

Key Stage 3 Leisure Marine Projects Design and Technology

Target Areas

Product Analysis
Product Design
Graphic products
CAD
Systems and Control

The three projects have been developed for delivery within the Key Stage 3 Design and Technology curriculum with a marine context. Pupils will benefit from visiting a boat show, but can also complete the projects using internet research

Key stage 3 Design and Technology Aims met by projects

- Develop designing and making skills
- Develop knowledge and understanding of materials and components; systems and control; and structures
- Develop capability, through combining their design and making skills with knowledge and understanding to design and making products
- Nurture creativity and innovation through design and making

Aim of Projects

The projects can have different entry and exit point dictated by individual circumstances of time, age, curriculum coverage, available resources etc

For instance it may be used as a product analysis in abstract, or support a visit to the boat show forming part of an investigation skills task.

Alternatively it could be a project where pupils design and make their own boats which they test, develop and have the opportunity to enter into the Schools Marine Challenge.

Project focus 1

Pupils investigate boat design and manufacture, visiting the boat show, then going onto research the topic and presenting findings as a product analysis.

If pupils are not able to attend a boat show, the project can be done with internet and library research alone.

There is the scope to focus on specific types of craft which have appeal to a younger audience with wind surfing, surfing and kayaking being the top three. From this that will generate their own designs for one or more of the following themes:

Product Identity – the importance of having graphic media that identifies a brand and or product

Product design – produce their own designs for a craft of their choice

Produce their own designs for accessories to water based activity, based on a pre-defined theme e.g. Safety, Transport, Storage, Clothing,

Project Focus 2

Pupils design and make a small boat using a vacuum formed hull which they can fit out with a low inertia motor to the specifications laid down in the schools marine challenge solar class. This can be powered by solar panels or for convenience a single AA sized battery.

The project can be tailored to suit product design and systems control depending on the level of detail gone into with the propulsion system.

Further resources for this project can be obtained at www.engineeringyourfuture.com/page26.html

Project Focus 3

Pupils research and design a system to protect a MP3 Player or mobile phone when participating in Watersports activities



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Project 1 Boat research and analysis

Tasks-

1- Small Boats Analysis

List the types of boat that are available for day use – rowing boats, sailing dinghies, canoes, punts etc

What to do -

Find pictures or do drawings to show some of the different types of boat in this category, produce a display in the form of a spider analysis where you group the different boat types together. Add notes to your work to identify types and uses of your boats.

2- Deeper Product Analysis

Produce an analysis of a selection of boats showing what sort of materials they are made from, how they are made and the sort of price category they fall into

The type of production volume they are made in, if they are available from many places or just the manufacturer that produces them.

What to do -

In a small group list as many types of small boat as you can think of, remember that one type of boat may have many sub-types e.g. canoes are made from different materials and are many shapes and sizes according to what they are going to be used for. Try to list as many sub types as you can as they are often made in very different ways. You could use a table similar to the one below to help organise your research

Type of boat	Made from	Manufacturing method	Volume of manufacturing	Cost
Inflatable craft 	Plastic PVC	Plastic PVC sheet welded together	Mass production	Very Low
Wooden Canoe	Plywood and solid wood	Highly level craft skills	Made one at a time	High



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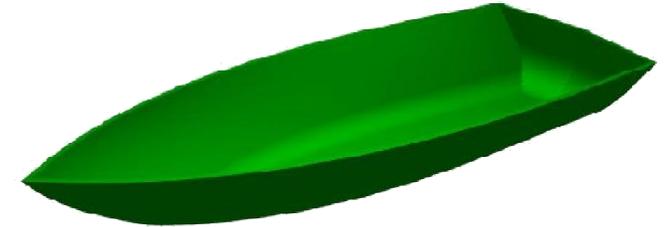


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Finalising Designs

Collect all the information you will need to enable you to design the layout of your hull and powertrain. 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!)
- ✦ Incorporate your power source to work in harmony with other design features



Produce a working drawing showing all dimensions and manufacturing detail

Manufacturing Section

Produce test pieces for any processing skills such as pattern making, from wood or Styrofoam.

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.

Produce a sequence of operations for manufacturing from cutting materials to finishing and applying a surface finish which will allow the mould to release from the pattern

Health and safety

Carry out a risk assessment for vacuum forming.

Consider: Materials, protective equipment and action in case of problems.



Test Your Boat

Build a test tank (This could be a piece of domestic guttering)

Calculate the speed of your craft

Develop and fine tune your designs

Race Your Boat

Start in your class or team visit www.engineeringyourfuture.com to see if there any competitions that your school could enter

Evaluation

Assess your boat under the following headings:

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Quality – Reliability - Ease of manufacture - Performance

For each of these headings give your boat a score and suggest if you would change anything if you were to repeat the project.

Give brief details of what and why you may change aspects of design and manufacture.



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Project 3 Mobile phone and MP3 player storage when afloat

Target Areas
Key stage three~:

Product Design
Graphic products
CAD

Aim of the project – To research and design a system to protect your MP3 player or mobile phone when participating in Watersports activities.

Watersports and mobile technology go hand in hand with young people.

The attraction to hop on a punt, rent a rowing boat or try kayaking at a moments notice are not uncommon.

There is always the risk of getting wet, or maybe even falling into the water whilst taking part in your activity.

Task

You are to design a simple but effective packaging system that will protect your mobile technology item from quick immersion in water.

The product could be something that doubles up as a carrying device to be used all the time or as a specialist after market sales item.

It could be an item that is made available at the point of hire or sale of Watersports equipment so that when you take your craft out you are offered the opportunity to use a water protection packaging system.

Research

Find out the typical dimensions of mobile technology, use drawings and a table of results to arrive at a 'typical' size that will fit the most popular technology. You may want to illustrate some of the more interesting and extreme ones you find, maybe the largest and smallest MP3 players.

Find out about the types of product that are already available to make mobile technology water resistant

Look into materials that would be suitable and that can be formed and jointed easily

Design

As well as being 'fit for purpose' the design has to be appealing, shape form and colour will all be critical to the success of this sort of product. It is likely that a simple technical solution that works well but has the ability to look different by the application of graphics, and different base colours will offer the greatest scope. You only have to look at aftermarket products in this sector to find that personalising items is an important sales feature



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Critical factor

Think of simple ways to make a seal that will stop water getting in. It will be very difficult to make a water proof seal, but a seal that will prevent water getting in for a brief amount of time will be enough to prevent damage from the most typical type of immersion, accidentally dropping the device into water and recovering it quickly.

fabrics or compliant materials - folding, draw strings, zip seal etc

resistant materials solutions - close fitting stoppers or mouldings, rubber type materials held in place under pressure

Product modelling

Make mock-ups or prototypes in card, and paper to show design features and develop them further.

Manufacture

If you decide to do this as a design and make project show how materials will be formed and joints made water tight. Pay close attention to detail and quality of finish, as this will be a critical success factor of your product.

Evaluation

Show how samples have been tested, **but don't use your mobile or MP3 player in case it does not work!!**

Gather information from friends on whether they think the product would be a success, list any design developments as a consequence

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