

Exhaust Design

Task:

To design an exhaust for you Formula Schools entry

Introduction

The exhaust is vital to the reliability and performance of you car. Not only does it reduce the noise pollution but it also provides power to the engine if correct and reduces engine power if not designed for that engine. It also provides fuel tank pressure to help maintain fuel delivery to the carburettor.

Research Section

What factors would influence the different exhaust design features?
 What is the combustion chamber size and fuel is your engine?
 What area should the exhaust vent into? What direction should the gasses take?
 What material should it be made out of? Can it be painted or would the temperature prohibit a finish? Is gas flow vital and if so why? Can you get the calculations and work them out for your engine?
 Will a manifold help and if so why?
 Include any graphs you find to show engine/revs power curves for each design.

Design Section

Collect all the information you will need to enable you to start designing your exhaust and draft a specification.
 Scale the design to fit the chassis layout.
 Sketch a number of different designs so accommodate various components such as wheels, axles, servos, fuel tank etc.

Initial design

Produce a few freehand isometric sketches of ideas then progress to dimensioned drawings appropriate to your design. Remember these must include all necessary information for someone else to manufacture your exhaust to the correct dimensions and tolerances and using the appropriate materials and manufacturing systems. Work in conjunction with the chassis design team so that the fumes can be directed away from the vulnerable areas.
 For example you may want to use tubular steel which can be hard to machine well and can be bent to give extra rigidity. It will need to have mounting holes and the slot machined in the correct places. You may want to specify that it has a particular colour or an appropriate finish that copes with the heat.
 Produce full working drawings using the most appropriate system with either manual or a CAD package.

Manufacturing Section

Produce test pieces for any jointing and machining skills e.g. Milling, welding, brazing, silver soldering, drilling etc.
 Produce a sequence of operations for manufacturing, from cutting the materials, deburring, joining and applying surface finishes to your exhaust.
 If your design requires fixing to the chassis, to reduce strain on the engine mounts, show clearly how they will support your design.

Health and Safety

Carry out a risk assessment on the main process you plan to use to produce the axle. Consider the following; materials, machine, tools, environment, training, protective equipment, and any action you have to take if a problem occurs.

Target Areas

KS 3 or 4

Resistant Materials
 Material properties and processing
 Maths
 Volume and area

GCSE Engineering

Unit 1

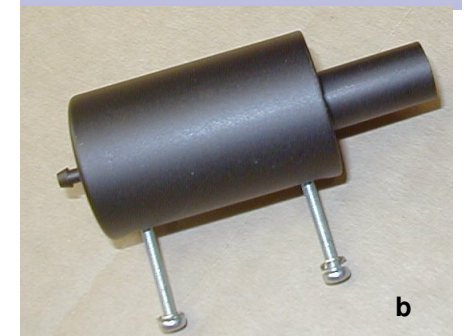
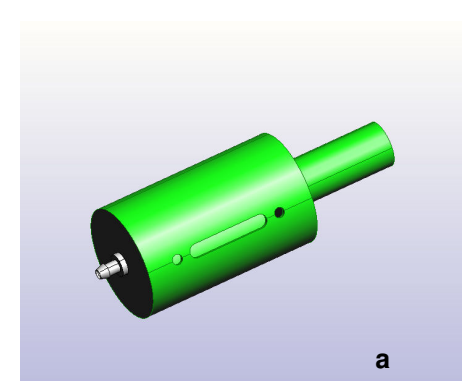
Specifications and Engineering drawings

Unit 2

Production planning, Choosing materials, Using processes
 Health and Safety

Unit 3

Key Skills
 Communication, Number.



a ProDESKTOP Design of the standard exhaust system.

b Actual exhaust.