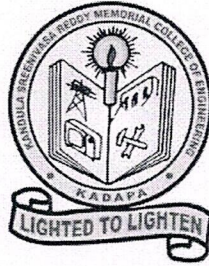


**KANDULA SRINIVASA REDDY MEMORIAL COLLEGE OF
ENGINEERING (AUTONOMOUS)**
Kadapa-516003. AP

(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)
(An ISO 9001-2008 Certified Institution)

DEPARTMENT OF MECHANICAL ENGINEERING



Certification Course on

“PRODUCT AND PROCESS DESIGN”

Resource Person : Sri P. Sreenivas, Assistant Professor, Dept. of ME, KSRMCE

Course Coordinators: S. Vijaya Kumar, Assistant Professor, Dept. of ME, KSRMCE

Date: 02/07/2018 to 21/07/2018



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Lr./KSRMCE/ME/2018-19/

Date: 29-06-2018

To
The Principal,
KSRMCE,
Kadapa.

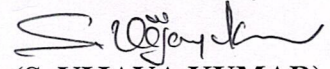
Sub: Permission to Conduct Certificate Course on “**Product and Process Design**”
from 02-07-2018 to 21-07-2018 – Reg.

Respected Sir,

The Department of Mechanical Engineering is planning to offer a certification course on “**Product and Process Design**” to B. Tech. students. The course will be conducted from 02-07-2018 to 21-07-2018. In this regard, we are requesting you to grant permission to conduct certificate course.

Thanking you

Yours faithfully


(S. VIJAYA KUMAR),
(Asst. Professor)

*Forwarded to Principal
20.06.18*

*Permitted
V. S. S. Murthy
29/06/2018*



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Lr./KSRMCE/ME/2018-19/

Date: 30-06-2018

CIRCULAR

The Department of Mechanical Engineering is offering a certification course on “**Product and Process Design**” from 02-07-2018 to 21-07-2018 to B.Tech students. In this regard, interested students are required to register for the Certification Course.

Course Coordinator

S. Vijaya Kumar,
Department of Mechanical Engineering

HoD

Professor & head
Department of Mechanical Engineering
K.S.R.M. College of Engineering
KADAPA - 516 003.

Copy to:
IQAC - KSRMCE



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DEPARTMENT OF MECHANICAL ENGINEERING

Certification Course on PRODUCT AND PROCESS DESIGN

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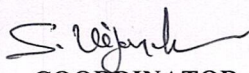
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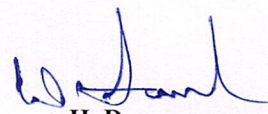
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COORDINATOR


HoD
Professor & head
Department of Mechanical Engineering
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SYLLABUS

PRODUCT AND PROCESS DESIGN

Chapter-1

Introduction:

Need for IPPD-Strategic importance of Product development - integration of customer, designer, material supplier and process planner, Competitor and customer - behavior analysis. Understanding customer-promoting customer understanding-involve customer in development and managing requirements-Organization process management and improvement.

Chapter-2

CONCEPT GENERATION, SELECTION AND TESTING:

Plan and establish product specifications. Task - Structured approaches - clarification – search externally and internally-Explore systematically - reflect on the solutions and processes - concept selection - methodology - benefits. Implications - Product change - variety - component standardization - product performance - manufacturability – Concept Testing Methodologies.

Chapter-3

PRODUCT ARCHITECTURE

Product development management - establishing the architecture - creation - clustering - geometric layout development - Fundamental and incidental interactions - related system level design issues - secondary systems -architecture of the chunks - creating detailed interface specifications-Portfolio Architecture.

Chapter-4

INDUSTRIAL DESIGN

Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools – Simulating product performance and manufacturing processes electronically – Need for industrial design – impact – design process – investigation of for industrial design – impact – design process – investigation of customer needs – conceptualization – refinement – management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design.

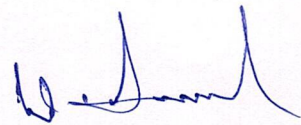
Chapter-5

DESIGN FOR MANUFACTURING AND PRODUCT DEVELOPMENT

Definition – Estimation of Manufacturing cost – reducing the component costs and assembly costs – Minimize system complexity – Prototype basics – principles of prototyping – planning for prototypes – Economic Analysis – Understanding and representing tasks – baseline project planning – accelerating the project – project execution.

Learning References

1. Lawrence D. Miles; “Techniques of Value Analysis and Engineering”, 2nd Edition, McGraw-Hill Book Company, Inc. New York.
2. Larry W. Zimmerman, Glen D. Hart; “Value Engineering”, Reprint 1999, CBS Publishers and Distributors, New Delhi.
3. A. K. Chitale and R. C. Gupta, “Product Design and Manufacturing”, 3rd Edition, Prentice-Hall of India.



