



**DNYANSAGAR ARTS AND COMMERCE COLLEGE,
BALEWADI, PUNE – 45**

**SUBJECT: PRODUCTION and OPERATIONS
MANAGEMENT(401)**

CLASS: SY BBA (IV SEM)

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Unit 1



Introduction

The very essence of any business is to cater needs of customer by providing services and goods, and in process create value for customers and solve their problems. Production and operations management talks about applying business organization and management concepts in creation of goods and services.

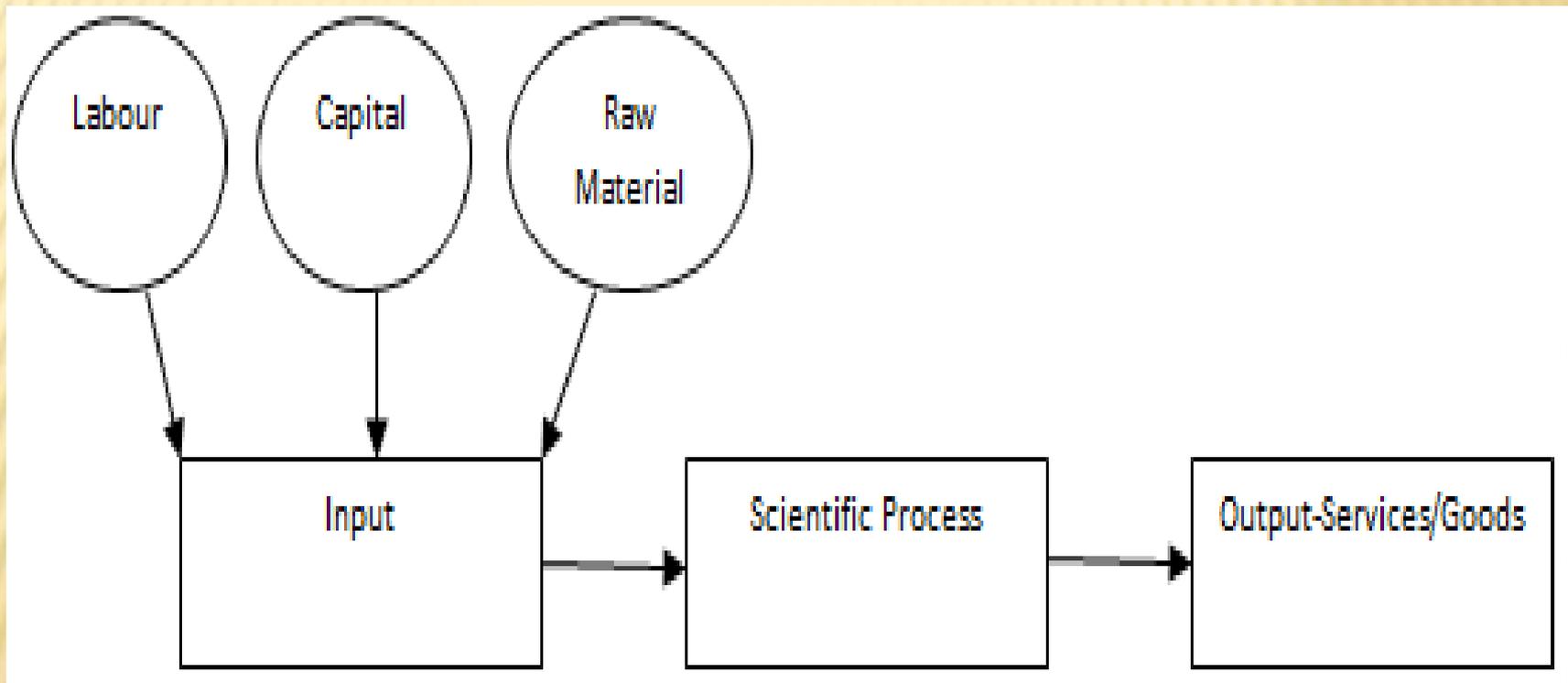
Production

Production is a scientific process which involves transformation of raw material (input) into desired product or service (output) by adding economic value. Production can broadly categorize into following based on technique:



Production through separation: It involves desired output is achieved through separation or extraction from raw materials. A classic example of separation or extraction is Oil into various fuel products.

Production by modification or improvement: It involves change in chemical and mechanical parameters of the raw material without altering physical attributes of the raw material. Annealing process (heating at high temperatures and then cooling), is example of production by modification or improvement.





Importance of Production Function and Production Management

Successful organizations have well defined and efficient line function and support function. Production comes under the category of line function which directly affects customer experience and there by future of organization itself.

