Production & operations management

Chapter 5

Product & Process design

Product & Process design

Product Design:

❖**Product Design** can be defined as the idea generation, concept development, testing and manufacturing or implementation of a physical object or service. It covers more than the discipline name - **Industrial Design**.

❖ Product Designers conceptualize and evaluate ideas, making them tangible through products in a more systematic approach.

❖The role of a product designer encompasses many characteristics of the marketing manager, **Product management**, industrial designer and design engineer.

❖The title name of Industrial designer has in many cases fallen into the category of an art.

Product & Process design

❖The role of product designer combines art, science and commerce for tangible non-perishable items. This evolving role has been facilitated by digital tools that allow designers to communicate, visualize and analyze ideas in a way that would have taken greater manpower in the past.

❖As with most of the design fields the idea for the design of a product arises from a *need* and has a *use*. It follows certain *method* and can sometimes be attributed to more complex factors such as *association* and Telesis.

❖Aesthetics is considered important in *Product Design* but designers also deal with important aspects including technology, ergonomics, usability, human factors and material technology.

Product & Process design

❖The values and its accompanying aspects which product design is based on vary, both between different schools of thought and among practicing designers.

❖Product designers are equipped with the skills needed to bring products from conception to market. They should also have the ability to manage design projects, and subcontract areas to other sectors of the design industry.

❖Also used to describe a technically competent product designer or industrial designer is the term Industrial Design Engineer. The Cyclone vacuum cleaner inventor James Dyson for example could be considered to be in this category

Product & Process design

❖A **Product** is anything that is capable of satisfying a felt need.

❖A **New Product** is the one which is truly innovative and is significantly different from the other existing products.

❖The stages through which a new product passes through

1) Needs Identification.
2) Advance product planning.
3) Advanced design, Detailed engineering
4) Production process design and development
5)Product Evaluation
6) Product use & support

Product Life Cycle

❖The conditions a product is sold under will change over time. The **Product Life Cycle** refers to the succession of stages a product goes through. **Product Life Cycle Management** is the succession of strategies used by management as a product goes through its life cycle.

❖The product lifecycle goes through many phases and involves many professional disciplines and requires many skills, tools and processes.

❖ Product life cycle (PLC) is to do with the life of a product in the market with respect to business/commercial costs and sales measures; whereas Product Lifecycle Management (PLM) is more to do with managing descriptions.

Product Life Cycle

❖Products tend to go through five stages:

1.New product development stage

❖very expensive

❖no sales revenue

❖losses

1.Market introduction stage

❖cost high

❖sales volume low

❖no/little competition - competitive manufacturers watch for acceptance/segment growth

❖losses

❖demand has to be created

Product Life Cycle

❖customers have to be prompted to try the product

1.Growth stage

❖costs reduced due to economies of scale

❖sales volume increases significantly

❖profitability

❖public awareness

❖competition begins to increase with a few new players in establishing market

❖prices to maximize market share

1.Mature stage

❖costs are very low as you are well established in market & no need for publicity.

