



Production System

Introduction to Manufacturing System



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Literatures

o Main:

- Fogarty, Blanck Stone and Hoffmann, *Production and Inventory Management*, South Western Pub., Co., Cincinnati, 1992

o Additional:

- Gu.P. AND Norrie. D. H., *Intellegent Manufacturing Planning*, Chapman and Hall, 1995
- Nahmias Steven, *Production and Operation Analysis*, 3rd edition, Mc.Graw-Hill International, New York, 1997
- Sipper Daniel, Robert L. Bulfin Jr. *Production Planning, Control and integration*, Mc.Graw-Hill Co., Inc., New York, 1998
- Vollmann, *Manufacturing Planning and Control System*, Dow John, 1988

●●● | Myself...

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●●● | What is manufacturing ?

PT Dirgantara Indonesia



CN 235



NBO 105



A380

●●● | What is manufacturing ?

An industrial robot handling silicon wafers during integrated circuit manufacturing

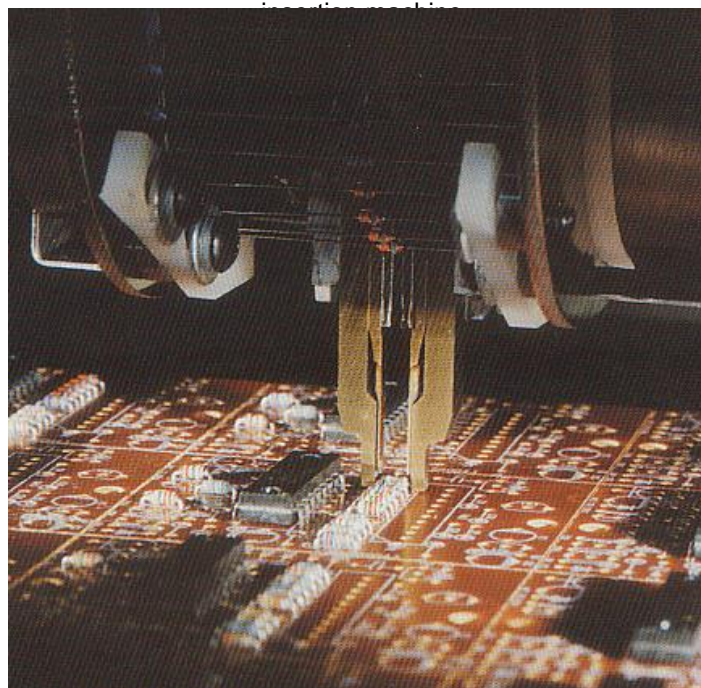


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5

●●● | What is manufacturing ?

Close-up view of electronic components being assembled to a printed circuit board by an automated



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6



What is manufacturing ?

Charging a basic oxygen furnace to make steel



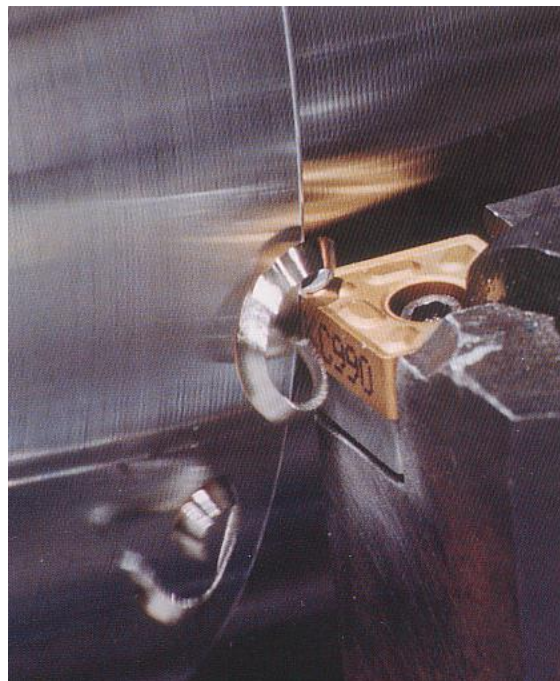
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7



What is manufacturing ?

Close-up view of a turning operation in which metal is removed from a rotating workpiece by a coated cemented carbide cutting tool



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8

●●● | What is manufacturing ?

