

COMPUTER-AIDED DESIGN AND DRAUGHTING

3D CAD
techniques

MORPHING

- The simplest way of looking at Morphing is to imagine that your 3D model is surrounded by a mesh which you can pull, stretch, scale etc.
- Morphing can be used to manipulate your 3D design so that it can be manufactured effectively – for instance, smoothing out a bottle design so that it can be blow moulded.
- Morphing can also add strength to areas which, under testing show weakness.

EXTRUSION ALONG A PATH (SWEEP)

- Sweep is a 3D command to enable a profile to follow a path (like a handle on a cup).
- Sweep can also generate surfaces where a curve is created and can follow either one or two paths (used to create body work for vehicles).

REGULAR AND IRREGULAR FILLETS AND CHAMFERS

- A fillet is a curve to smooth off an edge.
- A chamfer is a 45° cut on an edge.
- An irregular version of either of these describes tapering or adjusting the size or angle at either end of the feature.
- This is especially useful when applying these features to intersecting objects.

LOFTING, BLENDING

- Lofting is creating surfaces or solids between 2 or more profiles/curves on different work planes.
- This feature is particularly useful when creating transition pieces (prisms or pyramids with different shapes top and bottom).
- Classic examples of lofting are toilets or wash basins or ducting like the extractors in the workshop.

SOLID AND SURFACE MODELLING

(EXPLAIN THE DIFFERENCE BETWEEN THE TWO TECHNIQUES)

- **Solid Modelling:** Solid models are made by drawing 2D shapes and using a 3D feature (extrude, loft etc.) to create various 3D forms which can then be edited. The starting point of the solid model is a closed shape.
- **Surface Modelling:** For the purposes of this course surface modelling begins with an entity (a line) which can be extruded or revolved and given a thickness in order to create a surface.

SOLID AND SURFACE MODELLING

(EXPLAIN THE DIFFERENCE BETWEEN THE TWO TECHNIQUES)

- **In industry** surface modelling develops a “skin” between 2D or 3D curves (like a mesh). The intersections between the surfaces are very controlled so they can be smooth or crisp like a crease. It allows for more freedom and organic structures than an object that was created with solid modelling. These surface models have no thickness and the object can be geometrically incorrect; whereas a solid model must be geometrically correct. Think, video game characters.