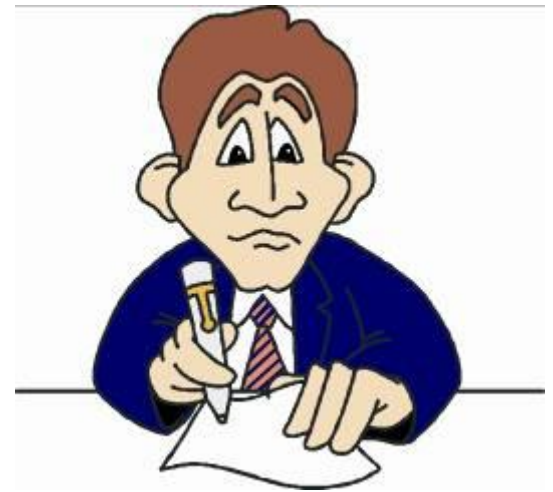


The impact of ICT on manufacturing

Exam expectations

You are expected to know about how ICT is used to aid manufacturing both in school and in industry so always expect questions in exam to relate to this topic



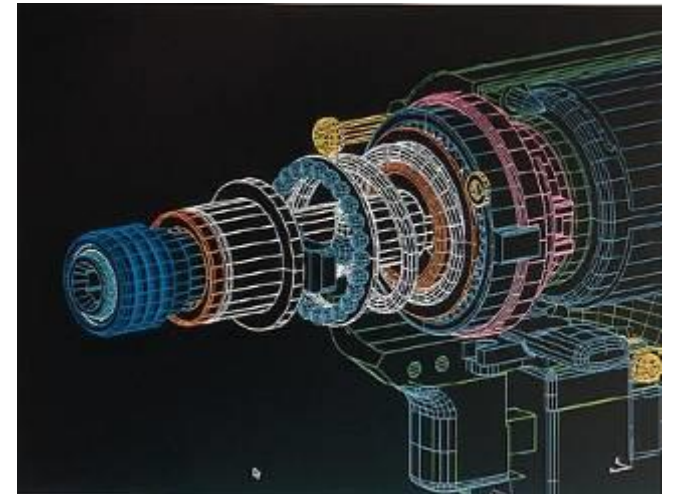
CAD/CAM - benefits

- Repeatability
- Easier data storage and retrieval
- Quick changes/set-ups
- Reduce labour costs
- Flexibility
- Full automation capability



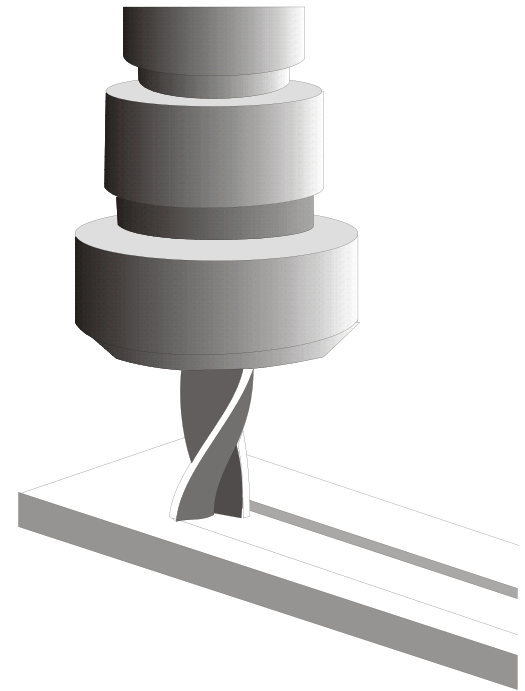
CAD/CAM - drawbacks

- Security of data
- Risk of data corruption
- Initial investment – plant and training
- Don't refer to job losses



Computer Aided Manufacture

- Printers
- Knife cutters
- Milling/engraving machines
- Routers
- Lathes
- Laser-cutters
- Embroidery machines
- Rapid prototyping



Digital printers

- Used for one-offs/prototypes
- Small print runs
- Direct onto fabrics/carpets
- Large areas
- Transfer printing
- Sublimation printing



Vinyl cutters

- Signs (especially vehicles)
- Graphics on prototypes
- Iron-on vinyl (T shirts)
- Masks for stencilling/sandblasting
- Labels for prototypes
- Card nets for prototypes
- Decoration on ceramics



Knife cutting and creasing

- Used for small scale production of cartons
- Samples and small batch production



Milling/engraving machines

- Cutting flat (2D) shapes in rigid materials
- Engraving copper board for electronics
- Signage name plaques etc.
- Raised forms (3D)



