

# Vacuum Formed Model Car Body

## Objectives

Students will develop their D&T capability by designing and making an original product of good quality that satisfies the requirements of the design brief.

By the end of the assignment, students will know that:

- thermoplastics can be formed by vacuum forming
- thermoplastics soften when heated and may be bent, twisted stretched and formed
- thermoplastics remain deformed after cooling
- a vacuum former heats whole sheets of thermoplastic sheet materials (cut to match the size of the vacuum former)
- patterns for vacuum forming are usually made from resistant materials and/or clay
- pattern edges should be chamfered to allow easy removal of the vacuum formed plastic from the pattern
- overhangs on patterns should be avoided
- corners on patterns should be rounded slightly
- plastics should be pre stretched before being vacuum formed
- hot parts of vacuum formers and heated plastics will burn skin so:
  - risk assessments of the hazards should be carried out
  - safe working practices should be adopted
- car body panels are shell structures
- flat sheet materials may be stiffened by forming bends and curves into the sheet.

## Success criteria

Each student:

- has designed and made an original product that satisfies the given design brief and specification
- has used tools safely and has strived to achieve quality in marking out, cutting, shaping, finishing and joining their chosen materials
- knows that thermoplastics can be softened by heating
- knows that vacuum formers are used to heat whole thermoplastic sheets (that have been cut to size to fit the vacuum former)
- knows that thermoplastics soften and can be formed when heated and become rigid again when cooled
- knows that patterns made of resistant materials and clay may be used to mould 3D shapes in thermoplastic sheets
- knows that a vacuum is used to draw heated thermoplastics around a pattern and hold it in place until the plastic has cooled
- has made a pattern independently
- has vacuum formed a thermoplastic sheet independently
- has assessed the risks associated with working with vacuum formers and hot thermoplastics and has worked safely throughout the assignment.
- knows that car body panels are shell structures
- knows that flat sheet materials may be stiffened by forming bends and curves into the sheet.
- shows evidence of having evaluated his/her work.

## Resources required

Each student will need:

- 2 pieces of MDF 140 X 70 X 6
- 1 piece of pine, approx. 600 X 5 X 5
- 2 electric motors (6V)
- 1 piece of half round dowel 70 mm long, the diameter to match the diameter of the motors used
- a sheet of thermoplastic sheet for vacuum forming

# Vacuum Formed Model Car Body

## Situation

Many young children enjoy playing with model cars, especially if the car can be made to move and can be controlled in some way.

## Design brief

Design and make a remote controlled model electric car. (Not radio controlled). You must supply your own wheels for your vehicle.

## Specification

The remote controlled model electric car must:

- have a vacuum formed chassis and body
- have at least two wheels
- be driven by at least one electric motor
- have a remote control hand set connected to the car by an electric cable
- be capable of stopping and starting
- turn
- be safe to use.

The remote controlled model electric car must not:

- fall apart in use
- be dangerous to use.

## What you must do

1. Analyse the design brief and specification and pick out the essential requirements.
2. Plan the design of:
  1. your remote controlled vehicle
  2. the remote control handset
  3. how the two will be connected.
3. Chamfer both pieces of MDF using a file or a plane.
4. Model the car body in clay, on one of the pieces of 140 X 70 X 6 MDF
5. Vacuum form the car body while the clay is still soft enough to be removed from the vac. formed plastic.
6. Make a pattern for the chassis using the half round dowel, the pine strips and the other piece of chamfered 140 X 70 X 6 MDF
7. Vacuum form the chassis
8. Trim off waste material and fit the chassis to the vehicle body.
9. Wire up your motor circuit and fit motors and wheels to the vehicle, modifying the chassis as required.
10. Make a pattern for the handset and vacuum form it.
11. Add switches and wiring to the handset.
12. Prepare a Risk Assessment of the hazards involved with making and using your product.
13. Evaluate the final product, e.g.:
  1. how good the design looks
  2. how well the design works
  3. discover what others think about your product.
14. Work safely and complete the assignment on time.

