Declaration and statement of authorship

I, bearing registration number 114119050, agree and acknowledge that :

1. The assessment was answered by me as per the instructions applicable to each assessment, and that I have not resorted to any unfair means to deliberately improve my performance.

2. I have neither impersonated anyone, nor have I been impersonated by any person for the purpose of assessments.

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Lean Manufacturing
Endsem

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1) i) ninth waste :- environmental waste

Uncontrolled process / activities from environment point of view where the carbon emission, CFC emission, other environment affecting factors are unchecked / uncontrolled such that it affects the environment. This type of waste also causes ecological imbalance in large scale industries. for ex:- uncontrolled carbon emission causes ozone depletion when done in large scale.

2) 5S is a workspace organization technique. It is basically implemented to ensure worker safety, increase efficiency, cleanliness and increase quality (also to increase uptime).

Steps followed in 5S:.

i) seiri - sort out
ii) seiton - set in order
iii) seiso - shine
iv) seiketsu - standardize
v) shitsuke - sustain

seiri (sort out):.

process of seperating out things that are in use and not in use. To remove the things that are not in use do improve working environment. The things that are currently not in use

should be red-tagged. Red tagged items should be listed in category wise for future reference and kept in a identified / seperated area. Later a Cross function team (CFT) is to be formed to take decision on the disposal action, The disposal action is also recorded for reference.

Seiton (sort in order):-

It is basically alloting the places for the sorted out in use materials. for example. machines are outlined meaning they are marked with paints which helps workers to identify machines work area. shadowboards are also used to keep tools in place which reduces the time of worker reaching the right tool among the disordered tools.

Shine (Seiso):

performing cleaning tasks / maintenance of machines and workfloors, inspection. Regular performance checks are incorporated. Performance standards are determined. Basically it is the process of keeping things clean such that they are ready to use. Incoporated in shopfloors, machines, tools, work areas etc...

Seiketsu (standardize):

process of documenting the methods / performance for

consistency. It is basically done to keep the activities done by various workers / machines inline with the recorded performance standards. Where improvements can be found and implemented and documented. It facilitates immediate corrective actions for process deviation

Shitsuke (sustain):

measuring / evaluation of the system. It is all about sustaining / continuing the performance that has been achieved with the previous 4's. Routine checks are performed. Results are analyzed and looked for possible improvements. To maintain the objective (to eliminate waste), the organization has to sustain its cleaning and standardizing objectives.

3) TPM implementation process:-

→ Management takes a decision to implement TPM as a part of implementing lean and to improve efficiency.

→ Goals / vision and strategies are formulated that needs to be attained after implementing.

→ Master Plan / schedules for training of employees are framed and the whole TPM training process is figured out.

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→ Cross functional team is formed for the inspection of training.

→ Training of employees are kick started as a part of the master plan.

→ Hold TPM kick off event. Identify / Calculate efficiency of existing equipments / machineries

