

## Challenges in Pre-Cast Construction



### Engineering

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### ABSTRACT

*INDIA is a developing country and its present economy is depend on the firstly on agriculture and secondly on the construction sector. The development of a country's infrastructure is vital to the growth of its sectors and the overall economy. Considering the rapid urbanization expected in the future, it becomes imperative to analyse the bottleneck of growth in the infrastructure sector. We are in the 21st century and where the work or construction should be done with less possible time with good quality to satisfy the client's requirement. For the speedy construction pre-cast concrete/construction is very important which satisfy the client's requirement of less time and good quality. This paper includes the study of problems which are arising during the pre-cast construction and remedies to overcome those problems to increase the productivity and also indirectly the economy of India.*

#### PRESENT SCENARIO OF CONSTRUCTION INDUSTRY IN INDIA.

The construction industry is the second largest industry of the country after agriculture accounting for 11 % of India's GDP. Indian construction industry employs 32 million people and its total market size is estimated at Rs. 2, 48,000 cr. (35,640 million €). The level of a country's development is reflected by its infrastructure and the desperate need for infrastructure development has increased the demand of the construction industry in India.

To boost urban infrastructure across the country, the government has initiated multiple measures to lift the infrastructure and construction sectors from the on-going slowdown and has allocated Rs. 11,842 cr. Under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), this is much higher than Rs. 6870 cr. sanctioned in the previous budget. The funds aimed at integrated development of urban infrastructure and services in rural areas and urban cities to boost allied construction sectors and also includes construction material, steel and cement.

The government has also launched the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) with an outlay of Rs. 64 billion to address infrastructure needs of 5,098 small towns and cities with an outlay of about Rs. 1,064. The JNNURM outlay of over Rs.1 trillion is targeted at augmenting urban infrastructure needs of over 65 mission cities under which the government provides grants ranging from 35% to 90% of the project cost, depending upon the size of the city with state governments and private players contributing the rest.

#### INTRODUCTION TO PRE-CAST.

Precast is the simple technique which consists of production of a structural elements in the proper or in a good environment as well as of require quality then transporting them on the site by suitable arrangement (i.e. on trailers, long trucks) and erecting this elements on proper location as shown in drawing with the help of tower cranes.

Precast construction is a construction product produced by casting concrete in a reusable mold or form which is then cured in a controlled environment, transported to the construction site and lifted into place.

By producing precast concrete in a controlled environment (typically referred to as a precast plant/precast Factory), the

precast concrete is afforded the opportunity to properly cure and be closely monitored by plant employees.

Pre-cast construction is gaining significance in Indian scenario in general and urban areas in particular.

General Pre-Cast which is Sector Specific Such as Buildings, Power Distribution, Water Supply etc., is available scattered in India. Again this category requires involvement of major players.

#### WHY PRE-CAST CONSTRUCTION?

The new boom in construction industry is the use of pre-cast members for constructing the members in a fast pace and also meeting the desired strengths. The major advantage of using pre-cast concrete member is its rapid erection with high versatility and design flexibility. The quality achieved by these members is highly assured. We can easily construct longer spans with them at a single stretch. All the aspects of pre engineering construction is covered in them which leads to the ease of construction.

The members constructed by pre -cast concrete are appealing in aesthetics and are highly finished.

There is no need to provide any extra or large form work. These members are durable and structurally efficient.

The maintenance and labour cost of the project is reduced. The main advantage of using these members is the limited construction activities and it being environmental friendly.

#### APPLICATIONS OF PRE-CAST CONSTRUCTION.

The use of the pre-cast concrete are increasing now-a-days. The pre-cast concrete has a various application such as building construction (i.e. columns, beams, and slabs), bridge construction (bridge girders and decks), tunnel lining member, railway slippers and road pavement blocks.

#### PRE-CAST STRUCTURAL ELEMENTS.

- Pre-cast column.
- Pre-cast beam.
- Rectangular beam
- Tee beam
- Staircase.
- Shear walls
- L shaped

- T shaped
- Slabs.
- Hollow core
- Solid slab
- Half slab.

#### OTHER PRE-CAST ELEMENT

- Pre-cast railway sleepers.
- Pavement blocks.
- Pre-cast hollow pipe.
- Aesthetic elements.

