

Body-shell Design

Task:

To design a body shell for your Formula Schools entry

Introduction

To produce a body shell for your car is one of the most challenging and rewarding elements of the whole scheme. It gives your entry shape, style and form. Whether you go down the production/saloon car route or a more futuristic design, the material it is made from governs the final look of your car. Other fundamental aspects are the aerodynamic consideration of the design.

Research Section

What different forms of car bodies have evolved over time?

Produce a time line to show the evolution of body design from the early 20th century to present day.

For each style of design state what material the designers used and the factors which dictated those materials.

What are the key features a body shell has to have?

Strength

Combinations of rigidity and flexibility

Resistance to fatigue and corrosion (possible finishes available)

Ease of manufacture

What material is available?

For each of the above say why they are important and add more if you can.

Design Section

Collect all the information you need to start designing your body-shell and produce a draft specification.

Using scale and size required; Chassis fixing locations; Material availability; Processing availability.

Initial design

Produce several freehand sketches showing the style of car body you want to produce and for each one state what are the good and bad points to each.

Remember that each page of sketches must have each style labelled so that the whole team can help choose a design.

Produce full working drawing for your chosen design with the most appropriate system, either manually or using a CAD package. If a CAD package is used then it may also be possible to CNC laminate layers of the design to aid manufacture. If vacuum forming the design for your car may not be possible as a whole shape, so look at producing it in sections?

Manufacturing Section

Whatever material you plan to make the final body-shell out of the first stage is to produce *plug*. This can either be made from wood, cut into strips and glued together, or clay/plaster as a whole block.

Rough the shape out using whatever tools that are recommended by your teacher(s) and check the design for scale and symmetry. Profile gauges and paper templates could be used to check the side profiles. Sand the final design carefully checking regularly against the gauges or templates until the shape is finished.

If the body-shell is to be vacuumed formed then a simple release agent such as wax should be applied after painting the plug to a high gloss finish. If Glass Fibre is to be used to produce a mould from your plug then 6 coats of wax need to be applied to stop the plug sticking in the mould.

Any surface imperfections and blemishes need to be filled (car body filler or other) at this stage. The better finished the plug then the better quality the mould or body-shell will be.

Target Areas

KS 3 or 4

Resistant Materials

Material properties and processing

GCSE Engineering

Unit 1

Specifications and Engineering drawings

Unit 2

Production planning, Choosing materials, Using processes
Health and Safety

Unit 3

Investigating Products

Key Skills

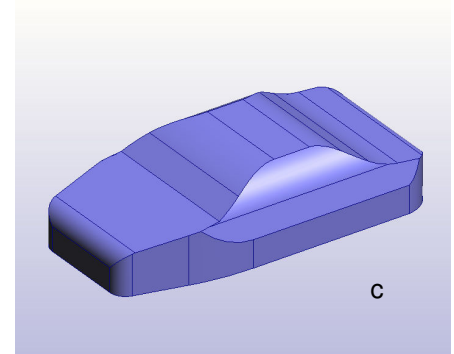
Communication, Number, IT



a



b



c

a Carbon fibre saloon type body-shell

b Single seater design

c Saloon style produced on ProDESKTOP



Kick Starting Engineering Excellence

Once you're completely happy with the quality of the plug then forming or mould production can then be done.

If you are planning Pre-preg Carbon Fibre then the release agent applied to the inside of the mould has to be capable to withstand the cure temperatures of the pre-preg. Once again the finish of the inside of the mould has to be as good as you can make it for a quality body-shell.

If your design is produced from polymers, and or composite production show clearly the stages in producing a mould and then the component itself.

Health and safety

Carry out a risk assessment for one of the processes and materials you plan to use.

Consider: Materials, adhesives, tools, environment, training, protective equipment and systems, action in case of problems.