Aim of production function is to add value to product or service which will create a strong and long lasting customer relationship or association.



And this can be achieved by healthy and productive association between Marketing and Production people. Marketing function people are frontline representative of the company and provide insights to real product needs of customers.

An effective planning and control on production parameters to achieve or create value for customers is called production management.



Operations Management

As to deliver value for customers in products and services, it is essential for the company to do the following:

Identify the customer needs and convert that into a specific product or service (numbers of products required for specific period of time)

-



Based on product requirement do back-ward working to identify raw material requirements

Engage internal and external vendors to create supply chain for raw material and finished goods between vendor → production facility → customers.

Operations management captures above identified 3 points



Production Management v/s Operations Management

A high level comparison which distinct production and operations management can be done on following characteristics:

Output: Production management deals with manufacturing of products like (computer, car, etc) while operations management cover both products and services.

Usage of Output: Products like computer/car are utilized over a period of time whereas services need to be consumed immediately



Classification of work: To produce products like computer/car more of capital equipment and less labour are required while services require more labour and lesser capital equipment.

Customer Contact: There is no participation of customer during production whereas for services a constant contact with customer is required



SCOPE OF PRODUCTION MANAGEMENT

Production management is mainly associated with the factory management crept with the development of factory system. Before the evolution of factory system, manufacturing activities were carried on by single person that posed no or very insignificant problem of production and therefore question of production management did not arise. But with the inception of factory system, the situation changed and so many problems of production were begun to creep up and necessity arose to tackle with the problems of quality control, layout facilities, meeting the schedules and organization of production activities. Thus the scope of production management began to develop. In early stage, the stress was on controlling the labour costs because labour cost was the major element of the total cost of production



. With the continuing development of factory system, the trend towards mechanization and automation developed and it resulted in the increased costs of indirect labour higher than the direct labour costs. So concerns found it difficult to run the business in these circumstances and evolved many controlling devices to regulate the cost of production. They had developed devices like designing and packing of products, indirect labour cost control, production & inventory control and quality control.



Production management, objectives

- Specifying and accumulating the
- input resources, i.e., management,
- men, information, materials, machine and
- capital.
- Designing and installing the assembly
- or conversion process to transform the
- inputs into output, and
- Coordinating and operating the production
- process so that the desired goods
- and services may be produced efficiently
- and at a minimum cost.



Types of Production System

Intermittent Production System

Project Production Flows

Jobbing Production Flows

Batch Production Flows

Continuous Production System

Mass Production Flows

Process Production Flows



Concept of Plant Layout:

The concept of plant layout may be described as follows:

Plant layout is a plan for effective utilisation of facilities for the manufacture of products; involving a most efficient and economical arrangement of machines, materials, personnel, storage space and all supporting services, within available floor space.



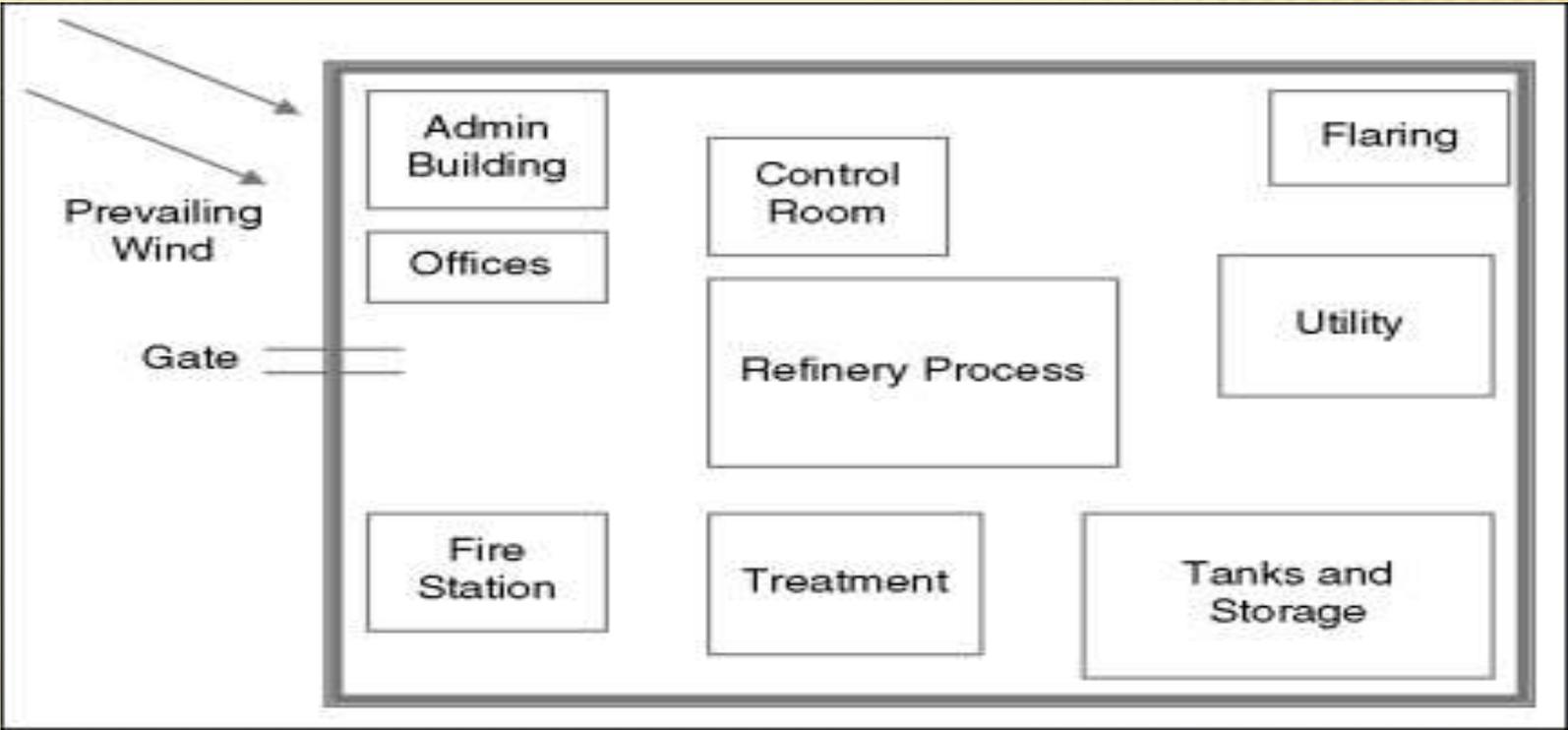
Objectives/Advantages of Plant Layout:

