Environment Friendly Materials & Technologies

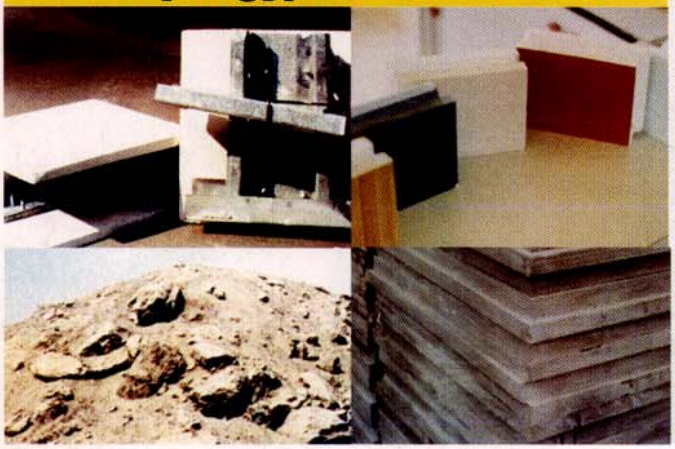
BMTPC, an inter-ministerial body under the Ministry of Urban Development and Poverty Alleviation strives to promote innovative, cost-effective building materials and products through evaluation, validation of technologies, demonstration and large scale dissemination of information. The Council maintains a continuing interaction with industry, concerned associations/ federations, industrial promotional agencies, financial institutions, construction organisations of public and private sectors, R&D, standardisation institutions and NGOs. Support for development of new and environment friendly standardised materials / components based on agro-industrial wastes and energy conserving process is available to interested entrepreneurs and professionals. To improve and expedite technology transfer and communication between various construction industries, BMTPC helps in :

Flyash Utilisation

72% of power generated in India is from thermal power stations. Ash content of 40-50% in coal generates nearly 95 million tonnes of flyash every year. Besides air and water pollution, the disposal of this flyash results in extensive land wastage. Today, there is an urgent need of well planned programmes for the proper management of flyash to protect our perilously imbalanced environment.

Research & development indicates that bricks, portland pozzolana cement, sintered aggregates, tiles, light weight aggregates and solid/hollow blocks can be produced using flyash as raw material. The properties of the materials made from flyash have been found to be quite comparable with conventional materials for use in construction works. Besides these uses, flyash can be utilised for backfilling of mines, lining irrigation canals, agriculture, filling in road construction etc.

Phosphogypsum Utilisation



Phosphogypsum is the waste generated by manufacturing plants of phosphoric acid, ammonium phosphate and hydrofluoric acid. 4.0 million tonnes of phosphogypsum is generated every year. The fluoride content of phosphogypsum is a source of land and water pollution. Over 12 million tonnes has accumulated at different plant sites. It is possible to profitably utilise this pollutant for making cement, gypsum board, partitions, ceiling tiles, artificial marble, fibre boards etc.

Phosphogypsum can be gainfully utilised in the manufacture of expansive or non-shrinking cement, super sulphated and anhydride cement, simultaneous manufacture of cement and sulphuric acid, as a hydraulic binder, as set controller in the manufacture of portland cement, as mineraliser and in making gypsum plaster boards and slotted tiles.

Redmud Utilisation

Red mud as solid waste is generated during extraction of non ferrous metals such as aluminium, copper etc. The conventional method of dumping red mud in ponds has often adverse environmental impacts. During monsoons, the waste may be carried by runoff to the surface water courses and as a result of leaching causes contamination of ground water. The dry disposal system has some advantages in reduction of area requirement, lesser seepage to sub soil etc. At present about 4 million tonnes of red mud is generated annually, which is not being disposed or recycled satisfactorily. Red mud can be used as a binder, as a cellular concrete additive, in making floor and wall tiles, coloured composition of concrete, heavy clay products, red mud bricks, corrugated roofing sheets and composite panels for door shutters. It is also used in the manufacture of aggregate and for making construction blocks.

Wood Substitution

Forests protect the land, conserve soil and water and protect the ecosystem. Traditionally, timber has provided shelter and fuel to mankind. Excessive deforestation is leading to an ecological imbalance which could spell large scale disaster for mankind. In fact, adverse impacts of deforestation are already being felt in many parts of the globe. It is necessary to take urgent steps to conserve our forests. A substantial portion of wood is consumed in building directly or indirectly. It is imperative to reduce the consumption of timber in building applications by identification, development and promotion of alternate materials which can be adequate substitutes for wood. A wide range of economical and versatile wood substitutes like ferrocement, plastics, door/window frames and shutters from plantation timbers such as rubber and poplar wood, composite materials from agro-industrial wastes, natural fibres & man made fibres and metal based products and techniques of construction are available.

