



***Higher
Design & Manufacture***

CAD, CAM and CIM

Learning Intention & Success Criteria

- *I am...*

- ★ *Learning about the influences of computers on Design and Manufacturing.*

- *I can...*

- ✓ *Explain the impact of computers on design and manufacturing.*
- ✓ *Understand and explain: CAD, CAM and CIM*

What is CAD?

- **Computer Aided Design (CAD)** is a system which allows the user to input design information.
 - Shapes
 - Forms
 - Materials
 - Sizes
 - Tolerances
 - can all be added as design criteria.
- **Standard components** can be stored in a library to save time.
- **Simulations** can be performed to test behaviours and properties and to identify errors.

The rise of CAD

- *Almost all design work is carried out using CAD systems.*
- *Whilst initial ideas may be sketched manually, CAD systems allow designs to be represented in 2D and 3D.*
- *Even in schools, CAD systems are crucial in Craft, Design & Technology based subjects.*



Advantages of CAD

- **Development time is reduced drastically.**
- **Quality and accuracy of design work is increased.**
- **Improvements are easily identified and quickly implemented.**
- **Data is easily stored, retrieved and shared.**
- **Design work is better integrated in to manufacturing systems.**



Disadvantages of CAD

- *Initial setup costs are high and software is expensive.*
- *Software must be updated regularly.*
- *Staff require training which is costly.*
- *Difficult to manage intellectual property rights when information is stored centrally.*

What is CAM?

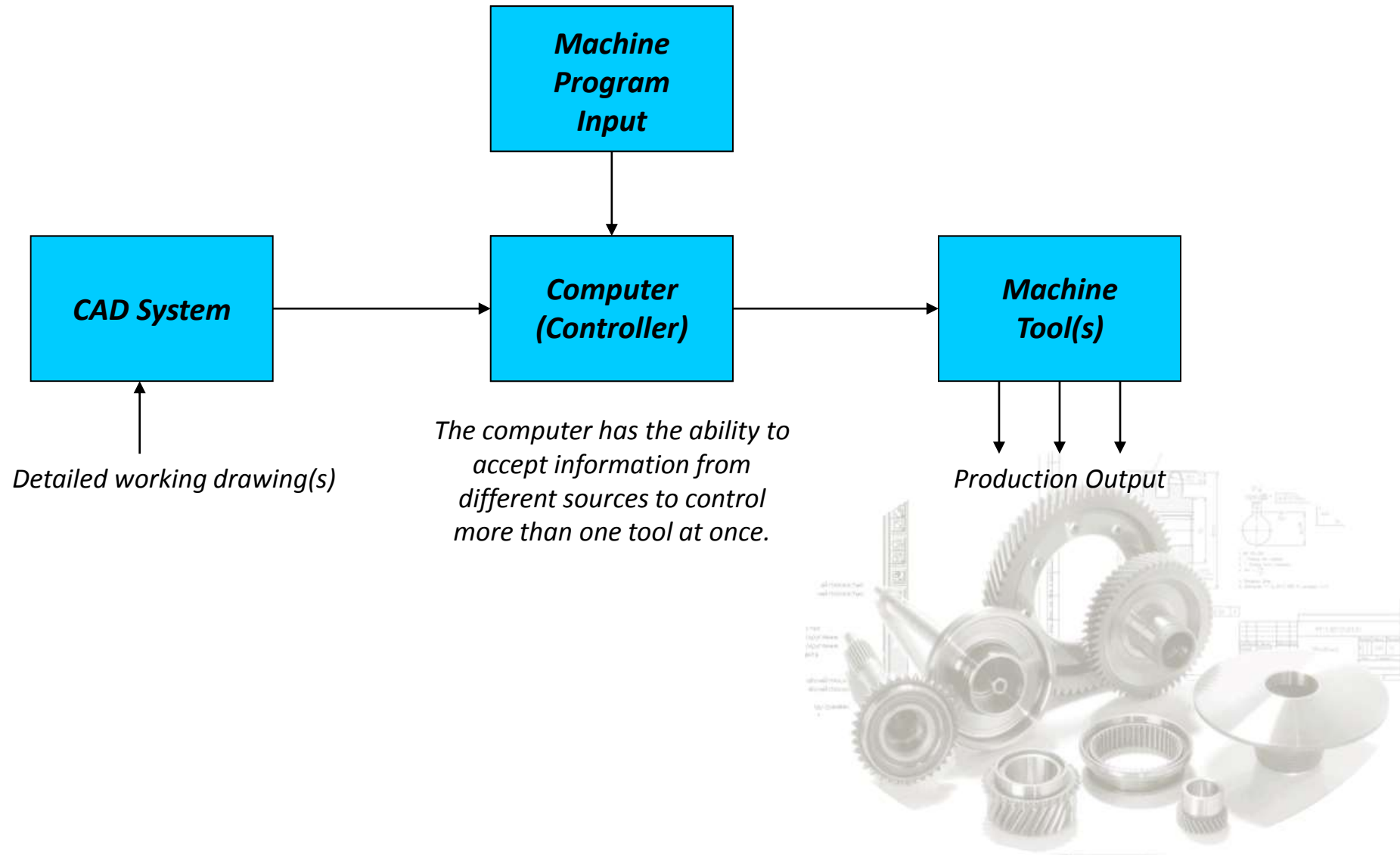
- **Computer Aided Manufacture or CAM** is a manufacturing system where machinery and equipment is controlled by computer.
- The use of computers in manufacturing with **Computer Numerical Control (CNC)** systems in the 1960s.
- CNC systems used complex numerical commands to manage machinery and tooling.
- However, the **setup cost was very high.**



