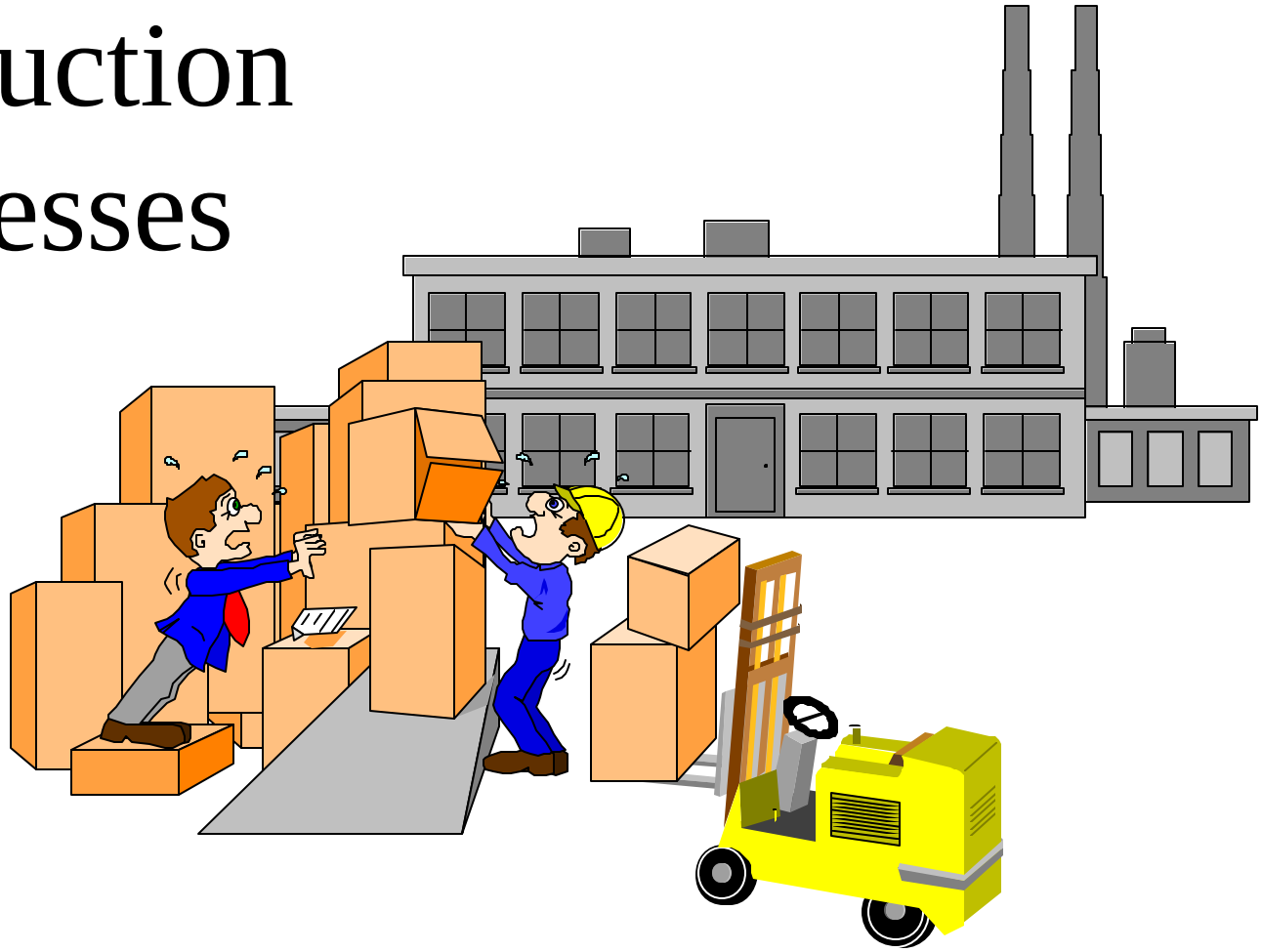
Production Processes



Jobbing, Batch and Flow Process

- Principles of operational process management apply to services and manufacturing.

Session Objectives

- to compare jobbing, batch and flow process approaches to work organisation
- to see how these apply to work in services and manufacturing
- to understand group technology, the nature of computer integrated manufacture and computer aided design.

Basic modes of organising work

How can operations/jobs be done?

- **Jobbing (jumbled flow)**
- **Project**
- **Batch (disconnected line flow)**
- **Assembly line (connected line flow)**
- **Continuous flow process**

Advantages/disadvantages of each.
Most processes combine two or more.

