

## Lean Assessment: Production Wastes in a PCB Manufacturer

A PCB (printed circuit boards) manufacturing company fabricates to customers requirements. As soon as a customer order is confirmed, the company starts the design process (Engineering) and makes a schedule for production of an initial quantity (*loaded* quantity). After production, each board is tested in Test process. When a defect in any PCB is found, the PCB will be scrapped.

The *finished* quantity is the quantity of good products that have passed quality tests. If the finished quantity is less than the quantity ordered (*wanted*), an *internal remake* has to be done. The *allocated* quantity is the quantity despatched to customer. For any customer returns, the company will remake the product (*customer remake*) and refund the customer. Since each type of PCBs is designed for specific requirements, any unsold product is assumed to be dead stock. The process flow is illustrated in figure 1.

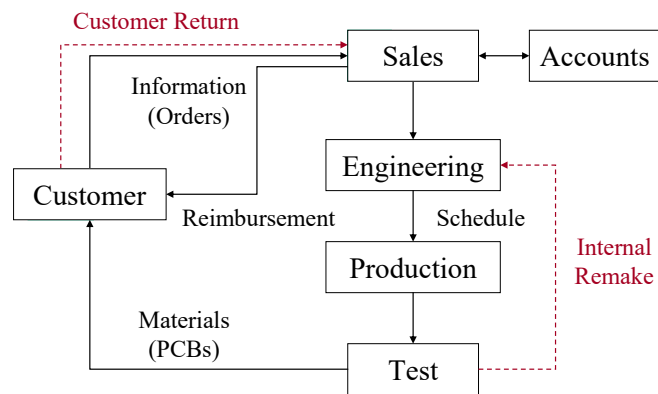


Figure 1 an illustration of the process flow

The data of six-month sales and production can be found in an Excel file, "Lean Assessment\_data".xls, which can be downloaded from the **ELE** of the module.

Please note that *PCBs/panel* shows the number of PCBs contained in a panel which is the minimum production unit in order to fit to the fixtures in production.

Write a report, which should be limited to 2000 words, assuming to be submitted to chief executives of the company on the problems you have found based on the data available. You may determine the structure of the report, but it should have an executive summary in the first page and the main body of the report starts with an introduction and ends with conclusions. It may help to think about the following issues.

- What are the different types of waste which can be found from the data?
- How many types of work order of PCBs are there? How much is the price of each type (in sale) and how much is the materials cost? (You may assume that the materials cost takes 25% of the sales price.)
- What could be the reasons for each type of waste? What are the relationships among different types of waste?
- What do you think is the major problem at the company? And why?

The reports are to be submitted to the **e-Bart system (please follow the procedure described on ELE to make your submission)**. The mark of the assignment (40% of the module) is distributed to the following assessment items.

a. Executive summary and introduction	10%
b. Calculation of the relevant quantities and costs	30%
c. Analysis of the results	30%
d. Conclusion development	20%
e. Report presentation including conciseness	10%

Clarification on data:

1. This is a set of data from a real company, rather than purposely designed for this assessment, therefore there are some errors due to human mistakes, for example, the number of finished PCBs are more than loaded PCBs which is impossible. Please ignore the errors. In this case, the loaded quantity will assume to have the same quantity as the finished quantity. the set of data was from a real company, so there are some errors and confusion. Please feel free to make assumptions if you come across some unclear situations.
2. Make some assumptions on what might be the reasons for each type of wastes.
3. It is totally up to you how you use this set of data. I would encourage you to use the most convincing approach and provide strong evidence.
4. You might also identify some silly things from the data, for example, some loaded PCBs are much more than the wanted ones. In theory it is not wise to make decisions like this, but it happens a lot in many companies because employees don't want to take risk of not producing enough products. The reason to use real data is that students might work in real companies in the future and need to be able to understand these problems and challenges.