ADHESIVE BONDING (INTRODUCTION)

Adhesive bonding is a process of joining two or more solid parts with an adhesive substance.

- Advantages of adhesive bonding
- Disadvantages of adhesive bonding
- Stages of adhesive bonding
- Applications of adhesive bonding

Advantages of adhesive bonding

- Ability to join dissimilar materials;
- Fast and cheap joining technique;
- Provides design convenience and flexibility;
- Sealing properties (adhesive fills gaps and voids);
- Provides thin and invisible joint;
- Joints may be electrically/thermally conductive or insulating;
- Eliminates Galvanic corrosion;
- Good vibration damping properties;
- Uniform distribution of mechanical stress over the joint;
- Good Fatigue resistance.

Disadvantages of adhesive bonding

- Requires careful substrate (adherent) surface preparation;
- Long mixing and curing time may be required;
- Importance of right joint design;
- Difficult disassembly of joined parts;
- Necessity to fixture (hold together) the joined parts during curing;
- Service temperature and environment limitation;
- Low creep strength;
- Changing properties during service.
Stages of adhesive bonding

1. **Assembly and joint design.** Proper design provides minimal peel and cleavage stresses. Tension, compression and shear stresses may be increased.

2. **Adhesive selection.** Selection of a proper adhesive is based on the substrate material, service temperature and environment, requirements to the bonding strength, flexibility and durability.

3. **Surface preparation.** The substrate surfaces should be cleaned from dirt and oils, and then abraded. Clean and roughened surfaces provide good wetting of the adhesive, which results in strong adhesion.

4. **Applying and spreading a proper amount of the selected adhesive over the substrate surface.** The operation is performed either manually or by means of dispensing devices.

5. **Assembly of the parts to be joined.**

6. **Clamping the parts in a fixture at a controlled pressure.**

7. **Curing.** In the curing process the adhesive molecules are cross-linked forming a strong adhesive joint. Curing method depends on the adhesive type.

Applications of adhesive bonding

- Construction;
- Electronics;
- Telecommunications;
- Automotive industry;
- Furniture manufacture and other woodworks;
- Medical devices;
- Surgery (Bonding of tissues and bones);
- Textile industry;
- Package materials (stickers, stick tapes).