Professor & head
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SCHEDULE

DEPARTMENT OF MECHANICAL ENGINEERING

Certification course on

“PRODUCT AND PROCESS DESIGN”

Date	Timing	Resource Person	Topic to be covered
02-07-2018	4 PM to 6 PM	P. Sreenivas	Need for IPPD-Strategic importance of Product development
03-07-2018	4 PM to 6 PM	P. Sreenivas	integration of customer, designer, material supplier and process planner, Competitor and customer - behavior analysis
04-07-2018	4 PM to 6 PM	P. Sreenivas	Understanding customer-promoting customer understanding-involve customer in development and managing requirements-Organization process management and improvement.
05-07-2018	4 PM to 6 PM	P. Sreenivas	Plan and establish product specifications
06-07-2018	4 PM to 6 PM	P. Sreenivas	Task - Structured approaches - clarification – search externally and internally-Explore systematically
09-07-2018	4 PM to 6 PM	P. Sreenivas	reflect on the solutions and processes - concept selection - methodology - benefits
10-07-2018	4 PM to 6 PM	P. Sreenivas	Implications - Product change - variety - component standardization - product performance - manufacturability – Concept Testing Methodologies.
11-07-2018	4 PM to 6 PM	P. Sreenivas	Product development management - establishing the architecture - creation - clustering - geometric layout development.
12-07-2018	4 PM to 6 PM	P. Sreenivas	Fundamental and incidental interactions - related system level design issues - secondary systems - architecture of the chunks - creating detailed interface specifications-Portfolio Architecture
13-07-2018	4 PM to 6 PM	P. Sreenivas	Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools
17-07-2018	4 PM to 6 PM	P. Sreenivas	Simulating product performance and manufacturing processes electronically – Need for industrial design – impact – design process – investigation of for



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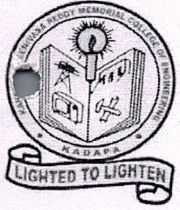
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			industrial design
18-07-2018	4 PM to 6 PM	P. Sreenivas	impact – design process – investigation of customer needs – conceptualization – refinement – management of the industrial design process
19-07-2018	4 PM to 6 PM	P. Sreenivas	technology driven products – user – driven products – assessing the quality of industrial design
20-07-2018	4 PM to 6 PM	P. Sreenivas	Definition – Estimation of Manufacturing cost – reducing the component costs and assembly costs – Minimize system complexity – Prototype basics
21-07-2018	4 PM to 6 PM	P. Sreenivas	principles of prototyping – planning for prototypes – Economic Analysis – Understanding and representing tasks – baseline project planning – accelerating the project – project execution

Course Coordinator

HoD

Professor & head
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Report of
Value Added Course on “PRODUCT AND PROCESS DESIGN”
From 02nd July 2018 to 21st July 2018

Target Group	:	B.Tech Students
Details of Participants	:	80 Students
Co-coordinator(s)	:	Sri S. VIJAYA KUMAR
Resource Persons	:	Sri P. SREENIVAS
Organizing Department	:	Mechanical Engineering
Venue	:	Seminar Hall, Mechanical Department

Description:

The Department of Mechanical Engineering conducted a certification course on “Product & Process Design” 02/07/2018 to 21/07/2018. The course duration was 30 hours. The course Resource Persons are Sri P. Sreenivas, Assistant Professor and Sri S. Vijaya Kumar, Assistant Professor Department Mechanical Engineering, KSRMCE.

The main objective of this course is to identify the concept generation, selection and testing of a product in Product & Process Design. It involves the importance of Product development, integration of customer, designer, material supplier, process planner- their behavior analysis.

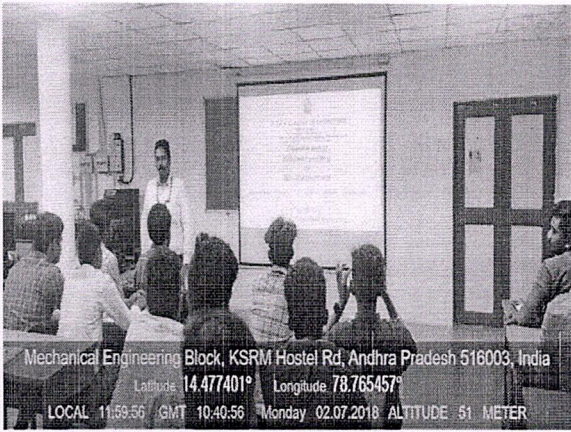
Students can able to learn product development management, establishing the architecture, creation, clustering –geometric layout development, fundamental and incidental interactions, technology driven products, user driven products assembling the quality of industrial design.

It involves the estimation of Manufacturing cost-reducing the component costs and assembly costs. Principles of prototyping, planning for prototypes, Economic Analysis.

Understanding and representing tasks base line project planning, accelerating the project, project execution.

Photos

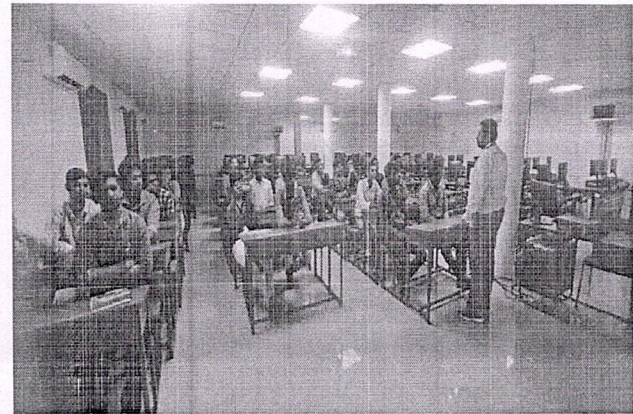
The pictures taken during the course are given below:



