Quadrant 4 - Learn More / Web Resources / Supporting Materials

References

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2. David J. Tyler., "Materials Management in Clothing Production ", Blackwell Scientific Publications 1991

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4. Glock, R.E. & Kunz, G.I., Apparel Manufacturing - Sewn Product Analysis, 2nd ed., Prentice-Hall,1995.

5. Cooklin, G., Introduction to Clothing Manufacture, BSP Professional Books, 1991.

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Journals

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5. Japan Textile News
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Web References

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   https://www.youtube.com/watch?v=UKCCXKRw8eo

2. Ina System - trousers production:
   https://www.youtube.com/watch?v=v03vPLGMNaM
3. Smart MRT - Unit Production Hanger System - Under Garment:
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4. Eton Systems: Installation Mattress Production:
   https://www.youtube.com/watch?v=Iwh5i6souRc

Glossary of Terms

Absenteeism - The total number of hours absent from work by direct operators during the week. It is unauthorized leave and is different from regular holiday. In brief, absenteeism means absence which is wilful but avoidable.

$$Absenteeism = \frac{Number\ of\ man\ days\ lost}{Number\ of\ man\ days\ scheduled\ to\ work.} X\ 100$$

Apparel Production System - An integration of materials handling, **production** processes, personnel, and equipment that directs work flow and generates finished products.

Attrition Rate - This rate can be calculated as:

$$Attrition\ rate = \left(\frac{Number\ of\ attritions\ X\ 100}{Actual\ employess + new\ joined}\right) X\ 100$$

Labour retention is a big issue in garment industry. Most companies struggle in this area and have been trying to implement various measures to ensure lower labour turnover.

Assemble-to-order - The products and services add option according to customer specifications.

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

Average Defects per Hundred Units (DHUs) "End of Line" - The number of garments with faults needing repair / number of garments examined (%).

Average Defects per Hundred Units (DHUs) "In Line" - The number of garments with faults needing repair/ Number of garments examined (%).

Average Order Size - The total number of units in each order being produced during the week/ Number of Styles being produced.

Capacity - The productive capability potential of a plant, machine or work centre in a given period of time.

Capacity Inventory - A table that is prepared and linked to a computer to calculate how long it will take to complete an order, according to the production units available. Such a table is often called capacity inventory.

Capacity Utilization - A metric used to measure the rate at which potential output levels are being met or used. Therefore, it refers to the relationship between actual output that 'is' produced with the installed equipment and manpower and the potential output which 'could' be produced with it, if capacity was fully used.

$$Capacity\ Utilization = \frac{Produced\ garments\ or\ Produced\ minutes}{Capacity\ in\ terms\ of\ garments\ or\ minutes}\ X100$$

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

Continuous Production Processes - A production process, such as those used by chemical plants or refineries, that runs for very long periods without the start-and-stop behavior associated with intermittent production.

Controlling - The activity with which the production manager inspects and corrects the execution of the production plan. It is the action that must be taken to change the production plan whenever production is behind the planned schedule because of improper planning, unforeseen emergencies, or unpredicted occurences.

Cost per standard hours - The total Company costs for the week including overheads/ Total Standard Hours produced.

Cut to Ship Ratio - A ratio that shows the percentage of garments shipped out of total no of garments cut for the order. It shows a bird's eye view of the entire system. A number close to 98% will be considered very good. This means only 2% of garments are rejected or lost in the system.

$$Cut\ to\ Ship\ ratio = \frac{Total\ pieces\ shipped}{Total\ Pieces\ cut}$$

Dynamic balance - Another approach of allocation is to utilize the operators in operations they can do best.

Efficiency - Standard Minutes earned / actual Minutes attended.

Efficiency of Direct Operators - The total Number of Standard hours produced/Total hours worked including overtime X 100%. The accuracy of this figure is dependent on the Standard Minutes Values for each operation, accurately measured against International Standards. This is one of the most important KPIs and should be subject to continuous scrutiny by managers to understand what has contributed to the %reported and how different aspects can be improved.

Excess Capacity - The difference between potential capacity and required capacity.

Floaters - The operators required to cover for absenteeism and problems of balancing. Labour = Floaters + operators.

Forecasting - The process of estimating the future sales volume, rate of sales, and the rate of delivery.

Indirect operators - All employees not producing Standard Minutes and include everyone from directors to maintenance personnel.

Intermittent Production System - A production that is performed on a start-and-stop basis, such as for the manufacture of made-to-order products.Under this system the goods may be produced partly for inventory/stock and partly for customer's orders.

Intrinsic balance - An approach of allocation that is used to find the closest match between operator performance required and operator performance available.

Labour Cost per minute - An important metric while calculating the price of a garment. It helps to quickly calculate the labour cost that will be incurred in production of the given garment.

$$Cost\ per\ minute = \frac{Total\ cost\ incurred\ on\ labour}{Total\ available\ working\ minutes\ \ X\ No\ of\ labour}$$

This can be calculated over a month or a year to give an accurate value to cost per minute.

Labour Turnover - The total number of employees that have left the company during the week/ Total number of employees at the beginning of the week (%).

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.

Line balancing - To set the flow through each operation to be as similar as possible checking from time to time to see how things are going and making adjustments to even out the flow again.

Make through System - The traditional method of manufacture in which an operator makes right through one garment at a time. That is one operator will do all the stages of the sewing operations of one garment and after completing it he will go for the next garment.

Make-to-order - The products and services that are made to a customer's specifications after an order has been received.

Make-to-stock - The products and services are made in anticipation to deman**d.**

Mass Customization - The design, production and delivery of customized products to customers for at or near the cost and convenience of mass-produced items.

Mass customization combines high production volume with high product variety.

Mass Production - A way to make many products faster and cheaper.