Choice based on experience, organisation skills, investment, practicality and economy

Product Life Cycle Stages

- Low volume, low standardization, one of a kind
- Multiple products, low volume
- Few major products, higher volume
- High volume, high standardization, commodity product

Jobbing

- All tasks performed by the same person. One part of the task is completed before the next starts.
- multi-skilled operatives required: all equipment, manual abilities, artistic competence and decision-making.
- A project with a “team” which combines to complete the whole is a more complex jobbing activity.

Jobbing

- **Non-Repetitive, Customised production**

  enhances value > diminishes it. Several people may produce the same product. Organisation and control to ensure key product features are present in every repetition. Multi-skilled people. Quantities small and to customer specification.

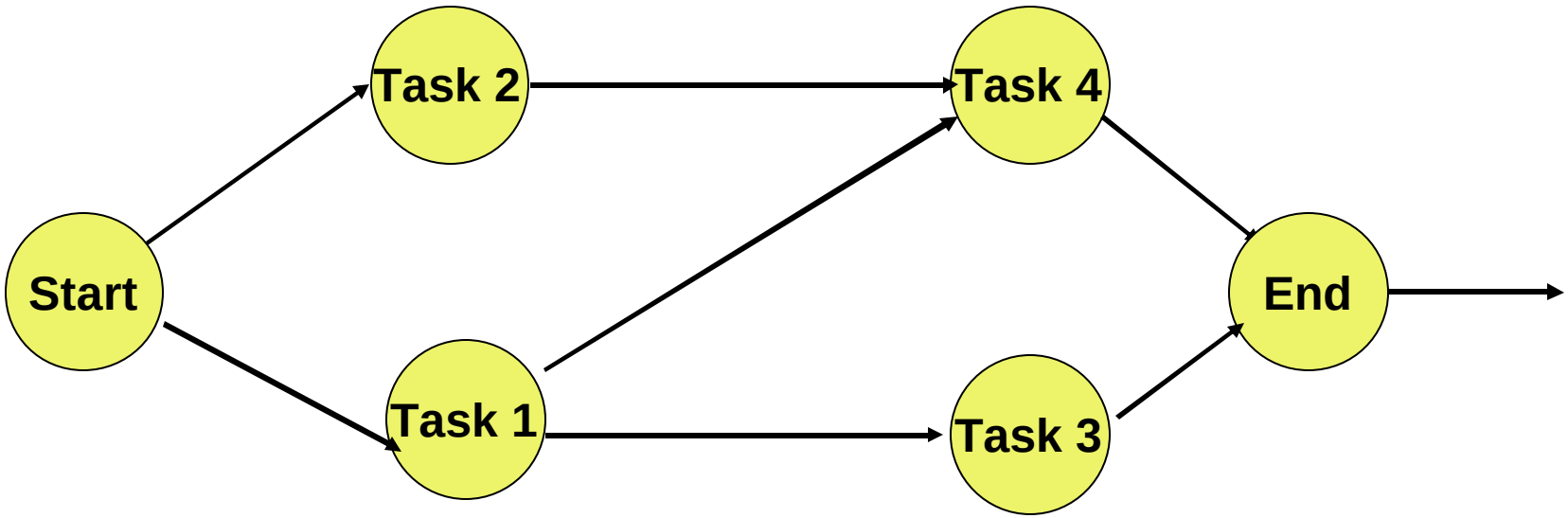
Equipment

Basic tools for craftsperson. Key equipment will be shared and scheduled. Equipment waiting time - a key factor.

- **Costing of products**

  labour + materials + overheads. ----> selling price . Premium prices for uniqueness, workmanship and materials quality.

Project Flow



Task or activity

Precedence relationship

Batch operation

The work done in batches with separate, sequential operations.

Example 1

- collect your dirty washing as two loads (5 minutes)
- Put Batch A in the washing machine.
- When washed, dry batch A in tumble drier while batch B is washed.
- When A is dry, B can be dried whilst A is ironed.
- B is then ironed
- 15 mins to wash batch, 12 mins to dry, 35 mins to iron a batch