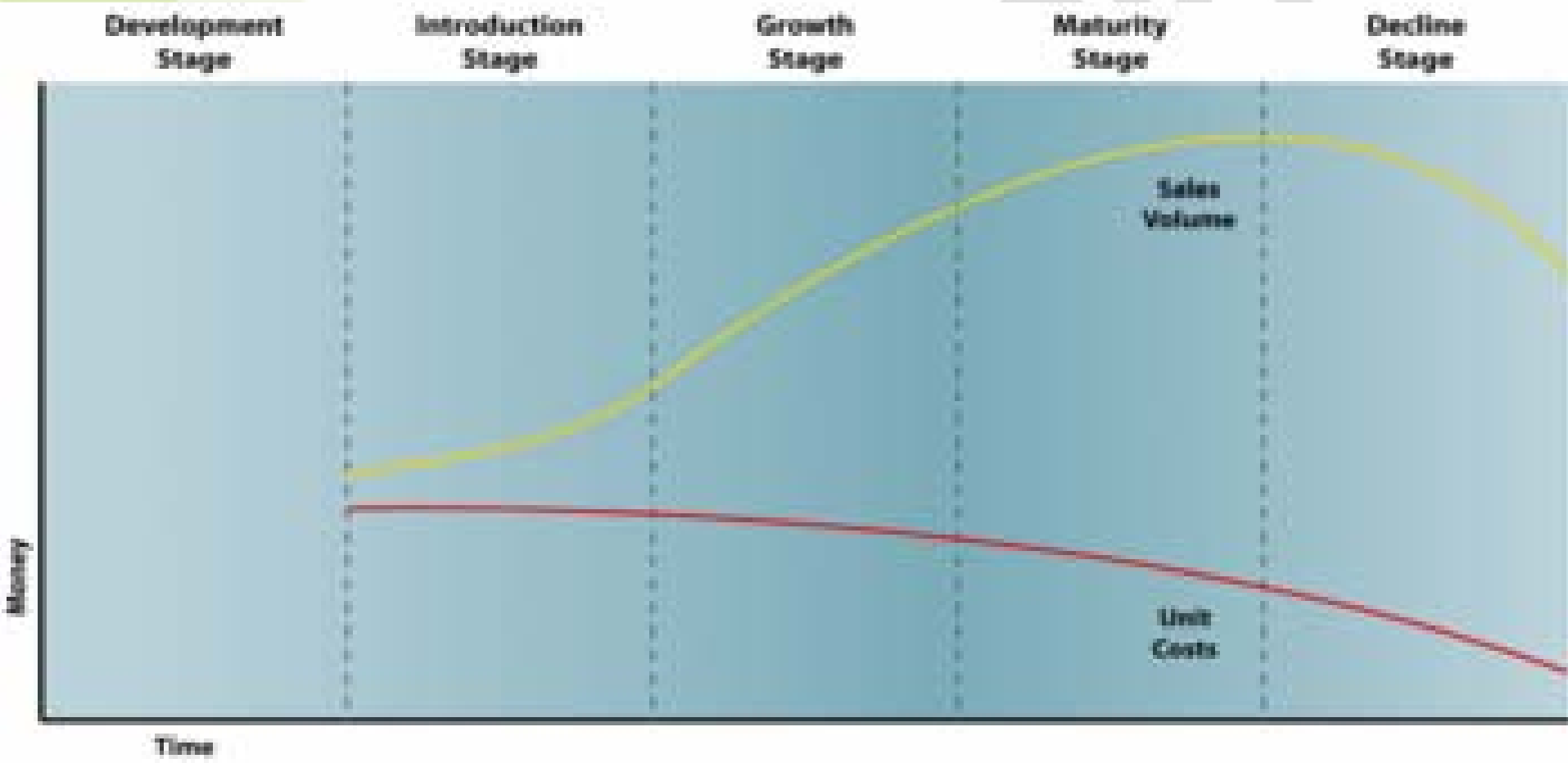
Product Life Cycle

- sales volume peaks
- increase in competitive offerings
- prices tend to drop due to the proliferation of competing products
- brand differentiation, feature diversification, as each player seeks to differentiate from competition with "how much product" is offered
- very profitable