Garbage Recycling

Discarded and used paper, boards/cartons, plastic bags and related items of consumer use can be prominently spotted in any garbage dump which has garbage from household, institutions, industries and hospitals. With constant urbanisation and industrialisation, the problems of discarded items of use, and their disposal through garbage has become a cause for concern.

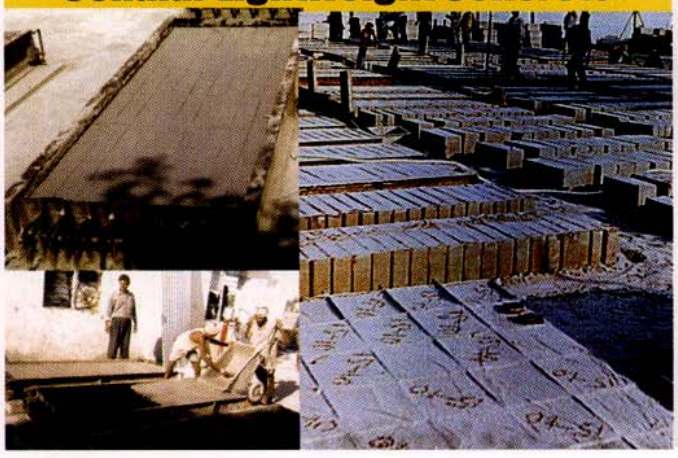
The only solution is recycling of urban solid waste after isolating and segregating the garbage material-wise, its organised collection, grading and treatment. Various paper and plastic wastes can be used as raw material in manufacture of fence posts, park benches, road furniture, pitch fibre pipes, electrical and drainage systems and asphaltic corrugated roofing sheets.

Agro-waste Recycling

The total availability of agro-waste such as bagasse, banana sheath, saw mill waste, sisal fibre, rice husk, jute stalk, coir, cotton plant scantling, pine needles etc. is about 500 million tonnes per annum. The building industry can in many cases gainfully utilise these wastes for a variety of applications, and in many cases substitute the use of timber through products made from agro-wastes processed along with suitable binders under pressure. Such treatment is used for making several kinds of insulation boards, panels, roofing sheets, door shutters & frames, ceiling tiles, etc.

Large quantities of extremely precious timber can be conserved through increased use of substitutes made from such agro-wastes. The products made from agro-waste can be strong, lightweight and can also find easy aesthetic acceptance for use as exposed surfaces in residential and office interior construction.

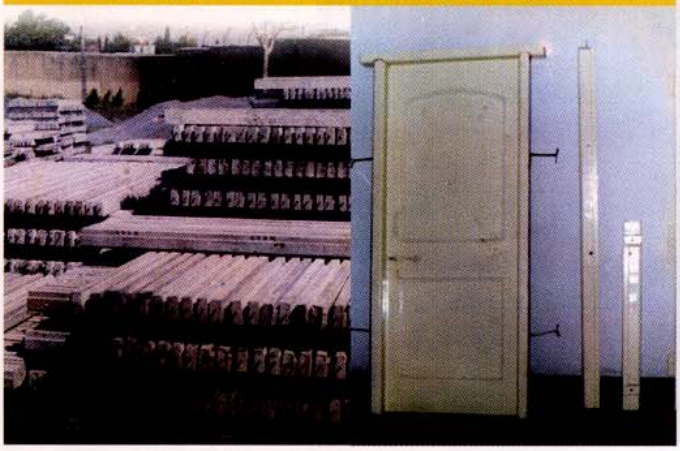
Cellular Lightweight Concrete



Cellular Lightweight Concrete (CLC) has been used in over 40 countries over the past 25 years to produce over hundred thousand houses and apartments, apart from schools, hospitals, industrial and commercial buildings. CLC is an air-cured lightweight concrete with flyash as a major ingredient, that can be produced at large project sites just like traditional concrete, utilising equipment and moulds normally used for traditional concreting. It is especially suitable in India for low-rise load bearing constructions and for partitioning work in multistorey buildings. Benefits of CLC Blocks/Panels include:

