

CAD and CAM



These icons indicate that detailed teacher's notes or useful web addresses are available in the Notes Page.



This icon indicates the slide contains activities created in Flash. These activities are not editable.

For more detailed instructions, see the *Getting Started* presentation.



What is CAD/CAM?

In this clothing factory, patterns are designed on screen and then printed using a plotter.



In this metalwork factory, robotic processes are used to mass produce industrial objects.

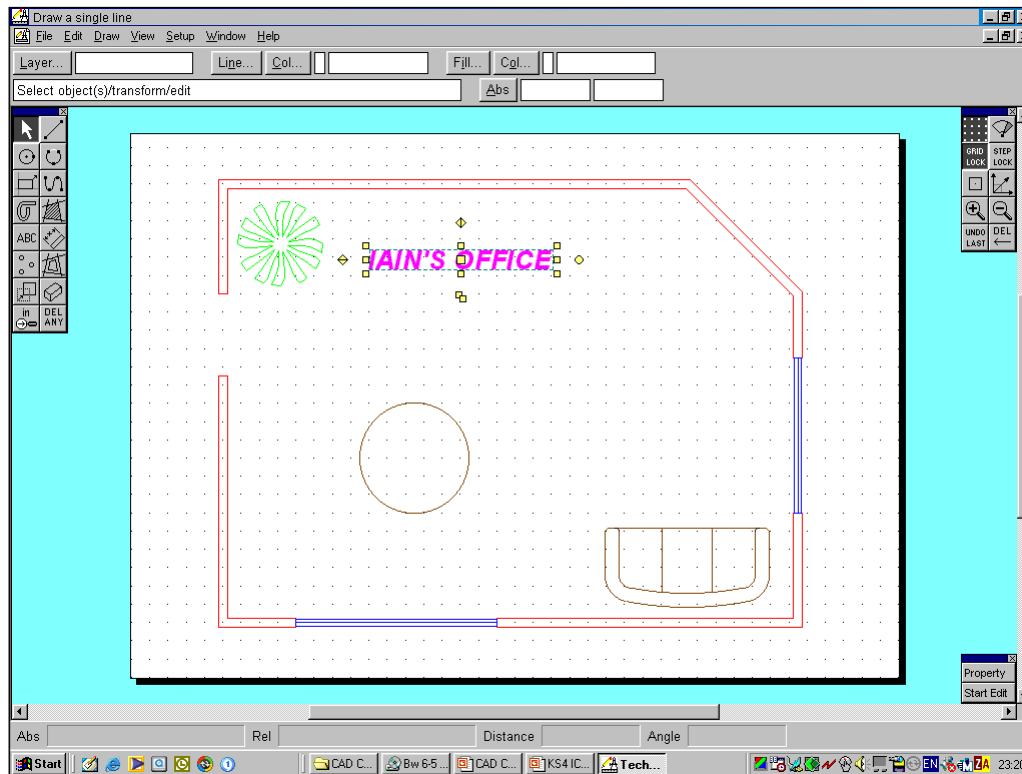


- **Computer Aided Designing (CAD)** is specialist software used to design and draw products.
- The CAD file produced by the software can also be used to help manufacturers make the product using **specialist machinery**.
- CAD enables designers and engineers to **generate ideas** much faster and more accurately than by hand.
- The **storage** and **retrieval** of CAD data is quick and easy.
- Designs produced using CAD packages are simple to reproduce, alter and send electronically.



There are different types of CAD modelling:

Two-dimensional (2D)