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

Modular production system - A contained, manageable work unit that includes an empowered work team, equipment, and work to be executed.It is also known as Cellular manufacturing units, Compact work teams, Flexible work groups, Self-directed work teams and Toyota Sewing System (TSS).

Number of Indirect Operators - The total Number of Employees – Number of Direct Operators.

Number of styles produced in a week - The number of style changes experienced during a week can have an impact on the Total Standard Hours produced and the Efficiency of Direct Operators.

Off standard - The rest of all the working time, exclusive of official breaks. e.g.; machine delays, measured work.

On standard - An operative is said to be 'on standard' when doing the job for which he or she is trained and equipped.

Off-Standard Time - The minutes/hours spent by direct operators when they are not producing Standard Minutes. This in the case of a sewing operator, the Off-Standard

Time would include time spent waiting for work, machine breakdown, sewing samples, etc.

On time delivery - A representation of the percentage of deliveries that a factory is able to make on-time without any delays or extensions.

$$On\ time\ delivery = \frac{On\ time\ delivery}{Total\ deliveries}\ X\ 100$$

An on-time delivery means that the products are delivered exactly on the date the exporter has promised to the customer.

Operation Breakdown - The job must be broken down into operations of equal size. The operation breakdown includes element description from method study, standard time of each operation and type of machinery required. Special work aids and attachments should also be mentioned on it.

Operation Bulletin - A document that is prepared and which includes one column for calculated machine requirement and another column for actual machine requirement as shown in the chart.

Operative performance - SM earned on standard/ minutes spent on standard.

Operator skill inventory - A database maintains the record of each operator, who can do what operation and at what rating. It is very important to keep this database updated as over the time operator acquires skills for new operations as well as improve performance in the existing operations.

OTIF - (On Time In Full), or DIFOT (Delivered In Full On Time), is one of the fundamental measurements for logistics performance. It measures if the Supply Chain was able to deliver:

a. the expected product (reference and quality)

b. in the quantity ordered (with the tolerance defined by the customer)

c. at the place agreed

d. at the time expected by the customer

$$\text{OTIF} = \frac{\text{Number of deliveries OTIF}}{\text{Total number of deliveries}}\ \text{X}\ 100$$

Overtime % - The percentage of overtime being used over total working time. As overtime costs considerable amount of money to the company, a tight control should be kept on overtime %.

$$Overtime = \frac{Total\ overtime\ minutes}{Total\ working\ minutes} X\ 100$$

Pitch time - The theoretical operation time; each operator should take for a planned balanced line. It is calculated as: (SAM value of a style) / (No. of operator required to meet the target) **Production -** The process of conversion process through which inputs are converted into outputs.

Plan Performance Index - An index that is used to show the percentage of variation between the planned work and the actual work done.

Planning (organising and scheduling) **-** The activity of organising the sequence of communications and material processing.

Potential Capacity - The maximum capacity adjusted for efficiency.

Price - The price from the client for one piece of garment/value of effective minutes for one piece of garment X 60.

Productivity - A relationship between output and input. Productivity = Output / Input.

Production control - The function to produce products with minimum total cost in required planned delivery time frame. The efficiency of the production control performance is equal to the precision of time and cost anticipation. Greater the deviation from the scheduled time and cost figure, the poorer the production control performance.

Production Control's Function - To produce products with minimum total cost in the required planned delivery time frame.

Production effectiveness - The evaluation of Production effectiveness is the process by which the company sets the parameters for reaching the required goals. An organisation commonly uses KPIs to evaluate the success of a particular activity in which it is engaged.

Production management - The managerial decisions involved regarding design of the product and design of the production system i.e. determination of production processes and production planning and control.

Production system - A system whose function is to convert a set of inputs into a set of desired outputs. Production system is the framework within which the production activities of an enterprise take place.

Progressive Bundle system - A traditional production system. According To AAMA Technical Advisory Committee it is 80% used. Sewing operations are laid out in sequence. Each operator receives a bundle, does his work, reties the bundle and passes it to the next operator.

Required Capacity - The Standard Allowed Hours (SAH), necessary to produce a specified volume in a certain period of time.

Scheduling - The second half of the planning activity; it adds the 'when' to organising ' what ' and 'where'.

Standard work content - The standard work content of an order is the time which would be taken by the labour force, if they were all working at the standard rate for all of the time.

Standard hours per style - The total effective hours produced in a week/Number of styles produced.

Start-up allowance or learning curve - The first few days (or weeks) output will be lower while machines are changed, operators develop new skills, the line is balanced and quality standard are achieved**.**

Throughput time **-** The amount of time required for a product to pass through a manufacturing process, thereby being converted from raw materials into finished.

Total Hours Worked including overtime - The total number of hours including overtime that all direct operators work in the factory.

Total Standard Hours produced - The total Standard Minutes earned by the direct operators/60. Accurate Standard Minute Values (SMVs) are needed to provide realistic figures. If the SMVs are loose (too high) then the total number of Standard Hours (Std. Hrs.) produced will be more and the efficiency will not be a true reflection of the performance. If the SMVs are tight (too low) the reported figures will not be accurate.

Unit Production systems (UPS) - A system that is similar to a relay race, each production operator has a task and passes that garment on to the next person. Normally there is only one garment between operations.

Utilisation - Minutes on standard / Minutes attended.

Utilisation of direct operators - (Total Hours Worked including overtime – Off-Standard Hours) / Total Hours Worked including overtime (%).

Work In Progress (WIP) - In the garment manufacturing industry, WIP would include fabric that has been spread, part sewn garments, through to finished garments, which may have been packed but not booked for finished goods warehouse. WIP needs to be controlled as apparel factories face the complexity of multiple styles, larger volumes, lower profit margins and shorter lead times.