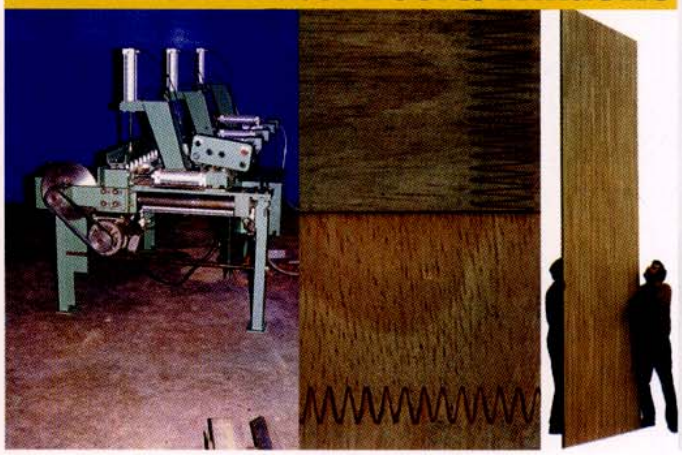
Tremendous weight reduction; High thermal insulation; Optimal fire rating; Substantial material saving (No gravel used; Little cement; Less steel in structure and foundation); Easy and fast production; No primary energy and reduced transportation costs; Boon for remote areas with only sand availability.

Precast Concrete Frames



Concrete door and window frames compare in strength, durability and quality with traditional timber door & window frames at a substantial cost saving. Commercial levels of production can be taken up at a low level of investment and with minimal training. Made out of cement, sand aggregates and steel reinforcement, these are, compared to timber frames, more durable and immune to attack of white ants, fungii widely prevalent in most areas. Advantages: Conservation of forest reserves of timber; Termite and white ant proof; High quality, long lasting and durable; Much cheaper than timber alternatives; High rate of production; Minimal requirement of raw materials; Fire proof; Water proof; Produced utilising unskilled labour; Save on the cost of lintels; Limited mechanisation resulting in high per capita output; Possibility of using industrial wastes like flyash, blast furnace slag, etc.

Plantation Timber Doors/Windows



With increasing consciousness about preservation of natural rain forests, large girth logs of exotic species like teak, rose wood etc., are no more available in required quantities. The future of wood industry has to be based on processing of plantation timber like rubber wood/poplar wood. Plantation timber are small girth logs and the trees are usually felled when still immature. Juvenile timber leads to growth stresses which lead to misbehaviour of timber even after drying. It is necessary to end join smaller sections to make them up to usable lengths. BMTPC has developed a complete line of finger jointing machines. The finger jointing line consist of 2 machines: The Finger Shaper and the Press. The machine can process both soft woods and hard woods; the largest dimension to be processed is 110x100 mm; Both face finger jointing as well as butt finger jointing; Machine can utilise of both thermoplastic and thermo setting resin adhesives.

Ferrocement Roofing Components

Ferrocement is a highly versatile composite materials consisting of cement mortar, chicken wire mesh and welded mesh. It is increasingly being accepted as an appropriate cost effective construction technique for different applications in housing and building. Till now ferrocement components are largely being produced by manual methods of casting in the country. To propagate this technology for wide scale application and with a view to introduce mechanisation for better quality and productivity, BMTPC has developed a machine for production of ferrocement roofing channels upto a span of 6.1 mtr. with high load bearing capacity, non porous surface and uniform thickness throughout. **Advantages:** Higher strength to weight ratio; 20% savings on materials and cost; Prefabricated elements and light structures; Suitability for precasting; Flexibility in cutting; drilling and jointing; Very appropriate for developing countries.

Bamboo Mat Corrugated Roofing Sheet

Recognising the urgent need for an appropriate and cost effective roofing technology for North-Eastern and other bamboo growing regions, and disaster prone areas, a technology for manufacture of laminated bamboo mat corrugated roofing sheets has been developed at the Indian Plywood Industries Research and Training Institute, Bangalore in collaboration with the Building Materials and Technology Promotion Council, New Delhi. This would be an alternative for existing roofing sheets like corrugated A.C. sheets, G.I. sheets, Aluminium sheets, FRP, Red Mud and Ashphaltic sheets.

The sheets possess excellent physico-mechanical properties and are based on renewable resources requiring low energy. It may also find use as value added products in the areas as an aesthetically pleasing material. These sheets are not only highly water and weather resistant but also resistant to decay, termites and insects.