Following are the objectives/advantages of plant layout:

- (i) Streamline flow of materials through the plant
- (ii) Minimise material handling
- (iii) Facilitate manufacturing progress by maintaining balance in the processes
- (iv) Maintain flexibility of arrangements and of operation
- (v) Maintaining high turnover of in-process inventory
- (vi) Effective utilisation of men, equipment and space



- vii) Increase employee morale
- (viii) Minimise interference (i.e. interruption) from machines
- (ix) Reduce hazards affecting employees





Safety precautions and environmental considerations.

...

1 General **considerations**. During the last two decades **environmental** control legislation has become an important factor for charcoal makers. ...

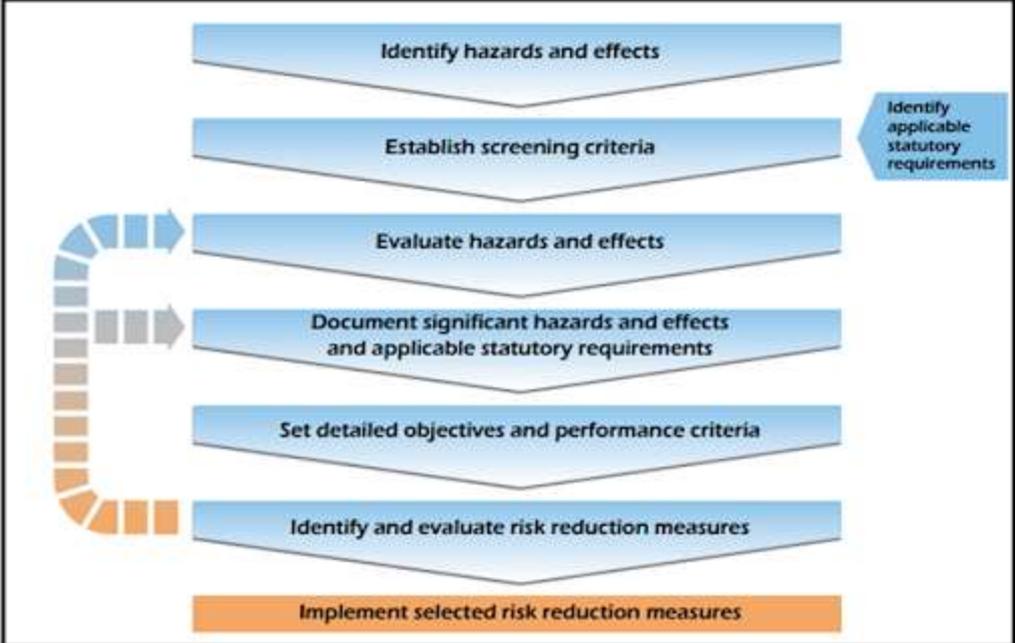
2 Raw material preparation. ...

