

Introduction

This individual assignment requires you to prepare a detailed feasibility report for the manufacturing of an tablet back panel (an example of a panel is shown in the image below).

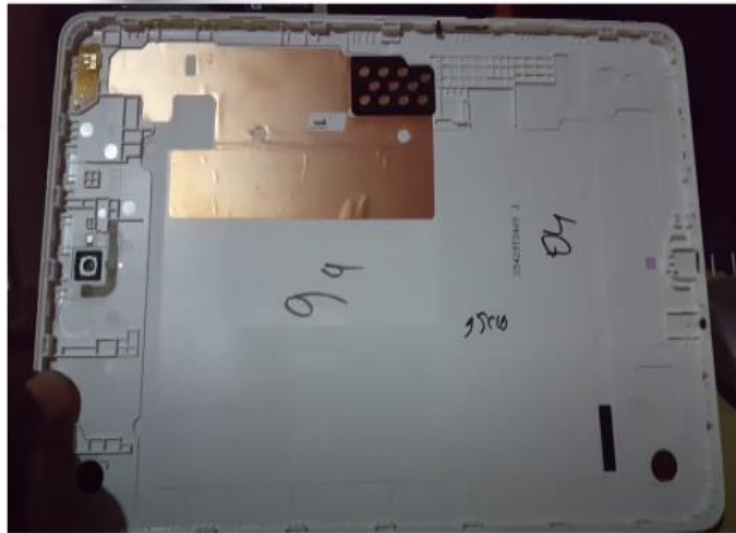


Image sources: <https://www.notebookcheck.net/HP-Stream-7-5700nq-Tablet-Review.134411.0.html> <https://www.youtube.com/watch?v=XHhviBjEds>

You need to present three possible processing route options; one using a metal, one using a polymer and one using a composite. This plan needs to demonstrate your understanding of the fundamental theory introduced in classes in your explanations and decision-making, while using external literature to extend your explanations and provide evidence to justify your answers (please reference appropriately). The feasibility report should contain information on material property requirements, process and microstructure/structure control, costs, quality and the use of lean manufacturing tools in your manufacturing facility (see specific requirements below).

Report requirements – While there is no required word limit due to the importance of graphical representations in the report (i.e. data plots or flow charts or tables), it is expected that individual reports should be approximately 3000-4000 words and written as concisely as possible in technical English.

The manufacturing report should contain the following:

1/ Material selection:

- Specification and **justification** of the required and/or ideal material properties for the component and application, clearly identifying which ones are constraints and which ones are objectives.
- Details of the EXACT material grade selected for **each** of the three material variations of the back panel; one metal, one polymer and one fibre reinforced composite (specify the resin type) with a description of the internal structure of the material and a fundamental theory/mechanism based explanation of how this microstructure provides the key material properties required for this application. *Note - You do not need to use a rigorous material selection process for this or need to use the EduPack software. You simply need to ensure that each material you select is appropriate for the application.

2/ Manufacturing process:

- Selection of a suitable manufacturing processes for **each** of the three materials to make the back panel, with a clear explanation and justification of the selections. The process selection should be appropriate for the material grade and the component geometry (Your component geometry might be different for the materials).
- A detailed process flow chart for each of the three manufacturing processes should be included that focuses on the production of the component and clearly highlights the steps involved, capital equipment, tooling, labour and the approximate time taken for each step of the process. This flow chart should only include key steps that are required in turning the input raw materials into the finished product (i.e. don't include steps such as shipping or design).

3/ Cost:

- Plot of the manufacturing cost per component versus number of components for **each** of the three materials on **one single plot** with justifications for ALL values used in the cost modelling (some of these you have detailed in 2b). Use the cost equation introduced in the class in studio 3.
- Explanation of the minimum number of components per year that you believe would make the business viable. This should factor in not only the production costs versus potential sell price, but also realistic production and sale volumes per year. If the answer to this question depends on the material (i.e. it varies between your three materials) then carefully highlight these differences.
- Suggest two wastes that are most relevant in the back panel manufacturing business (Lean Manufacturing principles), and explain why minimising or eliminating those wastes would be important for the success of your business.

4/ Process and structure/microstructure control

Select **one** of the three processes that you believe is a good choice to manufacture a tablet back panel from (this can not be MultiJet 3D printing from Assessment 2), with a simple explanation as to why you believe it a good choice. Answer the following questions (4 and 5) for that material ONLY.

- Temperature – Describe how temperature is involved in each stage of your selected process, including how it influences the internal structure of the material, the defects that could likely be introduced due to temperature, and the mechanical property issues that could be caused if temperature is not correctly controlled during your process.
- Pressure (or force/load) - Describe how pressure is involved in each stage of your selected process, including how it influences the internal structure of the material, the defects that could likely be introduced due to its effects, and the mechanical property issues that could be caused if it is not correctly controlled during your process.
- Time - Describe how time is involved in each stage of your selected process, including how it influences the internal structure of the material, the defects that could likely be introduced due to its effects, and the mechanical property issues that could be caused if it is not correctly controlled during your process.

5/ Quality:

Using the material and process that you selected as a good choice to manufacture the back panel from, answer the following question on quality for that material ONLY.

- Quality control plan – based on the likely defect or mechanical property issues identified due to temperature, pressure and time, specify a quality control plan to ensure that NONE of your components reaches the customer that do not meet minimum quality specifications. Your plan should include quality inspection/testing steps, process control steps and any highly relevant quality management steps or philosophies you believe to be important. Your plan should be fully justified and be as practical as possible (i.e. a balance between cost of implementing the plan and the cost of "not" implementing it).

Marking criteria:

Assessments should be uploaded either as Word docs or pdf's or PowerPoint to the appropriate dropbox on CloudDeakin. DO NOT UPLOAD ANY OTHER FILES OTHER THAN YOUR REPORT.

The Rubric for this assignment can be found [here](#).

- Demonstration of thoughtful and thorough decision-making in the material and process selection
- Accuracy and clarity in the presentation of the processing routes in the flow charts
- Demonstration of the *fundamental knowledge introduced in THIS UNIT* in explaining any the expected effects of temperature, pressure and time on the microstructure/structure/properties during processing
- Understanding of potential defects that could occur due to processing and development of a robust and practical quality plan that demonstrates an understanding of basic quality monitoring and process control
- Accuracy of cost model, including correct use of cost equations and justification of realistic cost assumptions
- Understanding of lean manufacturing tools and how they could be applied
- Quality of written report – structure, grammar and presentation