Routers

- Used mainly on timber (MDF) and rigid foams
- 3 axis – partial 3D
- 4 axis – turns material to get full 3D
- 5 axis – full 3D, much better detail



Lathes

- Work revolves against cutter
- Cylindrical
- Conical
- Spherical



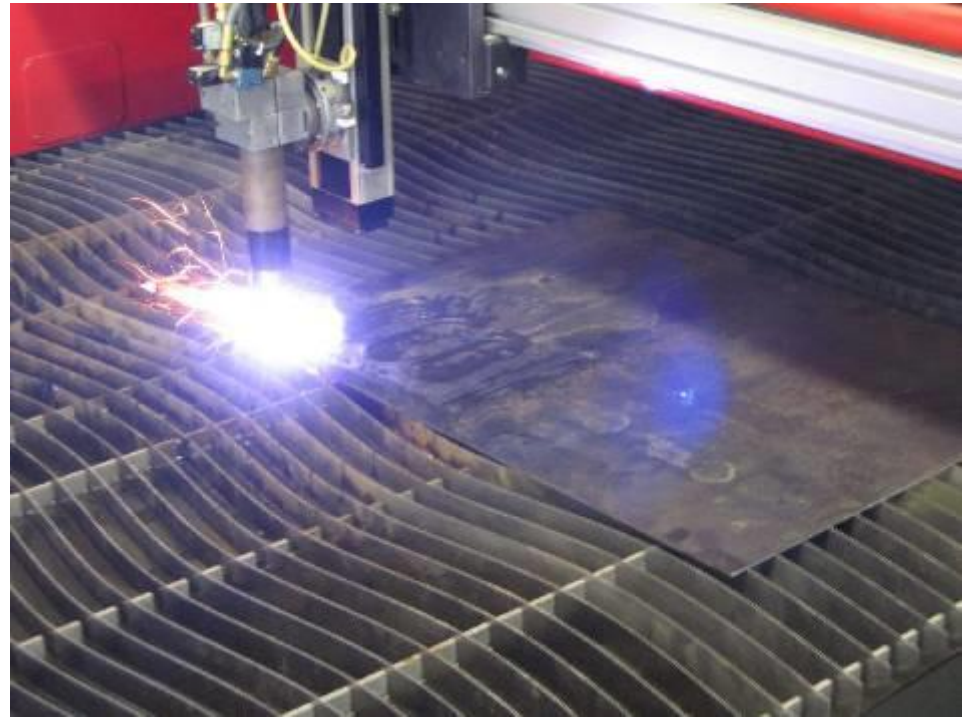
Laser cutters

- Very accurate cutting for sheet materials
- Engraving
- Small scale machines found in schools