Walling

Flyash sand lime bricks/ tiles, red mud bricks/tiles, compressed earth blocks, precast stone faced blocks, clay flyash bricks, solid/ hollow concrete blocks, Fal-G bricks/blocks

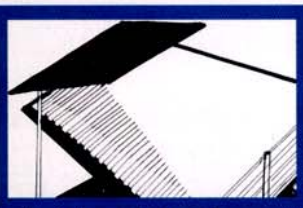
Roofing

MCR tiles, red mud/bamboo mat corrugated sheets, ferrocement channels, funicular shells, adobe vaults, local stone, RCC planks & joists, filler slabs.

Flooring

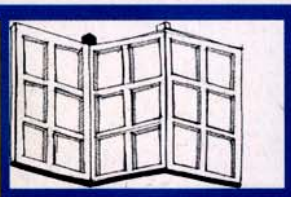
Red mud tiles, precast concrete blocks, pavers, chequerred/terrazo tiles.

False Ceiling



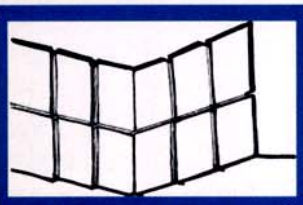
Aluminium rolled and extruded sections, gypsum fibre boards, MDF boards, bagasse boards, woodwool boards, bamboo mat boards, jute/coir composite boards.

Partitions



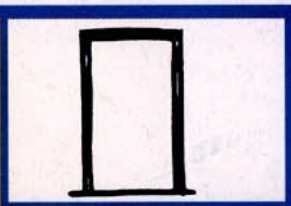
Plastic/PVC, MDF boards, gypsum fibre boards, rice husk boards, bagasse boards, bamboo mat boards, jute/coir composite boards.

Panelling



Particle boards, MDF boards, aluminium, wood and plastic composites, bagasse boards, bamboo mat boards, jute/coir composite boards.

Door Frames

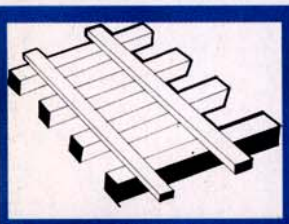


Rolled steel, pressed steel, extruded aluminium, extruded PVC, Precast RCC, Ferrocement, rubber wood, poplar wood, jute composite.

Shutters

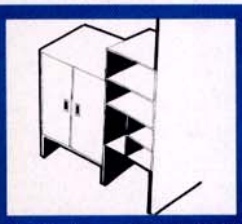
Red mud jute polymer/flyash polymer composites, ferro-cement, steel, aluminium, MDF boards, cement fibre boards, rubber/poplar wood, densified fibre plates, jute/coir polymer composites, GRP.

Rafter/Purlin



Ferrocement, steel, precast RCC, laminated wood, plastic components, bamboo.

Cabinets



RCC, ferrocement, MDF, various particle boards, bagasse boards, bamboo mat boards, jute/coir composite boards..

Choosing Environment Friendly Materials

By and large, conventional building materials like burnt bricks, steel and cement are high in cost, utilise large amount of non-renewable natural resources like energy, minerals, top-soil, forest cover etc. These increased dependence on external materials and man-power, harm the local economy and are generally polluting in nature.

The materials and technologies chosen for construction must, in addition to functional efficiency, fulfil some or more of the following criterion, for the cause of sustainability and a better quality environment:

- not endanger bio-reserves and be non-polluting;
- be self-sustaining and promote self-reliance.
- recycle polluting waste into usable materials
- utilise locally available materials
- utilise local skills, manpower and management systems
- benefit local economy by being income generating
- utilise renewable energy sources
- be accessible to the people
- be low in monetary cost

Trees are our friends in need of help

Save Trees

bmtpc

Building Materials and Technology Promotion Council

Ministry of Urban Development & Poverty Alleviation, Government of India
G-Wing, Nirman Bhawan, New Delhi - 110 011
Tel: 2301 9367; Fax: +91-11-2301 0145
OR
Core-5A, 1st Floor, India Habitat Centre, Lodhi Road, New Delhi -110 003
Tel: 2463 8096, 2463 6747; Fax: +91-11-2464 2849
E-mail: bmtpc@del2.vsnl.net.in
Website: www.bmtpc.org