

Lecture # 2.1c

Engineering Materials

Engineering Materials

Non-metals

Non-metallic materials are also used in engineering practice due to their low cost, flexibility and resistance to heat and electricity.

Though there are many suitable non-metals, the following are important few from design point of view:

Timber -

This is a relatively low-cost material and a bad conductor of heat and electricity.

It has also good elastic and frictional properties

It is widely used in foundry patterns and as water lubricated bearings.

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Leather -

This is widely used in engineering for its flexibility and wear resistance.

It is widely used for belt drives, washers and such other applications.

Rubber -

It has high bulk modulus and

is used for drive elements, sealing, vibration isolation and similar applications.

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Plastics -

These are synthetic materials which can be moulded into desired shapes under pressure with or without application of heat.

These are now extensively used in various industrial applications for their corrosion resistance, dimensional stability and relatively low cost.

There are two main types of plastics:

- (a) Thermosetting plastics and
- (b) Thermoplastics

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(a) Thermosetting plastics -

These plastics are formed under heat and pressure.

It initially softens and with increasing heat and pressure, polymerization takes place.

This results in hardening of the material.

These plastics cannot be deformed or re-moulded again under heat and pressure.

Some examples of thermosetting plastics are

Phenol formaldehyde (Bakelite),

Phenol-furfural (Durite),

Epoxy resins,

Phenolic resins etc.

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(b) Thermoplastics -

Thermoplastics do not become hard with the application of heat and pressure and no chemical change takes place.

They remain soft at elevated temperatures until they are hardened by cooling.

These can be re-melted and remoulded by application of heat and pressure.

Some examples of thermoplastics are

Cellulose nitrate (celluloid),

Polythene, Polyvinyl Acetate,

Polyvinyl chloride (PVC) etc.

References

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