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Supply Chain Management in Foundry and Machine Shop

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Abstract: In a Manufacturing Industry, the management of flow of goods and services, ie the transportation and storage of the raw materials, of work-in-process inventory, and of finished goods from original point to the point of consumption is called the Supply Cain Management (SCM). The Proper management in supply chain is mandatory for a mass production unit, So that the unwanted chaos within the processes can be neglected. This project is the implementation of the SCM as a Tool of Total Quality Management. In an industry there may be delays in production and delivery due to poor mode of transportation, improper storage facility and unplanned layout in locating the machineries. Hence implementing the various techniques and concepts on supply chain management such asmodification of the plant's layout, 3C concept, advanced transportation systems for working materials can provide a constant and continuous flow of materials. This may lead to continuous production. Hereby, the benefits like increased production rate, elimination of delays due to various factors and the reduced time consumption for machining processes. And also the SCM provide a perfect guideline to the flow of work materials. And this project deals with the SCM as a tool of Total Quality Management.

Key words:Total quality management, Supply Chain Management, Advanced transportation system, plant layout modification, 3C concept.

1. Introduction

In the current competitive scenario the production industries should be able to produce the desired amount of products within scheduled period. But it may have some obstacles such as delays improper layout of the plant, poortransportation, and poor warehouse management. In order to rectify these drawbacks, The Total Quality Management (TQM) tools can be implemented. TQM can be defined as "the system of management based on the principle that every member of staff must be commited to maintaining high standards of work in every aspect of a company's operations. Here the Supply chain management (SCM) is used as TQM tool. SCM can be defined as the management of flow of goods and services, iethe transportation and storage of the raw materials, of work-in-process inventory, and of finished goods from original point to the point of consumption is called the Supply Cain Management (SCM). In this there various management concepts like 3C concept, Kanban system, MMOG, inventory control, plant layout modification, etc can be used to increase the production rate of the firm.

Functional areas:
1. Fettling
2. Transportation
3. Inventory and Storage
4. Warehouse
5. Materials Handling, Loading and unloading
6. Packaging and Re-packaging

2. Literature Review

3. The concept of SCM

There is a basic pattern to the practice of supply chain management. Each supply chain has its own unique set of market demands and operating challenges and yet the issues remain essentially the same in every case. Companies in any supply chain must make decisions individually and collectively regarding their actions in five areas:

- Production: What products does the market want? How much of which products should be produced and by when? This activity includes the creation of master production schedules that into account plant capacities, workload balancing, quality control, and equipment maintenance.
- Inventory: What inventory should be stocked at each stage in a supply chain? How much inventory should be held as raw materials, semi-finished, or finished goods? The primary purpose of inventory is to act as a buffer against uncertainty in supply chain. However, holding inventory can be expensive, so what are the optimal inventory levels and reorder points?
- Location: Where hold facilities for production and inventory storage be located? Where are the most cost efficient locations for productions for production and for storage of inventory? Should existing facilities be used or new ones built? Once these decisions are made they determine the possible paths available for product to flow through for delivery to the final consumer.
- Transportation: How should inventory be moved from one supply chain location to another? Air freight and truck delivery are generally fast and reliable but they are expensive. Shipping by sea or rail is much less expensive but usually involves longer transit times and more uncertainty. This uncertainty must be compensated for by stocking higher levels of inventory. When is it better to use which mode of transportation?
- Information: How much data should be collected and how much information should be shared? Timely and accurate information holds the promise of better coordination and better decision making. With good information, people can make effective decisions about what to produce and how much, about where to locate inventory and how best to transport it.

Effective supply chain management calls first for an understanding of each driver and how it operates. Each driver has the ability to directly affect the supply chain and enable certain capabilities. The next step is to develop an appreciation for the results that can be obtained by mixing different combinations of these drivers. Let's start by looking at the drivers individually.

4. Plant layout

4.1 Introduction

Plant layout is the physical arrangement of equipment and facilities within a plant. Optimizing the layout of a plant can improve productivity, safety and quality of products. Un-necessary efforts of materials handling can be avoided when the plant layout is optimized. Plant layout techniques apply to the case where several physical means have to be located in a certain area, either industrial processes or service. The basic objective is to ensure a smooth flow of work, material, people and information. There are probably two levels at which layouts are required. In one, the various departments have to be sited, and in other the items of equipment within a department need to be located.

4.2 Criteria for a good layout

- Maximum flexibility: A good layout will be one which can be rapidly modified to meet changing circumstances.
- Maximum co-ordination: Entry into, and disposal from, any department or functional area should be in such a manner that it is must convenient to the issuing or receiving departments. Layout requires to be considered as a whole and not partially.
- Maximum use of volume: Facilities should be considered as cubic devices and maximum use made of the volume available. This principle is particularly useful in stores, where goods can be stacked at considerable heights without inconvenience, especially if modern lifting devices are used. In office, racking can be installed to maximize use of floor space.
- Maximum visibility: All the people and material should be rapidly observable at all the time: there should be no 'hidden places' into which goods or information can get mislaid.
- Maximum accessibility: All servicing and maintenance points should be readily accessible. For example, equipment should not be placed against a wall in such a manner that necessary maintenance cannot easily be carried out.
- Minimum distance: All movements should be both necessary and direct. Handling work adds to cost but does not increase value; consequently any unnecessary or indirect movements should be avoided.
- Minimum handling: he best handling of material and information is no handling, but where it is unavoidable it should be reduced to a minimum by the use of whatever device are most appropriate.
- Minimum discomfort: Poor lightning, excessive sunlight, heat, noise, vibration