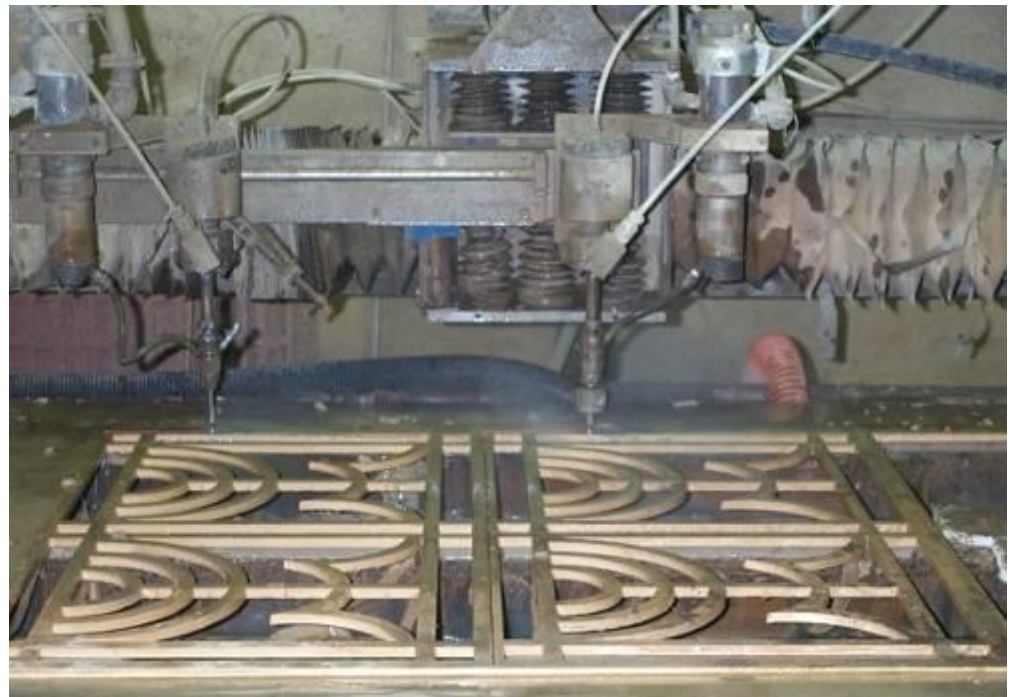
Plasma cutting

- Used for cutting sheet metal
- Not found in schools



Water jet cutting

- Fine cutting of metal sheet
- Again, not found in schools



Embroidery Machines

Detailed designs on fabric

- Text & graphics
- Repeat patterns



Rapid Prototyping

Prototype built up layer by layer –
Stereo lithography

- 3D printing
- 3D layering



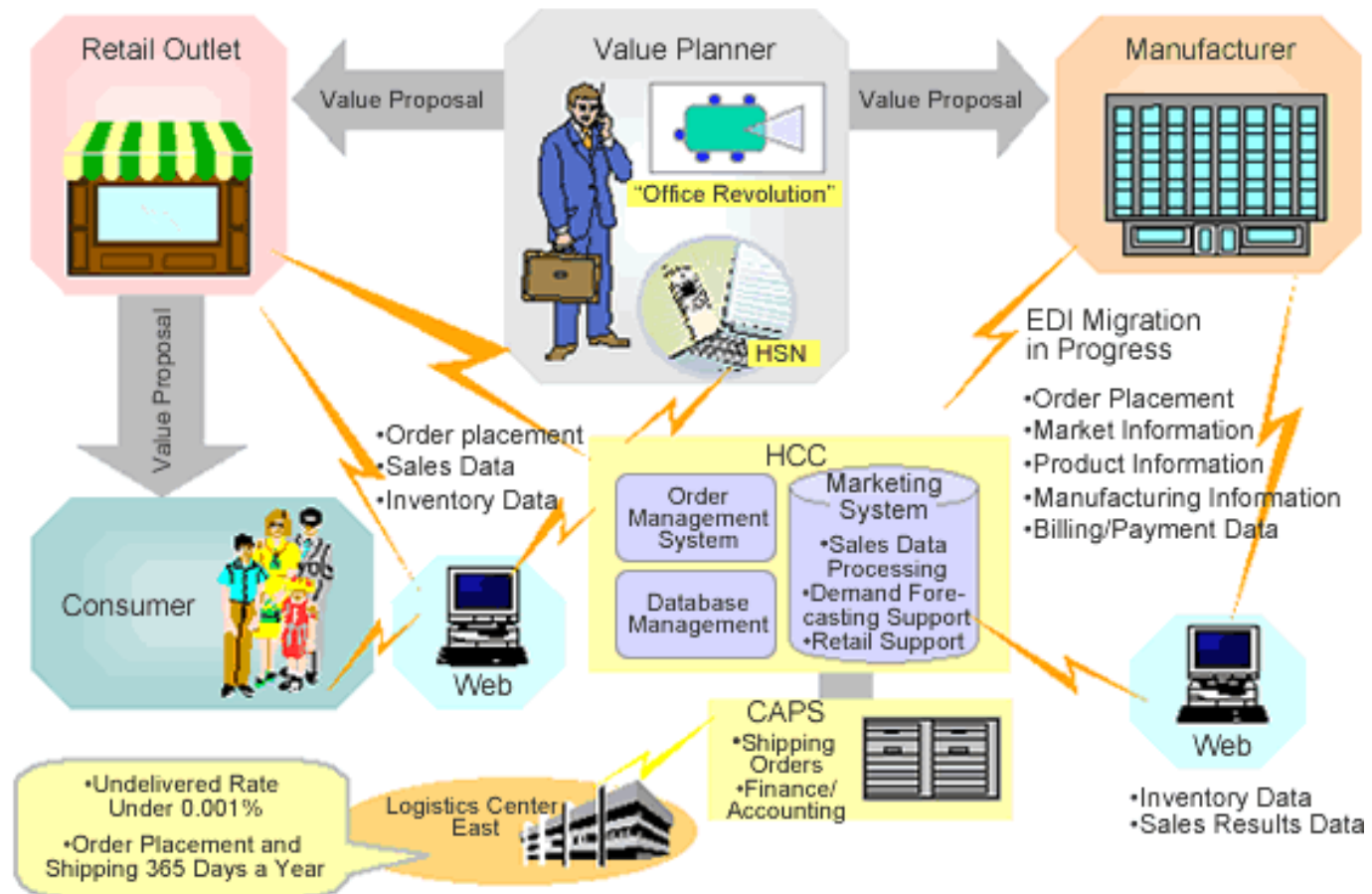
Impact of ICT on manufacturing

Further than CAD/CAM

- Electronic Data Interchange (EDI)
- Electronic Product Definition (EPD)
- Product Data Management (PDM)