Inauguration of Programme



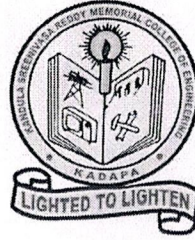
HoD Addressing the gathering



S. Vijaya
Coordinator

[Signature]
HoD

**Professor & head
Department of Mechanical Engineering
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Certification Course on
“PRODUCT AND PROCESS DESIGN”

02/07/2018 to 21/07/2018

ORGANIZED BY

DEPARTMENT OF MECHANICAL ENGINEERING



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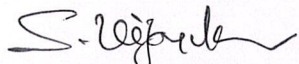
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80	179Y5A0348	YEDDULA SUBBAIAH	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P


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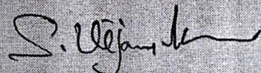
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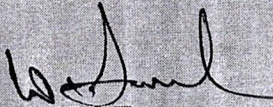
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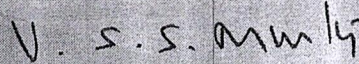
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Certificate of Completion

This to certify that Mr/Mrs. **P MADHU PRASAD** Bearing the Roll Number **169Y1A0342** has Successfully Completed Value Added Course on "PRODUCT AND PROCESS DESIGN" from 02/07/18 to 21/07/18,
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This to certify that Mr/Mrs. **B.CHOWDIAH** Bearing the Roll Number **169Y1A0305** has Successfully Completed Value Added Course on "PRODUCT AND PROCESS DESIGN" from 02/07/18 to 21/07/18,

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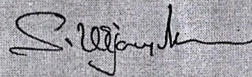
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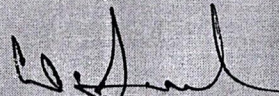
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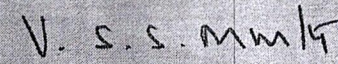
Certificate of Completion

This to certify that Mr/Mrs. **RAMAVATHI RAMA NAIK** Bearing the Roll Number **169Y1A0350** has Successfully Completed Value Added Course on "PRODUCT AND PROCESS DESIGN" from 02/07/18 to 21/07/18,

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DEPARTMENT OF MECHANICAL ENGINEERING

FEEDBACK of Certification Course on PRODUCT AND PROCESS DESIGN from 2nd July 2018 to 21st July 2018

LIST OF PARTICIPANTS

S. No.	Roll No.	Name of the Student	Is the Course content meet your expectation	Is the lecture sequence well planned	Is the level of course high	Is the course exposed you to the new knowledge and practices	Rate the Knowledge of the Speaker	Rate the value of Course in increasing your skills	Any Issues
1	169Y1A0303	BEPARI KARIMULLA	Excellent	Excellent	good	Excellent	Excellent	Excellent	
2	169Y1A0304	BHADUR YASEEN AHMED	Good	Excellent	Satisfactory	Excellent	Excellent	Excellent	
3	169Y1A0305	B. CHOWDAIAH	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
4	169Y1A0306	B RAMA KRISHNA REDDY	Excellent	Satisfactory	Excellent	good	Excellent	good	
5	169Y1A0307	B JAGAN MOHAN REDDY	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
6	169Y1A0309	BUTCHER KHALEELULLAH	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
7	169Y1A0312	DAMODAR ABDAS	Satisfactory	Excellent	Excellent	Excellent	good	Excellent	
8	169Y1A0315	G VISHNUVARDAN REDDY	Excellent	Excellent	Satisfactory	Excellent	Excellent	good	
9	169Y1A0316	GANDAM PRANAY KUMAR	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
10	169Y1A0317	GONDIPALLE NAVEEN	Good	Excellent	Excellent	Good	Excellent	Excellent	
11	169Y1A0318	GOPAVARAM RAKESH REDDY	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
12	169Y1A0319	K SUMANTH CHOWDARY	Excellent	Good	Excellent	Excellent	Excellent	Excellent	
13	169Y1A0320	KANDULA KIRAN REDDY	Excellent	Excellent	Excellent	Excellent	good	Excellent	
14	169Y1A0322	KODURU NAVEEN	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
15	169Y1A0323	KODURU SREEDHAR REDDY	Excellent	Excellent	Satisfactory	Excellent	Excellent	Excellent	
16	169Y1A0324	K ANANTHA KRISHNA	Good	Excellent	Excellent	Excellent	Excellent	Satisfactory	
17	169Y1A0326	KUPPAM SAI MANIKANTA	Excellent	Excellent	Excellent	Good	Excellent	Excellent	
18	169Y1A0327	M SIVAPRASAD REDDY	Excellent	Good	Excellent	Excellent	Excellent	Excellent	
19	169Y1A0329	MANDLI TRILOKANATH	Excellent	Excellent	Excellent	Satisfactory	Excellent	Excellent	
20	169Y1A0330	MANNEM SREEKANTH	Excellent	Excellent	Good	Excellent	Excellent	Excellent	



