

Subject: Apparel Production Management

Unit 4: Understanding capacity

Quadrant 1 – e-Text

Learning Objectives

The learning objectives of this unit are:

- State the need for batch setting.
- Describe operation breakdown.
- Describe dependent and independent processes.
- Compute the machine, operator, labour and floater requirement.
- Review examples from the garment industry to illustrate concepts.

4.1 Capacity

This refers to the productive capability potential of a plant, machine or work centre in a given period of time. Capacity is created from availability of resources, like machines, time (labour), space, facilities (capital investment).

Capacity measurement

When measuring Capacity

Use Minutes.... Not pieces!

As different products will have different SAM values.

For example, 12 minutes for t-shirt, 20 minutes for a pair of jeans or 9 minutes for a skirt.

So, Capacity measurement is done in units of output that is no. of garments produced or In terms of input that is no. of hours or days.

Basic Capacity Calculation

Let's assume that a company works for 8 hours per day or 480 minutes

No. of Operators per team is 10

So Capacity is 10 into 480 that is 4800 minutes per day.

It is the maximum capacity of the plant.

If the Standard Minutes for T Shirt style A = 12 , then

Target Output for the line is 4800 divided by 12 , that is 400 pcs per day.

Capacity Calculation with Style Change

Style Changes will normally mean that during the initial period *Efficiency* will be lower.

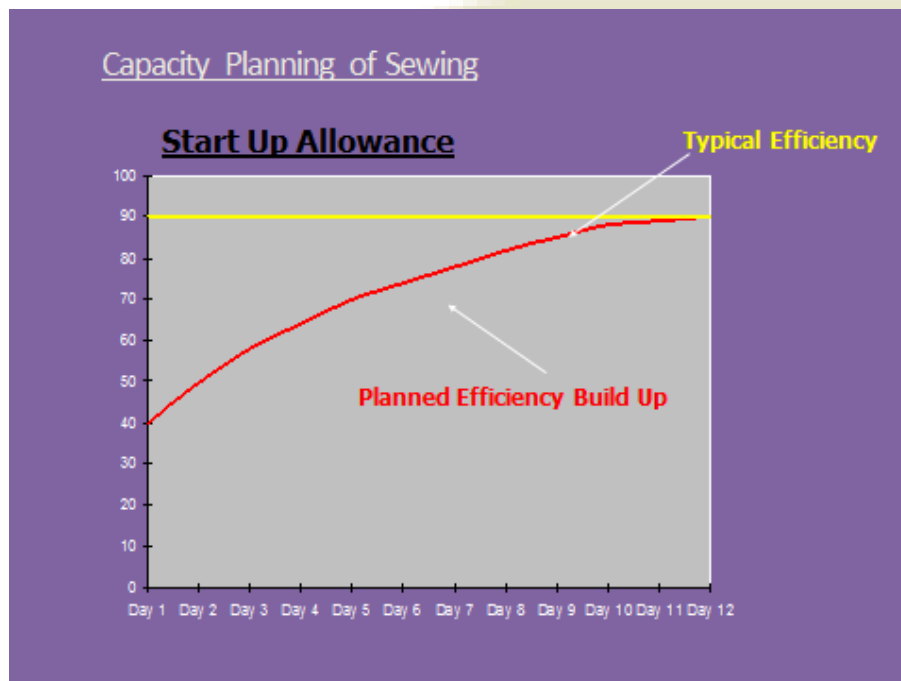
Planning must take this into account. This is done by applying a learning curve or start up allowance. It maybe that we expect Team 1 to reach 100% efficiency on the knit T-shirt style, but they will need some time to build up their skill and therefore, efficiency. The first few days (or weeks) output will be lower while machines are changed, operators develop new skills, the line is balanced and quality standards are achieved

This is called a *Startup allowance or learning curve*.

A company at 100% efficiency output produces 400 pieces per day, but for example, a 6 day allowance might look like this.

On day 1 the efficiency is 50% and then increases to 60%, 70%, 80%, 90%, 95%, and finally normal efficiency of 400 pieces is achieved only on day 7.

The graph refers to the relationship between actual output that 'is' produced with the installed equipment and the potential output which 'could' be produced with it, if capacity was fully used during a style change. Startup loss can also be seen here.



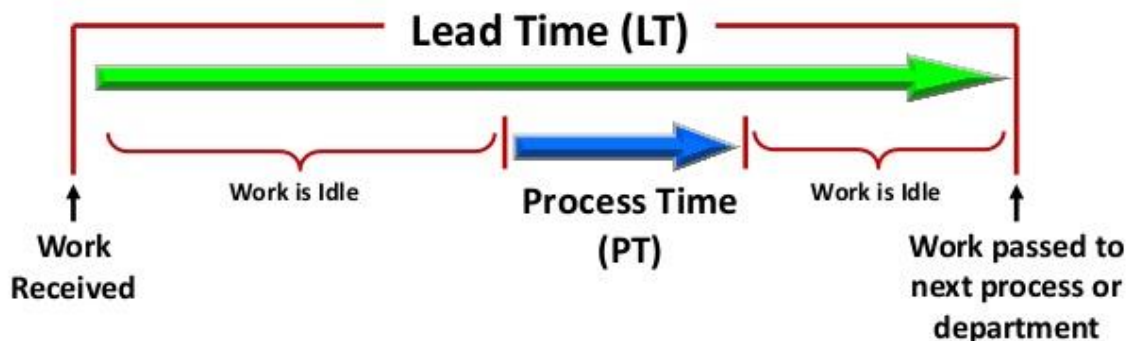
Capacity Inventory

For calculation we can prepare a table, which is linked to computer, and it will tell how long an order will take to complete according to the production units available.