A portion of an automobile final assembly line. Cars are produced on such a line at the rate of about one every minute



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9

●●● | What is manufacturing ?

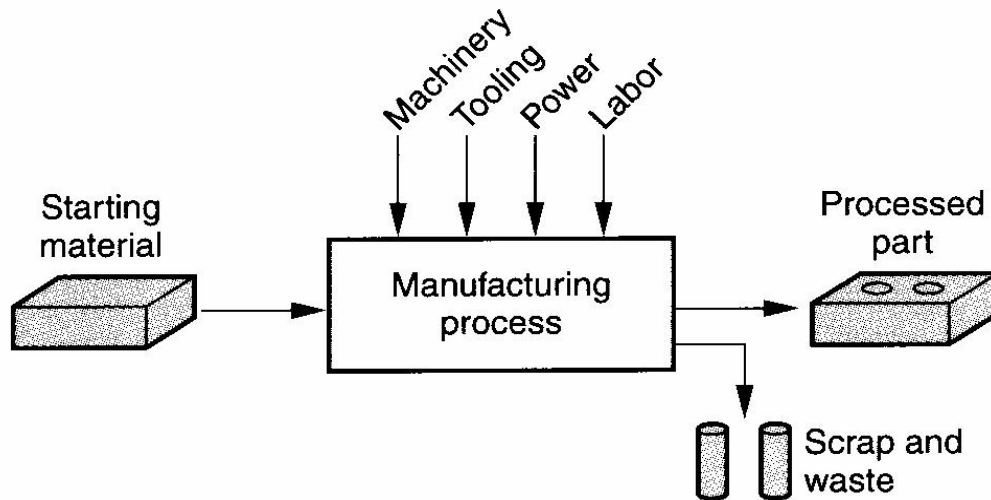
- Derived from two Latin words :
 - *Manus*: hand
 - *Factus*: make

- Means: made by hand
 - Described the manual methods used when the word was first coined (appeared in English around 1567)

- Modern context, manufacturing can be defined two ways
 - Technologic
 - Economic

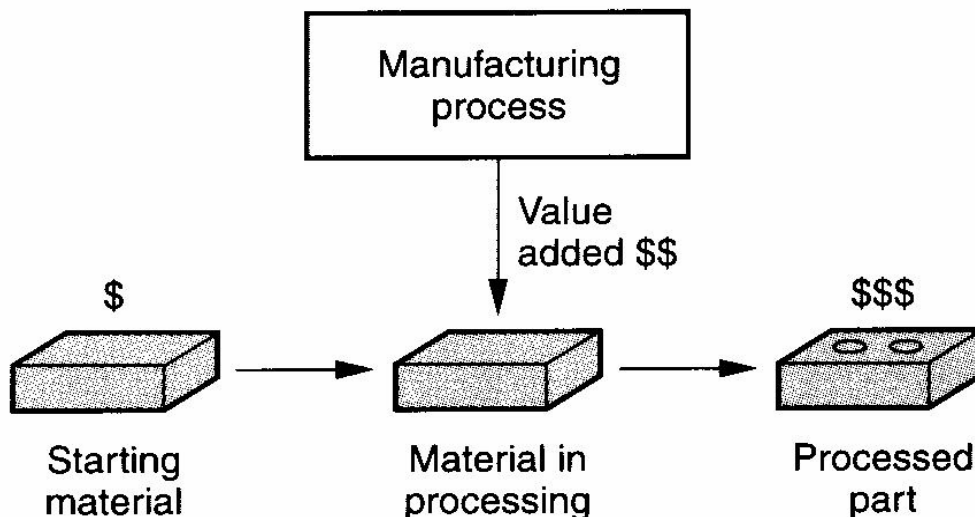
●●● | What is manufacturing (*technology*)?

- The application of physical and chemical process to alter the geometry, properties, and/or appearance of a material



●●● | What is manufacturing (*economy*)?