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21	169Y1A0331	M NARESH KUMAR REDDY	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
22	169Y1A0332	MERUVA VENKATESWARLU	Excellent	Satisfactory	Excellent	Excellent	Good	Excellent	
23	169Y1A0333	MOORA ASHOK KUMAR	Excellent	Excellent	Excellent	Excellent	Excellent	Good	
24	169Y1A0334	MULINTI PADMANABHA	Excellent	good	Excellent	Excellent	Excellent	Excellent	
25	169Y1A0335	MUMMADI OBUL REDDY	Excellent	Excellent	Excellent	Satisfactory	Excellent	Excellent	
26	169Y1A0337	N KARTHIK REDDY	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
27	169Y1A0339	P GANESH REDDY	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
28	169Y1A0340	P ROHITH KUMAR	Excellent	Excellent	good	Excellent	Excellent	Excellent	
29	169Y1A0341	P PAVAN KUMAR	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
30	169Y1A0342	PALEM MADHUPRASAD	Good	Excellent	Excellent	Excellent	Excellent	Good	
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35	169Y1A0349	RAKESH JONNAGIRI	Excellent	Excellent	Satisfactory	Excellent	Excellent	Excellent	
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47	169Y1A0365	SYED USMAN HAROONI	Excellent	Excellent	Excellent	Good	Excellent	Excellent	
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49	179Y5A0301	AMBATI GURU NAGENDRA	Good	Excellent	Excellent	Excellent	Excellent	Excellent	
50	179Y5A0302	AVULA KRISHNA KANTH	Excellent	Excellent	Excellent	good	Excellent	Excellent	
51	179Y5A0303	BOLLIGALA NARASIMHA	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
52	179Y5A0304	BOYA ANIL KUMAR	Excellent	Excellent	Excellent	Excellent	Excellent	Good	
53	179Y5A0305	C ASHOK KUMAR REDDY	Excellent	good	Excellent	Excellent	Excellent	Excellent	



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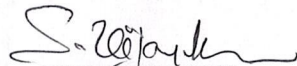
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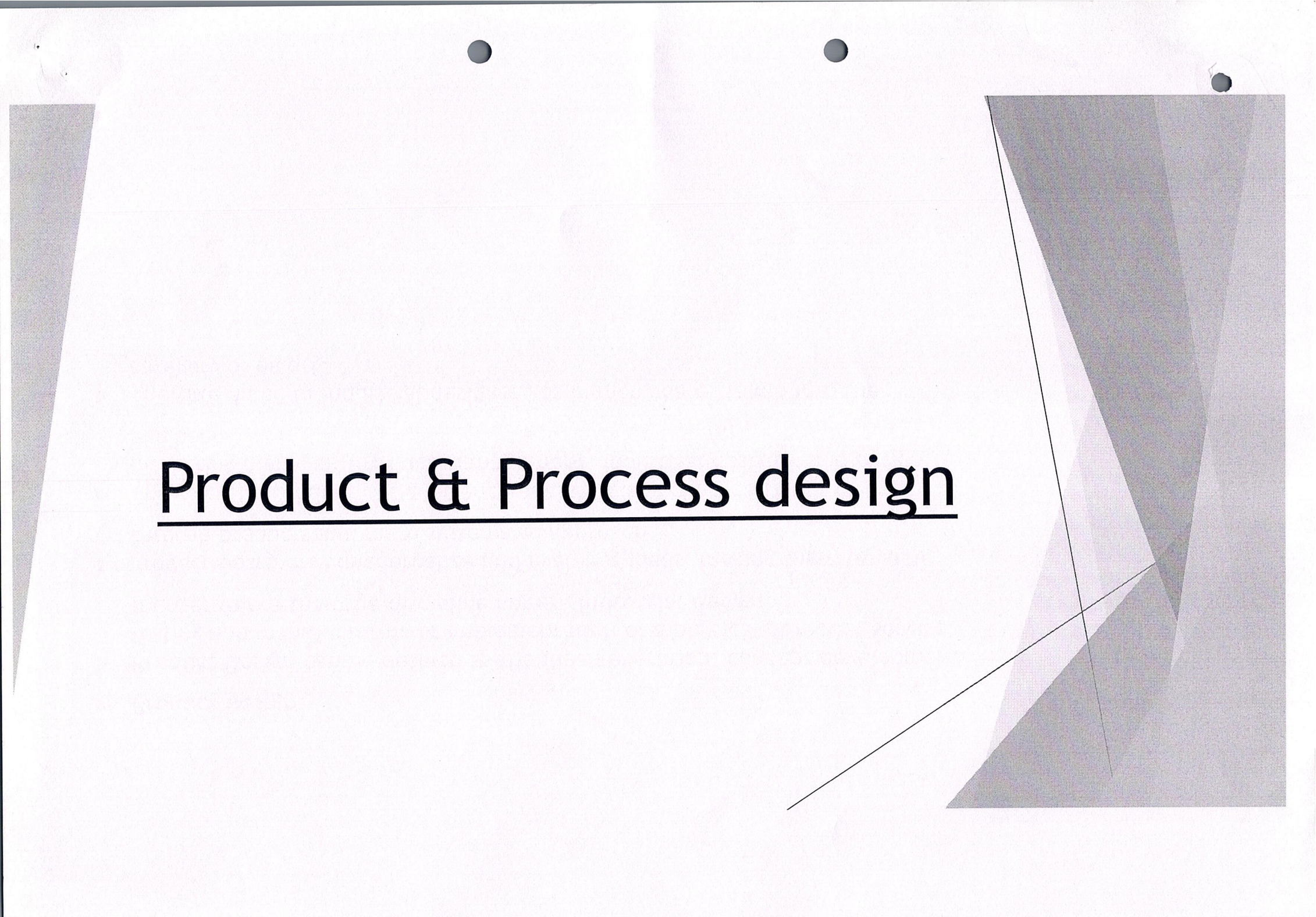
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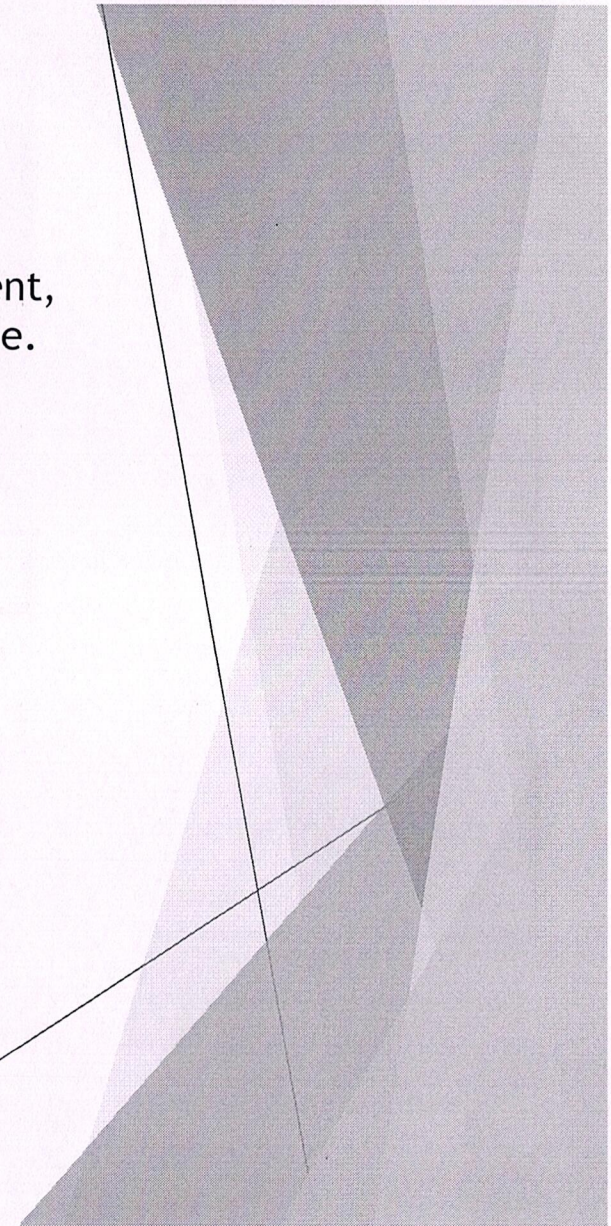

