



REDECON
2014

International Seminar and Exhibition
on
Recent Developments In **Design** and **Construction**
of

Precast Concrete Technology

Paper to Practice ...

NOVEMBER 9th -13th, 2014

NIMHANS CONVENTION CENTRE, BANGALORE



Organized by
Association of Consulting Civil Engineers (India)
Bangalore Centre

2, UVCE Alumni Association Building, K R Circle, Bangalore – 560 001

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INTRODUCTION

Civil Engineering has been an aspect of life since the beginning of human civilization, and it is the application of physical and scientific principles for solving problems of society. Across the board, every Country has witnessed considerable progress in its economy in the past few decades. Most of the infrastructure development sectors moved forward, however not to the required extent due to various challenges faced during the construction phase.

As the saying goes, "Time is Money", just fits right for to the Construction Industry, from paper to physical form it takes forever to complete. There has been steady and continuous growth in the number of inventions and related innovations to transform and speed up the construction process. From rebar manufacturing to curing of concrete, there has been substantial investment done both in terms of intellectual time and finance, to reduce overall project duration and increase profits. One such development has been in PRECAST technology, in recent years, precast building technology has rapidly gained a foothold in the market. From a socio economic aspect, this means that the demand for housing is increasing fast. Housing shortage is perhaps one of the most formidable challenges before the Government, and one of the practical solutions would be the use of precast structures.

India is prone to seismic activity, and precast offers solutions that have been tested in real time conditions to address this. Also, considering the rainy season which lasts for several months, adds to the challenge of meeting deadlines. Hence precast members can be manufactured at a safe location(s) and be transported to the site for assembling. The right catalyst to bring speed, quality and efficiency into construction would be precast, and it is going to play a crucial role moving forward.

ACCE – Bangalore Centre, in its constant endeavor to serve the Civil Engineering Fraternity, is conducting International Seminar on current topics of interests and need. ACCE (India) Bangalore Centre has been organizing REDECON - A National Seminar and Exhibition event in Bangalore on a regular basis since 2005, on varied topics. Five such events have been held thus far: 2005, 2007, 2008, 2010 and 2012. All of them have been overwhelming success and has been enthusiastically received and well attended by the civil engineering professional community in the Country, so much so, it is an eagerly looked forward to event by one and all.

ABOUT

REDECON 2014 focuses on the increasingly important aspect of precast technology in modern times; that provides practical, reliable and engineering answers to affordable and mass housing.

REDECON 2014 is intended to bring together practicing engineers, scientists, specifiers, researchers, manufacturers, applicators and others from around the country to share their knowledge and experience on current developments in precast technology. The event has developed a tradition of combining research and development aspects with practical case studies, aimed at identifying and communicating both tomorrow's technology and today's construction solutions. The exchange of knowledge and expertise is expected to result in the development of improved design and implementation methodologies for precast.

OBJECTIVE

This seminar continues to seek to extend the sound base of theory and practice in precast technology, through both theoretical and experimental studies, and through good case study literature.

The range of speakers, sponsors, exhibitors and delegates at the seminar continues to indicate its truly International nature, with representation from numerous research and industrial organizations, manufacturers and delegates from all over the World.

CALL FOR PAPERS

Technical Papers on the themes of the Seminar, including design and detailing for all loading conditions including transportation and hoisting, advances in material technology specific to pre-casting, design of moulds, their detailing, transportation 3-Dimensional, service life modelling, prediction of durability, performance-based methods for durability design and specification, advances in non-destructive testing and condition assessment of structures is called for publication in the proceedings being brought out on the occasion.

The Abstract of papers shall be sent to : admin@accehq.net / secretaryacceblc@gmail.com

Abstract Submission last date: 31st August 2014

Last date for intimation of acceptance: 15th September 2014

Submission of full paper upon acceptance: 15th October 2014

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SPEAKERS

Deliberations during the seminar will deal with, design detailing of elements, joints, seismic response/ behaviour predictions, advances in material technology, design and detailing of moulds, casting issues and transportation 3 dimensional. These will be dealt with in conformity with the needs of the industry to be on the right track, for efficient pre cast construction. Cases studies, latest development on strategies and materials, will also be presented. The need to cope with increasing demand and emphasis on quality will be discussed and showcased, during the proceedings.