3 Retorts and converters. ...

4 Char handling. ...

5 Retort condensates and gas. ...

6 Waste water.





Unit 2

What is product design ?

Product design is the process of creating a new **product** to be sold by a business to its customers.

It is essentially the **efficient** and **effective generation** And development of **ideas** through a **process** that leads to new **products**.





Idea Generation

- **Customer & competitor research**
- **Brainstorming sessions**
- **Surveys**
- **Customer input**
- **Research & Development team**



Concept screening

- Is there a real, clearly defined customer need or want for this product or service ?
- Can we fully develop this product or service ?
- Is the profit potential for this product large enough to justify it's development ?



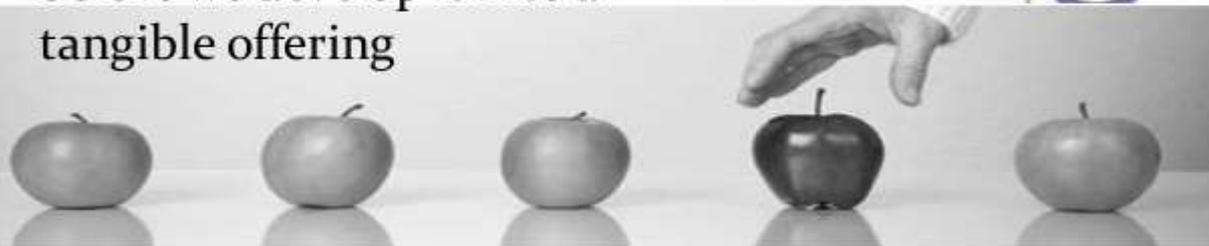
Competitive analysis

- “ Best of ” ideas are incorporated to mitigate any competitor advantage.
- Verify buyer market size for similar offerings to validate development investment.



Concept Testing

- Principle target is to quantify actual customer enthusiasm for the product or service.
- Get solid feel that the market of buyers is genuinely interested in the concept before we develop it into a tangible offering



In-depth analysis

- Formal list of features & benefits, key USP (unique selling proposition), etc.
- Summary of all resources needed for development.
- Marketing plan with ROI projections.
- Summary of competitive products, pricing, packaging etc.



Prototype Development

- Product name, specific marketing messaging, etc, are solidified.
- Prospective buyers review the prototype and asked if they like it, would they buy it, what would make it better, etc.



Commercialization

The product is finalized and launched full scale





PRODUCTION PLANNING

Production Planning can be referred to as a technique of forecasting every step in the long process of production, taking them at right time and in the right degree and trying to complete operations at the maximum efficiency.

“The planning of industrial operations involves Three considerations, namely, what work shall be done, how the work shall be done and lastly, when the work shall be done.” (by – Kimball)



PRODUCTION CONTROL

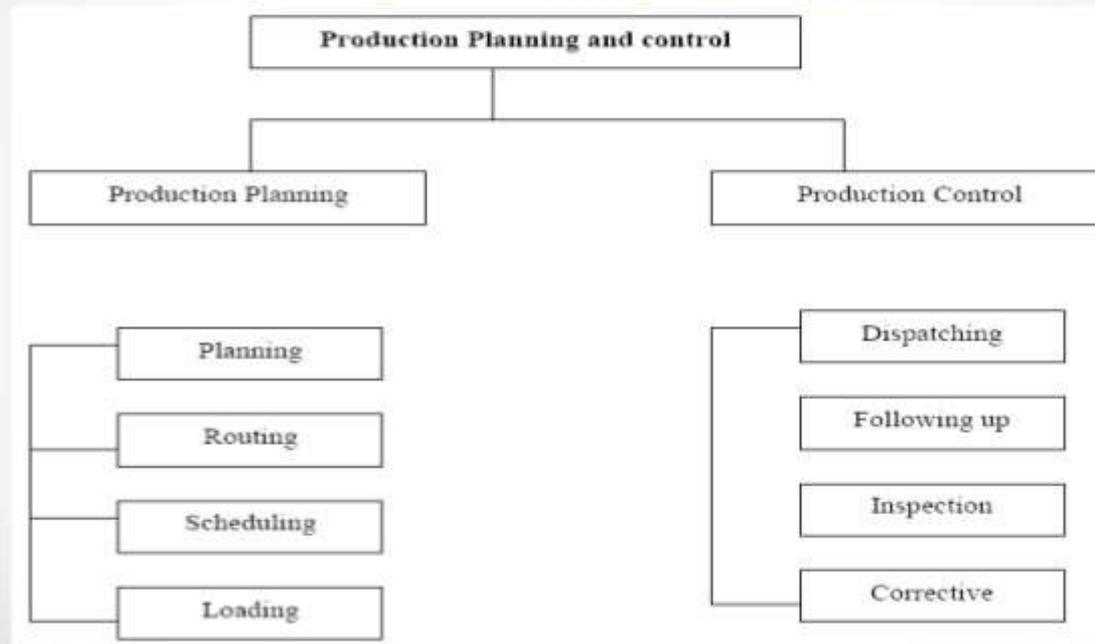
Production control is the process that keeps a watchful eye on the production flow, size of resources along with any deviation from the planned action. It also includes arrangement for the prompt remedy or adjustment in case of any deviation so that the production may run according to the original or revised schedule.

