Advanced Construction Materials, Equipment &MS Fabrications

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***Abstract* - Building material is any material which is used for a construction purpose. Many naturally occurring substances, such as clay, sand wood and rocks, even twigs and leaves have been used to construct buildings. Apart from naturally occurring materials, many man-made products are in use, some more and some less synthetic. Light weight construction materials can be a great choice when it comes to building a home. New technology has also made building with metal more practical than in previous human history. Most high-rise buildings and sky scrapers are built with steel or other metal frames. Plastics are another widely used modern building material. Formed of polymers, plastics are easily moulded while in the liquid state. Compared to metal and many other materials, plastic is very light in weight and relatively low in cost. Plastic is often used to make pipes and to decorate the interior of buildings. Many modern buildings use glass, not only for windows, but often as the primary exterior building material. Glass skyscrapers and other structures have become quite popular due to their aesthetic appeal. Technology continues to create new building materials with exceptional properties. For example, sea-creation is a construction material made from minerals found in sea water. Composite materials are made by combining different types of building materials together. These materials combine organic and inorganic components. One material act as a type of "adhesive" that binds the other components together. The "hard" components are usually glass, carbon or boron fiber. Composites are known for combining light weight with strength and durability. Cement composites bind together wood or similar materials like paper, fiberglass and natural fibres in a cement paste. These composites can be placed into moulds to create pre-shaped building components. With the increase interest in green technology, many builders are moving back to older building materials in an effort to increase sustainability. Thus, one can find modern homes or other structures built of mud and straw, or other archaic materials, in green living communities.**

1.INTRODUCTION

In most parts of the country, the soil bearing capacity is very low or the soil of expansive nature likes black cotton soil. Under such conditions, use under-reamed or pedestal pile foundation with plinth beams.

To understand all how and about of super performing construction materials we must study materials according to their use from very root to tip. By that way we can easily conclude and infer about the application, implementation and feasibility of that construction material. Elements of construction where these smart materials and techniques shall be implemented are:

1. 1.Foundation
2. 2.Plinth
3. 3.Beam
4. 4.Column
5. 5.Wall
6. 6.Sill
7. 7.Window
8. 8.Door
9. 9.Roof
10. 10.Parapet
11. 11.Skylight
12. 12.Fishing Works

Construction materials are said to be super performing when they Save overall building energy

- Make building aesthetically pleasing
- Cut cost of construction
- Easily available
- Increase life span of building
- Upgrade building quality
- Make the building safe for living

1. Save overall building energy
2. Make building aesthetically pleasing
3. Cut cost of construction
4. Easily available
5. Increase life span of building
6. Upgrade building quality
7. Make the building safe for living Foundation

- Plinth, Beam, Column, Wall, Sill, Window, Door, Roof, Parapet and skylights

2. LITRATURE REVIEW

Translucent concrete is a concrete based building material having light-Transmissive property. Light-Transmissive property is mainly due to uniform distribution of high numerical aperture Plastic Optical Fibres (POF) throughout its body. Hence it is also known to be transparent concrete, LiTraCon. The two basic materials used for making transparent concrete1. Fine concrete 2. Optical fibers Fine concrete: Consists of cement and fine aggregate such as sand. Optical fibres translucent concrete works Based on "Nano-Optics". These fibres pass as much light when tiny slits are placed directly on top of each other. Hence optical fibers in the concrete act like the slits and carry the light across throughout the concrete.

The manufacturing process of transparent concrete is almost same as regular concrete. Small layers of the concrete are poured into the mound and on top of each layers, a layer of fibres is infused. Fabric and concrete are alternately inserted into molds at intervals of approximately 2 mm to 5mm. Light-transmitting concrete is produced by adding 4% to 5% optical fibres by volume into the concrete mixture. The concrete mixture is made from fine materials and does not contain coarse aggregate. Thousands of strands of optical fibres are cast into concrete to transmit light smaller or thinner layers allow an increased amount of light to pass through the concrete.

Self-healing concrete could solve the problem of concrete structures deteriorating well before the end of their service life. Concrete is still one of the main materials used in the construction industry, from the foundation of buildings to the structure of bridges and underground parking lots. Traditional concrete has a flaw, it tends to crack when subjected to tension. A healing agent that works when bacteria embedded in the concrete convert nutrients into limestone has been under development at the Civil Engineering and Geosciences Faculty in Delft since 2006. The project is part of a wider Programme to study the self-healing potential of plastics, polymers, composites, asphalt and metals as well as concrete. Dr Henk Jonker's, a microbiologist who specializes in the behavior of bacteria in the environment, has developed self-healing concrete in the laboratory and full-scale outdoor testing will start in 2011. The first self-healing concrete products (successful research results permitting) are expected to hit the market in two years' time and are expected to increase the lifespan of many civil engineering structures. Jonker's has worked closely with civil and structural engineers to learn about the properties of concrete and steel reinforcement and develop the concrete. "For a biologist to work with civil engineers to incorporate living matter into structural concrete material is in itself a great innovation," he says civil engineering structures tensile forces can lead to cracks and these can occur relatively soon after the structure is built. Repair of conventional concrete structures usually involves applying a concrete mortar which is bonded to the damaged surface. Sometimes, the mortar needs to be keyed into the existing structure with metal pins to ensure that it does not fall away. Repairs can be particularly time consuming and expensive because it is often very difficult to gain access to the structure to make repairs, especially if they are underground or at a great height.