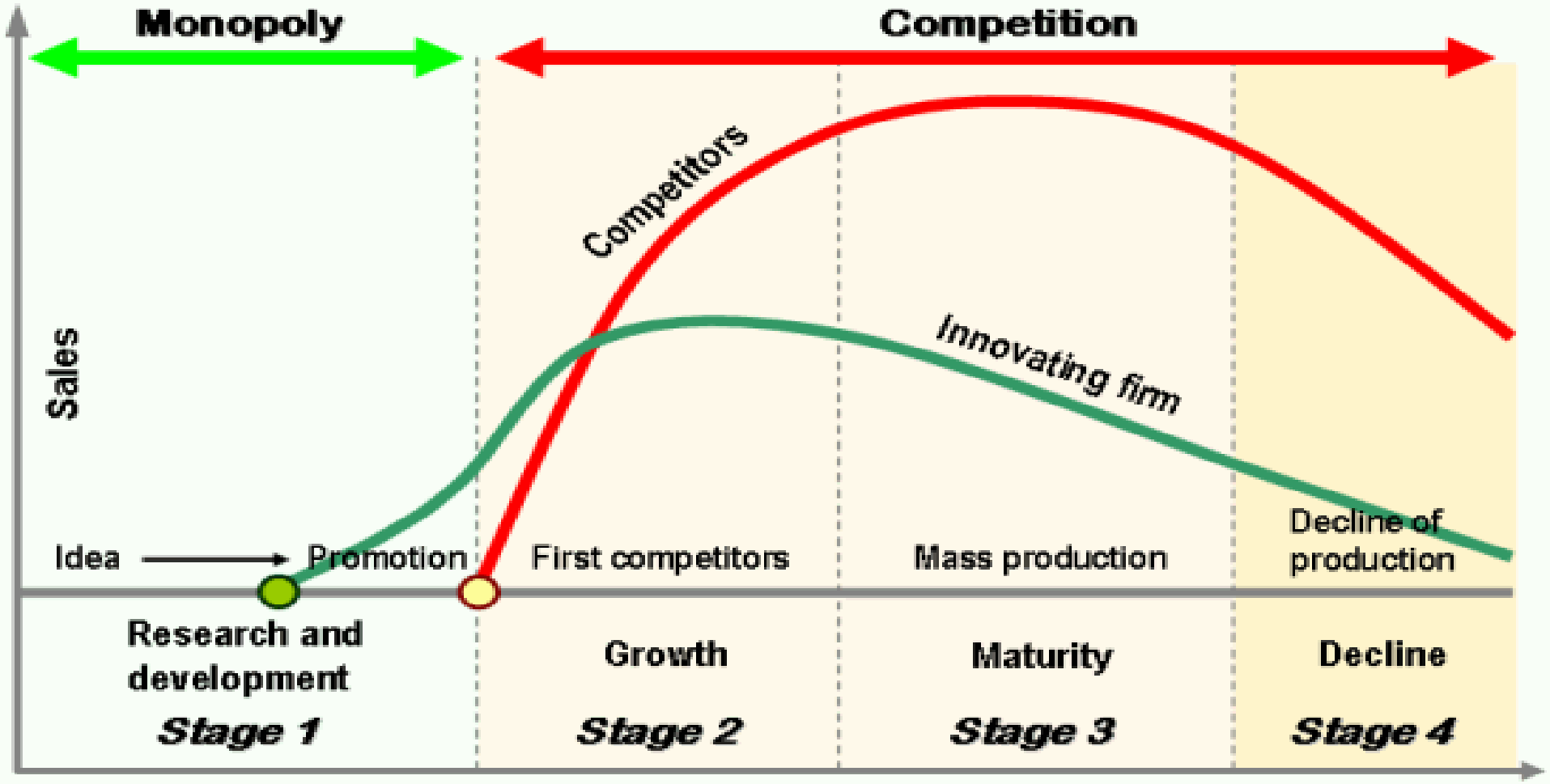
1.Decline or Stability stage

- costs become counter-optimal
- sales volume decline or stabilize
- prices, profitability diminish