“Production control refers to ensuring that all which occurs is in accordance with the rules established and instructions issued.” (By – Henry Fayol)

PPC : OBJECTIVES



PPC : PROCESS





ROUTING

Routing is determining the exact path which will be followed in production. It is the selection of the path from where each unit have to pass before reaching the final stage. The stages from which goods are to pass are decided in this process.

“Routing is the specification of the flow sequence of operations and processes to be followed in producing a particular manufacturing lot.”(Alford & Beaty)



SCHEDULING

Scheduling is the determining of time and date when each operation is to be commenced or completed. The time and date of manufacturing each component is fixed in such a way that assembling for final product is not delayed in any way.

“The determination of the time that should be required to perform each operation and also the time necessary to perform the entire series, as routed, making allowances for all factors concerned.”(Kimball)



LOADING

- The next step is Loading which is execution of the scheduled plan as per the route chalked out. It includes the assignment of the work to the operators at their machines or work places.
- So Loading determines who will do the work.



DISPATCHING

Dispatching refers to the process of actually ordering the work to be done. It involves putting the plan into effect by issuing orders. It is concerned with starting the process and operation on the basis of route sheets and schedule charts.

“Dispatches put production in effect by releasing and guiding manufacturing order in the sequence previously determined by route sheets and schedules.”(John A.Shubin)



FOLLOW UP & EXPEDITING

Progress may be assessed with the help of routine reports or communication with operating departments. The follow up procedure is used for expediting and checking the progress.

“Follow up or expediting is that branch of production control procedure which regulates the progress of materials and part through the production process.”



INSPECTION



- Inspection is the process of ensuring whether the products manufactured are of requisite quality or not.
- Inspection is undertaken both of products and inputs. It is carried on at various levels of production process so that pre-determined standards of quality are achieved.
- Inspection ensures the maintenance of pre-determined quality of products.

PPC : LIMITATIONS

- Assumption based
- Rigidity
- Difficult for small firms
- Costly
- Dependence on external factors
- Team work is a must
- Demands high level of co-ordination & efficiency



PPC : SIGNIFICANCE

- Structured & Planned Process
- Increased Production
- Seamless Plant Activity
- Better Co-ordination
- Optimal Resource Utilization
- Cost Control
- Rationalization of production Activities





Unit 3



Definition and Equation

Productivity is the ratio of output and input in any organization.

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

Output is in the form of product quantity and input is in the form of resources. The resources are in the form of

- Land acquired
- Salaries paid to employees
- Amount paid to purchase material
- Amount spent in infrastructure

Total productivity provides systematic framework and structure to an organization and increase profitability.



$$\text{Total Productivity} = \frac{\text{Total Output}}{\text{Total Input}}$$



Productivity Benefits

- Increase in income/profitability.
- Lowering running cost/operational costs.
- Maximising the use of all of the company's resources such as land, equipments/machineries, factory, workers, and etc.
- Gaining a greater share of the market.
- More cash flows mean more opportunity for the company to expand and grow.



TQM- TOTAL QUALITY MANAGEMENT

- Total Quality Management (TQM) is an approach that seeks to improve quality and performance which will meet or exceed customer expectations.
- TQM looks at the overall quality measures used by a company