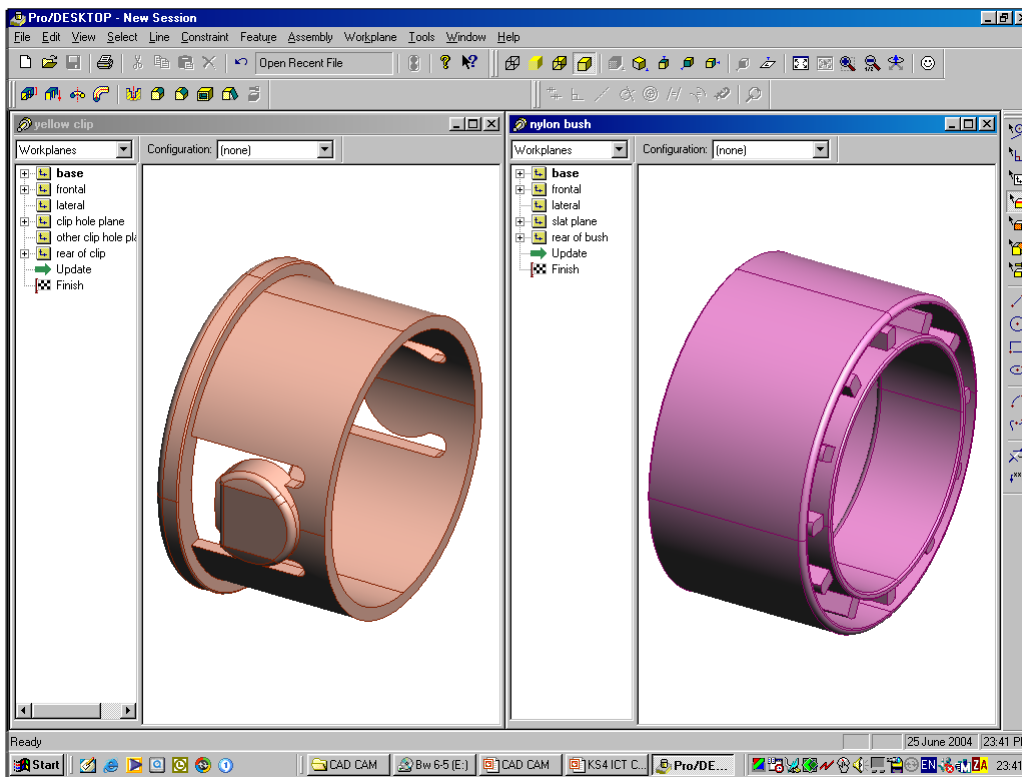


- 2D CAD packages can be used to **design** simple shapes.
- They can also be useful as a **drawing** tool to replace traditional hand drawing methods.



There are different types of CAD modelling:

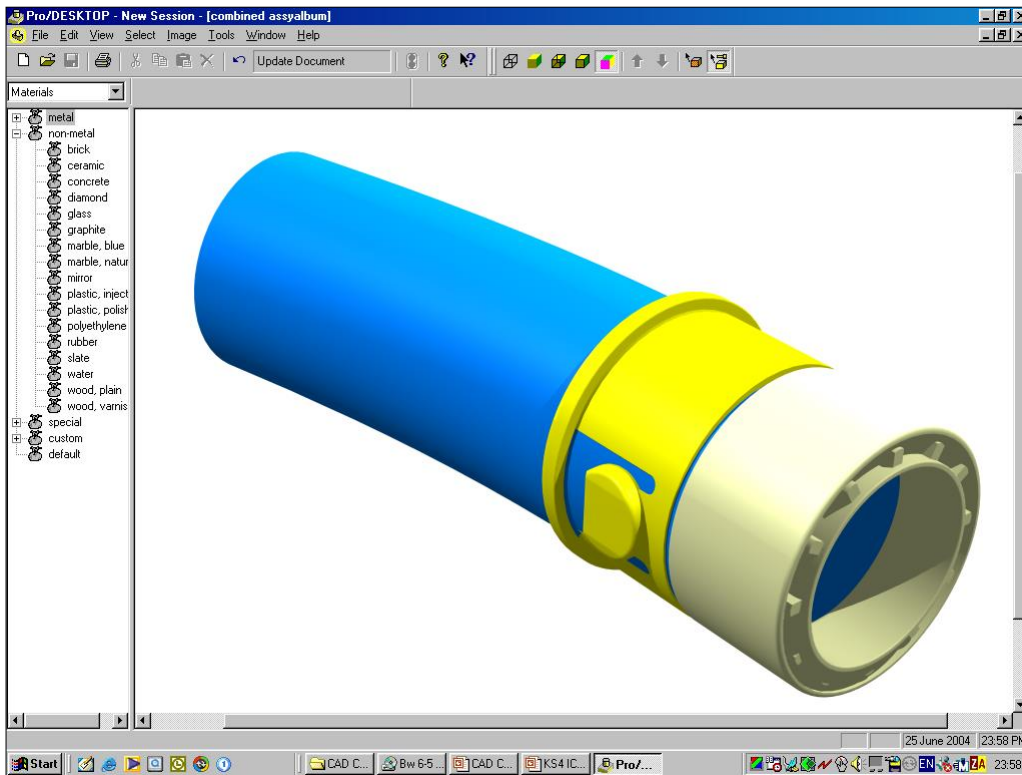
Three-dimensional (3D)



- **Wireframe models** show features behind and on the rear of the product.
- **Solid models** are easier to visualize because they look as though they were the real product.



