils to help run activities?

Involve others

- What existing/new partners could support your club?
- How will you approach them?

Cover the costs

- What resources (money and otherwise) will you need to provide your planned activities?
- What funding are you eligible to apply for and how long will the application process take?

Keep it safe

- What are the health and safety considerations of your provision?
- Do you need to undertake a risk assessment for your planned activities, including off-site visits?

Get pupils involved

- How can you involve pupils in developing and running new activities?
- Have you asked pupils what they are interested in?

Decide which pupils to target

- How will you identify which groups or individuals will benefit from your club?
- How will you encourage them to take part?

Promote your club

- How can you give your engineering club its own identity within the school?
- How can you turn engineering activities into publicity opportunities for the school?

Keep it going

- How will you review the success of your club and decide what you need to change in order to improve it?
- Who will you ask for their views on your engineering activities, and what will you ask them?

Useful resources

Below are some useful websites and organisations that exist to support learning in this area.

Active Robots – www.active-robots.com

Providers of robotic parts and kits.

Blast Off 4 Britain – www.blastoff4britain.org.uk

National organisation working to help maths and science education through rockets.

The British Model Flying Association – www.bmfa.org

Gives advice about building and operating radio-controlled model aeroplanes. Free handbook to download.

Caterham Cars – www.caterham.co.uk

Manufacturer of kit cars.

Circuit Diagrams – www.electronic-circuits-diagrams.com

View circuit diagrams online.

Deep Sky Rocket Shop – www.deepskyrocketshop.co.uk

Purchase rocket kits online.

Glider Plans – <http://f4bscale.worldonline.co.uk/plans.htm>

Free plans for a model glider.

Go Karts – www.karting.co.uk

Offers information about go-karting.

Hobby Stores – www.hobbystores.co.uk

Retailers of hobby materials and kits.

Imagineering Clubs – www.imagineeringweb.co.uk

Study support/oshl clubs for 9 to 12 year olds, guided by a volunteer tutor engineer with teachers and helpers. Each child assembles working models from kits. There is direct involvement of engineers and links with industry.

Lego – www.lego.com/education

Free activities to download, plus details of educational kits for sale.

The London Eye – www.londoneye.com

Click on 'our business' and then 'education'. There you can register to download free resources that cover designing and making structures, systems and controls, material properties and planning.

The Science Museum – www.sciencemuseum.org.uk/learning/families

Ideas and instructions for exploring science and engineering principles, including quizzes, competitions, and activity sheets for making your own models.

The Science, Engineering, Technology and Mathematics Network (SETNET) – www.setnet.org.uk/

Contains details of the Science and Engineering Ambassador scheme, designed to link schools with volunteers with an interest in science, engineering, technology and maths, and who aim to stimulate interest in those subjects.

Young Engineers – www.youngeng.org

A national organisation that supports a network of 1,100 engineering clubs by providing membership packs, club handbooks, activity ideas, challenges and competitions. Register at www.youngeng.org/clubs_ent_form.html.

Acknowledgements

ContinYou acknowledges the generous support of the Department for Education and Skills in developing the Extra Time Mini Guides. Thanks also go to Lil Grafton of Young Engineers, and Martin Evans of Imagineering, for contributing to this Engineering Mini Guide.

This guide was written by Jenny Evans, Jenna Hall and Kieron Nolan. It was edited by Louise Pile and designed by Paul Mepham.

Published by ContinYou
17 Old Ford Road
London E2 9PJ

Tel: 020 8709 9900
Fax: 020 8709 9933
Email: info.london@continyou.org.uk

Website: www.continyou.org.uk

Registered charity number: 1097596

This Extra Time Engineering Mini Guide is one of six **free** guides to setting up and running study support clubs:

- [Engineering](#)
- [History](#)
- [Magazines](#)
- [Modern foreign languages](#)
- [Science](#)
- [Sport and maths.](#)

The Extra Time Mini Guides can be downloaded from www.continyou.org.uk/miniguides.

Published February 2007

Edn 2