BENEFITS OF TQM

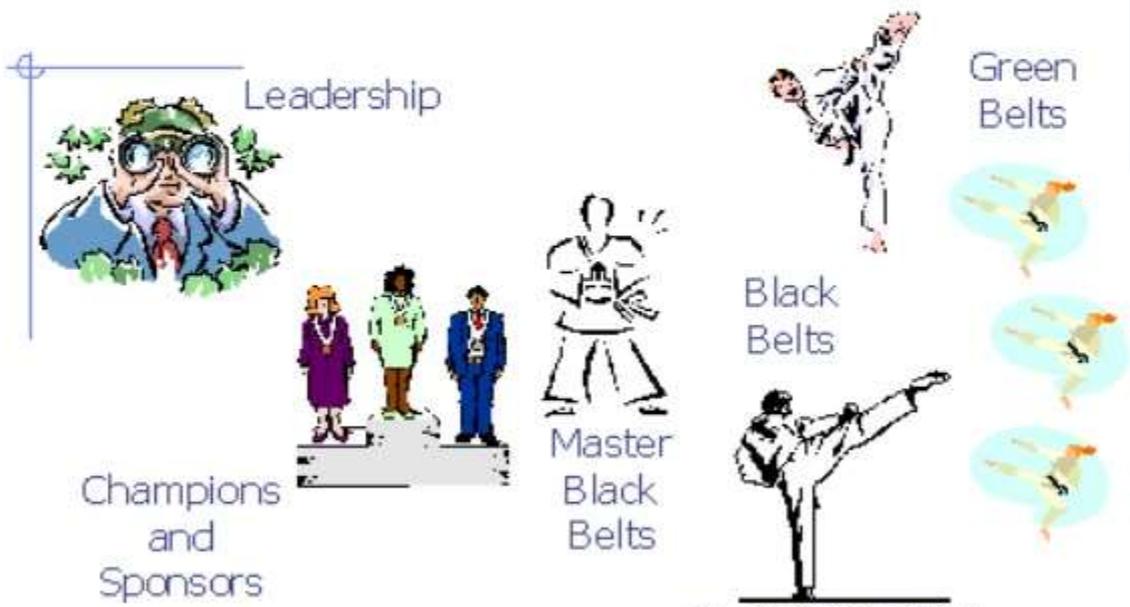
- Ability to be more competitive
- Increased market share
- Cost reduction
- Increased flexibility and responsiveness
- Simplified processes
- Improved communications
- Less frustration and more satisfaction among the work force



SIX SIGMA

- **Champions and Sponsors**
- **Master Black Belt**
- **Black Belt**
- **Green Belt**
- **Staffing Levels and Expected Returns**

Six Sigma Change Agents





DEFINITION

- The term “ergonomics” is derived from two Greek words: “ergon”, meaning work and “nomoi”, meaning natural laws. Ergonomists study human capabilities in relationship to work demands.
- Ergonomics is the science of designing the job, equipment, and workplace to fit the worker. Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and can lead to long-term disability.

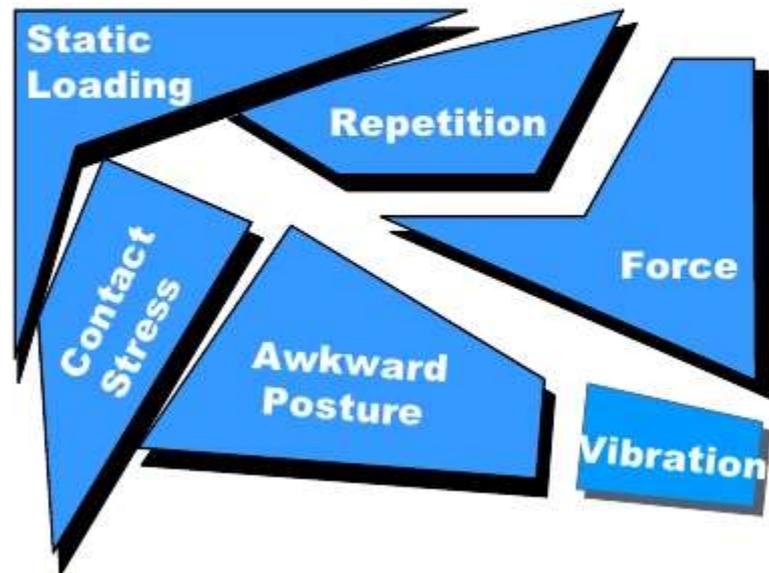


OBJECTIVES

- The objective is to improve the efficiency of operation by taking into account a typical person's size, strength, speed, visual acuity, and physiological stresses, such as fatigue, speed of decision making, and demands on memory and perception.
- To maximize productivity while lowering the risk of Musculoskeletal Disorders (MSDs). MSDs develop as a result of long term exposure to a combination of ergonomic risk factors such as repetition, high forces and awkward postures. Examples of MSDs include carpal tunnel syndrome, tendonitis and back disorders.



ERGONOMICS RISK FACTORS



Risk of injury increases with:

- Prolonged exposure to any of these ergonomic risk factors
- Presence of multiple risk factors within a single job task





Unit 4



INTRODUCTION

- Maintaining the production capability of an organization is an important function of production and operation management.
- Maintenance refers to upkeep & protection of
 - plant
 - building
 - machinery
 - other fixed assets



DEFINITION

- MAINTENANCE- Function of production management that is concerned with day-to-day problem of keeping the physical plant in good operating condition.
- MAINTENANCE MANAGEMENT- Concerned with planning,organising and directing the resources in order to control the availability and performance of the industrial plants to some specified level.