and smells should be minimized and if possible counteracted.
- Inherent safety

4.3 Advantages of good layout

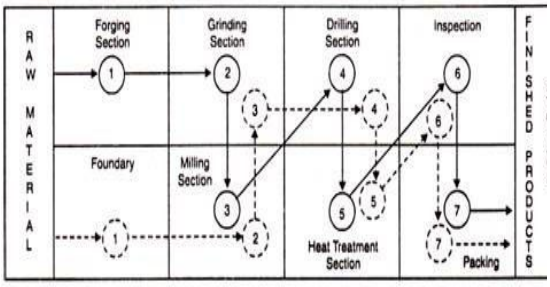
- The overall process time and cost will be minimized by reducing unnecessary handling and movement.
- Supervision and control will be simplified by the elimination of 'hidden corners'
- Changes in the programmers will be most readily accommodated.
- Total output from a given facility will be as high as possible by making the maximum effective use of available space and resources.
- A feeling of unity among employees will be encouraged by avoiding unnecessary segregation.

4.4 *Types of layout*

- Process or functional layout
- Product or line layout
- Cellular layout
- Fixed layout
- Hybrid layout(mixed)

4.4.1 *Process layout*

- Used when the operations system must handle a wide variety of products in relatively small volumes(I.e., flexibility is necessary)
- Designed to facilitate processing items or providing services that present a variety of processing requirements
- The layout includes departments or other functional grouping in which similar kinds of activities are performed.



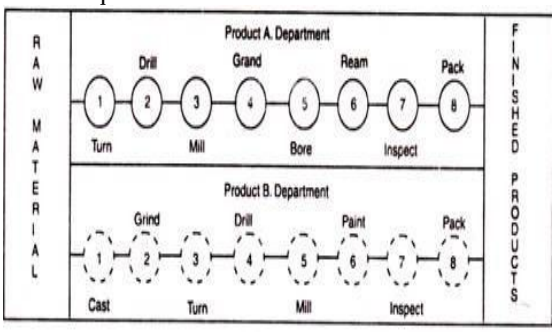
- A manufacturing example of a process layout is the machine shop, which has separate departments for milling, grinding, drilling and so on.

Characteristics of process layouts:

- General-purpose equipment is used
- Changeover is rapid
- Material handling equipment is flexible
- Operators are highly skilled
- Technical supervision is required
- Planning, scheduling and controlling functions are challenging.

4.4.2 *Product (assembly line) layout*

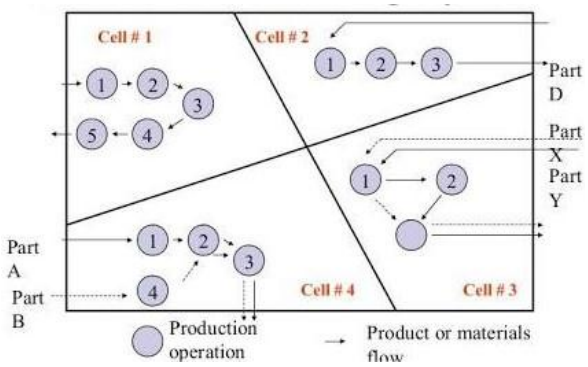
- Product layout is used to achieve a smooth and rapid flow of large volumes of products or customers through a system.
- A job is divided into a series of standardized tasks, permitting specialization of both labor and equipment.
- The large volumes handled by these systems usually make it economical to invest huge amount of money in equipment and job design.
- Operations are arranged in the sequence required to make the product. For instance, if a portion of a manufacturing operation required the sequence of cutting, polishing, and painting, the appropriate pieces of equipment would be arranged in that sequence.



- Product layout achieves a high degree of labor and equipment utilization.

4.4.3 *Cellular manufacturing (cm) layout*

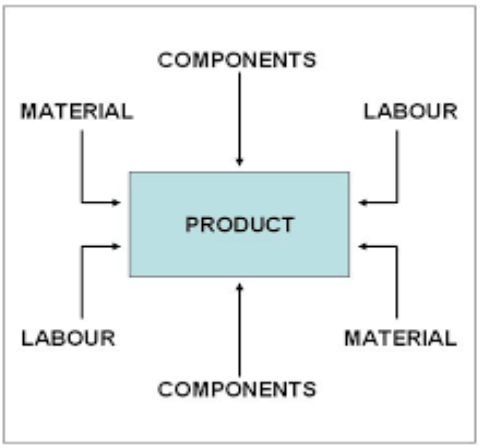
- Cellular manufacturing is a type of layout in which machines are grouped into what is referred to as cell.
- Groupings are determined by the operations needed to perform work for a set of similar items, or part families that require similar processing.
- Cellular layout provides faster processing time, less material handling, less work-in-process inventory, and reduced setup time.



