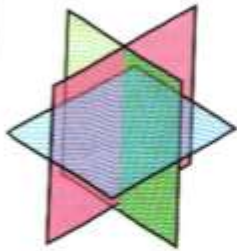


# KEY STEPS IN 3D MODELLING

## WORK PLANES



**Workplanes** can be thought of as digital paper – it is here you can create 2D sketches.

Most 3D CAD programs give you three workplanes to start with. These represent the **elevation, end elevation and plan** views.

You can also create your own workplanes. You should consider which workplane to use before creating a sketch.

## SKETCHES



**Sketches** are the 2D drawings from which 3D features are made.

When you choose to make a sketch the range of drawing and dimension tools will become available. These include line, circle and rectangle, and probably many more.

From these 2D drawings you will be able to create 3D features. The shape drawn on a sketch is called a **profile**. It is this profile that will become a 3D model.

## CONSTRAINTS



**Constraints** are used to control profiles. They fix lengths, angles, radii, diameters and can force lines to be locked, parallel, perpendicular or at a tangent to other lines or edges.

Constraints are very important when drawing profiles and should always be used.

Most CAD software will also allow you to draw centre lines and construction lines.

## FEATURES



A **feature** is the name given to types of 3D work, such as **extrusion, revolve solid and shell**.

Features are mostly created from the profiles drawn in sketches, but some like **fillet** and **chamfer** are made by selecting the edge of a 3D feature and modifying it.

When a feature is created, the original sketch is considered 'used'. If you edit the sketch, your 3D feature will be altered too.

## MODELLING TREE



All 3D CAD programs use a **modelling tree**. This tree will show you workplanes, sketches and features.

The order of the sketches and features will have an effect on the 3D model. The computer processes the sketches and features in order from top to bottom.

Each workplane, sketch and feature can be given a name. Naming these items as you work is considered good practice because it can make editing your work simpler.

## COMPONENTS



3D models are used to design or draw products or buildings that will be manufactured, simulated or illustrated. Real products and buildings are made of many individual parts. 3D CAD reflects this reality and so models are made of individual parts. Each part is called a **component**.

Components should be saved with a sensible name that describes the function of the part.

## ASSEMBLIES



**Assembly** is the name given to the 3D CAD model that combines all the components in the correct positions.

An assembly allows you to look at a complete product. Changes made to component files will affect the assembly.

Larger 3D models may use **sub-assemblies**, which are smaller assemblies of components added to one larger, completed assembly.

## 3D MODELLING | KEY FEATURES

You will need to understand seven key 3D modelling CAD commands.

1. Extrusion
2. Revolved solid
3. Shell
4. Subtraction
5. Union
6. Fillet
7. Chamfer
8. Array

**"DON'T WORRY ABOUT PEOPLE  
STEALING YOUR DESIGN WORK.  
WORRY ABOUT THE DAY THEY STOP."**

Jeffrey Zeldman

You may need to use 3D CAD to produce parts of your N4 Added Value Unit or N5 Course Assignment.

The bottle product on this page uses all the modelling techniques you will need to know for a National 5 exam. The CAD modelling commands used to create the bottle are highlighted.

On most 3D models these CAD commands are used more than once.

All 3D CAD software uses these commands and you can use this book to guide your understanding of these features.

Your teacher will explain how to navigate the 3D CAD package that you use.

Extrusion  
Fillet  
Revolved solid  
Shell  
Union  
Chamfer  
Subtract  
Array