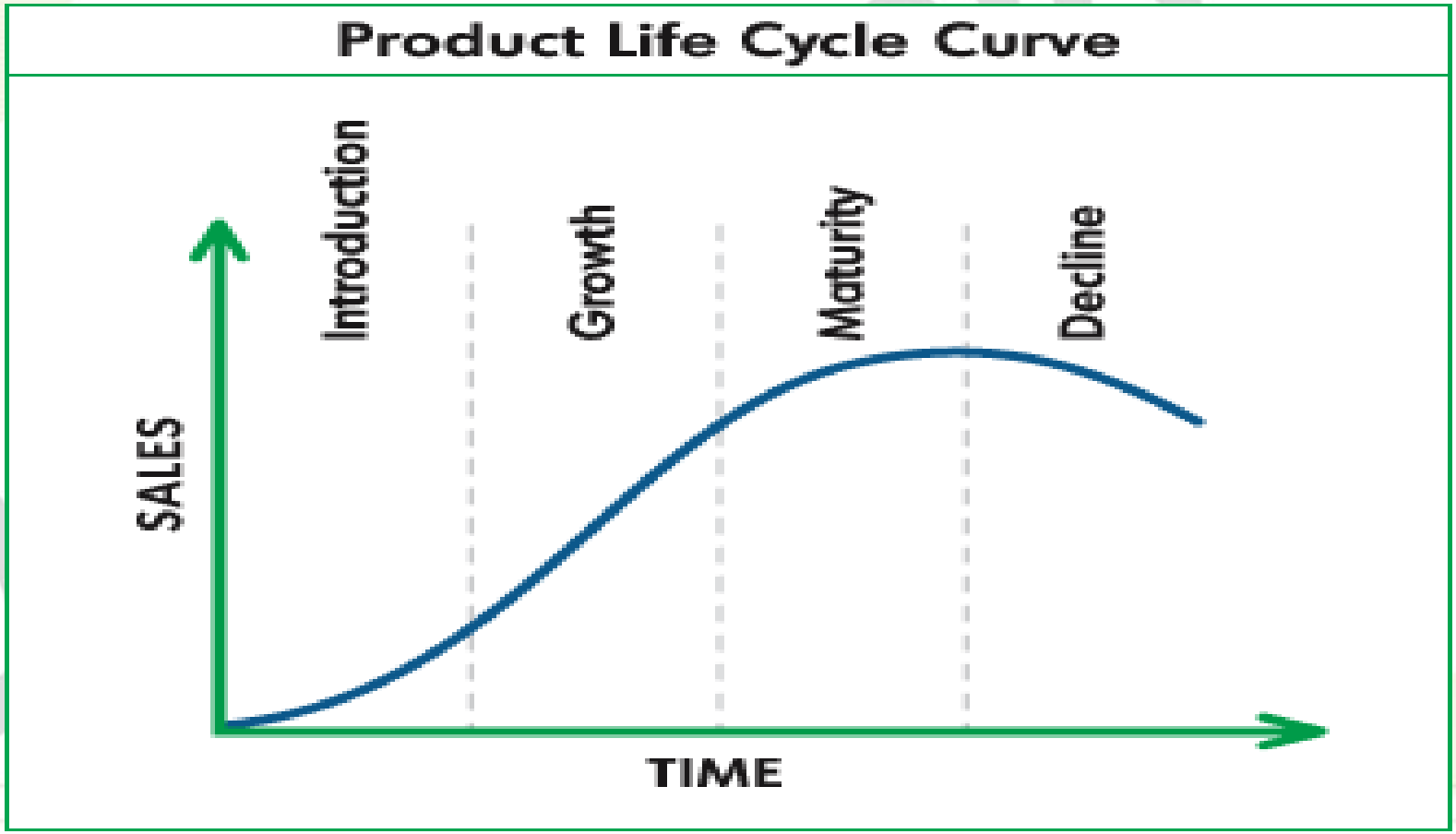
Product Life Cycle



Product Life Cycle



Product Life Cycle



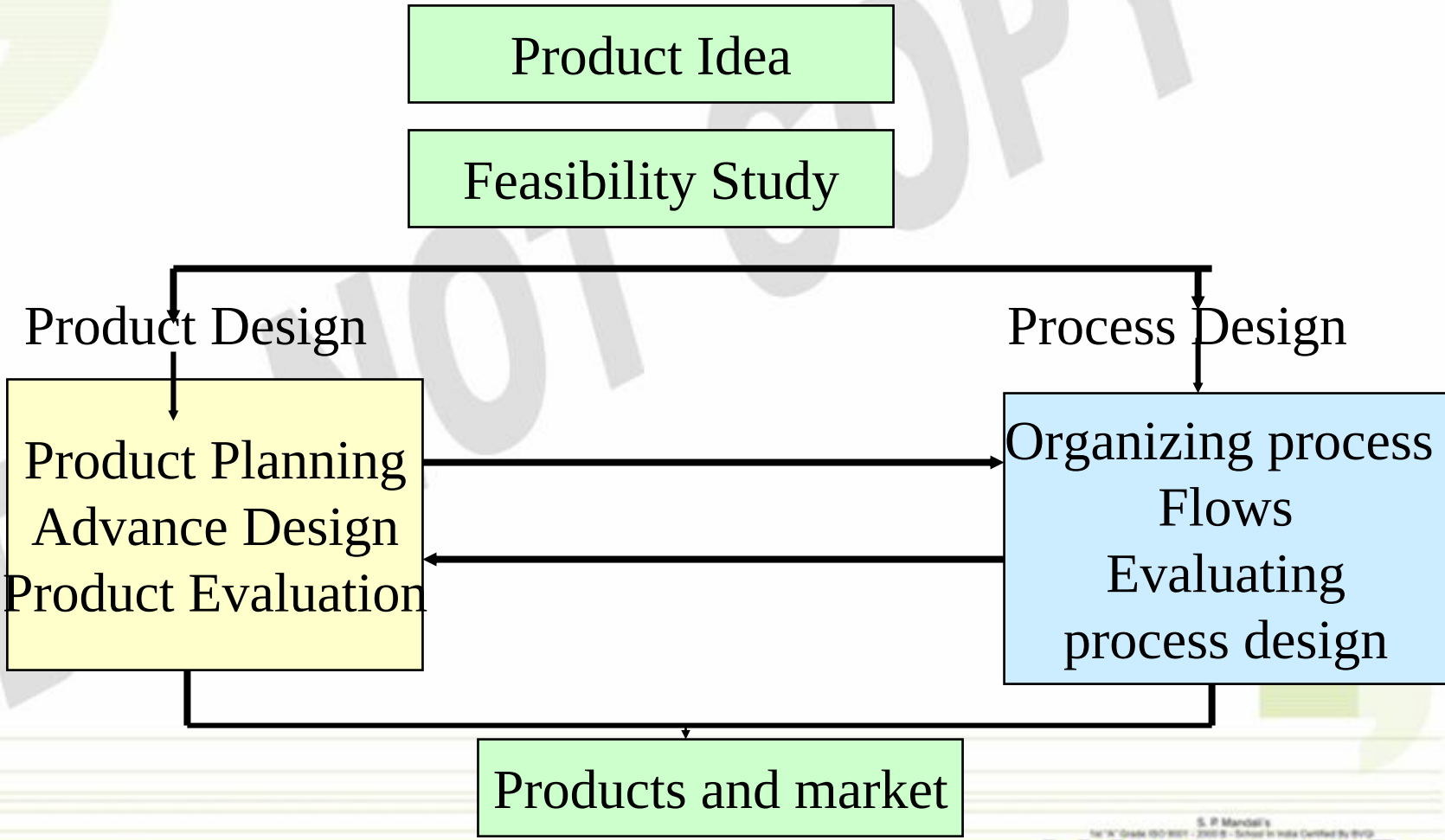
Process Design

❖New products are not realities until they are manufactured.
❖Process design is necessary to manufacture new products.

❖Process design means the complete delineation and description of specific steps in the production process and linkage among the steps that will enable the production system to produce products systems to produce products of the desired quality,in the required quantity.

❖Process planning is intense for new product,but replanting can also occur as capacity needs change

Interrelation between Product & Process Design



Key Decisions in Process Design

Key decisions relating to Process design is related to organizing the process flows necessary to manufacture new products.

Organizing process flow

- Five types of Processes are distinguished
- Project
- Job Shop
- Batch
- Assembly line
- Continuous

Relations of process Design to types of process flow

- There is a definite relation between **Production** process and process flow.For continuous manufacturing the methods and processes are determined before the line set up.
- The process design is built into the line
- Changes usually require that the line be shut down with consequent loss of production
- For intermittent process no lines are set up.process engineer is usually adapt the methods to the types of equipment available.
- Changes in methods can easily be effected without affecting the overall productive capacity of the plant.

Evaluation of process Design

- The major objectives of designing a **Process** flow is to ensure that the goods and services are produced at the minimum cost.
- Process design is a dynamic activity
- A process engineer should be alert to changes to which of the below mentioned factors

1) Volume.
2) Product quality.
3) Equipments.

- Careful Planning ensures a complete coverage of all operations in manufacturing a product and the costs involved.

Production & operations management

End Of

Chapter 5