

Grade 9 Integrated Technologies

Electric Car Design and Build

Task

Your task is to design and construct an electric car that drives in a straight line the length of the hallway. This project provides you with the opportunity to:

Be creative in the design process

Learn about electronics

Use tools and materials to build your vision



Materials

Everyone will be provided with the same standardized parts for their car's construction:

- 6mm by 190mm by 340mm hardboard platform for the chassis
- Two metal axles
- Material for wheels
- Axle clamps
- Materials for direct drive wheel or gearing system
- One electric motor
- Circuit board material and wiring
- Battery packs
- LED lights

Background (Research)

Electric cars have been around for over 100 years so there is a lot of information out there. So where do you look? The Internet, of course, can be used to search some ideas for your design and build; but what sites should you research? Review designs from old to new. What's changed? What do you think caused these changes? Use this information to help you brainstorm some new ideas for your car's design.

Design Process

Using the images you've found as inspiration sketch 5 thumbnail drawings showing different body shapes and chassis layouts. Try three or four wheel chassis layouts.

Use 11X17 graph paper and select one design and draw a top view, looking directly down at the chassis that includes all the necessary components. See the attached drawing and use it as a guideline. Don't just copy it! Get this checked by the teacher to make sure it will work.

Once your chassis design has been approved draw the body shape from three different views - Side, Front and Rear. Again have this checked by the teacher for form and function.

An AutoCAD rendering may be completed.

Building Process

Once your plans have been approved now comes the time to start building! Using some of the measurement, layout and machining skills you've already practiced it's time to begin.

Chassis

Creating the chassis is the 2nd step in the process.

- Transfer drawing layout to the chassis platform
- Cut the chassis to shape
- Cut out any openings for the drive system
- Consider the order of assembly for the drive system - gear on axle before attaching
- Attach the axles using clamps or other methods
- Machine the mount for the motor
- Attach the motor using straps or other method - make sure the gearing lines up!

Electrical

Circuit Board

Learning about circuits and how the work is the 3rd step in the process.

- Using Traxsmaker draw your circuit board
- Print a copy with tracks in white and background in black for approval
- An acetate copy will be made to burn onto the surface of the board material
- Cut your board material using the shear
- Use the ultraviolet light box to burn the image onto the board
- Put it in the white solution tank - Always wear gloves and safety glasses!!
- Rinse off all residue using scrub pad
- Put a wire through the hole you've drilled and put in bubble tank
- Remove after 45 minutes
- Put it in the blue solution tank - Always wear gloves and safety glasses!!
- Rinse off all residue using scrub pad

- Center punch all drill points
- Drill holes for attachment points for the battery pack, switches and LED lights
- Solder wires for switches into place
- Attach LED lights to wires long enough to reach desired location
- Solder wires and resistor into place

Assembly

The assembly brings together the chassis and the power

- Secure the board to the chassis
- Secure the battery pack to the chassis
- Test motor and lights
- Test run for alignment - does it run straight or turn to one side?
- Adjust front axle location to compensate

Body

Creating a body that fits your platform and is easily removable is the 4th step.

Vacuum Moulded

- Glue together two blocks of Styrofoam large enough for the body
- Trace your design on the sides, front and rear of the block
- Use the band saw to rough cut your shape
- Use a file and sandpaper
- Use wood filler to fill in any imperfections
- Sand smooth
- Use the vacuum moulder to form the body
- Trim any openings using scissors
- Smooth rough edges

Wooden

- Trace your side view on 12 mm thick pine
- Cut out shape using the scroll saw or band saw
- Sand smooth
- Use 12 mm strips the appropriate length and glue to the sides to form the body
- Sand smooth all surfaces
- Neatly apply a finish

Congratulations to have successfully completed your car!!

Evaluation

Design	25%
Chassis / Body	30%
Electrical	25%
Performance	20%

Total	100%
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Take .jpg photos through your process (at least 4) and attach them here - then print this sheet out for final evaluation.