

Design Brief

1. Introduction

Out of control fires in general and **forestry wildfires** in particular pose a significant and growing threat in today's world. Addressing these challenges requires a **multifaceted approach** that includes climate action and **investment in technology** to protect lives, property, and ecosystems. Continued research and collaboration between **engineers, firefighters, and policymakers** the world over is crucial to the widespread development of **cutting-edge tools** to enhance firefighting efficiency. Leading industries worldwide, including Ireland, specialising in the design and manufacture of advanced high-performance machines for firefighting applications have produced **robotic water cannon firefighting systems**. These robots have **modular architecture**, representing significant advancement in fire control and fire safety technology.

Design a **Model Robotic Water Cannon** to the general specifications below. The Robotic Water Cannon should be your own unique design and should:

- (a) Incorporate a **drive-train mechanism** using **variable speed track technology**
- (b) Have a **water nozzle unit** that can be **electronically rotated and tilted**
- (c) Feature an **audible warning system**
- (d) Include a **control panel** which **may be tethered** to the vehicle.

Presentation of the completed project should ensure that:

- (a) All main operating features are **clearly visible without dismantling**
- (b) The longest dimension does not exceed **400 mm**
- (c) Electric power does not exceed **9 volts**

Special Note: **Modified toys or recycled projects** are not acceptable.

2. Design Process (40 marks)

A design folio must be compiled which will detail your:

- (a) **Analysis of the given Brief** and **Investigation of Possible Solutions**

Note: **You must reference and acknowledge all research sources** used such as: publications including books, professional journals and government reports; online sources and other types of media; any material generated using artificial intelligence (AI) software or applications; and material from specialist organisations and relevant individuals. To include such material without properly referencing the source will be considered plagiarism. In addition, the copying from, or reproduction of, material from such sources may also be considered plagiarism.

Any case of suspected copying, plagiarism (which includes the use of AI software), improper assistance, or procurement of work prepared by another party will be thoroughly investigated.

(b) **Criteria for Selection** of your own Individual Solution

(c) **Production Drawings/Plans**

Note: Digital drawings or other manufacturing details, if presented for assessment, must be included in **hard copy** format in your design folio.

Note: Where computer aided manufacture (CAM) is used, **supporting CAD drawings** must be included in your design folio to authenticate **your own individual work**.

(d) **Testing and Evaluation** of your design solution

(e) **Special instructions**, if required, regarding the testing of the solution by the examiner

Note: Marks are awarded as shown in Marking Scheme (Page 4 of 4). **Computer-aided design (CAD) should be used** where possible.

3. Design Realisation (110 marks)

Using **appropriate materials and processes**, make the model according to your own individual design plans. Computer aided manufacture **(CAM) technology should be used**, where appropriate, to enhance manufacture. You are expected to demonstrate **a range of appropriate skills** to manufacture and assemble all the parts, subject to the following guidelines:

(a) **Standard components** may be used to support the assembly and interconnection of various parts;

(b) Unnecessary recycling will result in lost marks. Recycling will be acceptable only in cases where a complex part **cannot readily be made** in the school

(c) **Bought-in electronic solutions will result in lost marks**

(d) Adhesives, if used, should be **applied sparingly**.

Note: Marks are awarded as shown in Marking Scheme (Page 4 of 4).

4. Project Presentation

Your completed project consisting of the **model and design folio**, must be available to the visiting examiner.

Marks are awarded for **quality of presentation** and **finished appearance** of both the model and design folio.