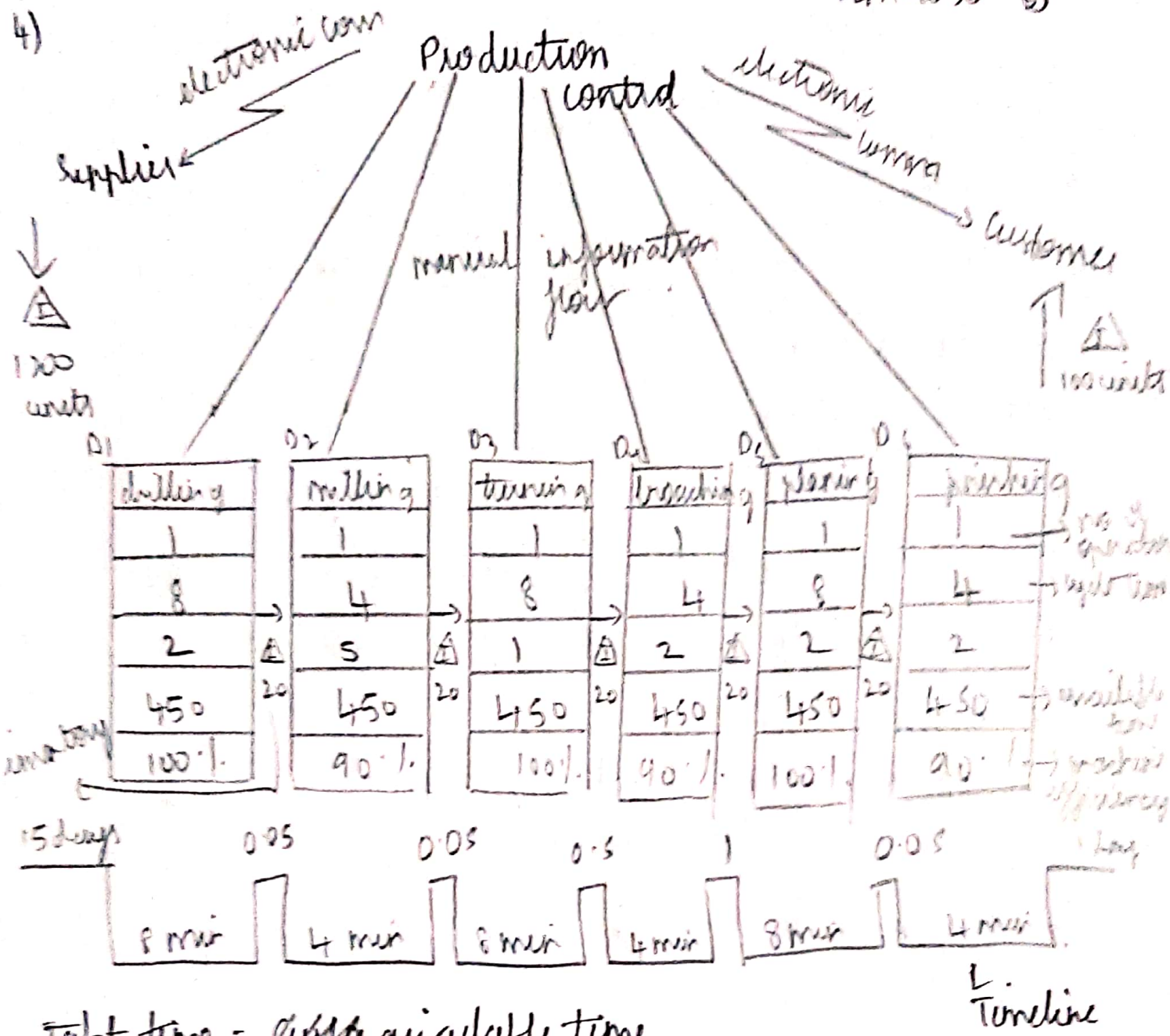
→ preventive maintenance / scheduled maintenances are planned and process maps are prepared.

→ Form a team externally for scheduled maintenance to assist with the owner of the workplace.

→ process / procedure revised / implemented is documented and standardized.

→ Continuous improvement of process is looked there after in every departments.

4)



Takt time = available time / customer demand

= 450 min / 100 → (4.5 hrs) ← consumption

Takt = 4.5 min

Takt time refers to the amount of time a manufacturer has per unit to produce enough goods to fulfill customer demand. Takt time is a essential tool used within lean productionlines to ensure that goods flow through

each workstation according to customer demand.

8) Lean scope in service domain..

Irrespective of domain lean is used almost everywhere where the customer demand is given priority. Lean is mostly used in:

i) financial sectors:.

providing banks, insurance companies with more productive and cost effective solutions, allowing workers to satisfy customers and increase customer value

ii) marketing services:

Lean provides a direct improvement on work quality and provides added value to the customer and kan help companies to streamline their processes by removing tasks that are unnecessary

iii) public services sectors:.

Lean improves operations and profitability of manufacturing firms and can be successfully implemented here as well.

Other sectors like medical, banking and marketing are also employing lean as it provides accelerated growth in business.

7) a) Six sigma role in lean system:

Lean is all about eliminating wastes and improving customer value whereas six sigma is the process of reducing the number of defective parts in the whole of production (ie in ppm). the principles of six sigma are very closely inclined with that of lean i.e six sigma is used in lean to reduces reworks, rejections and enable kaizen approach (mistake proofing).
Basically six sigma is employed in reducing the defective parts being produced. lean for

b) Production leveling:

It is the process of leveling of production by both volume and product mix. It is a production planning method where total volume order for a period of time is being mixed and planned to run with same amount and mix everyday. incoporated eliminate unevenness, overburden, NVA activities.

ex: A → 800 units, B → 2400 units required
instead of producing A fully and then going on to B. We can mix the volume we produce for A & B and supply ~~customer~~ customer as a daily demand like

40 units of A, 120 units of B

(not exact just assumption)

iii) economies of scale: NO

→ Economies of scale is generally implemented in mass production. It cannot be incorporated in lean.