Evolution of CAM

- *Now it is possible for even the smallest manufacturers to use CAM systems.*
- *High powered computers are widely available at affordable prices and electronic/cloud storage means instructions/commands can be programmed quicker.*
- *Designs and modifications can be implemented more quickly and the design process is more responsive to consumer needs.*

Evolution of CAM



Advantages of CAM

- *The **reliability** of CAM systems result in higher productivity and therefore lower costs.*
- ***Eliminates and limits human error.***
- *Programs can be **easily updated** and modified.*
- ***Complex operations** can be carried out easily.*
- *Once programs are operational, **highly skilled operators** are no longer required.*

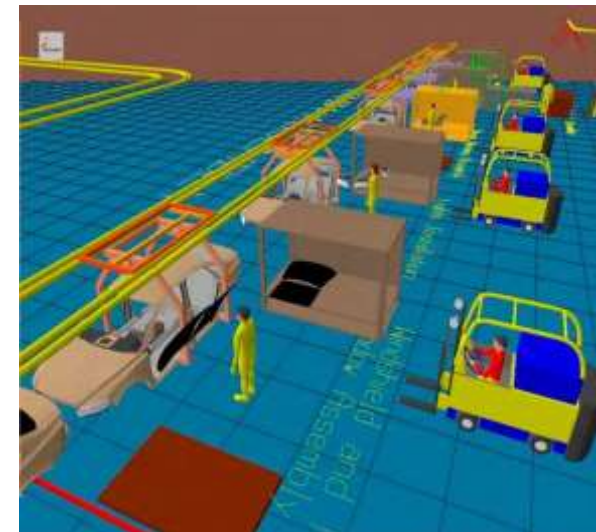
Disadvantages of CAM

- *Installation and start-up costs can be high.*
- *Skilled technicians are required for maintenance, resulting in high training costs.*

