

CATEGORY BUILDING SYSTEMS



PRODUCT / TECHNOLOGY



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Technology Detail

COST EFFECTIVE INNOVATIVE HOUSING TECHNOLOGIES

Various Alternatives to conventional walling & roofing system



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CONTACT DETAILS

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BRIEF

In order to use and adopt Cost Effective Building Materials and Technologies developed by various R & D Institutions across the Country, Government of Karnataka took an initiative to set up an apex centre called "KARNATAKA RAJYA NIRMANA KENDRA (KARNIK).

KARNIK has the following primary objectives:

- To monitor, oversee, supervise and guide the Building Centre's (Nirmithi Kendras) activities in the State, set up in the various districts of the State
- To promote Cost-effective, Environmental Friendly, Alternative Building Materials and Technologies through the network of Nirmithi Kendras & Training on these technologies
- Providing guidance to Government on emerging housing concepts and policy options from time to time.
- Developing replicable housing infrastructure models.

Various innovative & cost effective technologies/products promoted through Nirmati Kendras, include;

SALIENT FEATURES

- **Stabilized Mud Blocks for walling:** Blocks based on soil stabilized with suitable quantity of binder (cement/lime), being promoted for housing construction. These blocks have significantly lower embodied energy & are cost effective as compared to ordinary burnt clay bricks.
- **Funicular Shells:** A roofing system consists of doubly curved shells made with materials of good compressive strength such as waste stone pieces and brick tiles and supported on reinforced





concrete edge beams. It uses locally available waste stone, normally available from stone cutting and polishing unit.

- Ferrocement Channels & Trusses for Roofing:** The building system uses pre-cast ferrocement roofing channels of a segmental arch profile which are placed adjacent to each other and spanning over two supports. Ferrocement comprises of a uniform distribution of reinforcement by use of chicken wire mesh and welded mesh encapsulated in rich cement mortar, thereby achieving significant reduction in both steel reinforcement and dead weight of roof. Similarly, Ferro cement trusses support structurally the sloping roof.
- Filler Slab for Roofing:** It is a roofing system in which the concrete from bottom portion of the floor/ roof slab is replaced with filler material such as easily available & cost-effective options of local bricks, light weight materials, tiles, clay pots/ kullars, etc. The principle is that concrete is structurally not required in bottom half, as it is a compression material/ member & is required in top half of the slab. This results in resource efficiency & cost-effectiveness.
- Jack Arch for structural masonry over openings as alternate to lintel/ beam:** A jack arch is defined as a structural element in masonry construction that provides support at openings in the masonry. Unlike regular arches, jack arches are not semicircular in form. Instead, they are flat in profile and are used under the same circumstances as lintels. No steel is required for the construction.
- Hollow concrete blocks/ Interlocking blocks for walling:** The concrete blocks are made out of lean concrete mix with low cement content. The embodied energy of concrete blocks are lower as compared to ordinary burnt clay bricks. The interlocking blocks require very little /nil mortar as compared to normal blocks. This is a suitable product if sand & aggregates are available locally & cheap.
- Fly ash based Bricks/ blocks/ Interlocking blocks for walling:** Fly Ash bricks comprises of Fly Ash, a by-product from Thermal power plant as major ingredient (> 50% of raw material), lime/cement, sand, gypsum etc. This product is being primarily promoted by specialized Nirmithi Kendra namely Centre for Ash Utilization Technology and Environment Conservation(CASHUTEC).

Apart from above, there are several other cost-effective products/ technologies being promoted by various Nirmithi kendras in the State.





ECONOMIC ASPECTS

- One important aspect of promoted technologies/ products are reduction in cement & steel consumption with cheaper & locally available materials, thereby reducing the cost of construction
- Machineries/ techniques used are generally simple, therefore any person can be trained with little efforts for the construction job, thus providing local employment.

SUSTAINABILITY ASPECT

- Replacement of cement & steel with locally available resources reduces the energy consumption.
- Avoids the use of burnt clay bricks, thus reduces the Green House gas emissions due to burning of fossil fuels & preserving the top fertile soil for agricultural purpose

SUITABILITY AND AVAILABILITY

- Products/ technologies are suitable for the State of Karnataka as Nirmithi kendras are operating in the State only & available across the State to provide technological solutions.

LIMITATIONS (IF ANY)

- Technology/ products solutions are available in the State of Karnataka primarily.

MARKET LINKAGES

- Technological solutions are available across the State of Karnataka.





MAJOR PROJECTS

Several Projects by various Nirmithi Kendras in the State of Karnataka using innovative & cost effective products/technologies, include;

- Houses by Mysore Nirmithi Kendra, Mysore (using Stabilized Mud block)
- Ambedkar Housing- Koppal (Funicular Shells)
- Koraga Housing, Mangalore (Ferrocement Trusses)
- Administrative Block, Fisheries Dept., Mysore (Ferrocement Channels)
- Private Residence, Shivamogga (Filler slab)
- B.D.A.A Indoor Sports Complex At Bellary (Fly Ash Inter-Locking bricks)
- Bengaluru Rural Nirmithi Kendra Admin Block
- Slum Housing Bangalore (Jack Arch)
- Skill Department Project Up- Gradation of ITI Colleges In Karnataka – Refurbishment of existing Tech Lab
- Specialized works (Alur Bhavan at Dharwad, Gurukul Houses, Repairs & Renovation to Kannada Samuchhaya, Bellary etc.)

CERTIFICATION/INDIAN STANDARD/ENDORSEMENT

- Various innovative products/ technologies have been developed by R&D Organizations/ Technical Institutions etc., & covered with standard specifications/ Codes. KARNIK & Nirmithi Kendras are bodies functioning under State Government of Karnataka

