



Nilachal Polytechnic

Bhubaneswar

Sem : 6th Subject : ACT

Branch : Civil engineering

Name of the Faculty : Sweta Sarangi

Text Book to be followed by Student / Faculty

Book-1 : (Ch - 02)(S.K. Duggal)

Chapter- 2 : Prefabrication

1.Learning Objective

Students will learn about

1. The Prefabrication and its importance
2. The process of prefabrication of various structural elements
3. The assembling and dismantling of prefabricated components
4. The design considerations in the process of prefabrication
5. The joining techniques in prefabrication.
6. The procedure of prefabrication

2.Essential Questions

- i) Define prefabrication?
- ii) What are the various classification of prefabrication?
- iii) What are the necessity and scope of prefabrication?
- iv) What are the types of prefabricated elements?
- v) Write down the limitations of prefabrication?
- vi) What are the difference between pre cast and cast in situ?

3. Hours Required

Theory	2 hours
Problems	nil
Question & Answer Theory	1 hour
Total	3 hours

4. Question for Teaching / Assignment / Self Practice

	02 Marks	05 Marks	10Marks
Teaching	2nos	3nos	2 nos

Assignment	2nos	2nos	1 no
Self Practice	1no	1no	1 no
Total	5 nos	6 nos	4 nos

Lesson Description

Prefabrication is the practice of assembling components of a structure in a factory or other manufacturing site, and transporting complete assemblies or sub-assemblies to the construction site where the structure is to be located.

The term is used to distinguish this process from the more conventional construction practice of transporting the basic materials to the construction site where all assembly is carried out.

The term prefabrication also applies to the manufacturing of things other than structures at a fixed site.

It is frequently used when fabrication of a section of a machine or any movable structure is shifted from the main manufacturing site to another location, and the section is supplied assembled and ready to fit.

Enclosed :

Course Material **Chapter - 2**

Prefabrication

Prefabrication

Prefabrication is the practice of assembling the components of a structure in a factory or other manufacturing site, and transporting the complete assemblies or subassemblies to the construction site where the structure is to be located.

The term is used to distinguish this process from the more conventional construction practice of transporting the basic materials to the construction site where the assembly is carried out.

Classification of prefabrication

Small Prefabrication:-

Elements using in that construction

Ex- brick is a small unit precast and used in building This is called as a small prefabrication.

Medium prefabrication:-

Suppose the roofing systems and horizontal members are provided with pretested elements those construction are known as medium prefabricated.

Large Prefabrication:-

In large prefabrication most of the members like wall panels, roofing/ flooring systems, beams and columns are prefabricated.

Volume offsite Prefabrication:-

In this method of pre fabrication, this refers to the completion of elements or components of a construction project at a different location to where they will be permanently installed, the completed item is then transported to site and assembled in place.

Types of prefabricated element

Prefabricated walls

Prefabricated beams

Prefabricated columns

Prefabricated slabs

The necessary of prefabrication are:-

Prefabricated concrete is very durable.

Prefabricated steel structures can be used efficiently in industrial areas , construction of buildings, construction of malls .

Use of prefabricated strucutr in construction increases the speed of construction.

For onsite work, the need of labours is very less.

Prefabrication makes the use of locally available material to makes the project work more economy.

The provision of electric wiring pipe connection & plumbing can be done immediately after installation of the building.

The current uses of prefabrication are:-

Current uses are:-

The most widely used of prefabrication in building is prefabricated concrete and prefabricated steel section.

The technique is also used in office blocks, warehouse and factory buildings. Fabricated steel and glass sections are widely used for the exterior of large buildings.

Fabrication is widely used in air craft, aeroplanes rocket jet etc.

Communication towers are made up of prefabricated steel section.

Various characteristics of prefabrication

Characteristics of prefabrication are:-

Prefabricated elements are light weight and can be easily transported to site.

The overall efficiency of a project can be maximized by using prefabricated structures.

By Prefabrication the buildings made are light weight, can be transported easily and are more durable.

By prefabrication to reduce the no. of labours at construction site. Setting up of prefabricated structures is very safe for labours.

Construction of prefabricated structure take less time and hence reduces the cost of the projects.

Necessity and scope of prefabrication of building

Prefabricated concrete is very durable. Prefabricated steel structures can be used efficiently in industrial areas, construction of buildings, construction of walls.

Quality control in case of prefabricated structure. Use of prefabricated structure in construction increases the speed of construction.

For onsite works the need of labours is very less. During installation of prefabricated structures scaffoldings are not required.

Prefabrication makes the use of locally available material to makes the project work more economy.

The provision of electric wiring pipe connection and plumbing can be done immediately after installation of the building.

Limitations of prefabrication

Limitations are:-

Size of prefabricated element:- Only a particular size of prefabricated element can be produced.