- The transformation of materials into items of greater value by means of one or more processing and/or assembly operation

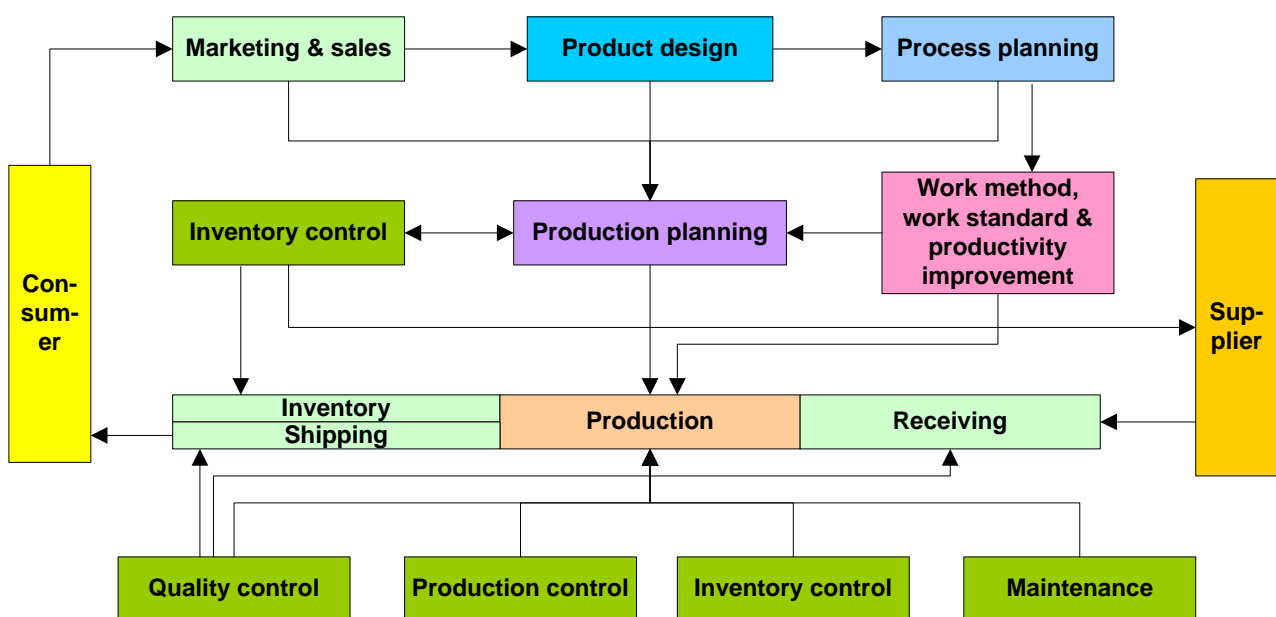


●●● | Manufacturing Definition

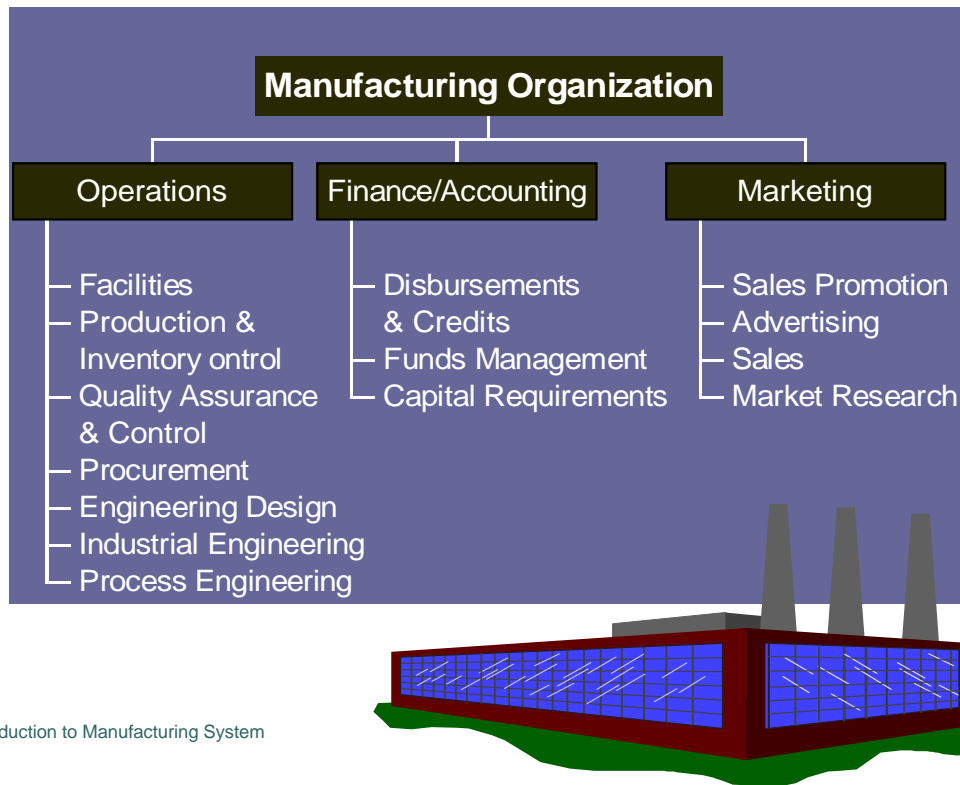
○ CIRP (*International Conference on Production Engineering*), 1983:

