

## SOLAR BOATS CHALLENGE



### Introduction

Build a Solar Boat that will be raced over a 10m course.

Credit will be given for technical design and innovation, teamwork skills, communication skills and the ability to make your craft go faster than anyone else's.

Schools typically undertake the scheme in a variety of ways:

school clubs, Primary links project, specialist event days, KS3 / 4 curriculum delivery

The solar challenge has been tailored to fit engineering curriculum requirements enabling both individual projects and team delivery to take place side by side.

The size of these craft means that all schools can build trials tanks and have the freedom to test and develop without having to go to a lake.

### Prestigious Race Day Events

The BMF (British Marine Federation) have agreed to host National Race Day events at the London International Boat Show in January. The first one is planned for January 2011.

What you need to do to get involved:

- Select who you want to do the scheme with: Groups of three to five pupils for a team event, individual pupil project if used for discrete curriculum delivery. School participation anything from five to twenty boats is typical.
- Register with Engineering Your Future to take part which includes: *Curriculum Materials, Technical support. Newsletters, Race Day entry.*
- Purchase kits to get you off to a flying start. You will need a full kit per team to get you started, (suggest minimum 5 per schools) thereafter solar panels can be interchanged between boats and last indefinitely. Solar motors can be recycled when the boat is no longer needed.
- Build a school test tank so that you can race the boats in your school
- Let us know what you are doing so that we can feature you on the website and in Newsletters and help you to get in touch with marine based companies near you

To start the project off we can offer support in person and one day event for Teachers, pupils or both to suit your needs where teams work to produce boats from initial concepts through to testing and racing them on our boating pool or test tank! Contact us for further details.

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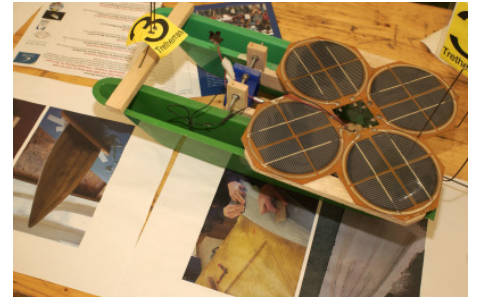
## Task Outline

### DESIGN

Produce ideas for boats of different types, describing why you arrived at your chosen design. Show the layout of your powertrain and solar arrays, add in any technical innovations that you feel will give you better performance

#### Consider:

Types of hull as this is the most fundamental element of any boat as it is the structure that holds in place all other components. It gives the craft its shape, size, form and buoyancy dictating performance and handling. Stability, ease of trimming, aesthetics, manufacturing processes and materials. Size and power available from the solar panels The overall visual impression as it is essential to marketing. How to produce your designs full size and how you will develop them for your chosen forming processes. Variations that can be used for different light conditions. How to store solar energy using the capacitors allowed The propulsion system must be efficient and not waste any of the sun's energy, and it has to be designed to work in harmony with the rest of the boat.



### RESEARCH SECTION

Look at the rules and points criteria for Formula Sun Investigate the different types of hull and propulsion systems available; what are their advantages and disadvantages? From searching the internet to finding a local boat builder, explore different design options. Find out about the different materials, which would be the best for your task?

### INITIAL DESIGN

Produce freehand sketches of ideas or use CAD systems. Show why you selected the layout of your hull and sub-assemblies.

### LAYOUT DESIGN SECTION

Collect all the information you will need to enable you to design the layout of your hull. Where and how will you locate and fix the major components e.g. motor and propeller mount?

- ✦ Prepare and locate the power-train. (make sure your boat will move forwards, not backwards!)
- ✦ Arrange your solar cells (select parallel or series)
- ✦ Make sure wires and switches are not likely to give problems
- ✦ Incorporate a system for connecting in the capacitor if you are running it low light

### MANUFACTURING SECTION

Using styra-foam shape your hull; vacuum form your hull. (A tip for removing the form tool from the moulding is to carefully cover the Styrofoam with masking tape. This prevents the heat from the vacuum forming plastic from sticking your former to the surface of the plastic)

Prepare and locate propeller shaft and any coupling

Arrange your solar cells on their mounting system

Test your capacitor systems

### TEST YOUR BOAT

Build a test tank

Record times with and without capacitors, record light levels

Calculate the speed of your craft

Make adjustments

### RACE YOUR BOAT

Start in your class or team then find out who else is doing the scheme locally to arrange a Race Event, get the local media involved.

Get ready to go to the London. Boat Show in January!!