CATEGORIES

➤ Two categories of maintenance-

1. Maintaining buildings, parking lots, lawns, fences, services and utilities.
2. Maintaining equipments, machinery, material handling equipments, transport vehicles, tools, metrology tools, test instruments, office equipments etc.



IMPORTANCE

1. Dependability of service
2. Quality assurance
3. Low cost inventories
4. Cost control
5. Investment





OBJECTIVES

- **Minimizing loss of productive time**
- **Minimizing the repair time & repair cost**
- **Minimizing the loss due to production stoppage**
- **Efficient use of maintenance personnel & equipments**
- **Prolonging the life of capital**
- **To keep all productive assets in good working**
- **To maximize efficiency & economy**
- **To improve the quality of products & to improve productivity.**



AREAS OF MAINTENANCE

1. Civil Maintenance
2. Mechanical Maintenance
3. Electrical Maintenance



MAINTENANCE PLANNING

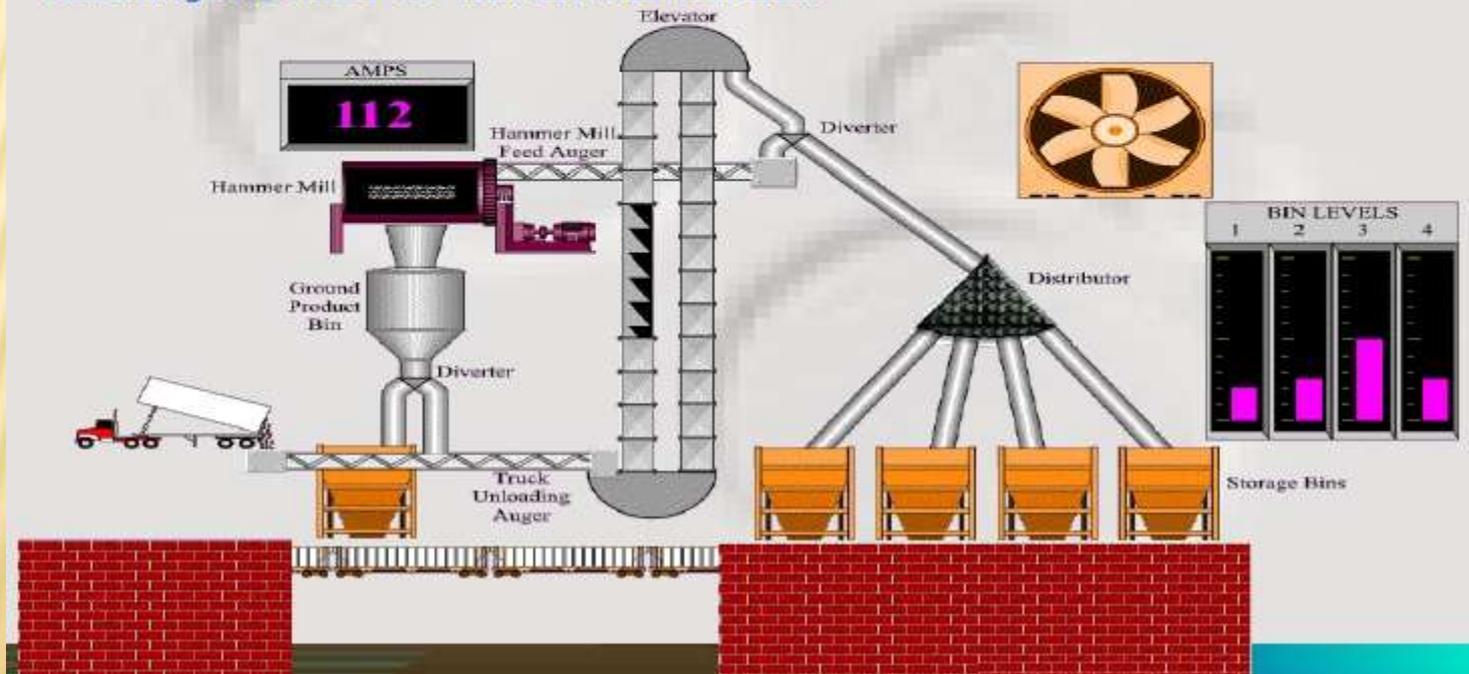
- Know
- Establish priorities
- Investigate
- Develop
- Prepare list
- Estimate
- Provide



