



निर्माण सामग्री एवं प्रौद्योगिकी संवर्द्धन परिषद्  
आवास एवं शहरी गरीबी उपशमन मंत्रालय, भारत सरकार  
**BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL**  
Ministry of Housing & Urban Poverty Alleviation, Government of India

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## Performance Appraisal Certification Scheme

The details of activities carried out under Performance Appraisal Certification Scheme (PACS) for the quarter April 2016 to June 2016 are highlighted below:

### Inspection of works

Inspection of Works of the following new systems has been carried out by BMTPC and TAC members:

- (i) Insulating Concrete Forms of M/s Reliable Insupacks Pvt. Ltd., Greater Noida (UP) on 25th May, 2016



### Surveillance Inspection

Surveillance Inspection of Works of the following products/systems for renewal of the PACs has been carried out by the officers of BMTPC:

- (i) Bamboowood Flooring manufactured by M/s Mutha Industries Ltd., Agartala (Tripura) on 26 & 27 May, 2016
- (ii) QuikBuild 3D Panels manufactured by M/s Beardsell Ltd., Chennai on 16 & 17 June, 2016



### New Applications

New applications received for issue of PACs are in the pipeline as per the details given below:

- (i) Stay- in-Place Formwork System of M/s Coffor Construction Technology India, Vadodra (Gujarat)
- (ii) Easywalls Hollowcore Concrete Wall Panels of M/s Mahesh Prefab Pvt. Ltd., Gurgaon (Haryana)
- (iii) Prefabricated Fibre Reinforced Sandwich Panels of M/s HIL Ltd., Hyderabad
- (iv) Concrewall Panels of M/s Schnell Home, Italy
- (v) Plastic Honeycomb Panels of M/s Anjani Technoplast Ltd, Greater Noida



### From the Desk of the Executive Director

In order to achieve housing for all by 2022 under Pradhan Mantri Awas Yojana(Urban), BMTPC has been playing proactive role to provide new construction systems which can help in building safe quality houses with speed. There have been around 16 such systems identified, evaluated and certified by BMTPC and are being attempted by state govts. for mass housing projects. The organizations like CPWD, BIS are also supporting our endeavor by providing SORs, requisite directions to construction agencies and inclusion of these systems in National Building Code. Also, the organizations like defense, railways are showing keen interest to adopt them in their projects. Some of the private developers are also using these systems for their housing projects.

This zeal towards new construction technologies will change the approach towards construction in India leading to sustainable, safe & speedy development. However, in order to keep the tempo high, we need to enthuse consultants, architects & contractors to work in the area of emerging technologies. I as head of BMTPC is doing my bit by conducting sensitization cum awareness programmes across states on the new systems, nevertheless, a lot need to be desired and to be achieved. Research & Academic Institutes should come forward and extend a helping hand towards training human resource.

*Shailish*

(Dr. Shailish Kr. Agrawal)

## Demonstration Housing Project using GFRG Panel System at Nellore, Andhra Pradesh

BMTPC is constructing Demonstration Housing Project at at Saraswathi Nagar, Chowtapalem Village, Venkatachalam Mandal, SPS Nellore District. Under the project, 36 houses and one community building will be constructed. The District Magistrate and Collector, SPS Nellore, Government of Andhra Pradesh has allotted land admeasuring 1.85 acres for construction of Demonstration Houses and a Demonstration Community Building.

The Demonstration Housing Project is being constructed using one of the Emerging Technologies i.e. Glass Fibre Reinforced Gypsum (GFRG) Panel System and comprise 36 houses in cluster in G+1 having minimum carpet area of 30 Sq.mts. consisting of Living room, Bedroom, Kitchen, Bath, WC and Balcony including on site infrastructure development like internal roads, pathways, boundary wall, UG tank, electrification etc. The Community Building having an area of 6900 sq.ft. is being constructed using green technologies like flyash bricks, filler slabs, etc. The structural design of the houses is undertaken by IIT Madras. While designing the layout and the housing units, provision of adequate natural lighting and ventilation to each area have been planned with Vastu friendly unit design. The project is being undertaken by BMTPC with technical support from IIT Madras whereas APSHCL & FRBL Cochin are undertaking construction work.



For further details, please contact:

**BMTPC** Executive Director  
**BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL**  
Ministry of Housing & Urban Poverty Alleviation, Government of India  
Core 5 A, 1<sup>st</sup> Floor, India Habitat Centre, Lodhi Road, New Delhi – 110003  
Phone: +91-11- 24638096, 24636705; Fax: +91-11-24642849  
E-mail: bmtpc@del2.vsnl.net.in, Website: www.bmtpc.org

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## Emerging Technologies for Building Construction

### STRUCTURAL STAY-IN-PLACE FORMWORK SYSTEM (COFFOR)

The formwork is composed of two filtering grids comprising of rib meshes which are made up of plain of galvanized plain steel (GP) sheets with a herringbone mesh pattern (rib lath) reinforced by C profile GP sheet vertical stiffeners. These grids are further connected by articulated horizontal MS rebar loops in one direction and Cold Rolled Close Annealed (CRCA) plate/GP horizontal connectors in other direction. It is a patented structural stay-in-place formwork system to build monolithic concrete wall structures based on shear wall concept.