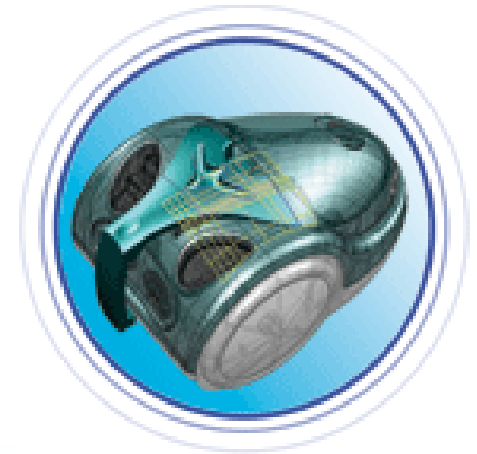
Electronic Data Interchange

Sales Information Network



Electronic Product Definition

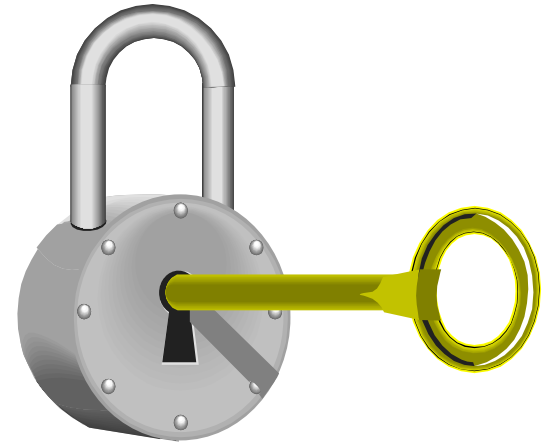
- Product and process data stored electronically on one database
- Total Product Modelling (TPM)
- Virtual Product Development (VPD)
- Virtual Manufacturing



Electronic Product Definition

Release mechanisms:

- Who sees information?
- When is it available?
- What form is the information in?



Product Data Management

Gerber Garment Technology Inc.

- Up to date information for both manufacturers and retailers
- Instant changes to all concerned parties
- World wide potential
- Quality monitoring via remote cameras

Product Data Management

Allows manufacturers to:

- Start with an illustration and build product information around it
- Customise specification sheets to suit their manufacturing needs
- Use digital camera to show construction details
- Manage concurrent design, development, merchandising and production

Product Data Management

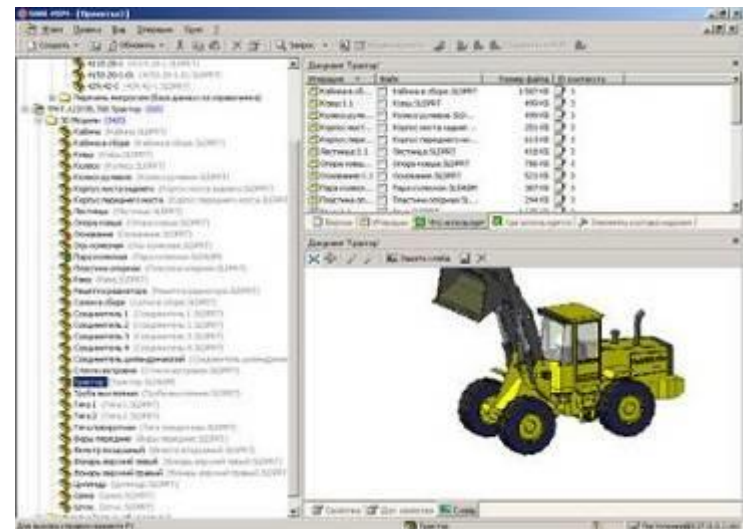
Allows manufacturers to:

- Communicate manufacturing data next door or world wide
- Record and monitor all costs
- Monitor quality assurance
- Reduce product time-to-market
- Successfully use quick response manufacturing techniques