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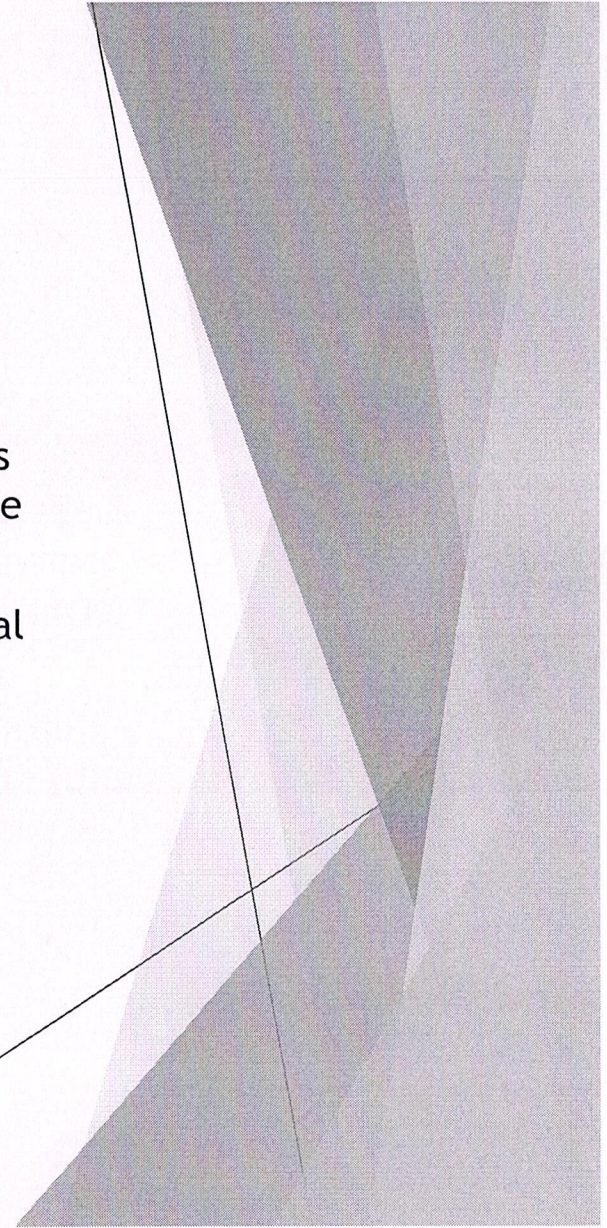


Product & Process design

- ▶ **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.



- ▶ ❖ 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.