CIM

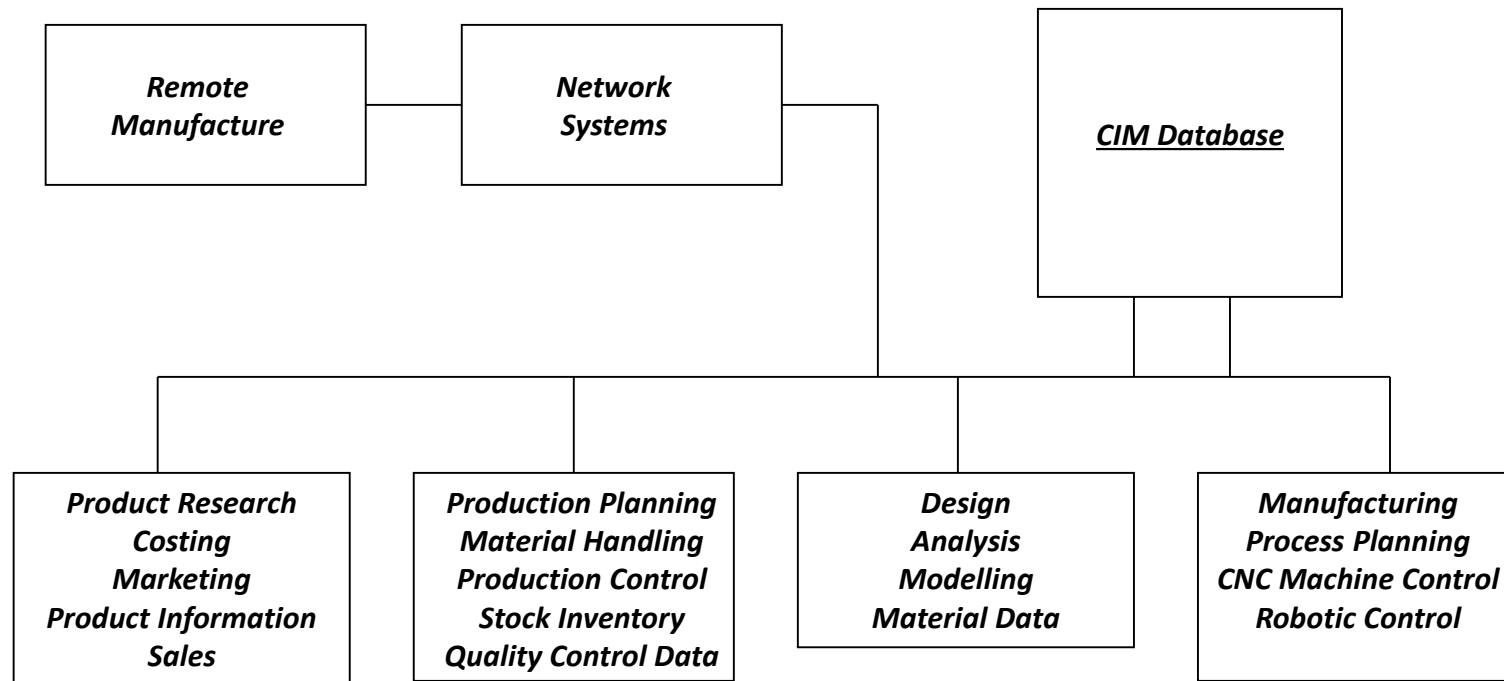
Computer Integrated Manufacturing

- *Modern manufacturing uses computer technology to organise and control the **entire production processes**.*
- *CAD and CAM systems form part of Computer Integrated Manufacturing system.*
- *In CIM systems, a number of aspects can be monitored including...*
 - *Design Development*
 - *Production Scheduling*
 - *Machine Operations*
 - *Assembly and Packaging*



Computer Integrated Manufacturing

- In a CIM system, the software on the central computer manages the system.*
- All computers can perform individually but also interact with the system.*

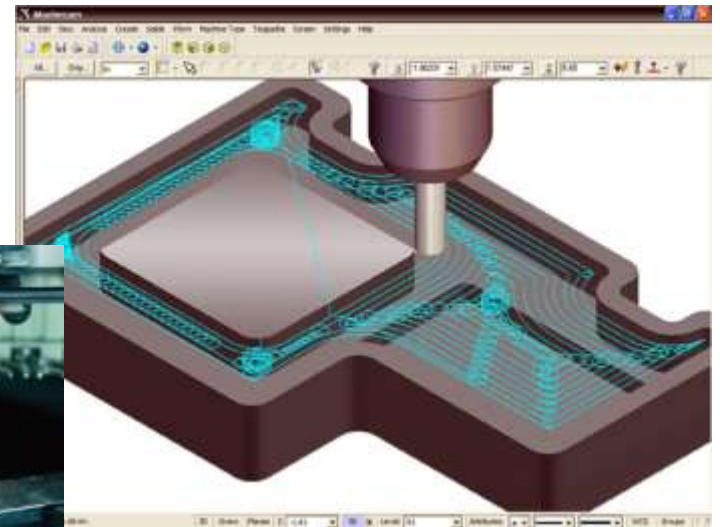


Advantages of CIM

- *All data and **information** can be exchanged quickly via computers and networks.*
- *The overall **time** to develop and manufacture products is **vastly reduced**.*
- *The **quality** and **reliability** of products has been **increased** significantly.*
- *Savings in **time**, **materials** and **labour** result in **cost savings** for the consumer.*

Use of CIM

- *CIM systems are now crucial due to the demand for technologically advanced subjects.*
- *CIM systems have allowed the storing, sharing and translation of information to be instantaneous.*



H 2008 Q4

Explain the benefits of using computerised systems in the design and manufacture of modern products.

(4)