

Adapted from the Course Book: *Manufacturing Facilities Design and Material Handling*, F.E. Meyers and M.P. Stephens, 5th Edition, 2013, Purdue University Press (ISBN-10: 1557536503)

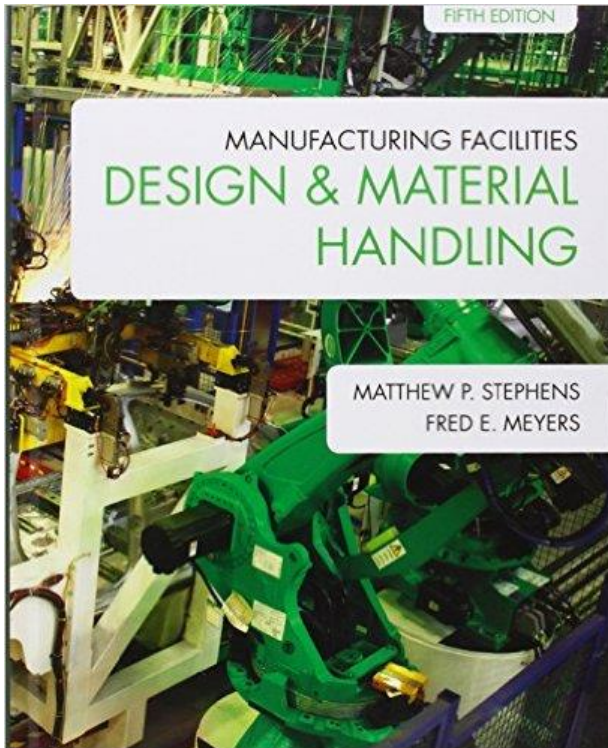
Introduction to Facility Layout Planning

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Course Book



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Introduction

Facility Layout:

Arrangement of machines, storage areas, and/or work areas usually within the confines of a physical structure, such as a retail store, an office, a warehouse, or a manufacturing facility.



Objective of Plant Layout



The main objective consists of organizing equipment and working areas in the most efficient way, and at the same time satisfactory and safe for the personnel doing the work.



Factors Affecting Plant Layout

The final solution for a Plant Layout has to take into account a balance among *the characteristics and considerations of all factors* affecting plant layout, in order to get *the maximum* advantages.

The factors affecting plant layout can be grouped into 8 categories:

- *Materials*
- *Machinery*
- *Labor*
- *Material Handling*
- *Waiting Time*
- *Auxiliary Services*
- *The Building*
- *Future Changes*

Types of Plant Layout

The production process normally determines the type of plant layout to be applied to the facility:

- *Fixed-position plant layout*
Product stays and resources move to it.
- *Product-oriented plant layout*
Machinery and Materials are placed following the product path.
- *Process-oriented plant layout*
Machinery is placed according to what they do and materials go to them.
- *Cellular manufacturing layout*
Hybrid Layout that tries to take advantage of different layouts types.

Types of Plant Layout

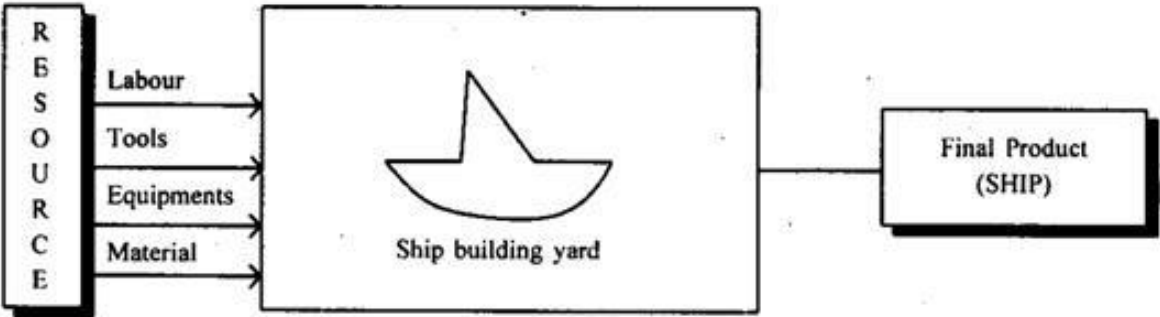
Fixed-Position Layout

Manufacturing and non-manufacturing operations of bulky or fragile products, *e.g., ships and planes.*

Move machines and/or workers to the site; products normally remains in one location for its entire manufacturing period