- A series of **interrelated activities** and **operations** involving the:
 - design,
 - materials selection,
 - planning,
 - manufacturing production,
 - quality assurance,
 - management and
 - marketing of productsof the manufacturing industries.

●●● | Manufacturing Life Cycle (Groover, 1987)



Organization Chart-Major Elements



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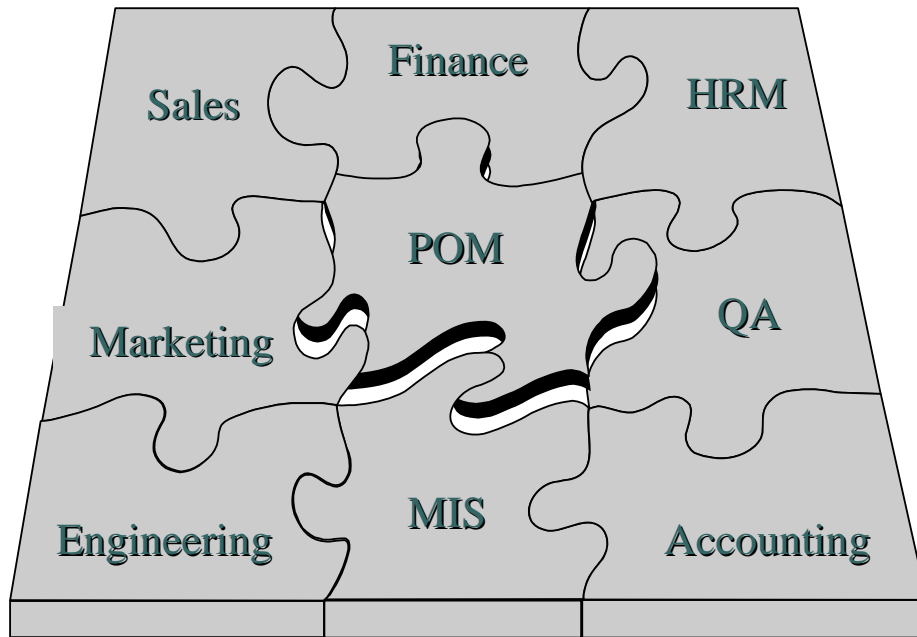
Production System

- Production and operations management (POM) is the management of an organization's production system.
- A production system takes inputs and converts them into outputs.
- The conversion process is the predominant activity of a production system.
- The primary concern of an operations manager is the activities of the conversion process.

