# FORMWORK

## Introduction:-

Formwork is a mould or open box, like container into which fresh concrete is poured and compacted. When the concrete is set, the formwork is removed and a solid mass is produced in the shape of the inner face of the formwork. The systems used can be a combination of two materials. Selection of materials suitable for formwork should be based on maximum economy to the contractor, consistent with safety and the quality required in the finished work.

Formwork system can be generally classified as Vertical Systems (wall and column) and Horizontal Systems (slab and beam). The material serving as the contact face of forms is known as sheathing and it is used in both the vertical and horizontal systems.



→characteristics of formwork:-

1. Strong enough to resist the pressure or the weight of the fresh concrete plus any constructional live loads.
2. Rigid enough to retain the shape without undergo deformation.
3. Economical in terms of the total cost of the forms and the concrete surface finishing when required.
4. Sufficiently watertight to avoid leakage at the joints.

→FORMWORK MATERIALS:-

Formwork materials can be classified as:

1. Timber
2. Metals
3. Plastics

1. Timber Formwork:-

(a) Lumber: Lumber is commonly available material and has excellent strength, weight and cost factor.

(b) Plywood: The use of plywood in concrete forming for form facing has improved the quality of finished concrete. The relatively large sheets of plywood have reduced the cost of building and at the same time have provided smooth surfaces that reduce cost of finishing of concrete surfaces. Plywood is a manufactured wood product consists of a number of veneer sheets, or plies.

2. Metal formwork:-

(a)The initial cost of metal formwork is more than timber formwork but the number of reuses of metal formwork is higher than that of timber.

(b) In long run metal formwork can be economical. İn heavy construction works metal formwork may require a lifting mechanism to handle the formwork panels or props.

(c) Steel sheet formwork has the problem of rusting also. To avoid rusting, in every use the surfaces should be oiled with an appropriate releasing agent.

(d) Steel or aluminum or magnesium is the most widely used metals.

3. Plastic Formwork:-

(a) They have impervious surfaces that usually create a smooth finish to the concrete.

(b) Plastic formwork is lighter but less durable than metal formwork.

## →FORMWORK TYPES (BY SHAPE):-

1. Column Formwork
2. Beam formwork
3. Slab Formwork
4. Wall Formwork

## →Column Formwork:-

1. Column formwork is made usually with either timber or metal panels.
2. The principle is to create an enclosed box with frames at the exact size of the column and fix it tightly on the kicker left from base or at the last stage of column concreting.
3. The box is held in position by steel column clamps or bolted yokes and supported by timber studs or props.

## → Beam formwork:-

1. Beam formwork consists of open through section and because it is not closed at the top requires more supporting framework to restrain the sides.
2. The supports need to be maintained to the soffit and also provide lateral support to the sides.
3. In timber this is done by the use of a head tree across the top of a vertical member.
4. Metal panels are used with corner pieces, but timber head trees are needed for vertical support.

## → Slab Formwork:-

1. Floors require a large area of formwork to be provided usually from beam to beam.
2. Timber floor formwork consists of timber boards or plywood sheets supported on a framework and resting on a series of timber joists.
3. Again timber and metal props can be used for vertical supports.
4. Metal panels can be used and bolted or clipped together and held in place by a system of metal beams or a tabular scaffold system.
5. Adjustable props need for leveling purposes.

## →Wall Formwork:-

1. Wall formwork is a simpler than for other concrete units as the actual forces against it is less, most of the load being carried vertically downwards.
2. The panels at both sides are held in position by ties.
3. Ties are also used as spacer, arranging wall thickness.
4. Wall support systems are usually sloping props at satisfactory intervals.

## →FORMWORK STRIKING TIMES:-

The time to be allowed before formwork can be removed naturally depends on many factors, such as:

1.**The type of concrete mix** used (type of cement) Rapid hardening cement mix requires less time, whereas high water cement ratio needs longer time for striking the formwork.

2. **The type of structural member** being cast Soffit of beams and slabs or sides of beams or columns require different time.

3**. Temperature:-** High temperature can cause rapid curing of concrete and formwork can be struck in shorter time than low temperature weather.