

<b>Faculty:</b> TAS	<b>Subject:</b> HSC Engineering Studies	<b>Title:</b> Aeronautical Engineering Report
<b>Teacher:</b> Boundy		<b>Student:</b>
<b>Outcomes/Content Assessed:</b> <b>H1.2</b> – Differentiates between the properties and structure of materials and justifies the selection of materials in Engineering applications. <b>H2.1</b> – Determines suitable properties, uses and applications of materials, components and processes in engineering. <b>H3.2</b> – Uses appropriate written, oral and presentation of detailed engineering reports. <b>H5.1</b> – Works individually and in teams to solve specific engineering problems and prepare engineering reports.		
<b>Weighting(s):</b> 20%		
<b>Date Given:</b>		<b>Date of Completion:</b> Monday 24th June 2019 (T2-Wk9, Monday)
<p><b>DESCRIPTION OF TASK</b></p> <p>In this assessment students, will interact with aspects of Aeronautical Engineering. The student is to design an Aluminium fan constructed from aluminium drinking cans. This Aluminium Fan design will then be tested via the wind generated by a desktop fan and a reading of voltage is taken from a small motor and Multimeter. In conjunction with this practical task the student is to write an Engineering Report that details their design, aircraft aluminium alloys, electric motors and conversion of energies.</p> <p><b>Task Guidelines: (steps/marking scale/grid)</b></p> <ol style="list-style-type: none"> <li>1. Using aluminium cans, design and produce an efficient blade turbine structure which will catch the breeze of a pedestal fan and, through a flat belt drive, drive a small generator to a maximum voltage.</li> <li>2. Compile an Engineering Report as per Engineering Report format expectations.</li> <li>3. Include in this report the following areas for research and analysis: <ol style="list-style-type: none"> <li>a. Justification for your choice of Aluminium Fan Blade design, based on Jet Turbine/Wind fan research.</li> <li>b. An analysis of the extraction/production, a historical snapshot of its existence and uses of aluminium with an emphasis on its use in Aircraft manufacture.</li> <li>c. Define the use of Copper and Aluminium in Electric Motors. Explain the benefits and mechanical and Thermal properties.</li> <li>d. Analyse and describe the energy achieved from wind via the sustainable use of Wind Farms and the importance of fan/generator design in generating electricity.</li> </ol> </li> </ol>		
<p><b>Advice on Acknowledging of references, format and submission:</b></p> <p><b>Completing the Bibliography</b></p> <p>Complete the <u>bibliography</u> following the steps below. This is for any resource you have used, images, text, videos etc. You must include these details in your bibliography, it will be returned if it is not.</p> <ol style="list-style-type: none"> <li>a. Authors name: Surname first, then first initial or name.</li> <li>b. Title of document/website in 'single quotation marks'</li> <li>c. Date of publication</li> <li>d. (Online) Available</li> <li>e. &lt;full URL&gt;</li> <li>f. [Date of access in Brackets]</li> </ol>		

## **Assessment Expectations**

It is expected that this research report should be a substantial document that will showcase your skills in researching and using Information and Communication Technologies to compile a report on the topics highlighted in the Assessment Task.

Refer to the Assessment Policy set by Orange High School for details that are consistent with standard assessment criteria. If an assessment is late you must follow the Assessment Policy guidelines or accept the zero mark for the late submission for the assessment task. A Misadventure Form should be submitted as per guidelines with relevant supporting documentation. If circumstances are known prior to the submission date, students are required to inform prior to the assessment task due date.

## **Assessment Format and Submission**

You will use **Microsoft Word or the like** to present your Engineering Report. You will be required to upload this assessment to the Google Classroom assessment link.

# Marking Criteria

Student: .....

Criteria	Possible Marks	Mark
<b>C1 - Turbine Voltage Generation:</b> Marks awarded for meeting a range of voltage that would fit into a High, moderate and low range. Should a design fail to turn, 0 marks should be awarded.	High 8-10 Mod 4-7 Low 1-3 Zero 0	
<b>C2 1 - Engineering Report:</b> <ul style="list-style-type: none"> <li>Student should compile an Engineering Report that contains all report components: Title page, table of contents, introduction, body, Conclusion, References and appendix.</li> <li>A student submits a report that only contains some of the components listed in dot point above.</li> </ul>	4-5  0-3	
<b>C2 2a - Turbine Fan Blade Design Justification:</b> <ul style="list-style-type: none"> <li>Relevant in-depth research that justifies the design selected from past and present sources.</li> <li>A brief justification showing obvious content of Turbine Fan examples.</li> <li>A reason for choice is implied yet limited in explanation and justification.</li> </ul>	7-10  3-6 0-2	
<b>C2 2b - Analysis of Aluminium:</b> <ul style="list-style-type: none"> <li>Comprehensive analysis of aluminium's use in aircraft, the method of extraction/production and a historical context documenting many sources and the use of visual aids.</li> <li>Some relevant research is evident in the use of aluminium in aircraft and a basic level of historical content.</li> <li>Limited reference to aluminium use, or reference to aircraft and historical content.</li> </ul>	7-10  3-6 0-2	
<b>C2 2c - Copper and Aluminium use in Electric Motors:</b> <ul style="list-style-type: none"> <li>A clear and comprehensive analysis of the use of copper and aluminium in electric motors. Detailing the benefits for and against each metal and the importance of their mechanical and thermal properties. How they differ in use and the use of visual aids to complement your research.</li> <li>Sound and relevant content in the use of copper and aluminium in electric motors and some identification of the benefits. Identified mechanical and thermal properties.</li> <li>Limited detail on the use of copper and/or aluminium in electric motors, little to no content on the benefits of either metal or mention of the materials properties</li> </ul>	7-10  3-6 0-2	
<b>C2 2d – Conversion of Energies</b> <ul style="list-style-type: none"> <li>A clear explanation on the principles on why the Fan &amp; generator produces voltage. What is happening from the motor of the fan to the generator connected to the Turbine. Detailed and documented understanding with visual resources to assist.</li> <li>Stages and types of energy are expressed with a basic explanation of transformation.</li> <li>An understanding of the transformation of energies are implied without clarification.</li> </ul>	7-10  3-6 0-2	
<b>Total</b>	<b>/ 55</b>	

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