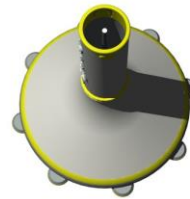
CAD packages are also capable of producing very realistic products for different purposes.



- **Testing:** Solid models can be given mass and volume and can be tested before they are made.

Why is this useful to a designer?





Evaluation:

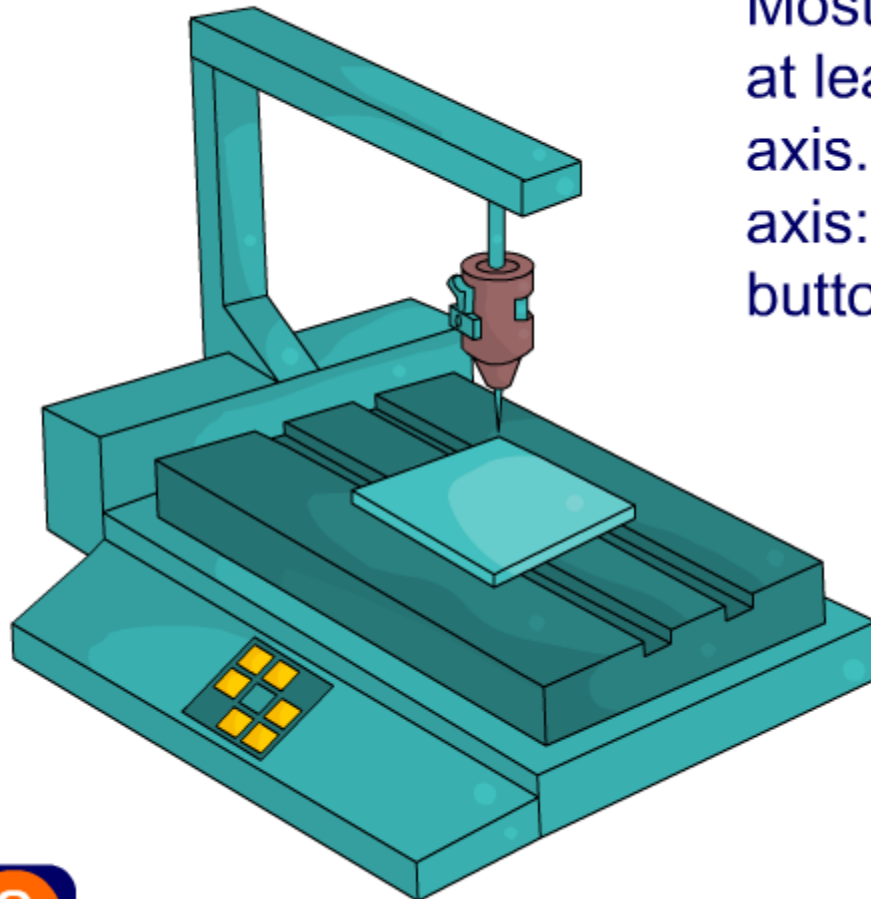
Designers and clients can view products before they develop them further.

How could this save the manufacturer money?

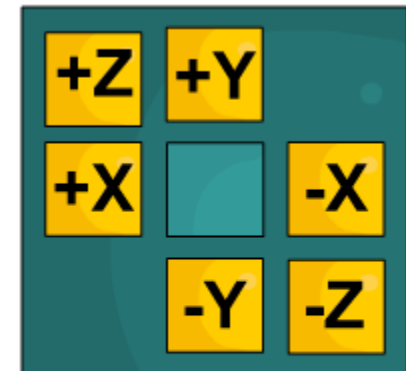


- **Computer Aided Manufacturing (CAM)** uses a computer to control special manufacturing machinery.
- When combined with CAD, computer aided manufacturing is a very useful production process.
- **Computer Numerically Controlled (CNC)** machines interpret CAD drawings and automatically make the product.
- CAM enables large numbers of identical products to be manufactured.
- When **CAD** and **CAM** are used together in this way, it is often referred to as **CIM** (Computer Integrated Manufacturing).