- ▶ 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

- ▶ 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

The various aspects in product design are as follows:

- **Design for function:** A product must perform the function which its customers expects it to do. If a product is designed by taking its functional features in to account, then it will create satisfied customers, and will further lead to having more repeat customers. The factors which are to be considered for functional design are strengths and wearability of the product and its components.

- Design for making: A product design that solves the functional problem smoothly, but is impossible to manufacture, is of no use. Attention must be given to materials, fastening devices, etc., while designing a product.
- The hardness of the material specified at the design stage must be within the permitted range while machining.
- Making use of standard parts in an important aspect of product design. Also, operational convenience of the machineries must be taken into account at the design stage.

PROCESS DESIGN

- **Process is that part of an I-P-O System, with a sequence of activities that is intended to achieve some result (output) and/or to add value for the output in tune with customers requirements. A process converts inputs into output in a production system.**
- **To enable a better product design we necessarily require a suitable process planning cum design to make the design aspects reflect in the product.**
- **It is a known fact that process based design changes in a production system are long lasting than the product based design changes.**

Process Selection: It refers to the way, in which the production of goods and services are organized. It make the vital decisions such as

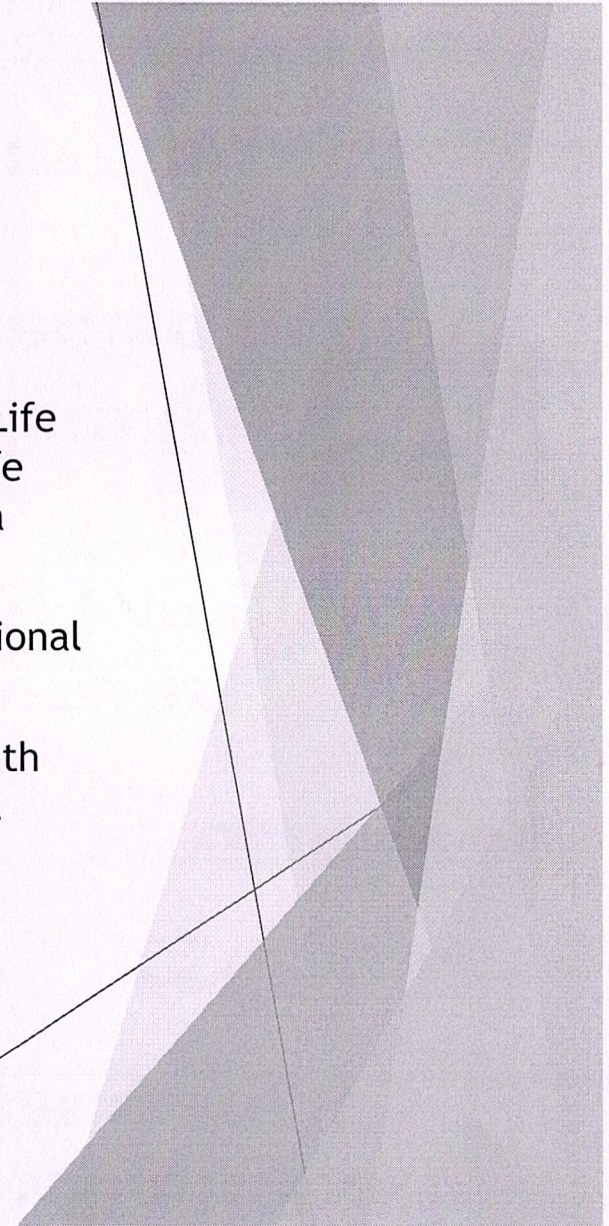
- ❖ Capacity Planning
- ❖ Facilities layout
- ❖ Equipments and design of work systems

The primary questions to be addressed here are:

- How much variety of Products / Services will the system requires to handle ?
- What degree of equipment flexibility is required?
- What is the Quality & Quantity level expected in the Output etc.
- Whether it is a New product or already established Product etc.