→ It says the unit cost of product comes down as a result of high volume production

→ But in lean we have to produce according to customer needs with varied products unlike similar products in mass manufacturing. So the cost of mixed / varied products decrease as they are produced by eliminating wastes

* Lean → more variance

6) Kanban System:-

Kanban system is basically a signal initiated system where if the signal is received, say raw materials are delivered to workstation which initated the signal. It basically provides the right material at right place with right quantity.

In Lean, a Kanban Card is used as a signal.

ex:- Say miner assembly lines and material resources are seperated.

when the miner assembly known the material in its account are depleted it basically sends a kanban card to the central repository where materials are stored.

The central repository picks up the signal and ~~delivers~~ delivers the right material of right quantity to the right work station at the required time.

Kanban cards ~~are~~ can be used in Industry 4.0 as the next gen will be fully automated with minimal human intervention. So this type of automated signal system with supply on demand can be incorporated to makes the process organized and automate resource supply in a better way.

5) problems in modifying existing process layout-to cellular layout:.

→ The operators will be reluctant to work on more than one machine.

→ operators will be feared of losing their jobs as each operator will be assigned with more number of machines.

→ Employees will feel it difficult to adapt to the change

→ Higher capital investment is required to purchase new machinery & improved tooling.

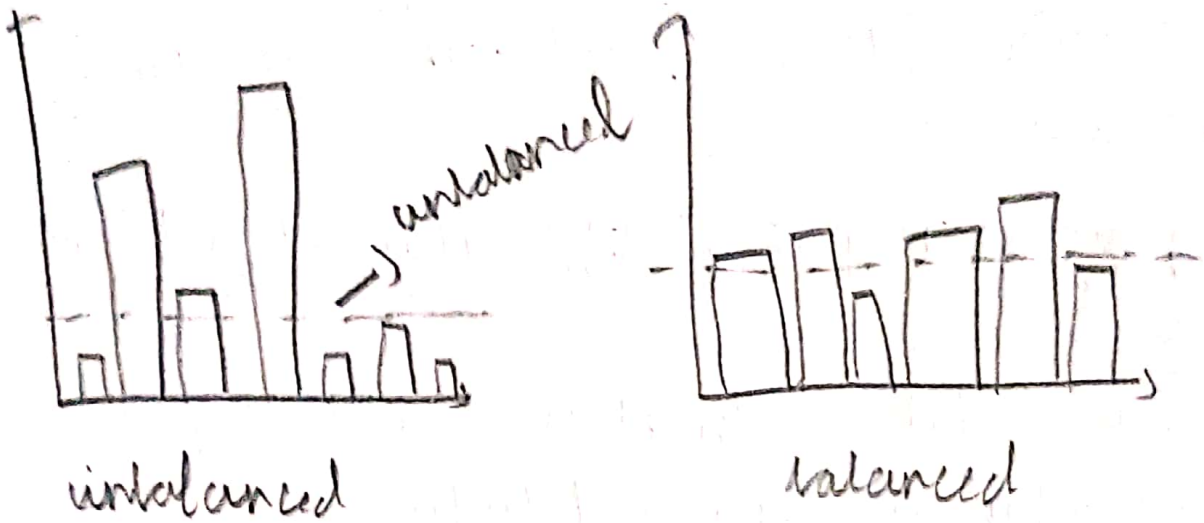
→ Retraining of the existing employees.

→ Employees may feel it difficult to operate new technologies / other machines.

Machine load Calculation:.

machine load can be visually inspected from line balancing where cycles times are plotted. If the cycles time of all the machines are normalized means are more or less to the avg then the machine load is balanced / line is balanced.

whereas if the machine load is like 2 machines have very high cycles time & others have very low or average cycle time than the line is unbalanced and machine load is unbalanced.



unbalanced

balanced