Metal joining processes

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Adhesives

- Forms a permanent bond between two joint surfaces. – e.g glueing
- Joining processes involves thoroughly cleaning of surfaces to be joined, preparing and applying the adhesive, and finally assembling the parts.
- Can be carried out at room or at a higher temp, with or without pressure and for a period depending on the time required for the adhesive to set (or cure).

Advantages of adhesives

- Variety of materials can be bonded–similar or dissimilar; thick or thin; metallic ornon–metallic.
- Thin, delicate and heat–sensitive parts which heat methods of joining would distort or destroy can be bonded.
- When used to replace mechanical methods of joining: hole drilling is eliminated – reducing time, reducing cost, avoiding weakness in the region of the hole; loads distributed over total joint area; a weight saving is made; the outer surface is smooth and free from bolt and rivet heads.
- The adhesive layer provides:
  - good seal against moisture;
  - good thermal and electrical insulation;
  - some flexibility of the joint.

Disadvantages

- Problems may exist:
  i. in preparing joint surfaces;
  ii. in storing, preparing and applying the adhesive;
  iii. in the time required for curing.
  iv. Bonded structures are difficult to dismantle for repair and replacement.
  v. In most cases, temp limitations in service are below those of other joining methods.
  vi. Health and fire hazards when using solvent–based fluids.

Types of adhesive

Natural adhesives

- subdivided into adhesives of animal, vegetable and mineral origin.
- Most natural adhesives produce low–strength joints with poor resistance to water and to temp variation.
- The exception is the mineral type, which has excellent high temp properties.
- Applications of natural adhesives are mainly in woodworking and packaging industries.

Synthetic adhesives

subdivided into:

- thermoplastic resins,
- thermoplastic rubbers and
- thermosetting resins.