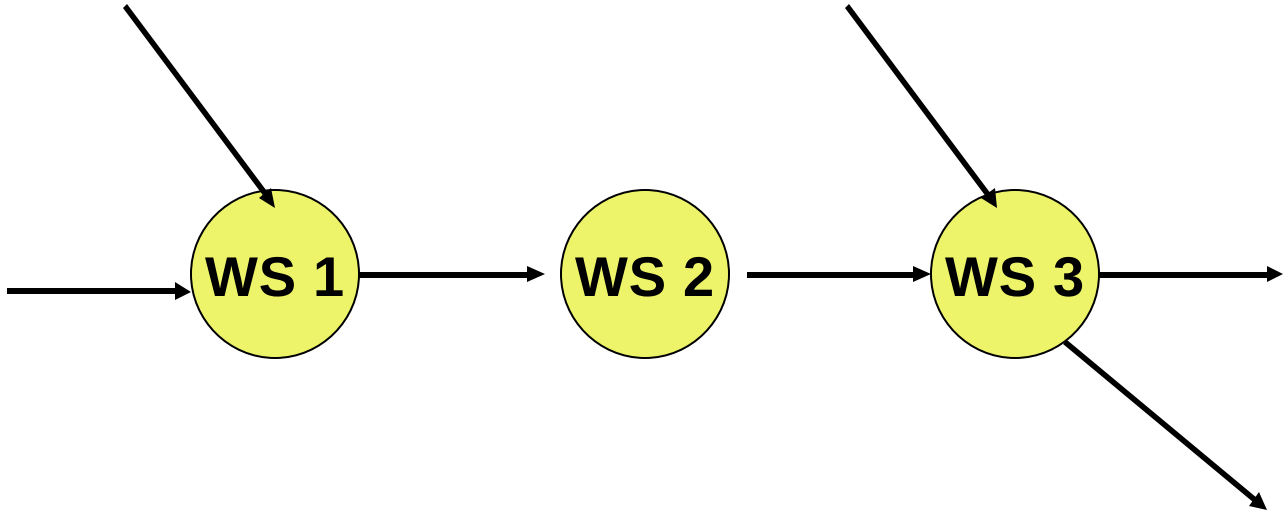
Example 2

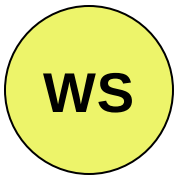
- prepare and cook 235 breakfasts to be served on Quantas flight QT567K to Melbourne

Flow Process

- Not all work has to be done in batches.
- Commercial dish washing machines and factory biscuit baking ovens incorporate a feed conveyor belt. The dirty plates or biscuits are washed or baked in a smooth non-stop operation - flow production.