Product Data Management

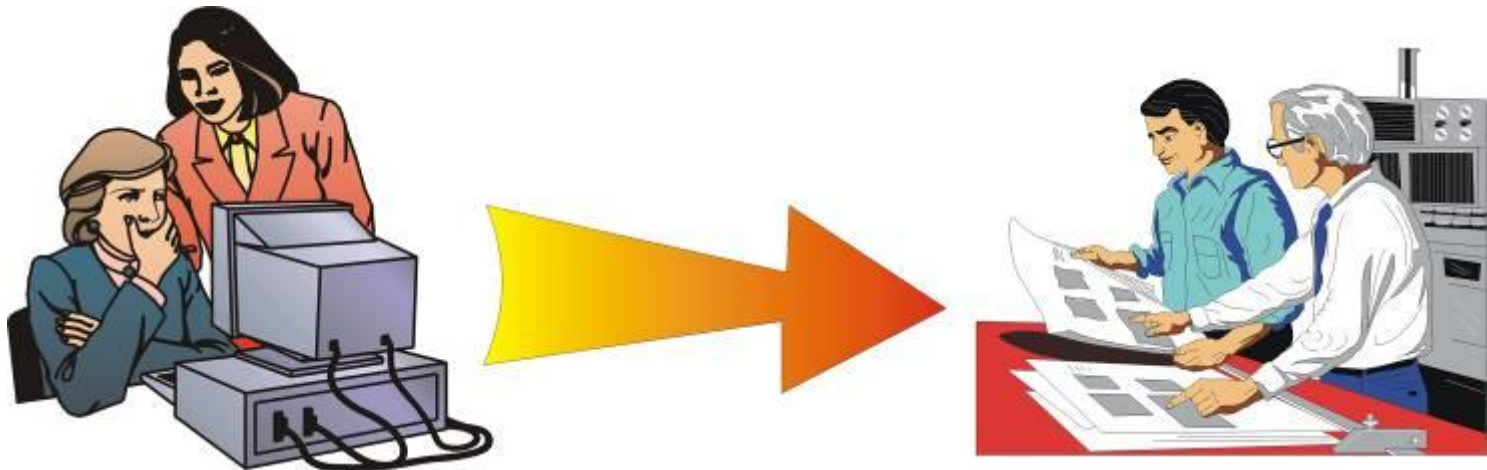
Allows manufacturers to:

- Respond to five or more new “seasons” in a year
- Right product at the right time



Remote manufacturing

- Very common especially in the printing industry
- Maximises savings by manufacturing abroad



Video conferencing

Advantages include:

- Time saved travelling
- Costs
- Face to face
- Observe facial/body language
- Several locations can be linked together

Disadvantages include:

- Time differences



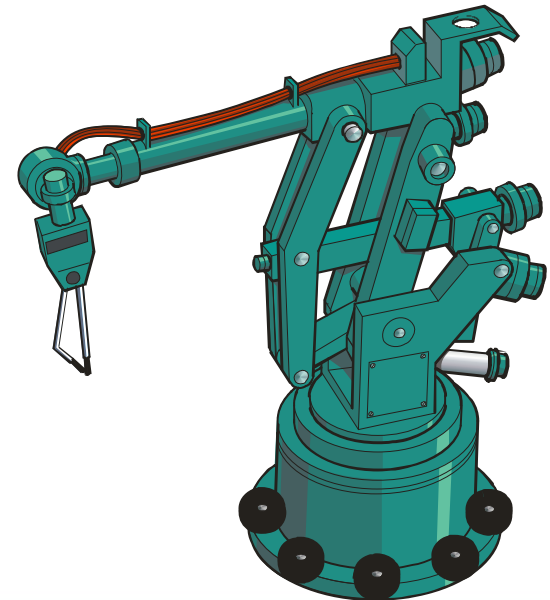
Just in Time

- Shared information systems
- Reduced lead times
- Less finance tied up in stock



Automation

- Numerous interlinked sub-systems centrally controlled
- Use of robots for repetitive/dangerous tasks
- Monitoring/measuring
- Logistics