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

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

▶ **Organizing process flow**

1. Five types of Processes are distinguished
2. Project
3. Job Shop
4. Batch
5. Assembly line
6. Continuous

Product Life Cycle

Development
Stage

Introduction
Stage

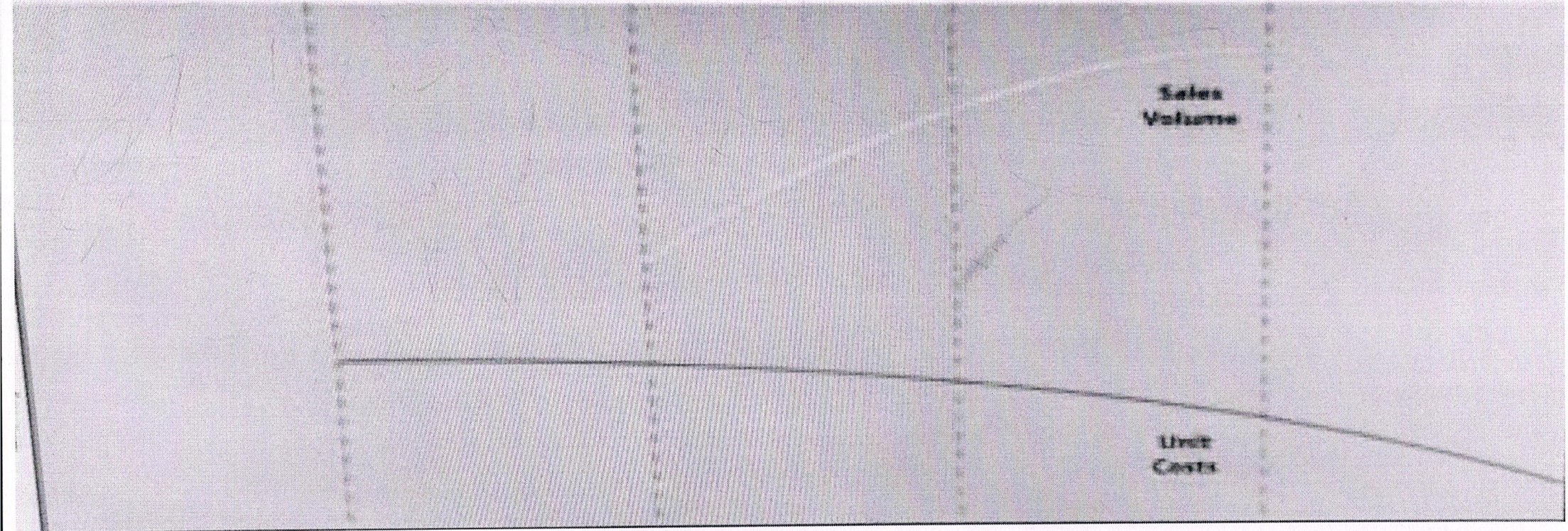
Growth
Stage

Maturity
Stage

Decline
Stage

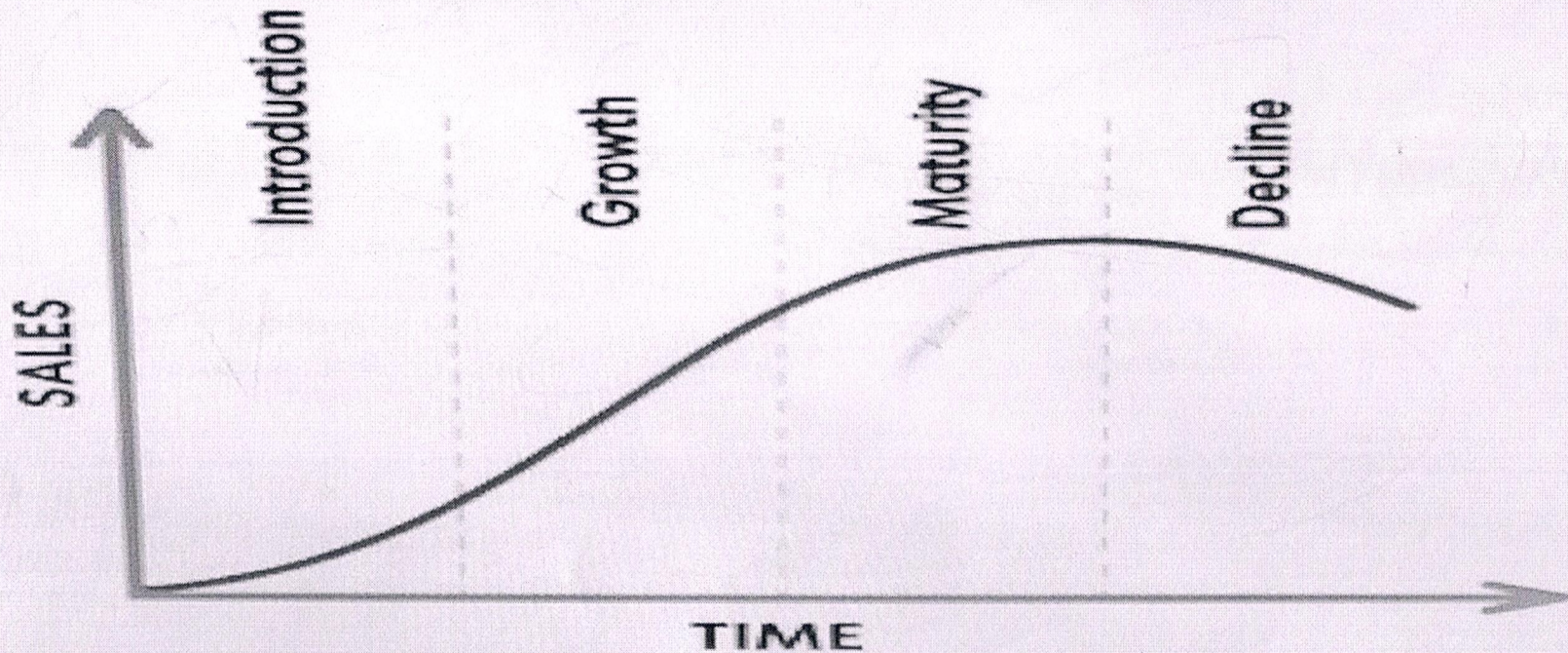
Sales
Volume

Unit
Costs



Product Life Cycle

Product Life Cycle Curve



Process Flow Structures

- **Job shop (ex. Copy center making a single copy of a student term paper)**
- **Batch shop (ex. Copy center making 10,000 copies of an ad piece for a business)**
- **Assembly Line (ex. Automobile manufacturer)**
- **Continuous Flow (ex. Petroleum manufacturer)**