The detailed list of speakers and their topics of presentation based on the listed themes will be uploaded on the website as and when they are finalized with all relevant details. You are requested to visit the website www.redecon.in regularly for updates.



Keynote Address

Mr. R Sundaram, India
President, SEWC Worldwide**Dott. Ing. Gian Carlo Giuliani**
ITALY**Per Oluf H Kjaerbye**
DENMARK**Prof. Fermin González Blanco**
SPAIN**Prof. S G Tsoukantas**
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INDIA**Dr. Mark Son**
RUSSIA**Prof. Akira Wada**
JAPAN**Dr. Denis Konin**
RUSSIA**Mr. Ajit Bhate**
INDIA**Dr. Manu Santhanam**
INDIA**Dr. Pradeep Kumar R**
INDIA**AND MANY MORE...**



DAY 1: INAUGURATION

DAY 2: DESIGN & DETAILING

The design of precast concrete elements involves understanding the method of fabrication, the implicit constraints as well as the various aspects that facilitate the erection and assembly of these elements on site. Salient guidelines for the design of precast concrete elements can be found in the codes. In addition to the design and detailing of precast elements, it is important to carry out design checks on the overall building stability and robustness of the complete structure as recommended in the codes. The design should also consider the manufacture, transportation, hoisting and temporary stability of the element and of the structure during construction.

To achieve good quality precast concrete elements, it is important to consider the following aspects during the design stage:

- * Dimensions and shape of the precast elements
- * Concrete constituents – strength and workability
- * Reinforcement – disposition and detailing
- * Mould design
- * Joints and connections
- * Lifting, handling and transportation devices



DAY 3: FORM WORK

Today, a number of technologies have emerged, that offers casting methods for a range of purposes. On a large scale, the market is dominated by well-known techniques such as precast elements made from standard moulds and in-situ casting in standardized modular systems. On a small scale, new methods for casting and new types of moulds have emerged to meet the rising demand for customization and creation of curved concrete architecture.

Formwork or Moulds can be manufactured using any suitable materials such as timber/plywood, glass reinforced concrete, steel etc. The selection of the form work material depends on a number of factors such as, usage, surface finish type, shape etc. Locally, steel mould is preferred owing to its robustness and precision. In general, the steel plate thickness adopted for mould design and fabrication varies from a minimum of 4.5mm to 6mm, which can be used up to 50 – 100 times with proper care and maintenance.



Besides, the mould should be designed to allow for appropriate placing and compaction of concrete. Adequate number of braces, ties and struts should be provided for proper casting and hardening of the concrete. A minimal number of demountable parts will help to ensure good maintenance of dimensional accuracy during production as well as to facilitate easy assembly and dismantling. To enhance cost effectiveness, adjustable mould should be adopted where possible, for greater flexibility and variety in the production of precast concrete elements.

The most important aspect to consider when designing a form is its limitations. The wider the desired range of possible shapes, the more difficult and advanced the construction will be. It is also clear, that no matter how a surface is manipulated in a flexible form, the very nature of the method results in a specialization in a common family of shapes. For instance, if a flexible mould were to create a perfect box, it may be designed to take different length, width and height, but because it needs specialized geometry like corners, it would be unable to create a sphere with no corners.

A flexible mould aiming at the ability to do both, would possibly fail to achieve a perfect result in either case. It all comes down to the fact that every point on the surface of a flexible mould does not have the ability to change from continuity to discontinuity, because that would demand an infinitely high number of control points. Without an infinitely high number of control points, the flexible form, therefore, has to aim at creating smooth, continuous surfaces, the complexity of which must simply be governed by the number of control points. It is then left to decide, what the least number of control points is, relative to the properties of the membrane which will result in a mould design capable of achieving the curvatures needed for most free form building surfaces.



DAY 4: MATERIAL TECHNOLOGY

Precast concrete has been produced time and time again in a quality controlled manner, reducing shrinkage and creep, as well as cost effective. However with the advancement in technology, some of the processes producing these precast elements have improved and continue to do so.