- Used when the operations system must handle a moderate variety of products in moderate volumes.

4.4.4 *Fixed-position layout*

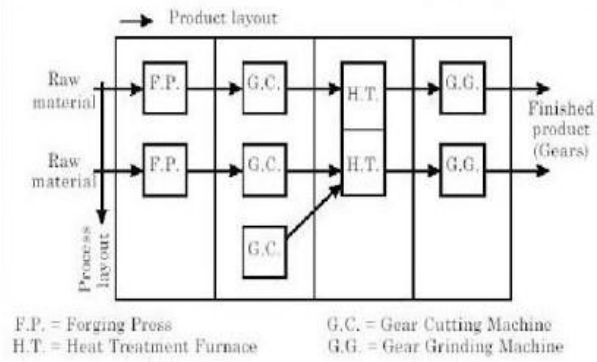
- In fixed-position layouts, the material or major components remain in a fixed position, and workers and equipment are moved as needed.
- Fixed-position layout is used in large construction projects (buildings, power plants, and dams), ship building and production of large aircraft and space mission rockets.



- Fixed-position layout is used when product is very bulky, heavy or fragile.
- Fixed-position layout is widely used for farming, firefighting, road building, home building, remodeling and repair.

4.4.5 *Hybrid (mixed) layout*

- Actually, most manufacturing facilities use a combination of layout types.
- An example of a hybrid layout is where departments are arranged according to the types of process but the product flow through on a plant layout.
  For instance, supermarket layout are fundamentally of a process nature, and however we find most use fixed-pat material-handling devices such as roller-type conveyors both in the stockroom and at checkouts , and belt type conveyors at the cash registers.
- Hospitals also use the basic process arrangement, although frequently patient care involves more of fixed-position approaches, in which nurses, doctors, medicines, and special equipment are brought to the patient.



5. Transportation system

Transportation in a manufacturing unit refers to the short-distance movement within the confines of a building or between a building and a transportation vehicle. It utilizes a wide range of manual, semi-automated, and automated equipment and includes consideration of the protection, storage, and control of materials throughout their manufacturing, warehousing, distribution, consumption, and disposal. Material handling can be used to create time and place utility through the handling, storage, and control of material, as distinct from manufacturing, which creates form utility by changing the shape, form, and makeup of material. The various transportation facilities are automated guided vehicles (AGVs), trolleys, bins, forklifts, etc.Trolley system is one of the important mode in transportation management systems (TMS). First, we should see about the stock inventory in the industry. Stock inventory means just a store room which is used to store the work piece and restore the work piece that is needed for machining. The trolley has a major role in the material handling such s moving the work piece from one place to another. Various types of trolley is used by the industry like,

- Automated Guided Vehicle
- Hoist
- Fork lift
- Platform trolley etc.,

In order to reduce the timing for moving the work piece, trolley will be the best choice. It is nothing but, portable work piece storage. It makes the work easier to be quick moving the work piece. And it is less economic and easy for loading and unloading. The trolley is very useful for the workers to save time and to increase the work efficiency.

6. 3C- SYSTEM

3C system is nothing but it is constant location, constant quantity and constant container. This system is used to improve the supply chain management through control inventory storage. 3C system is possible by using three types of container like green, yellow and red color containers. This system doesn't need any type of documents and card system because this system is fully based on visual inspection. Also this system is used to monitoring the supply chain management and easy to counting the number of products is in line.

9.1 constant location

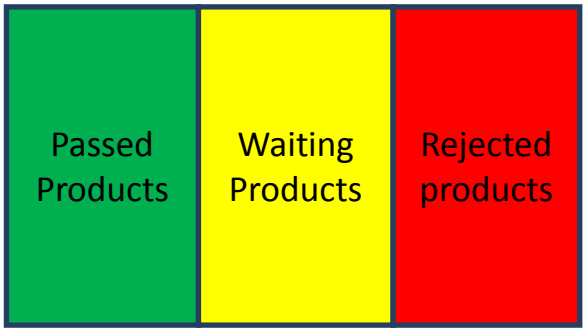
Constant location means allot a fixed location to each type of products such as waiting products, passing products and rejected products. This method is used to find the products where is placed that whatever we want.

9.2 constant quantity

Constant quality means fill the products into the container in constant number. All containers have a constant number of products for easy to handle in the supply chain management.

6.3 constant container

Constant container means place the container in terms of constant number. It is used to visual inspection. Three types of container are used such as green, yellow and red color container.



yellow color container is filled with waiting product for testing or other process and red Color product is filled with rejected product and it is gone to rework.

7.Conclusion and suggestions

Supply chain management practices and innovation measure are become most important strategy and it involves local car manufacturer and automotive suppliers. Therefore, it will be an effort for them to become more effective and competitive by enhancing the organization's ability to improve quality, business operation, customers and employee satisfaction, business performance.

The main purpose of the method is to develop new theory or refine existing theory by uncovering new variables and relationship.

Benefits:

- Easy material handling
- Man power saving
- Waste elimination
- 5s improvement
- Time saving

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