Types of Plant Layout

Fixed-Position Layout



Types of Plant Layout

Product-Oriented Plant Layout

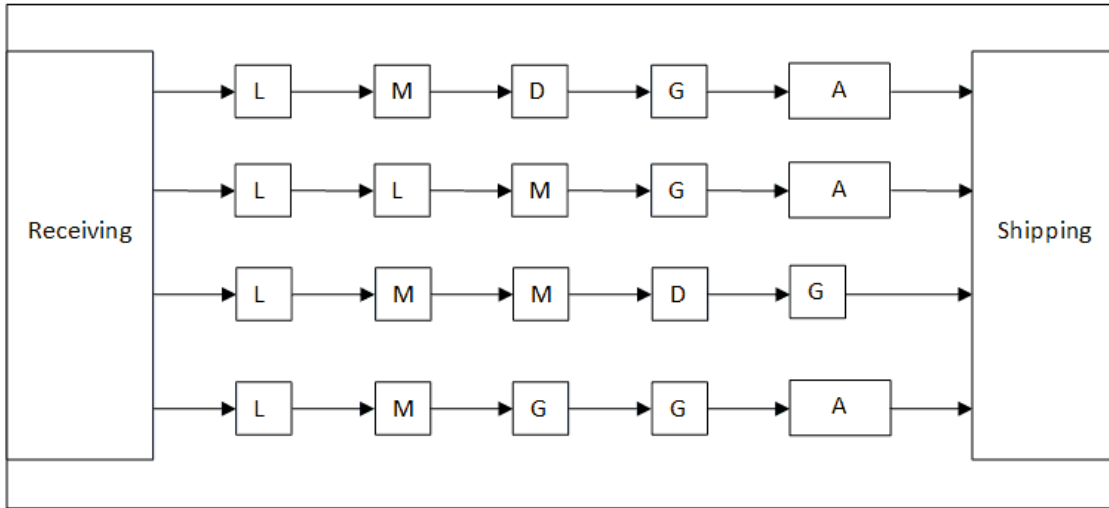
This type of plant layout is useful when the production process is organized in a *continuous* or *repetitive* way.

- Continuous flow: The correct operations flow is reached through the layout design and the equipment and machinery specifications.
- Repetitive flow (assembly line): The correct operations flow will be based in a line balancing exercise, in order to avoid problems generated by bottlenecks.

The plant layout will be based in allocating a machine as close as possible to the next one in line, in the correct sequence to manufacture the product.

