CENTRE OF EXCELLENCE IN CONCRETE AND FORMWORK

DEPARTMENT OF CIVIL ENGINEERING

Centre of Excellence in collaboration with L&T Construction, Chennai on "**CONCRETE AND FORMWORK**" was inaugurated on 21st August 2017 by eminent personalities from L&T construction (Buildings and Factories) with the prime objective to:

- ✓ To impart the importance of formwork to the students.
- ✓ To involve the students practically to work with concrete and forms.
- ✓ To inculcate in the students the present industrial needs on formwork and concrete.
- ✓ To bridge the gap between industry and academia.

EXPERT TEAM MEMBERS FROM L&T CONSTRUCTION:

1. Mr.B.Murugesan. Head, Technology centre.
2. Mr.L.S.Kannan. Head, Concrete management centre.
3. Dr. K.Sivakumar, DGM, Concrete management centre
4. Mr. C.N.V.S.Rao. Sr.Manager- Formwork systems

ROLL OUT PLAN…..

- Centre of excellence is planned to be conducted for III year students
- Selection of 30 students through screening test during the 5th Semester
- Training for the selected students will be conducted during 6th and 7th Semester by L&T Constructions
- Training includes 96 hrs of theory and 48 hrs of practical classes supported by L&T
- Periodic evaluation during the training period by L&T online evaluation test
- 8th Semester project must be done compulsorily with L&T
- On Successful Completion of the training program, they will be employable in L&T or similar reputed core companies.

TECHNICAL CORE TEAM MEMBERS:

Name	Designation
Dr.M.S.Palanichamy	Advisor, R M K Group of institutions
Dr.K.K.Sivagnana Prabhu	Head, Training and Corporate affairs
Dr.Binu Sukumar	Prof &Head, Civil Engineering
A.Hemamathi	SPoC- CoE

FACULTY TRAINERS:

1. Mr.P.Ramshankar, Asst Professor/CE
2. Ms.S.Kokila, Asst Professor/CE

3. Ms.Seena Simon, Asst Professor/CE
4. Ms.J.Martina Jenifer, Asst Professor/CE
5. Ms.P.Rekha,Asst Professor/CE

ABOUT FORMWORK……

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.

Formwork for concrete structures should be

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 undue 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.

In order to reduce the cost of formwork for concrete structures the following are to be considered:

1. Design the formwork to provide adequate but not excessive strength and rigidity.
2. Fabricate the forms into modular sizes to provide more reuses without refabricating when practical.
3. Prepare working drawings prior to fabricating the forms.
4. Prefabricate form sections on the ground rather than on scaffolding.
5. Use the most economical formwork material considering the initial cost and reuses.
6. Remove the formwork as soon as it is permissible.
7. When it is permissible install construction joins to reduce the total quantity of form material required and permit the carpenters to work more continuously.

Conventionally timber was used as formwork. The number of reuses in timber formwork is less. Also it requires plastering. In modern construction metals are used as formwork. Metal formwork is advantageous when compared to timber formwork, such as

- 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.
- In long run metal formwork can be economical.
- Metal formwork requires no plastering
- İn heavy construction works metal formwork may require a lifting mechanism to handle the formwork panels or props.
- Steel or aluminum or magnesium is the most widely used metals.

Steel: The major advantages of steel sections in formwork are the ability of steel to form longer spans and its indefinite potential for reuse when handled with reasonable care. Steel sections are used in the fabrication of different formwork components, namely: (1) Steel panel forms. (2) Horizontal and vertical shores. (3) Steel pan and dome components used for joist and waffle slabs. (4) Steel pipes for formwork bracing. Other heavy forms and formwork are also made of steel, such as bridge formwork. Steel is used for formwork when other materials are impossible to use because of their low strength. Steel forms are typically patented, and allowable loads are generally published by the manufacturers.

Aluminum: Aluminum stems from have lighted weight which reduces handling costs and offsets its higher initial material cost. When compared to steel panels, aluminum panels used for ganged forms

weight approximately 50% less. The major problem with aluminum forms is corrosion: Pure aluminum is attacked chemically by wet concrete. Aluminum alloys have proven to be very successful in resisting corrosion. Support trusses fabricated with aluminum alloys have been effectively used for flying forms. These forms are lightweight and allow large lengths of deck forms to be moved easily. Cast aluminum alloy molds have also been used successfully to form ornamental concrete products. Aluminum wall forms have also been used to produce textures on the surfaces of concrete walls. Forms made from aluminum are in many respects similar to those made of steel. However, because of their lower density, aluminum forms are lighter than steel forms, and this is their primary advantage when compared with steel. Because the strength of aluminum in handling, tension, and compression is less than the strength of steel, it is necessary to use larger sections when forms are made of aluminum. Because wet concrete can chemically attack aluminum, it is desirable to use aluminum alloys in resisting corrosion from the concrete.

Types of Formwork – There are three main types of formwork

a. Horizontal (Floor/Slab) Formwork
b. Beam Formwork
c. Vertical (Column/Wall) Formwork

Primary Factors Affecting Concrete Lateral Pressure on Forms:

a. Concrete Density
b. Concrete Temperature, T at the time of placing (Deg. F)
c. Vertical Concrete Placement Rate, R (feet per hour)
d. Concrete Placement Height, h (feet)

ABOUT CONCRETE….

Concrete is a composite material that consists essentially of a binding medium, such as a mixture of portland cement and water, within which are embedded particles or fragments of aggregate, usually a combination of fine and coarse aggregate. Concrete is by far the most versatile and most widely used construction material worldwide. It can be engineered to satisfy a wide range of performance specifications, unlike other building materials, such as natural stone or steel, which generally have to be used as they are. Because the tensile strength of concrete is much lower than its compressive strength, it is typically reinforced with steel bars, in which case it is known as reinforced concrete. The material obtained immediately upon mixing of the various concrete ingredients is called fresh concrete, while hardened concrete results when the cement hydration process has advanced sufficiently to give the material mechanical strength.

Testing on fresh concrete and hardened concrete:

Fresh concrete:

- Workability test – slump test,
- flow test,
- Compacting factor
- Vee- Bee Consistometer
- Kelly ball test.
- weight density.

Hardened concrete:

- Testing of cube for compressive strength
- Split tensile strength on cylinders
- Flexural test on beams.