Break-Even Analysis

- **A standard approach to choosing among alternative processes or equipment**
- **Model seeks to determine the point in units produced (and sold) where we will start making profit on the process or equipment**
- **Model seeks to determine the point in units produced (and sold) where total revenue and total cost are equal**

Break-Even Analysis (Continued)

Break-even Demand =

Purchase cost of process or equipment

Price per unit - Cost per unit

or

Total fixed costs of process or equipment _____

Unit price to customer - Variable costs per unit

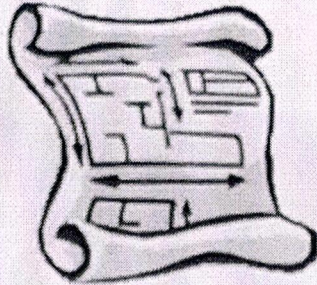
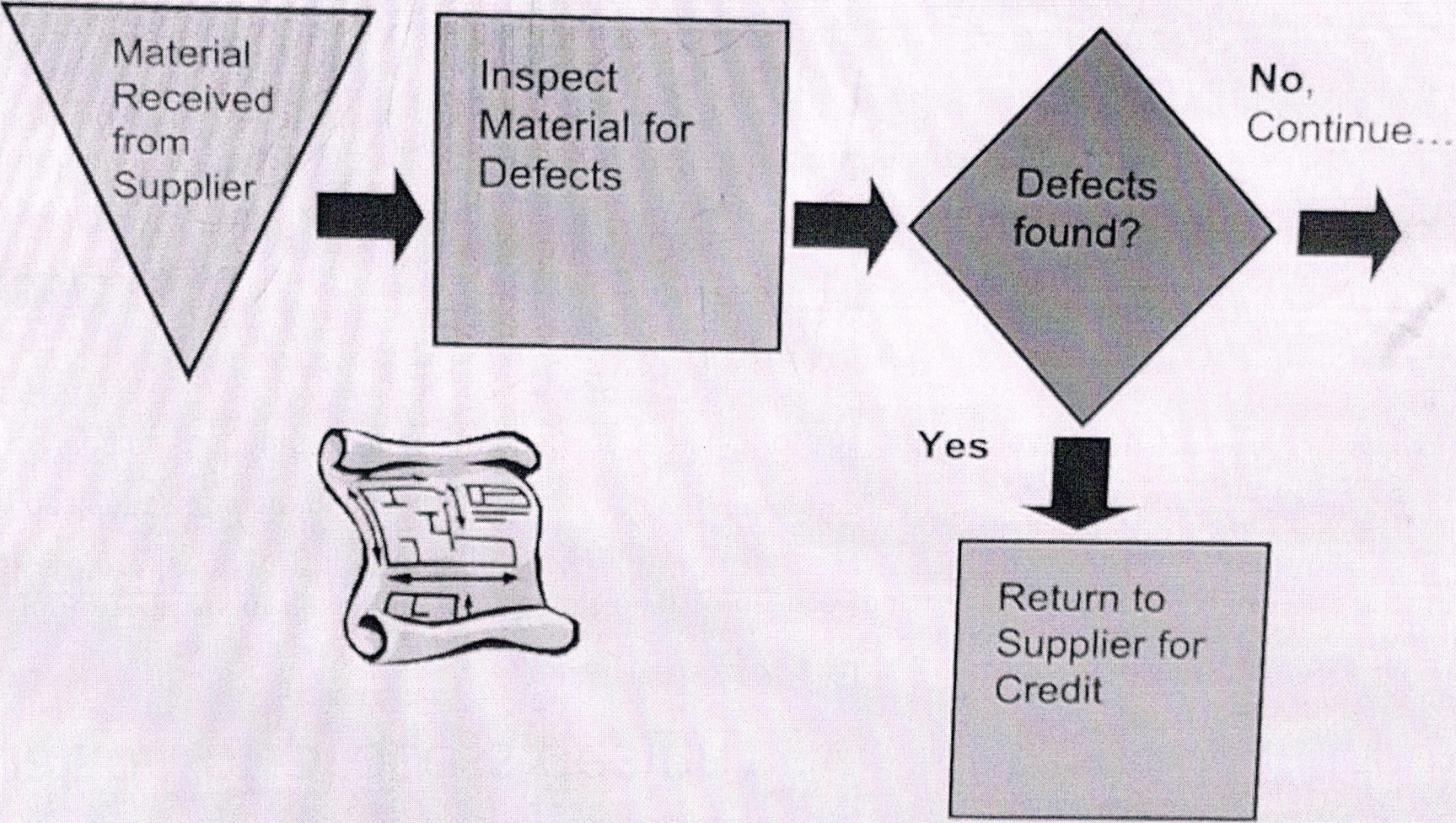
This formula can be used to find any of its components algebraically if the other parameters are known

Process Flow Design

Defined

- A process flow design can be defined as a mapping of the specific processes that raw materials, parts, and subassemblies follow as they move through a plant
- The most common tools to conduct a process flow design include assembly drawings, assembly charts, and operation and route sheets

Example: Process Flow Chart



Evaluation of process design

- ▶ The major objectives of designing a Process flow isto 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.