Lead Time

The lead time is the time period between the placement of an order and the shipment of the completed order to the customer. A short manufacturing lead time is a competitive advantage. Many customers want the delivery of their products as soon as possible following the placement of the order. Lead time consists of waiting time before or after actual manufacturing and throughput time.

Lead Time vs. Process Time



Lead Time = Elapsed time; Throughput time; turnaround time

Process Time = Touch time; work time; cycle time

© 2011 A T&E K&M Martin Group, Inc.

19

4.2 Factors Affecting Capacity

Capacity can be calculated for different areas, depending on the requirement, like Plant capacity, Section capacity, Line capacity, Individual Operation Capacity.

Factors which effect capacity of plant, section, line or individual are Machinist work, Attendance, Utilization, Average performance, Unexpected problems.

For example, Factors effecting Production capacity for cutting department are the type of laying up machine, cutting machinery allocated, skill of the cutter involved, depth of the lay(size,range of colours), thickness of fabric, cutting accuracy required, presence or absence of vacuum system, etc.

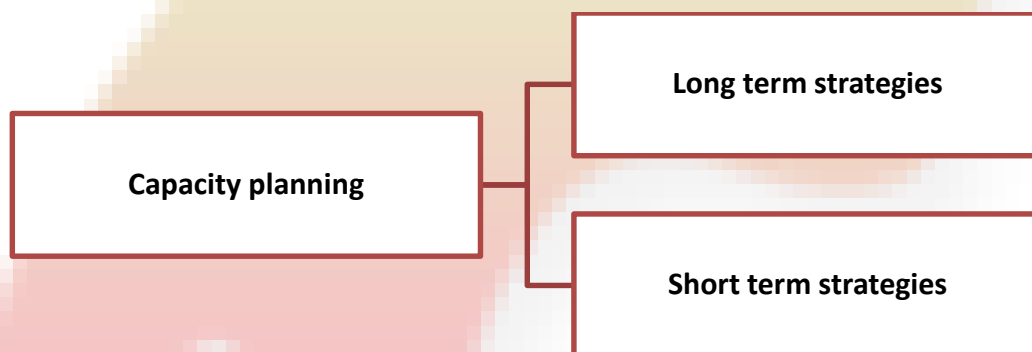
Major Reasons for low capacity of Indian companies are:

1. Inconsistency of export orders.
2. Frequent breakdown of machinery.
3. Average age of machinery used by Indian firms is more than 10 years; hence chances of breakdown are more.
4. Availability of electricians, technicians is also an issue which hampers production in case of machine breakdown, then, Inconsistent power supply.
5. Inconsistent raw material supply.
6. Labour absenteeism.
7. Equipment type configuration and uses.
- 8) The skill, size, versatility and productivity of labour force.

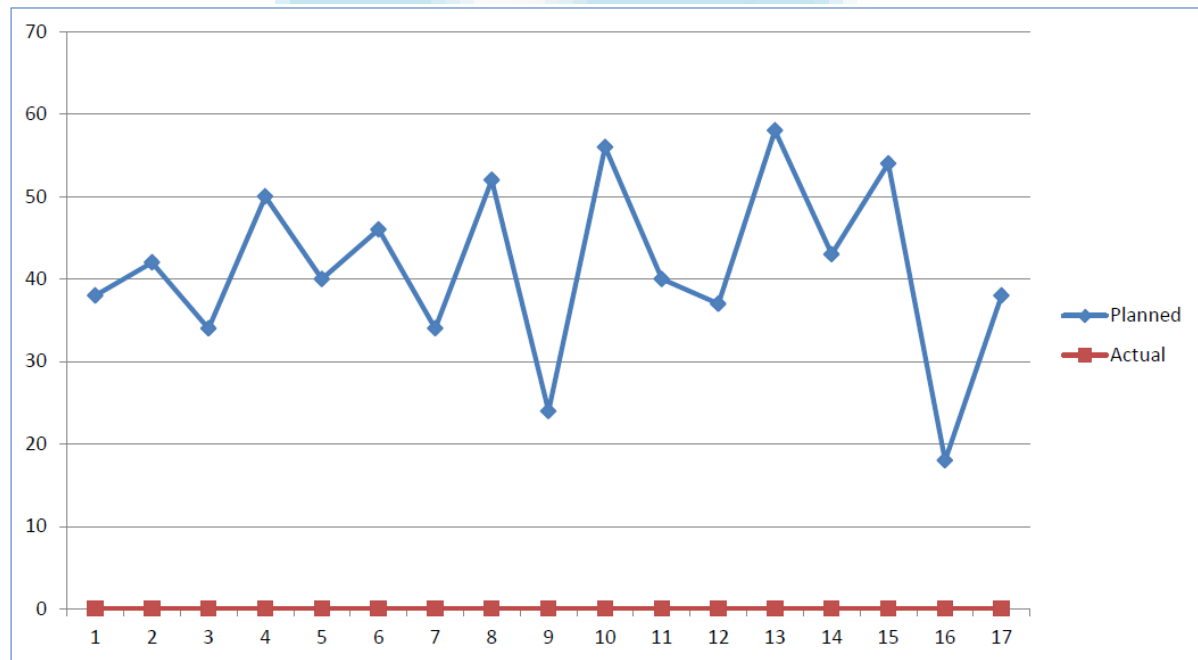
Capacity can be increased in a number of ways, such as better use of available resources, changing the resources, breaks, multiple shifts or by Addition equipment or operator.