Joints of Prefabrication structures cannot be changed:- On a design of prefabricated structures is done and executed on site then the joint cannot be changed.

Required of high skilled labours.

Difficult to handle and lift.

Pre-Cast and Cast In-Situ (or Site Cast)

Pre-Cast	Cast In-Situ
precast concrete is cast into a specific shape at a location other than building site like factories. The concrete is placed into a form, typically wood or steel, and is cured. These components are then transported to the construction site for erection into place. Precast concrete can be plant-cast or site-cast. In the precast concrete, elements are manufactured in a controlled casting environment and hence it is easier to control mix, placement and curing. Elements can be cast in advance and held until the hour you need them, thereby saves time. Weather condition has no effect on casting work.	Cast-in-situ concrete is cast into forms on the building site. It offers unlimited possibilities to the designer for any shape formation with a limitless selection of surface textures. In the cast-in-situ concrete, column, slab etc. elements are casted on site in the open environment and hence it is difficult to control mix, placement and curing. Elements cannot be casted in advance. Weather condition can delay the casting work. Quality control and maintenance is difficult. In situ concrete is cheaper form of construction for small structures.

Quality can be controlled and maintained easily. Precast concrete is cheaper form of construction if large structures are to be constructed. Maintenance cost of precast concrete structure is higher. Less labours are required. Skilled labours are required at construction site. Skilled and technical contractor is required for construction of the precast concrete structure Precast concrete requires heavy machinery and cranes for handling i.e. lifting and installation of heavy elements.	Maintenance cost of cast-in-situ concrete structure is less compared to the precast concrete structure. More labours are required. Skilled labours are required at construction site. Local contractors can also build the structure. Cast-in-situ concrete does not require such handling equipment.
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Modular co-ordination in prefabrication.

Modular Coordination (MC) is a concept for coordinating dimension and space for which buildings and components are dimensioned and positioned in basic units or modules.

It is a dimension and space coordination concept in which building and components are placed at their designations based on the unit or basic module known as "1M" that equals to 100 mm.

The main factors limiting the uses of MC in building industries is lack of knowledge on MC concept and it requires precision dimensioning and proper planning.

The basic module is small in terms of odd size in order to provide design flexibility, yet large enough to promote simplification in the components' variation in sizes.

Industry friendly features that not only cater for manufacturing but also the transportation and assembly requirements.

MC is an important factor in application of Industrialized Building System by way of standardization of components and dimensions such as reduce time of production and installation of components, achieving repeatability and able to construct building at lower cost.

The principal objective of implementing MC is to improve productivity through the reduction of wastages in the production, installation process, to improve quality in the construction industry and to encourage an open system.

MC may be applied to the design, manufacture and assembly of buildings, its components and installations.

It also affects the work positioning and dimensioning during construction.

At the work level, MC allows for relative independence in decision making with the common dimensional language.

Design principles of prefabricated systems.

Design the structure from the beginning as the precast structure. It is because the precast elements have to be designed according to the structural need of a building.

Shape of the precast elements should be as simple as possible. It is because complex shape of precast elements will increased difficulty in construction of prefabricated structure.

Precast element must be large so as to decrease the no. of connection.

Precast element should be designed such that it can be easily transported.

Dimensional tolerance will give a restriction to the shape and size of precast element to make the connections fit and avoid loose connection.

Advantage and disadvantage of prefabrication

Advantages

Prefabrication construction is time saving.

Prefabricated concrete structures are more durable.

Overall efficiency of prefabricated structure is more.

Mass production of prefabricated element is easy and quick.

Due to less consumption of construction time, this makes the project more economic.

Disadvantages

The cost of the project due to production of prefabricated element may be high.

Transportation of prefabricated elements may increase the cost of the project.

Large prefabricated modulus may be difficult to lift.

Leakage of the joints of prefabricated elements may allow rain water in to the structure.

Maintenance of prefabricated elements to avoid corrosion.

Question Set.

Classroom Teaching

Group A

What do you mean by prefabrication?

[2018 S]

Classification of prefabrication

[2016S]

Group B

What are the current uses of prefabrication?

Write various characteristics of prefabrication.

[2018S]

Necessity and scope of prefabrication of building.

[2017S]

Group-C

Describe modular co-ordination in prefabrication.

Explain various design principles of prefabricated systems.

[2016S]

2.Assignment Questions

Group-A

What are the types of prefabricated element? [2017S]

Define prefabrication.[2016S]

Group- B

Write down various limitations of prefabrication.
[2015S]

Compare between Pre-Cast and Cast In-Situ (or Site Cast).

Group- C

Describe various types of prefabricated systems [2017S]

3.Self Practice

Group- A

What is the necessary of prefabrication? [2018S]

Group B

What are the various materials used in prefabrication systems? [2018 S]

Group C

What are the advantage and disadvantage of prefabrication? [2018 S]

Faculty

HOD

Principal