

Recent Trends in Construction Industry

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Abstract Recent trends in construction industry is a topic which deals with the recent developments held in civil engineering branch. Now days there is so many inventions, researches & implementations are carried out to modernize the construction industry. A trend should be such that it should helpful for achieving the economic, safe, speed and appearance factors of a civil engineering works. By using modern mechanical equipment's and techniques we can overcome any type of difficulties arising during the time of construction

KEY WORDS:-GPS- GLOBAL POSITIONING SYSTEM, UAV-UNMANNED AERIAL VEHICLES, FAA-FEDERAL AVIATION ADMINISTRATION, RFID-RADIO FREQUENCY IDENTIFICATION

1. INTRODUCTION

As the technologies developed in all the fields in engineering, it is essential to develop new trends, researches, inventions in civil engineering field also, so that we can minimize the time of construction and cost of construction and effort of humans. Civil engineering has always readily adopted new technologies, using innovations like GPS to plot new roads and suspension systems to build bridges. And as technology continues to evolve, we can expect that the civil engineering field will only keep incorporating this recent technology in increasingly creative ways. In fact, it already is. New technologies – those that have been released within the last 5 years – are about to revolution the civil engineering field and allow innovations previously not possible

2. NECESSITIES OF IMPLEMENTING RECENT TRENDS IN CONSTRUCTION INDUSTRY

Basically all the traditional code books, construction practice are prepared with view of safety and durability only. That's why we can't achieve so many challenging constructions. But once we break monotony and start exploring new trends we can achieve any difficulties arising in construction and when we start imagination into implementation we can change the world.

- Safety in construction
- Less time, Less effort & cost
- Aesthetic appearance

2.1 Safety in Construction:-

In olden days the safety precautions is too low in construction field that's why so many lives lost during construction. For an example, during time construction of Panama Canal it is estimated that over 25,000 labours lost their lives during the huge and dangerous project, with most are dying from disease and landslides. So that by implementing new trends can provide safety to the workers

2.2 Less Time, Effort & Cost:-

Following the old trends in construction results in delaying or long time of construction, which increases the cost of construction, materials wastage, quality reduction etc., but by adopting the few recent trends can minimize the above drawbacks and helps in constructing the structures within the time. In traditional or old construction practices there is no use of equipment's which increases the effort of the workers, but in recent trends by use of modern equipment's such as automatic rendering machines for plastering, painting reduces both time and effort. By implementing latest trends in construction industry, we can reduce the cost of construction ex: - by using of modern equipment's, ideas we can minimize the number workers and working days there by it proves that economical

2.3 Aesthetic Appearance:-

Most of the structures built now days are in view of aesthetic point of view, some of the skyscrapers are built without the restriction of cost, for achieving this factor the construction industry has to adopt modern trends, materials, equipment. Some of the structures enlisted here to prove, those are Burj Khalifa, Petronas Twin Towers, Empire State Building, One World Trade Centre, Shanghai Tower and Abraj Al Bait Towers etc.

3. LATEST TRENDS IN CONSTRUCTION INDUSTRY

A. Drones: Advanced Mapping and Scanning Capacities for More Accurate Visualizations



Fig 1. Drone surveying

Civil engineering has developed to the point of readiness with applications for unmanned aerial vehicles, which can help in scanning and mapping construction sites as well as capturing photos and videos for surveying purposes. UAVs often proves that an economical measure for aerial mapping, as a drone doesn't require a pilot, but rather, a technician. UAVs are helpful to conduct the aerial surveying for several times around the same construction field, which means in the future, UAVs can capture a variety of images and videos while the project is being carried out and that will helps to better manage project progress and maintain documents. UAVs will also transforms civil engineering through the use of photo scanning, an image capture process that uses photos (rather than lasers) to capture images. Photo scanning captures not just the ground surface, but also buildings, plants, benches, and other nearby structures – and represents them in three dimensions. With these advanced capabilities, drones will allow for more accurate and more interactive realistic representations of civil engineering projects there are also potential issues involving federal aviation administration (FAA) regulations, citizen's right to privacy, and how liability insurance would address drone usage.