Capacity Planning

Capacity planning is concerned with defining the short term and long term capacity needs of an organization and determining how these needs will be satisfied. Capacity planning includes *Long term strategies* and *Short term strategies*. Long term strategies are made for multiple products manufacturing, phasing in capacity, and phasing out capacity. On the other hand, short term strategies are made for dealing with inventories, backlogs, employment level (hiring and firing), employee training, workforce utilization (flexible work hours), subcontracting, process design (change job content) and for maintenance (temporarily discontinue).



Plan Performance Index shows the percentage of variation between the planned work and the actual work done.



4.3 Classification of Capacity

Capacity can be of different types: such as, Maximum capacity, Potential capacity, Committed capacity, Available capacity, Required capacity and Excess capacity.

Maximum Capacity

The total hours available under normal conditions in a given period of time.

Potential Capacity

The maximum capacity adjusted for efficiency.

Committed Capacity

The total hours previously allocated for production during a certain time period.

Available Capacity

The difference between potential and committed capacity over a period of time.

Required Capacity

Standard Allowed Hours (SAH) necessary to produce a specified volume in a certain period of time.

Excess Capacity

The difference between potential capacity and required capacity.

Calculating Capacity

Capacity is calculated as (number of machines or workers) × (number of shifts) × (utilization) × (efficiency)

Scenario

Read the scenario and let's answer these questions.

A small apparel contract sewing business employs 180 operators, who work for 40 hours week, 5 days a week. The plant's absenteeism is 5%. Operatives do the jobs for which they are trained and equipped for 80% of the time and average performance is 90 BSI, instead of 100 BSI. All these factors reduce the output.

A customer brought an order for 24000 pcs of style A that needs a 2 weeks turn around. SAM per garment is 20 min. The plant has appropriate equipment and skill to make the style. The plant also has a committed capacity of 1500 standard hours for that 2-week period.

a) To calculate the maximum capacity of plant in standard min for 2 week period.

Maximum Capacity = no.of operators x hours per week x no. of week

$$= 180 \times 40 \times 2$$

= Maximum capacity 7200 hours/week, and 14400 for 2 weeks.

b) To calculate the potential capacity of plant in standard min for 2 week period.

Potential capacity = Maximum capacity x utilisation x performance x attendance.

$$= 14400 \times 80/100 \times 90/100 \times 95/100$$

Potential capacity 4925 hours/week, 9850 for 2 weeks

c) To calculate the plant through put time for order?

$$= \text{SAM of the garment} \times \text{order quantity} / 60$$

$$= 20 \times 24000 / 60$$

Throughput time for order = 8000 hours

d) Is there adequate potential capacity to accept the order?

Total potential capacity – committed capacity = $9850 - 1500 = 8350$

Therefore enough capacity is available to accept the order.

e) What factors should be considered in deciding whether to accept the order?

These factors should be considered in deciding whether to accept the order:

Analysis of the order on basis of quantitative production capacity.

Also analysis of the order on the basis of quality specification of product like raw material, production equipment and tools, production personnel.

Capacity Utilization

Capacity utilisation is a metric used to measure the rate at which potential output levels are being met or used. Displayed as a percentage, capacity utilization levels give insight into the overall slack in the economy or a firm at a given point in time and refer to the extent to which an enterprise or a nation actually uses its installed productive capacity.

Example:

This example, details the produced minutes, capacity and capacity utilization of a factory.

Factory XYZ has 400 operators and they work at 65% efficiency. The factory runs 24 days in a month, 8 hours each day.

The factory made 2,00,000 pieces of 12 minutes each in the last month.

Produced minutes = $2,00,000 \times 12 = 24,00,000$ minutes

Capacity = $400 \times 0.65 \times 24 \times 480 = 29,95,200$ minutes

Capacity utilization = $24,00,000 / 29,95,200 = 80\%$

4.4 Conclusion

To summarize, in this unit, you have reviewed the definition and need for batch setting. You have also learnt about operation breakdowns, dependent and independent processes, and seen ways to compute the machine, operator, labour and floater requirements for apparel production.