3. METHODOLOGY

Electrified wood:

Engineered wood products, glued building products "engineered" for application-specific performance requirements, are often used in construction and industrial applications. Glued engineered wood products are manufactured by bonding together wood strands, veneers, lumber or other forms of wood fiber with glue to form a larger, more efficient composite structural unit. These products include glued laminated timber (glulam), wood structural panels (including plywood, oriented strand board and composite panels), laminated veneer lumber (LVL) and other structural composite lumber (SCL) products, parallel strand lumber, and I-joists. Approximately 100 million cubic meters of wood was consumed for this purpose in 1991. The trends suggest that particle board and fiber board will overtake plywood. Wood unsuitable for construction in its native form may be

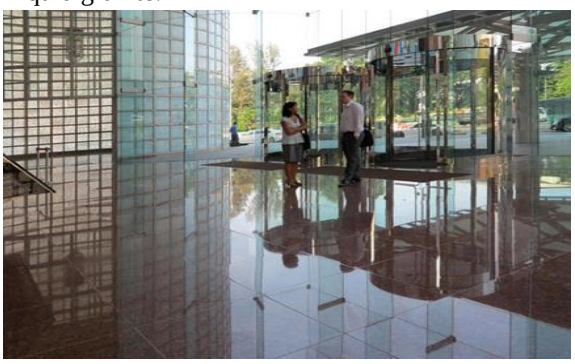
broken down mechanically (into fibers or chips) or chemically (into cellulose) and used as a raw material for other building materials, such as engineered wood, as well as chipboard, hardboard, and medium-density fiberboard (MDF). Such wood derivatives are widely used: wood fibers are an important component of most paper, and cellulose is used as a component of some synthetic materials. Wood derivatives can be used for kinds of flooring, for example laminate flooring.

Rich lite:

Paper composite panels are a phenolic resin/cellulose composite material made from partially recycled paper and phenolic resin. Multiple layers of paper are soaked in phenolic resin, then molded and baked into net shape in a heated form or press. Originally distributed as a commercial kitchen surface in the 1950s, it has recently been adapted for use in skateboard parks as well as various other applications, such as residential counters, cabinetry, fiberglass cores, guitar fingerboards, signage, exterior wall cladding, and a variety of architectural applications. It was used for the Boeing 747 for their air tables, hydroforming dyes, vacuum chuck faces, work holders, and proofing materials architecturally, it is used for countertops.[2] It has also been used for whale board in fiberglass boat building. Other commercial uses include cutting boards, prep tables, pizza peels, and the dashboard of a pickup truck prototype vehicle.

Since the last quarter of the 20th century, phenolic resin and cellulose based compound materials have been used as an alternative to ebony and rosewood to make stringed instrument fingerboards. From 2012, Gibson Guitar Corporation replaced the ebony fingerboard on the production with paper composite panels (Rich lite).

Liquid granite:



The material is made up of between 30 and 70 per cent recycled material, mainly base products from industry. It uses less than one third of the cement used in precast concrete, which also reduces its carbon footprint. The product was developed at Sheffield Hallam University and is available from Liquid G Liquid Granite is a self-contained, pre-mixed cement, blended with specially selected aggregates. Its handled bucket means that it can be carried to the site of repair with ease and only needs to be mixed with water to produce a firm mortar. Liquid Granite can repair a range of problems from holes and cracks in the floor to crumbling walls and ceilings, plus loose bolts and posts. Mix to a firm consistency to repair overhead or vertical surfaces. Pour a more fluid mixture into horizontal areas. According to its creators, liquid granite has the ability to completely replace cement in concrete. The material is a lightweight and has the same load bearing capacity of cement but is made of recycled materials. Liquid granite has none of the environmental impacts that cement and concrete do. It is made up of between 30 and 70 percent recycled material and uses less than one third of the cement used in precast concrete. Which means that it has a greatly reduced carbon footprint.

Concrete Canvas:

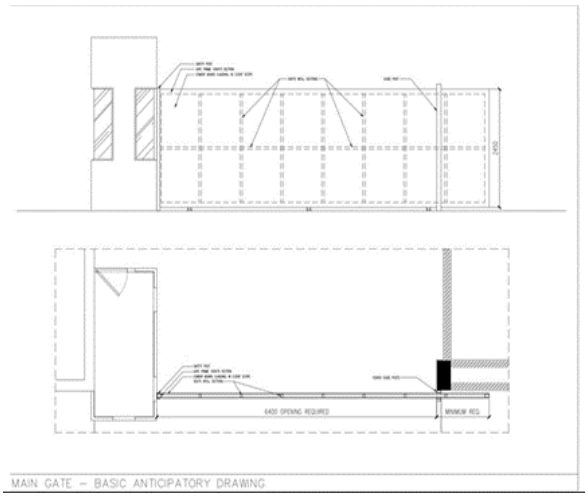
Concrete Canvas® is part of a revolutionary new class of construction materials called Geosynthetic Cementitious Composite Mats (GCCMs). It is a flexible, concrete impregnated fabric, that hardens on hydration. to form a thin, durable, waterproof, and fire-resistant concrete layer. Essentially, it is concrete on a roll. Concrete Canvas® GCCM (CC) allows concrete construction without the need for plant or mixing equipment: just add water.CC consists of a 3-dimensional fiber matrix containing a specially formulated dry concrete mix. A PVC backing on one surface of the CC ensures the material is completely waterproof. CC can be hydrated either by spraying or by being fully immersed in water. Once set, the fibres reinforce the concrete, preventing crack propagation and providing a safe plastic failure mode. Concrete Canvas® GCCM is available in 3 thicknesses: CC5TM, CC8TM and CC13TM, which are 5, 8 and 13mm thick respectively.

The PVC backing on one surface of the CC ensures that the material has excellent impermeability. The fiber reinforcement prevents cracking, absorbs energy from impacts and provides a stable failure mode.CC is twice as abrasion resistant as standard OPC concrete, has excellent chemical resistance, good weathering performance and will not degrade in UV. CC has good drape characteristics and will closely follow the ground profile and fit around existing infrastructure. Unset CC can be cut or tailored using basic hand tools.

Fabrication

Metal fabrication is the creation of metal structures by cutting, bending and assembling processes. It is a value-added process involving the creation of machines, parts, and structures from various raw materials. Typically, a fabrication shop bids on a job, usually based on engineering drawings, and if awarded the contract, builds the product. Large fab shops employ a multitude of value-added processes, including welding, cutting, forming and machining. As with other manufacturing processes, both human labor and automation are commonly used. A fabricated product may be called a fabrication, and shops specializing in this type of work are called fab shops. The end products of other common types of metalworking, such as machining, metal stamping, forging, and casting, may be similar in shape and function, but those processes are not classified as fabrication.

Gate Fabrication & Drawings



1.Fabrication of the Gate

- Cutting of the materials as per the desired sizes available in the drawings.
- Welding of the cutting pieces as per the gate drawing which is received
- Welding of the gate as per the required gauge of the rod and then grinding the welding excessive material for finishing of the gate.

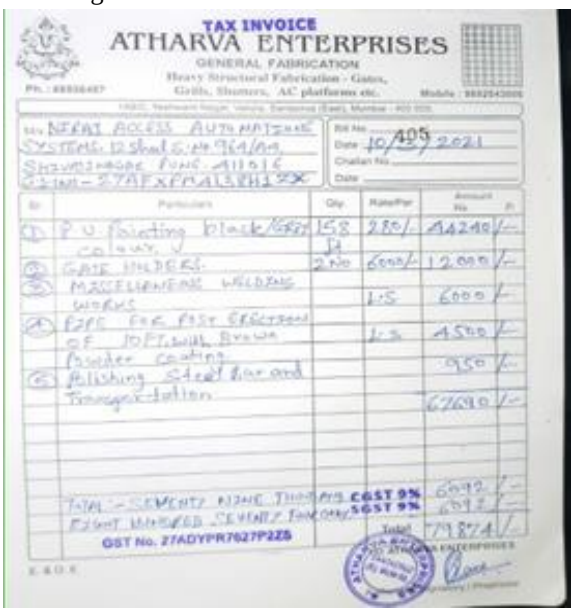
2.Painting of the Gate

The painting of the gate is been carried out by spray painting with PU (Poly Urathin) Quality paint

3.Alignment of the gate on Site

- Track Fixation with 25mm stainless steel bar of Grade 304
- Allignment of the gate on the track for to and from motion with automation factor.

4. Billing Process



4. REPORT ON PRESENT INVESTIGATION

- Experimental setups, procedures adopted, techniques developed, methodologies developed and adopted.
- While important derivations/formulae should normally be presented in the text of these chapters, extensive and long treatments, copious details and tedious information, detailed results in tabular and graphical forms may be presented in Appendices. Representative data in table and figures may, however, be included in appropriate chapters.
- Figures and tables should be presented immediately following their first mention in the text. Short tables and figures (say, less than half the writing area of the page) should be presented within the text, while large table and figures may be presented on separate pages.
- Equations should form separate lines with appropriate paragraph separation above and below the equation line, with equation numbers flushed to the right.

6. CONCLUSION

1. The demand for building material has been continuously rising with the increasing need for housing both in rural urban areas
2. Selecting environmentally attractive materials with reduced environmental impacts is primarily achieved through the practice of resource conservation and selection of non-toxic materials.
3. The resources used to manufacture construction materials affect the environment by deflecting natural resources, using energy, and releasing pollutants to the land, water.
4. Commercial's exploitation of traditional building materials by various industries has aggravated the situation. It has, therefore, become necessary to think over this problem seriously and to provide some sustainable solution to make the advanced materials available to solve the housing problem.

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