B. 3D Printing: Marrying Design and Construction



Fig 2.3D Printing

3D printing is gaining a lot of scope in construction industry not just creating a model, but also in business – and with 3D printers coming down in price each year, it's not long before we'll see them used in civil engineering. 3D printing offers benefits for both design and construction, with 3D printing, it's easy to design custom and creative construction supplies and then build them using nearly any kind of material imaginable. In fact, 3D printers are already in use in construction projects in Europe. Dutch construction company Heymans – most well-known for its "smart highway" and its glowing bicycle paths, which use luminescent paint to clearly mark road lanes at night – has created the world's first 3D-printed bridge. The bridge, which was first designed in October 2015, will span across the Oudezijds Achterburgwal canal when it is completed in 2017.

MX3D's 3D printer, though, isn't like those that we've traditionally seen. Rather than a desktop 3D printer, MX3D's technology consists of a set of large mechanical arms that hold a torch-like tool for welding. These robot arms build 3D objects in an open warehouse space rather than inside a box as most 3D printers do. The arms can also print in all directions, unlike typical 3D printers, which allows for much more creativity and variability in the design stage. Heymans Innovation Manager Jarred van der Venn says that 3D printing joins design and construction into a single process, rather than two separate processes as has traditionally been seen in construction. Van der Venn notes that this change will require site managers and designers to start looking at the design process in a new way.

However, 3D printers do pose several challenges for civil engineering. First and foremost, 3D printers are limited in the kinds of materials they can print – for instance, 3D printers that can print circuit boards are still in development and may not be ready for commercial use for several years. 3D printers also pose a threat to manufacturing jobs, and training staff to use 3D printers may require a significant capital investment.

C. Recycled Plastic Used In Construction Fields



Fig 3. Animated view of typical plastic roads

Plastic is one of the most commonly recycled products in now days, with plastic materials most often being recycled into bottles, bags, toys, containers, and much more. But now, a Dutch company is attempting to recycle plastic into something much larger: Roads and building materials. VolkerWessels is a Dutch construction company that is preparing to build a Plastic Road in Rotterdam. While VolkwerWessels' Plastic Road is still only a concept, it's becoming quite popular in Holland, where 96 million tons of carbon dioxide are released into the air through road building and maintenance alone. VolkerWessels expects that its Plastic Road will reduce greenhouse gas emissions while making roads stronger and increasing their lifespan. Holland's infrastructure industry expects that these new roads will slowly change the way, thus development occurs. Relative to laying an asphalt road, building the plastic roads is significantly faster, and could take just a few weeks to construct. These Plastic Roads are also helpful in the upgrading of infrastructure. As the road is hollow, which allows city planners to run pipes and wires inside the road itself. By the various researches and scientifically it has been proved that the road's hollow cavities are useful in draining floodwater during heavy rainfall. If Holland's plan succeed, it would forever change the way of civil engineers all over the world approaching the road building.

There are concerns about the plastic roads that Netherland plans to build. Environmentally, there are concerns that the plastic may combine with the soil and harmful to the local flora. The road's components are also somewhat volatile, and exposure to chlorine will cause the road to release hydrogen chloride – a colourless gas that, when exposed to atmospheric humidity turns into hydrochloric acid. When it becomes sufficiently concentrated, hydrochloric acid forms an acidic mist which can cause irreversible damage to human tissue and if it is combined with an oxidizing agent, hydrochloric acid synthesizes into toxic chlorine gas. That means the engineering process will require strict safety measures in order to protect the on-site crew, and the materials engineers responsible for the plastic road has to take the remedial measures to create a safeguard or additional waterproof layer that prevents leaching and exposure to chemicals.

D. Holographic Computers: Giving More Accurate Information to Engineers in Real Time



Fig 4. Holographic computers

The next revolution in civil engineering is here, and it's going to be a forever change in the information management and communication processes. Microsoft has been promoting its new Hollers for over a year, guiding the world's most respected technology journalists to a secret underground bunker at the company's Redmond campus for tightly controlled product demonstrations.

Hollers is a mixed reality headset that layers 3D holograms over physical world images in order to convey helpful information to the wearer. Using the Hollers, civil engineers can see digital input drawn over physical objects, share that input with collaborators via Skype, fine-tune designs in 3D, and explore designs in real time. A variety of businesses are currently using Microsoft Hollers to alter the way production happens. Volvo, for instance is using.

Hollers technology to design and configure its vehicles in completely new ways now a days. Meanwhile, NASA's Jet Propulsion Laboratory is planning to use the Hollers to make holographic representations of the Mars landscape based on Mars Rover images. Currently, businesses in the architecture and construction industries are piloting the Hollers and developing innovative new processes that leverage 3D holographic models to improve the design phase.