Most CAM machines move in at least three directions called axis. There are three main axis: X, Y and Z. Use the buttons below to find out more.



CNC CAM machines interpret the information provided by CAD software. Many CNC machines use a special software language called **FANUC**.

- FANUC software reads the CAD file and then produces **machine code** for the CNC machine to use.
- Much of this special language is made up from information called **G code** and **M code**.
- **G codes** provide the CNC machine with information about the **direction** of movement of the cutting tool.
- **M codes** refer to **miscellaneous functions** such as starting the cutting tool and turning on the coolant.



Milling Machine

- Uses a **rotating cutting tool** to shape a range of metals and plastics.
- The work is clamped to a **bed** which moves in the **X** and **Y** direction.
- The cutting tool is placed in a **chuck** connected to a rotating **spindle**.
- The spindle moves in the **Z** direction.



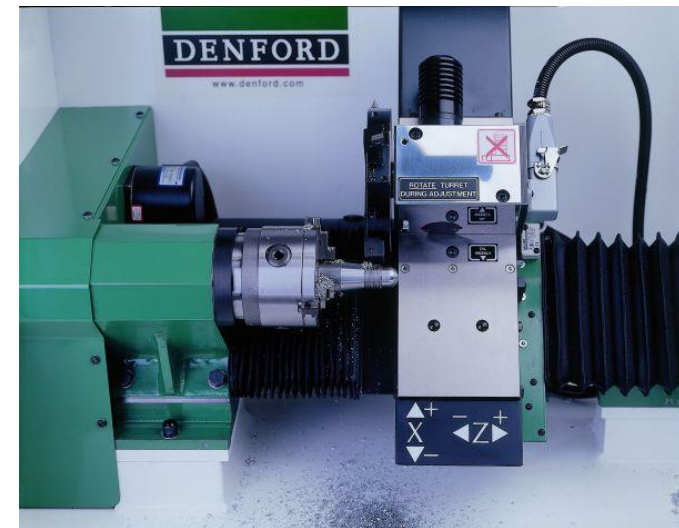
Router

- Uses a **rotating cutting tool** to shape a range of timbers.
- The work is clamped to a **bed**.
- The cutting tool is placed in the router **chuck** connected to a high-speed rotating **spindle**.
- The router moves in three axis on a complex arrangement of mechanisms.



Lathe

- Used to produce **cylindrical** objects.
- Materials are held in a **chuck** and **rotated** at different speeds.
- The cutting tool is held in the **tool post** and is inserted into the material as it rotates. It moves in the **X** and **Y** axis.
- The final shape of the material depends on the **path** taken by the cutting tool.



How many CAD/CAM words can you find?



V	M	I	L	L	I	N	G	M	A	C	H	I	N	E	T	U	
R	R	I	Y	U	L	Y	L	Y	C	O	A	W	T	L	L	N	Q
Q	L	A	N	O	I	S	N	E	M	I	D	C	L	H	A	U	N
C	W	I	R	E	F	R	A	M	E	H	M	C	P	V	T	I	M
N	D	I	D	Y	F	W	D	W	U	Z	Y	H	N	S	H	P	G
C	D	U	H	H	E	L	X	A	D	E	S	I	G	N	E	R	C
B	V	R	J	J	V	Y	T	H	H	Z	P	I	P	Z	Z	U	I
F	U	K	A	D	X	A	W	F	A	V	K	B	P	J	Y	P	P
W	A	U	R	F	D	D	L	F	U	D	I	S	I	X	A	F	G
C	U	P	L	E	D	O	M	U	F	K	Z	H	C	F	M	L	E
X	E	U	I	W	X	E	D	A	M	D	N	A	H	G	Z	E	E
H	N	A	U	T	O	M	A	T	E	D	A	G	B	X	O	G	C
R	W	H	X	C	R	O	U	T	E	R	X	N	A	S	I	O	L
F	E	U	Q	N	K	Z	D	U	B	J	Q	P	Q	M	X	M	I

Play new grid

show answers

Show words