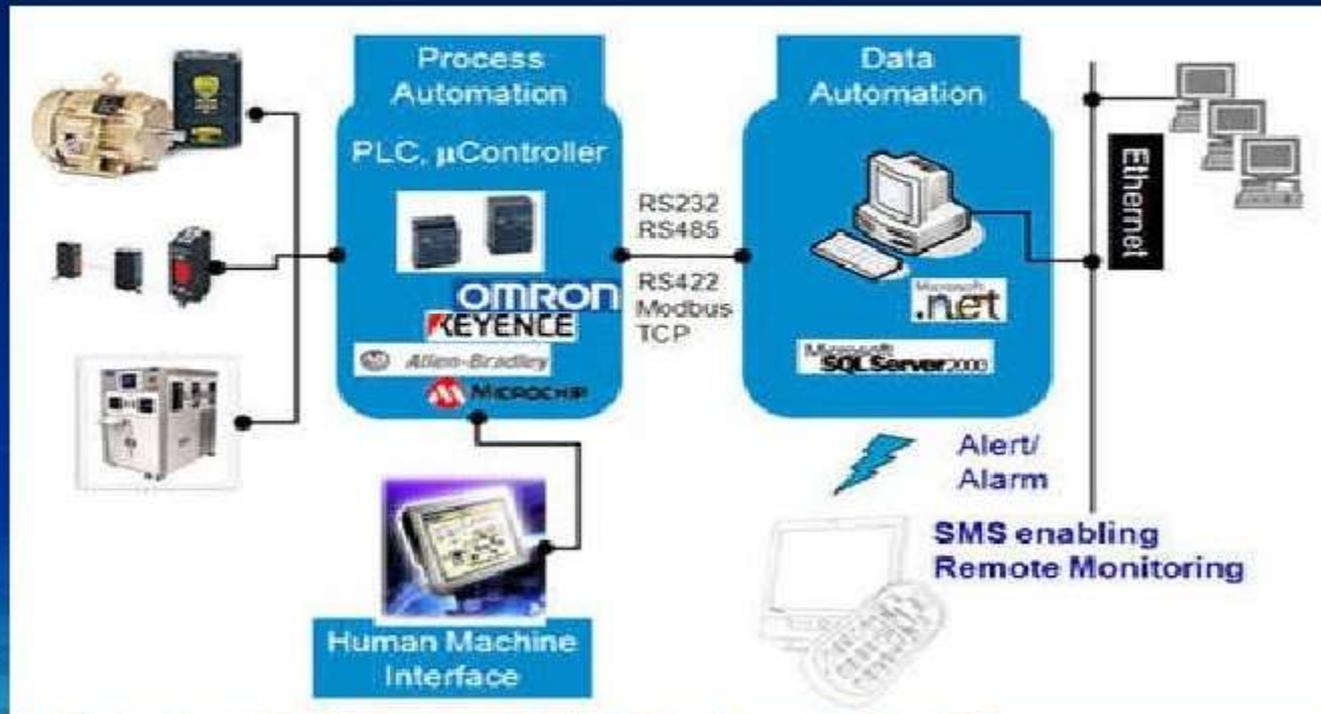
Automation

Automation is basically a delegation of human control function to control technical equipment.

Automation is the use of control systems and information technologies reducing the need for human intervention.



CONCEPT OF AUTOMATION



Automation Tools

Different types of automation tools exist:

- ANN - Artificial neural network***
- DCS - Distributed Control System***
- HMI - Human Machine Interface***
- SCADA - Supervisory Control and Data Acquisition***
- PLC - Programmable Logic Controller***
- PAC - Programmable automation controller***
- Instrumentation***
- Motion control***
- Robotics***



Definition of *CIM*

“CIM is the integration of the total manufacturing enterprise through the use of integrated systems and data communications coupled with new managerial philosophies that improve organizational and personnel efficiency.”

Computer-integrated manufacturing (CIM) is the manufacturing approach of using computers to control the entire production process.



What is CIM?

- CIM is the integration of all enterprise operations and activities around a common corporate data repository.
- It is the use of integrated systems and data communications coupled with new managerial philosophies.
- CIM is not a product that can be purchased and installed.
- It is a way of thinking and solving problems.
- This integration allows individual processes to exchange information with each other and initiate actions.



Potential Benefits of CIM

- Improved customer service
- Improved quality
- Shorter time to market with new products
- Shorter flow time
- Shorter vendor lead time
- Reduced inventory levels
- Improved schedule performance
- Greater flexibility and responsiveness
- Improved competitiveness
- Lower total cost
- Shorter customer lead time
- Increase in manufacturing productivity
- Decrease in work-in process inventory

