

### Bought-in components and fittings

Manufacturers often order standard bought-in components, parts and fittings when producing products. There are advantages and disadvantages that need to be considered:

#### Advantages

- Saves preparation / increases production time
- Guaranteed quality
- Less effort and skill required
- Less machinery and equipment needed
- Components bought in bulk (cheaper)
- Standard components fit multiple products

#### Disadvantages

- Supply can be unreliable
- More storage space needed for parts
- Ordering takes time, and delays occur
- No control over quality of parts
- Cannot guarantee safety

### Joining / fastening in a temporary way

Simply considered, these are **temporary** methods of joining or combining that can be undone. These include **pins, clips, catches, hinges, nuts and bolts, rivets, knock down fittings, scan fittings, keys and keyways, and press studs.**

**Semi-permanent** methods, such as **screws**, can be considered both temporary and permanent.

Different materials require different temporary fixing methods, and some fixing methods are not always appropriate for certain materials.

### Joining and forming:

The primary difference is joining involves fusing materials together, where forming involves shaping a product.

Joining methods include:	Forming methods include:
<ul style="list-style-type: none"> <li>• welding</li> <li>• brazing</li> <li>• soldering</li> <li>• bonding</li> <li>• nailing</li> <li>• screwing</li> <li>• bolting</li> <li>• riveting</li> <li>• clinching</li> <li>• stapling</li> <li>• press fitting</li> </ul>	<ul style="list-style-type: none"> <li>• tube bending</li> <li>• forging</li> <li>• hot rolling</li> <li>• extrusion</li> <li>• pressing</li> <li>• bending</li> <li>• shearing</li> <li>• stamping</li> <li>• coining</li> <li>• ironing</li> <li>• moulding</li> </ul>

### Combining and laminating

- **Combining** materials can mean 'mixing' them to form a composite material. Epoxy resins, for example, use a resin and a hardener, and once these are mixed, a chemical reaction occurs and the epoxy resin cures. Carbon fibre and GRP are also composites.
- **Laminating** is a process where layers of materials are added together. Kitchen worktops can be chipboard with a melamine veneer added to the surface for protection and decoration. Plywood is also constructed using layers or veneers at 90 degrees to one another. Laminating can also be used to create curved shapes using layers of materials.

### Adhesives in manufacturing

There are many commercial and industrial adhesives used when manufacturing.

- **Polyurethanes** - fast curing and robust bonding surfaces, popular in the construction and automotive industries.
- **Water based** and **solvent based** adhesives offer flexible application methods, with flammable and non-flammable formulas.
- **Solvent-free adhesive** - versatile range offering excellent chemical and moisture resistance.
- **Epoxy resins** - can bond similar and dissimilar materials using a compound comprising of a resin and hardener.
- **PVA** - (polyvinyl acetate) is an aliphatic, rubbery synthetic polymer also known as wood glue.
- **Contact adhesives** - adhesives applied to both surfaces. Dried and bonded to provide a permanent join under pressure.

### Adhesives used in the automotive industry

Adhesives have replaced welding and mechanical fasteners to become a key technology in the automotive industry. In addition, adhesives are lightweight and can improve strength and stiffness of vehicles, absorbing and dampening vibrations, engine and road noise.

As well as bonding, automotive adhesives are used as sealants in gearboxes, bushes, bearings, gaskets, flanges and bolt holes.