#### CHALLENGES

In developing country like India it is necessary to fulfil the present need of the infrastructure. Government investing the large amount about 40-50% of the total budget.

While constructing the various buildings that may be the commercial, residential or any other building for achieving the fast and desired quality pre-cast concrete/construction technology is used now-a-days in India.

And this technology is at a initial stage i.e. it cannot be used as a primary technology in India because of it has some problems. Which are arising during the pre-engineering work, staking of the members, transporting, and erection and at various construction stages etc.?

For finding out those problems of the pre-cast construction we visited the various (pre-cast) constructions site and come to the following problems arising during the pre-cast construction.

#### At the initial level

**DESIGN STAGE:** It is important and the initial stage in the pre-cast construction. The main problem while designing is that the building is required to be divided into number of structural elements (general/important) i.e. column, beams, slabs.

And due to that designing of each member separately is somewhat difficult as the design of the members are depends upon the loading on that particular member.

**HIGH INVESTMENT:** The production of pre-cast element is also the important and the costly activity. For production of structural member's large factory setup, various machineries, RMC plants, tower cranes, advanced curing techniques, stacking yard are required. And for that the high initial investment in terms of money and land are required. This is the main problem of pre-cast industry it require very high initial investment for the production of the structural members.

**HUMAN RESOURCE:** 70-80% of the construction industry (any project) is depending on the humans. Which are?

- Skilled Man-power
- Semi-skilled Man-power
- Unskilled Man-power

For production, operating the various machineries, erection, handling the various equipment's, the skilled man-power is requires. And that is the problem arising during the complete process of construction. The completion of the project on time is 95% depends on the efficiency of the humans working at the various stages and rest on the machineries and equipment's i.e. 5%.

To get that skilled labour now-a-days with the less expenses is a difficult task. Man power is not only the problem of the construction but also at every sector.

**SITE ACESIBILITY:** The precast project is consisting of the various prefabricated structural members which are transported from pre-cast factory (where the structural members are produced) to the construction site. But the long and heavy vehicles are require for transportation of the that elements. And due to heavy traffic in the metro cities and the large towns it

is not possible to overcome this problem with high efficiency. Therefore the construction site should be accessible and also in the traffic free area.

**LESS STACKING AREA ON SITE:** Metro cities are growing rapidly and the construction of various commercial and residential building is also at its peak. The areas on the site for stacking of these heavy elements are less due to small site.

**ERECTION AND JOINTING:** Erection is important stage in the pre-cast construction and at this stage the efficiency of the crane operator plays important role. The pre-cast element consist a large jointing which is the main problem while erection of the member. At the junction point there is a large number of connections it is difficult for the erection of the members.

#### REMEDIES

At the initial stage of designing of the pre-cast elements that members are design in such a way that the every member of the same type are similar in design and in the dimensions.

I.e. if we consider slab members (design and drawing) should be similar for the various levels of the building. And it is likewise for the other members such as beams, columns, staircase, railway sleepers etc.

There is a high initial investment for the production of the structural elements. But if the large number of similar members is to be produced on the factory site the investment is not that much high which are for the different elements.

For that production of the element at the factory government should provide a land at manageable rates so that the initial investments of the establishing the pre-cast factory will be minimize and the gives profit to the owner which also improve the economic condition of the country.

Human resource planning is the important and for skilled labour in the construction sector in India, the private and government sector should organize various workshops or a training programs to train the people or the labour to sort out the problems which arising in the lack of skilled labour's for the various stages of the work.

The site should be easily assessable. And for that careful site selection at initial stage should be properly done. It contains

- 1 Proper road connectivity
- 2 Availability of space around the site
- 3 Less traffic

Site layout is the important pre-engineering work/activity which is to be done before the actual construction is start. It should be properly plan and should have a enough space for stacking/storing of the element which are transported for the erection at its actual place. It should be done by proper planning of the site layout.

The pre-cast members are very heavy so for reducing its self-weight of the concrete use for production of member is light weight concrete.

#### CONCLUSION

As per the study to satisfy the clients need i.e. speed and good quality in the construction pre-cast concrete/ construction is one of the important and useful construction technique available.

To increase its use in the construction industry the various problems associate with this should be tackled. So that it can be used in large amount for increase in the speed or to cut down the construction time and also to improve the quality of the final product. And that improve the infrastructure facilities, increase the employment potential and alternatively the economy of our country.

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