One of the key factors to achieving cost effectiveness in precast is the ability of produce the elements in short time and achieving the required compressive strength. One way is through accelerated curing process. In order to maximize the efficiency of the curing process of concrete for precast application, a general understanding of the hydration reaction is necessary. When combined with water, Portland cement undergoes chemical reaction know as hydration, the process responsible for the hardening of concrete.

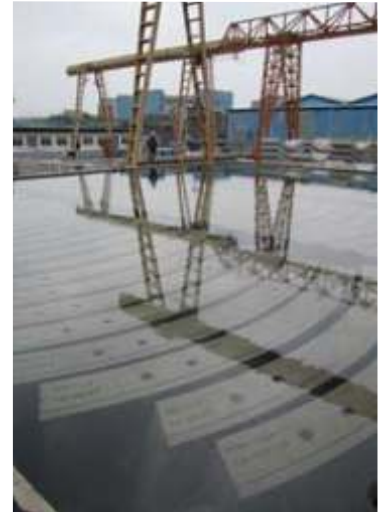
Two distinct methods for accelerating the curing process exist,

- * The use of physical processes
- * The use of admixtures to act as catalyst for the hydration process

Typical physical processes used to accelerate curing process are generally combination of the following: Increase in curing temperature, introduction of moisture to curing environment.

When using elevated temperature in order to increase the curing rate of concrete, three main factors should be considered; rate of temperature rise, maximum curing temperature, and heating time. Traditionally, it has been thought that early strength gains are offset by lower 28 day strength. As such specifications often restrict maximum curing temperature to between 60 and 71 C.

The use of admixture in order to accelerate the curing process can be further subdivided into the use of mineral and chemical admixtures. Calcium Chloride has proven to be an extremely effective accelerator; however due to corrosion concerns, its use in concrete with rebar is not recommended. The most common mineral admixture used as an accelerator is micro silica, or silica fume. While fly ash is frequently used in order to improve other properties of concrete, it has retarding effect on the initial set and early strength gain of concrete, and should not be used for accelerating curing process. Superplasticizers, have been used as indirect accelerators, primarily due to their ability to reduce water demand for given mix.



DAY 5: TRANSPORTATION

PRECAST construction, producing the concrete elements is the easy part, however transporting it to its final destination for erection or assembly needs highly coordinated effort and true engineering skills.

The preparatory works for transporting the elements are,

- * How long transporter vehicle is required?
- * What is required load capacity of the transport vehicle?
- * What is the maximum vertical extension of the shipment?
- * Is route permission required?
- * Routes on the site?

Precast concrete elements are usually lighter than the equivalent area of on-site cast in place concrete, and can be brought to site with each transport for erection. Delivery of precast elements should be planned according to the general erection sequence to minimize unnecessary site storage and handling. When possible, it is desirable to transport the precast elements into a manner which they can be lifted directly for erection or storage without much change in orientation and sequence. For example, wall panels can be transported using A-Frame type trailer in upright position

Precast elements should be loaded and delivered with proper supports, frame, cushioning and tie-downs to prevent in-transit damage. Adequate packing or protection to the edges of precast elements should also be provided to minimize risk of damage during transit.

The Handling process mainly involves the removal of the precast elements from the mould, transportation to the storage yard, loading and unloading operation and erection of these elements at the job site. Different sets of lifting points and cast-in devices will have to be used for various handling stages.





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WHO SHOULD PARTICIPATE

- Academicians - For knowledge assimilation, dissemination, interaction and status review.
- Consultants - Gain insights into new technologies and meet potential clients
- Designers - To know recent trends in Design, materials and their application
- Builders - To understand new technology, gain communication skills and confidence to implement precasting
- Architects - To understand the intricacies of precasting, scope of detailing and limitation
- Equipment and Material Manufacturers - Showcase/launch products to the right clientele and key decision makers by displaying their merchandise, systems, process and testing gadgets
- Govt, Semi Govt, Private and Autonomous Organizations - Meet, learn, interact and share experience about projects/products/service
- Project Managers - Interact with Consultants, Manufacturers, Applicators, etc.,
- Infrastructure Managers - Gain insight into new technologies, systems and processes.
- Research Scholars - Excellent platform to showcase/share latest research trends and developments
- Students. - To know the current trends, needs, gain exposure and for networking.

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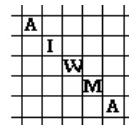
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