Line Flow





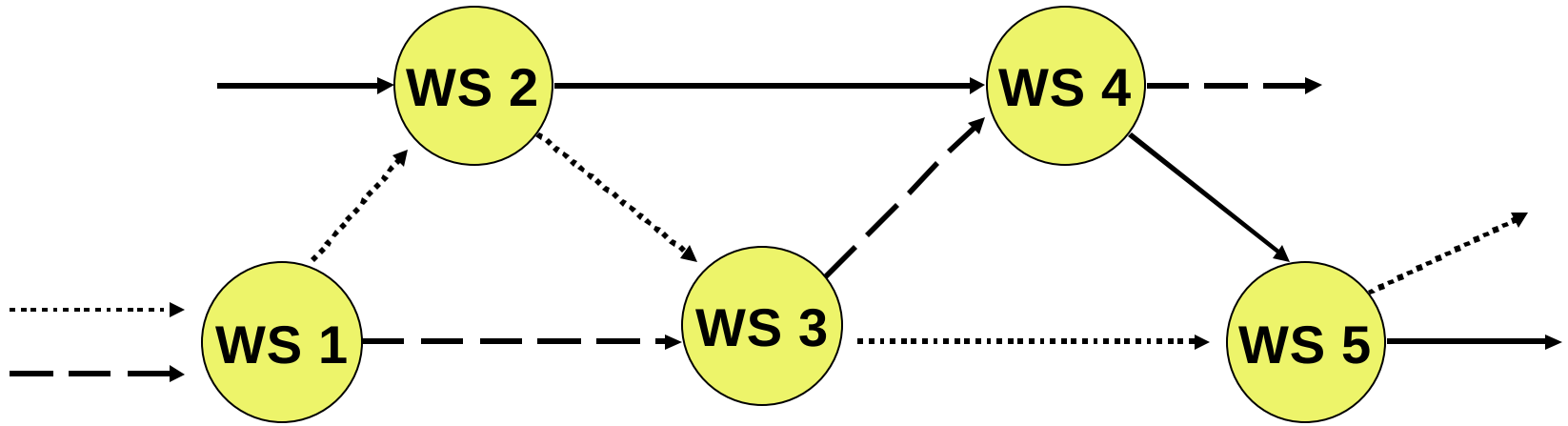
Task or work station

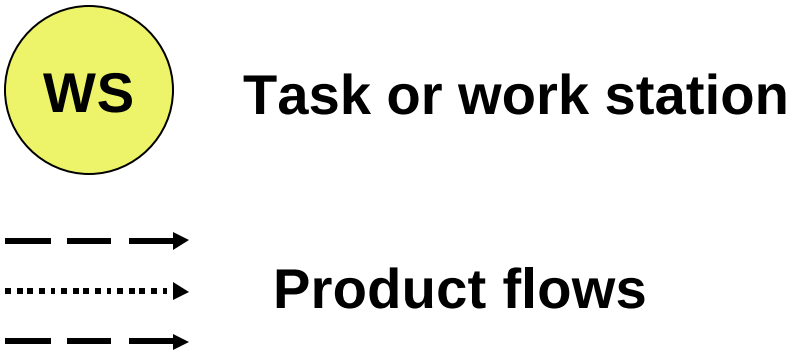
Product flow

Batch Production Shop

- Similar layouts + equipment to a job shop. Batch progresses in stages. Process A done the batch moves on to the next workstation.
- Batch stage by one person or one team.
- Separation of Design, planning and scheduling work
  - Order received
  - work to make it is systematically defined and organised.
  - main assemblies, sub-assemblies and each part/component etc..
  - operations to make each part/assembly, machines/workstations where processing occurs + timing of each step
  - drawings and tools and staffing
- Materials are supplied to workstation for the batch. Whilst item 1 is being processed, the rest queue (work in progress (idle stock)).

Batch Flow





Batch operations information system

- systematic recording of operational instructions and work changes
- Management (industrial engineers) examine efficiencies and update operational specifications
- Computers and database systems, documented procedures and trained/meticulous administrators
- Managers, industrial engineers, planners, and operators record, store, access & disseminate batch operations data

Data collection and Batch analysis

- optimum batch sizes ? No “one right answer”.
- hundreds of batches in progress - each with different status
- production control records to track every batch.
- high levels of “work in progress” (variety of work and batch hold ups).
- data collection points and logging
- bar code scanning for up-to-the-minute analysis: delays, bottlenecks, lost time, quality problems and costs.

Batch costs and resource utilisation

- large, inflexible, expensive items of equipment?
- Large batch sizes reduce average set up costs/unit in batch.
- Objectives
  - reduce change-over times and set-up costs.
  - high utilisation of people and key equipment
  - insert new jobs with minimum interruption
  - Hit deadlines, improving work methods especially for repeat jobs
  - lowest cost operations with minimum down time, high quality and customer service.
- Competitive aim = take smaller orders, give better prices, quality and responsiveness.
- Flexibility: CAD, CAM/CNC, cell technology

Batch processing applies to services also.

- data processing (payroll, trial balance runs, master file updating) on corporate computers?
- lunch and sandwich making in a college cafeteria? Hamburgers and chips in a fast-food restaurant?
- Flying eye-operation theatre?
- Todays patients to an out-patients' clinic?
- processing of tax demands sent out to individuals?
- How are car repairs done in a garage?
- Baggage handling at an airport
- Preparing dinner for 2/3 people vs. a wedding buffet for 150?
- assembly of TVs., PCs, cars, flat-pack furniture

Flow Production

- manufacturing or assembly process where work done on a product in a steady, sequence as it moves along a track.
- The track does not stop (no idle time).
- Operators, at work stations, perform tasks on the product as it passes thru. the workstation.
- Line dedicated to one product . No “batch” as such.
- A flexible continuous flow line may be capable of switching to a model or product variant.

Capacity and Demand Variations

- Track speed determines through-put capacity.
- Speed governed by slowest point on the line - (bottleneck).
- Production planning to balance line capacity with demand.
  - +/-staffing levels, overtime, extra shift, make for stock

Investments & costs - expensive dedicated flow line

- Downtime ---> no feed to down-stream clients.
- Poor quality at a station continues down the line.
- Rectifying faults at line end is expensive
- Upstream servers need holding areas to keep going
- Rapid response repair & planned maintenance systems
- Manage supply to stations - Kanban/JIT
- operations at stations benefit from work study
- Control product changes & equipment installation/maintenance - to avoid disruption

Flow Process Staffing and Skills

- Operators- skilled/trained only for tasks at workstation?
- Simpler recruitment & training but routinised and repetitive. Little operator discretion over speed/sequence of work and methods.
- Technology determined - limited scope for line worker interaction .
- Operators must be high focused + work rhythm
- Alienation with routine, continuous, pace????

Job re-design

From the late 60s -job flexibility and empowerment programmes e.g. Volvo and Herzberg

- work team at a work station act as a “cell”
- manage own activities, roles & methods
- opportunity for multi-skilling, job rotation & quality management by by the team itself.
- re-engineer how technology is implemented.
  - Don’t adopt people to technology, adapt technology to people.
  - Form cells (workstations) where work can stop and operators in team can do a series of tasks
- “Team” emphasis - group problem-solving supported by specialists & management when needed.

Group/cell technology