**Stage 2 Industry and Entrepreneurial Solutions**

**(Product design using metal)**

**Design, Technology and Engineering**

External Assessment

**Assessment Type 3: Resource Study**

Purpose

Students investigate and analyse design features, processes, materials, and production techniques and apply creative thinking to the design of a solution. Students apply critical problem solving skills and incorporate technologies to address design problems and challenges. Through this task students plan, develop, test and validate concepts and procedures.

Students analyse influences on a solution including ethical, legal, economic, and/or sustainability issues. They consider the practical implication of these issues on society or design solutions

Description of task

Part One: Resource Investigation

Students investigate and analyse the functional characteristics and properties of two or more materials or components they are considering for use in the creation of their solution. They report on how their research into and testing of the functional characteristics and properties of these materials or components will affect their selection for use in the realisation of their solution.

e.g. Properties and testing of TIG and MIG welds

Students investigate the properties of welds produced by the two different welding processes: Tungsten Inert Gas welding and Metal Inert Gas welding. They look at the chemical properties of the metal and gases involved, and the implications for the type of weld produced.

Components you will need to complete;

* Identify the two or more materials to test, state the reasons clearly why these materials have been selected.
* Conduct relevant research, and identify important existing properties for the chosen materials
* Design and conduct experiments/tests. State clearly the reasons for conducting the tests i.e. how the tests will actually make your choice of materials clearer? Show the set-up of the tests as clearly as you can, and record the testing procedure through video/screen capture.
* Result and graph the tests
* Analyse the results
* Draw conclusions

The use of diagrams, charts, simulations and videos is encouraged. Correct referencing is required.

The specific features of the assessment design criteria assessed in this part are:

* Investigation and Analysis (I1)
* Design Development and Planning (D2).

Part Two: Issues Exploration

Students investigate and analyse ethical, legal, economic and/or sustainability issues related to their solution.

Students may investigate and analyse using one or more of the following strategies or approaches;

* ethical use and application of the end product
* ethical concerns related to health and safety, discrimination, social media, advertising, data, images, conflicts of interest
* sustainability: life cycle analysis, carbon footprint, potential to reuse or recycle, fair trade, customs, carbon footprint
* target audience, end user and potential for entrepreneurship and marketing
* economic considerations: costing of products including materials, labour and equipment and machinery, responsible use of resources, products built to last, time management and material availability
* legal responsibilities- patents, safety requirements, intellectual property, creative commons, Australian International Standard , regulations and legislation including OH&S, safety of the product for the user
* historical and cultural influences including social trends, the changing nature of work, technological change

This task requires the identification of an issue related to your AT2 solution. Discuss your issues proposal with your teacher.

You may choose to follow the outline below:

1. Brief statement to identify what the issue is, and how it relates to your AT2 solution
2. Clarification and researched, detailed explanation of the issue
3. Researched data relating to the issue, where possible
4. Your observations, analysis of the issue
5. Concise summary statement.

Diagrams, charts, simulations, videos etc., can be used effectively. Ensure all researched work requiring referencing, has been done in accordance with current SACE Policy.

The specific features of the assessment design criteria assessed in this part are:

* Investigation and Analysis (I2)
* Evaluation (E1).

Assessment conditions

Evidence for this assessment type, Resource Study, (comprising of the two sections: Resource Investigation and Issues Exploration) should be provided in written or multimodal form or a combination of both. It should be up to a maximum of 2000 words if written or the equivalent in multimodal form, where 1000 words is equivalent to 6 minutes.

The following specific features of the assessment design criteria for this subject are assessed in the Resource Study:

* Investigation and Analysis (I1 & I2)
* Design Development and Planning (D2)
* Evaluation (E1)

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| Investigations and Analysis | Design Development and Planning | Production | Evaluation |
| A | Comprehensive and insightful analysis of the design features of products, processes, materials, systems and/or production techniquesPurposeful research and critical analysis of ethical, legal, economic and/or sustainability issues | Insightful and comprehensive communication of design concepts using relevant technical language and visual representationsInsightful and thorough planning, development, testing and validation of design concepts and procedures | Highly proficient application of skills, processes, procedures and techniques to create a solutionComprehensive development of solutions to technical problems that arise during the solution realisation | Comprehensive and insightful evaluation of the solution features and realisation process |
| B | Thoughtful and well-considered analysis of the design features of products, processes, materials, systems and/or production techniquesDetailed research and well-considered discussion of ethical, legal, economic and/or sustainability issues | Thoughtful and well-considered communication of design concepts using relevant technical language and visual representationsWell-considered planning, development, testing and validation of design concepts and procedures  | Proficient application of skills, processes, procedures and techniques to create a solutionThoughtful development of solutions to technical problems that arise during the solution realisation | Well-informed and detailed evaluation of the solution features and realisation process |
| C | Considered analysis of the design features of products, processes, materials, systems and/or production techniquesResearch and some analysis of ethical, legal, economic and/or sustainability issues | Clear communication of design concepts using technical language and some visual representationsCompetent planning, development, testing and validation of some design concepts and procedures  | Competent application of skills, processes, procedures and techniques to create a solutionDevelopment of solutions to technical problems that arise during the solution realisation | Considered evaluation of the solution features and realisation process |
| D | Identification of the design features of products, processes, materials, systems and/or production techniquesSome description of information about ethical, legal, economic and/or sustainability issues | Basic communication of design concepts using some technical languageSome planning and development of design concepts and/or procedures | Basic application of some skills, processes, procedures and techniques to create a solutionSome endeavour to develop solutions to technical problems that arise during the solution realisation | Some description of the solution features and realisation process |
| E | Attempted identification of the design features of products, processes, materials, systems and/or production techniquesSome accessing of information about ethical, legal, economic and/or sustainability issues | Superficial and simplistic communication of design concepts Limited use of information to plan design concepts  | Limited application of emerging skills Attempted development of a solution to a technical problem  | Emerging recognition of the solution features and realisation process |