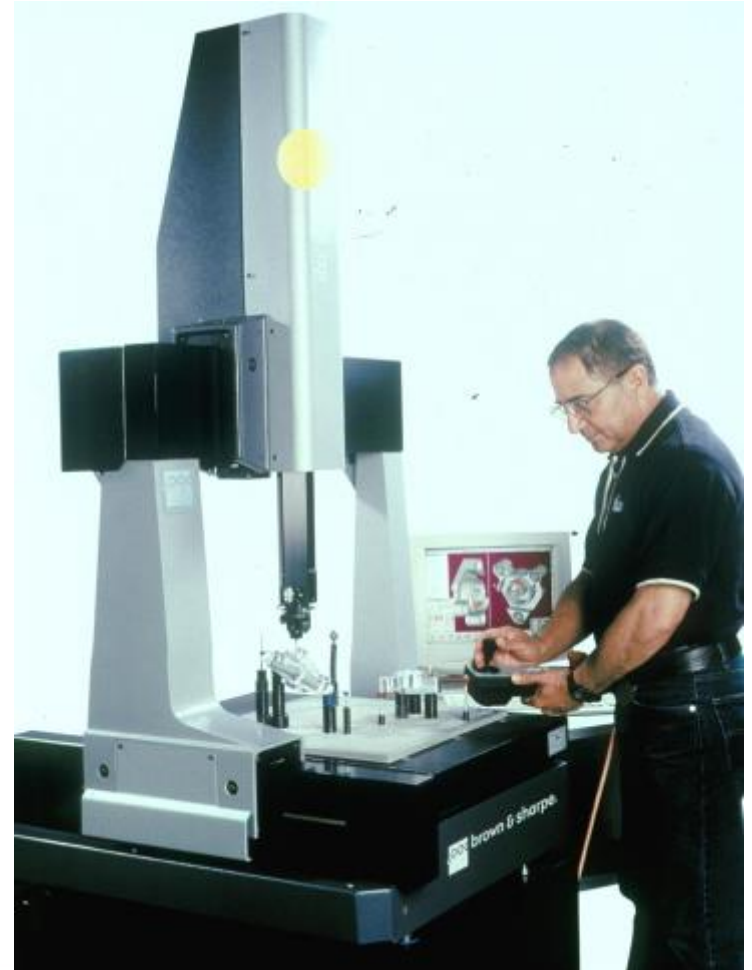
Flexible Manufacturing

- Benefits of one-off production at mass production prices
- Only possible with ICT



Computerised measuring

- Very complex measuring tasks can be undertaken at various stages of manufacturing



Compression testing

- Ensuring the structures can withstand pushing forces



Tensile testing

- Ensuring structures can withstand pulling forces



Simulated destruction testing

- Software can simulate how structures will perform under impact loads
- This is a cheaper option than destructive testing



Product testing

- Extensive testing can be undertaken in controlled conditions



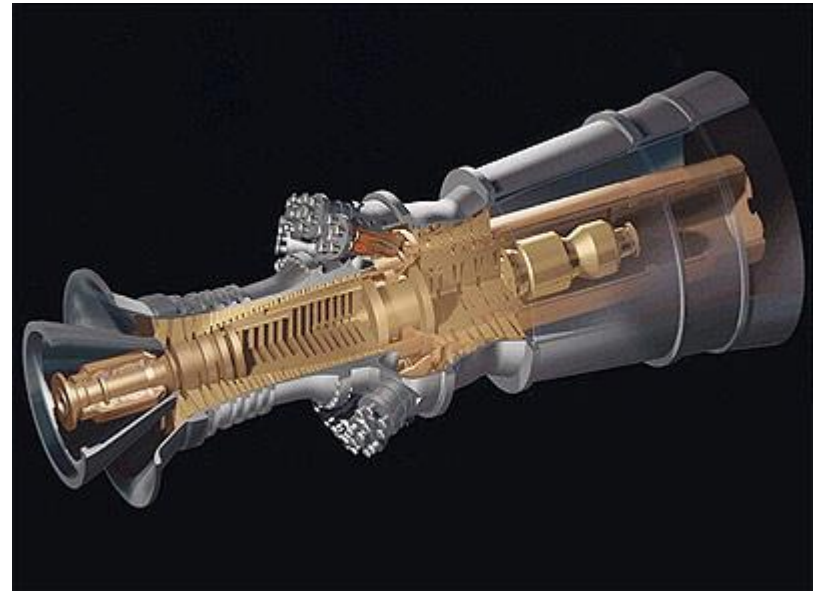
Stress analysis

- Components can be tested at many stages of the design and manufacturing stages



Simulated fatigue testing

- Saves time and costs as components can be tested before manufacture
- Uses finite element analysis software



Accelerated wear testing

- Wear testing can be performed with materials and finished products



Logistics

- As well as design and manufacturing applications the whole supply chain needs to be carefully planned and managed



Supply chain management

- Ensuring that materials are at the point of processing, products and components are made on schedule and delivered to the customer on time is essential for efficient manufacturing

ICT makes a major contribution to this