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16

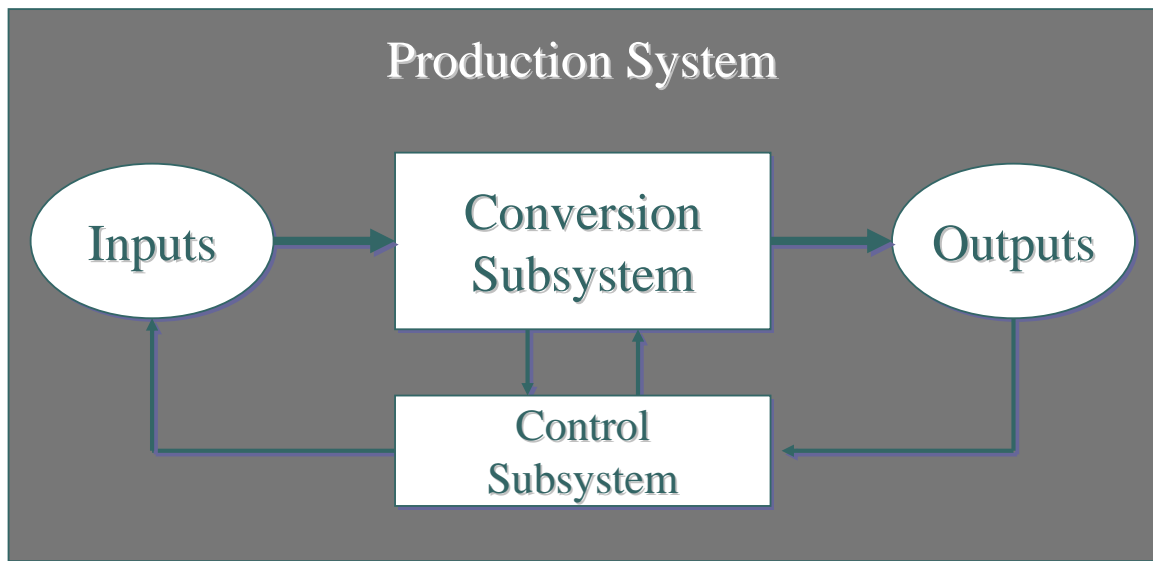
●●● | Organizational Model



●●● | Different Ways to Study POM

- Production as a **System**
- Production as an **Organization Function**
- Decision Making in **POM**

●●● | Production as a System



●●● | Inputs of a Production System

- External
 - Legal, Economic, Social, Technological
- Market
 - Competition, Customer Desires, Product Info.
- Primary Resources
 - Materials, Personnel, Capital, Utilities

●●● | Conversion Subsystem

- Physical (Manufacturing)
- Locational Services (Transportation)
- Exchange Services (Retailing)
- Storage Services (Warehousing)
- Other Private Services (Insurance)
- Government Services (Federal, State, Local)

●●● | Outputs of a Production System

- Direct
 - Products
 - Services
- Indirect
 - Waste
 - Pollution
 - Technological Advances

●●● | Historical Development of Production System

- 1765: **Factory System** (Adam Smith, James Watt)
- 1810: American System of Mfg (Whitney's **interchangeable parts**)
- 1890s: Bicycle boom (sheet metal stamping, electrical resistance welding). **Scientific Management** → Time & motion studies (Frederick Taylor 1900s)
- 1913: **Mass Production** (Henry Ford's Moving Assembly Line)
- 1927: Flexible Mass Production (Alfred Sloan & GM). **Statistical Quality Control** (Walter Shewhart at Bell Labs, 1930s)
 - Hawthorn Studies (Elton Mayo at Western Electric, 1930s)
- 1970: **Toyota Production System** (Taiichi Ohno)
- 1980s-now: **JIT, CAD/CAM, CIM, FMS, TQM, business reengineering**

●●● | Changing sources of competitive advantage (1)

- **Low price**: Having cheap labor 1900s
- **Economies of Scale** (< 1960s)
 - Inject capital to increase labor productivity
- **Focused Factories** (mid 1960s)
 - You can have any color you want as long as it is black
 - Avoid diseconomy of scale



Changing sources of competitive advantage (2)

- Flexible Factories and Product variety (1970s)
 - Cope with changes in consumer references. A car for every taste and purse
 - Flexible resources. Quick changeovers
- Quality (1980s)
 - Quality is free.
 - Continuous improvement strategy. Zero defect. Perfect reliability
- Time (late 1980s-1990s)
 - We love your product but where is it?
 - Don't sell what you produce. produce what sells.



World Class Practice

- Manufacturing Resource Planning
- Enterprise Resource Planning
- Just-in-Time
- Theory of Constraints
- Supply Chain Management
- Project Management
- Computer Integrated Manufacturing
- Flexible Manufacturing System

The above... will be the content of our lecture on Production System