#### Raw Materials

- Rib mesh: Hot dip galvanized steel in coil: Fe 500 & Fe 550 grade having thickness: 0.6 mm, width: 101 mm, tolerance  $\pm 0.06$  mm and galvanization: 275 & 180 gm/m<sup>2</sup>.
- "C" Profile: Hot dip galvanized steel in coil: Fe 500 & Fe 550 grade having thickness: 0.42 mm, width: 342 mm, tolerance  $\pm 0.04$  mm and galvanization: 180 & 140 gm/m<sup>2</sup>.
- Connector: Cold galvanized steel: Fe 500 & Fe 550 having thickness: 1.60 mm and width: 19 mm
- Reinforcement: Dia 5 mm

#### Construction Procedure

- The alignment is traced with chalk on the two sides. Boards/battens are nailed on the ground to indicate the positioning of one face of the panels.
- The Structural formwork panels are fitted over projecting vertical reinforcing rods.
- On a provisional basis, each panel is held vertically with wood pieces (boards/battens) or metal pieces
- When all the panels are installed, these are consolidated with wood pieces or metal pieces spaced from each other at approx. 1 to 1.50 m. Then these shall be fixed horizontally with galvanized steel wire.
- When all the wall panels, in this way, have been erected and consolidated to each other, a final adjustment is performed with wood pieces or metal pieces which is used as bracing.
- The opening for windows is done using a rotary saw. Rims of doors and windows are closed preferably with wood pieces, the width of which is equal to thickness of the panel.
- Once the panels are correctly stabilized, reinforcement bars, complementary to the Formwork are installed in the following way:
- In case the cross-section of the vertical reinforcement bars is less than 1 cm<sup>2</sup>/m, as per the design, the vertical sections of the Formwork shall act as reinforcements. The vertical reinforcement bars are grouped in pairs, connected to each other by 2 horizontal rods (3 or 4

according to the wall height) welded or bounded to the vertical reinforcement bars.

- Details of the reinforcement elements in the angles and around the openings are the same as for traditional walls of reinforced concrete.
- After positioning the regular reinforcement bars of the walls, vertical bars and horizontal bars in U-shape, shall be placed in the angles and openings and bound together.
- The angles are closed with Formwork angle panels delivered from the factory. The angle panels shall preferably be fixed as follows:
  - On the inside with a batten placed vertically all the way up the angle. This batten is bounded around the stiffening sections of Formwork panels of the angle.
  - On the outside with braces spaced about one meter apart and bound around the stiffening sections.
- The electric and plumbing ducts etc. are placed inside the ducts. For connectors, small openings are made in the expanded metal.
- The concreting is done with OPC grade 43 as per IS 456:2000. The pouring is monitored at the jointing points, reveals and zones containing reinforcement bars.
- On the outside, traditional hydraulic or sprayed façade coating is used, the bond of which is also facilitated by the expanded metal's rough surface.
- On the inside, normal plaster, panels of wood, tile, marble etc. is used.
- Given the rough surface of concrete, the inside face is finished either with a panel of plaster or other material bonded by dabs, either using a sprayed coating of cement mortar or of plaster.
- Outside coverings are the same as for coatings or insulated cladding elements or traditional walls.

#### Special Features

The special features of the system encompasses, Simplification; Time-saving; Rapid time saving as compared to conventional construction; Easy to Use High quality.

## Skill Development and Capacity Building

### Participation in Global Bamboo Summit in Indore, Madhya Pradesh

BMTPC participated in the Global Bamboo Summit "Bamboo for Sustainable Development – Global Cooperation" organized by Madhya Pradesh State Bamboo Mission (MPSBM) & Indian Federation of Green Energy (IFGE) from 8-10 April 2016 at Indore (MP). The objective of the Summit to discuss, deliberate and create opportunities to harness the untapped potential of this important materials. The Council put up a display of bamboo based housing technologies during the event.



### Training Programme on Use of Bamboo in Housing and Construction

The Council organised a Training Programme on Bamboo in Housing and Building Construction at Imphal, Manipur from May 13 - 17, 2016 jointly with South Asia Bamboo Foundation (SABF) and Manipur State Bamboo Mission. During the programme, training were provided to 30 participants. During the training programme a Bamboo Toilet was constructed by the participants under the guidance of master crafts mason for practical training.



## Mainstreaming of Emerging Technologies

With the efforts of BMTPC, Ministry of Urban Development vide OM No.JS/Works/OM/2016 dt.30.05.2016 has directed CPWD, DDA & NBCC to adopt following three new emerging technologies which have been validated by BMTPC at their construction sites initially in Metropolitan cities of India and where the value of works is Rs. 100 crores or more. These new Technologies may be mandatorily adopted for all projects across the country irrespective of location and project cost with effect from 01.04.2017.

1. Monolithic Concrete System using Aluminum Formwork.
2. Industrialized 3 S System using Cellular Light Weight Concrete Slabs & Precast Columns. (Precast / Prefab)
3. Monolithic Concrete System using Plastic-Aluminum Formwork.

CPWD vide OM No.DG/DSR/010 dt.24.06.2016 has also published Schedule of Rates for the following three emerging technologies :

1. Monolithic Concrete Construction
2. EPS Core Panel System
3. Light Gauge Steel Framed Structure.