Types of Plant Layout

Product-Oriented Plant Layout



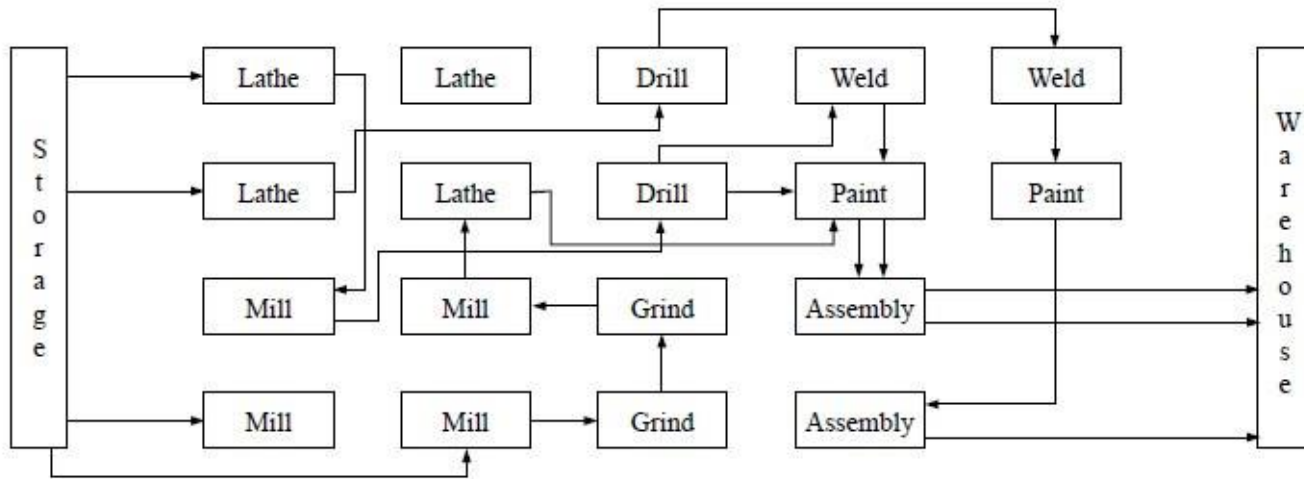
Types of Plant Layout

Process-Oriented Plant Layout

- This type of plant layout is useful when the production process is organized *in batches*.
- Personnel and equipment to perform the same function are allocated *in the same area*.
- *The different items* have to move from one area to another one, according to the sequence of operations previously established.
- The variety of products to produce will lead to *a diversity of flows* through the facility.
- *The variations in the production volumes* from one period to the next one (short periods of time) may lead to modifications in the manufactured quantities as well as the types of products to be produced.

Types of Plant Layout

Process-Oriented Plant Layout



Types of Plant Layout

Cellular Manufacturing Layout

Group of equipment and workers that perform a sequence of operations over multiple units of an item or family of items.

Looks for the advantages of product and process layouts:

Product-oriented layout: *Efficiency*

Process-oriented layout: *Flexibility*

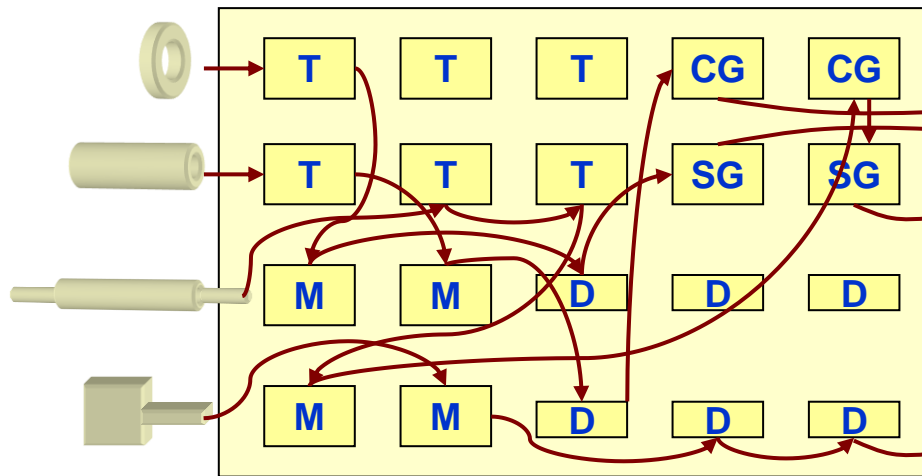
Group Technology

Grouping outputs with the same characteristics to families, and assigning groups of machines and workers for the production of each family.

Types of Plant Layout

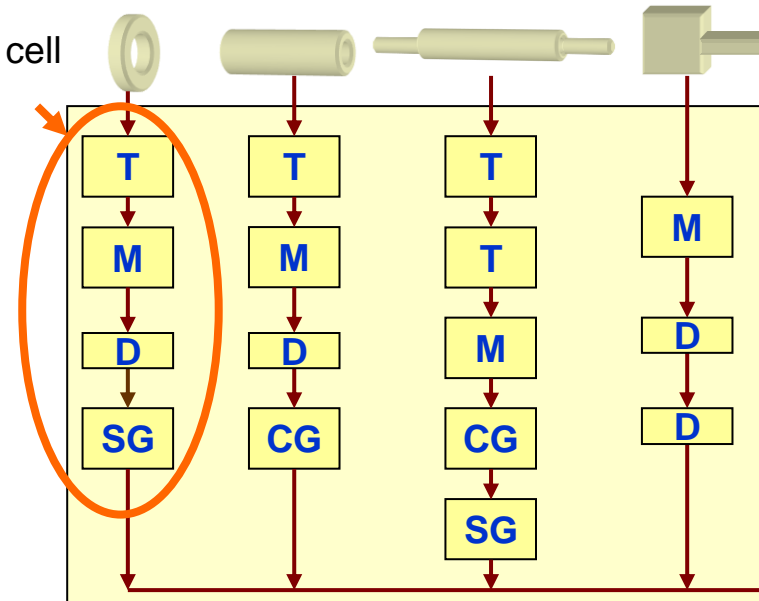
Cellular Manufacturing Layout vs. Process-Oriented Plant Layout

Process-Oriented Plant Layout



Similar resources placed together

Group (Cellular) Layout



Resources to produce similar products placed together

Video: Facility Planning Process and Layout



Thanks for Listening ...