However, the Hollers also having some of the disadvantages. The headset could serve as a workplace distraction that obstruct productivity. The prototype version also has a very limited field of view, allowing increase in reality vision of only certain objects.

F. Contactless Security Cards: Using Of RFID to Boost Security



Fig 5. RFID protection cards

Site security is always a priority, and with technology evolving, site managers need more and more security measures at their disposal. The next big thing in site security is contactless security cards. These cards help in identifying unique cardholder, and can give users access to secure offices, secure parking, and even computer networks. The great advantage that these smart cards offer is that security becomes much easier to manage. Employees can check themselves into and out of the worksite with just a swiping of a card.

However, security cards also having certain disadvantages. Firstly, security cards can be lost or stolen. That means security cards that are reported as stolen or lost will need to be immediately deactivated. Card-based site access systems are also vulnerable to hacking site. Workers won't even know their card has been hacked.

G. Software's used in Modern Construction Industry:-



Fig 6. Various software's used in civil engineering

By using the modern software's we can predict the structures parameters such as elevations, realistic images, 3d view , structural behaviour , deception age , weak zones and over reinforced zones etc. There by knowing the future of a structure which is to be build. So many software's are used in civil engineering so that we classified the software's based on their functions those are as follows

1. Modelling:-

- Auto cad & Autodesk Revit
- Sketch Up
- Archi Cad
- SP 3D
- Planner 3d

2. Analysis and design:-

- STAAD.Pro
- SAP 2000
- SAFE
- ETABS
- ANSYS

3. High ways

- MX ROADS
- HDM
- AUTO PLOTTER
- HEADS

H. Equipment's Used In Modern Construction:-

By using the modern equipment's in every construction works will reduces the time as well as effort with a greater quality. In recent years so many equipment's emerging into construction field, these equipment's created in view of specific works in construction.

Some of the examples are:-



Fig .7 Plastering equipment Fig.8 formwork equipment

Plastering equipment is designed of 1 to 1.5 m width which can plaster the wall up to desired height with optimum cement mortar quantity. Formwork equipment is designed using fibre and plastic materials which is more durable than metallic

formworks and exhibit the greater finishing appearance.

J. Materials and techniques used In Recent Years

1. Photo-catalytic Cement: - This is a patented Portland cement developed by Italcementi Group. The photo-catalytic components use the energy from ultra-violet rays to oxidize most organic and some inorganic compounds. Air pollutants that would normally result in discoloration of exposed surfaces are removed from

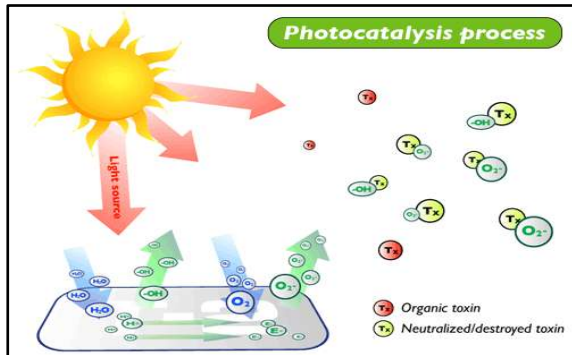


Fig 9. Photo catalysis process

2. Waffle slabs



Fig 10. During construction Fig 11. After construction

Waffle slab Are a reinforced concrete footing and slab system constructed on ground. They consist of a perimeter footing (edge beam) and a series of narrow internal beams (strip footings) at one meter nominal centres running each way. The whole footing and slab system is constructed on top of the ground.

the atmosphere by the components, and the residues are washed off by rain. This cement can be used to produce concrete and plaster products that save on maintenance cost while they ensure a cleaner environment. In addition to Portland cement binders, the product contains photo-catalytic titanium dioxide particles. The cement is already being used for sound barriers, concrete paver blocks and façade elements. Other applications include pre-cast and architectural planners, pavements, concrete masonry units, cement tiles etc.

Conclusion

By the use of modern trends we can achieve the greater quality of work and reducing the wastage of materials, Eliminating the risks during and after construction We can construct economical buildings, eco-friendly buildings, tallest structures, under water construction, aesthetic appearance to the city, and many more advantages are there but the main thing is researches, invention implementation, trained and skilled employees and investment.

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