Gyan Ganga
Institute of Technology & Sciences
Jabalpur

Department of Civil Engineering

संरचना
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We shape our buildings, thereafter they shape us.

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FROM THE EDITOR`s DESK

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WORD FROM HOD

I am very happy that our civil engineering department is releasing the first issue of departmental newsletter the department runs UG program in civil engineering and PG programs in structure engineering the department has well qualified and dedicated faculty who are continuously supporting the students for their academic excellence newsletter is a technical platform to bring out the hidden talents that our students and faculty each issue of this newsletter unleashes the imagination and creations of our vibrant faculty and students in spite of being the oldest discipline civil engineering is still evolving and many new developments are taking place lots of research activities are going on in low cost housing green buildings disaster resistance construction etc this newsletter will abreast the student and faculty with these new techniques

Prof. VEDANT SHRIVASTAVA

I congratulation the editorial team for their efforts to make this newsletter and reality I invite the readers of this newsletter for their contribution and suggestions.

VISION

- The vision of Department of Civil Engineering is to develop the students that will handle critical areas in System planning, Design and Rehabilitation management of the infrastructure for giving much needed impetus for economic development and improve quality of life, meeting the societal needs.

MISSION

- To generate a specialized cadre of Civil Engineering by imparting training through the state of the art laboratories and updated hardware and software.
- To excel in R&D and Industrial Consultancy with linkages in India and abroad and bring teaching, research and consultancy to international standards in the field of Civil Engineering.
- To create accredited / certified centre for testing of materials and structures to cater to the needs of infrastructure sector / industries.

PEO(PROGRAMME EDUCATIONAL OUTCOMES)

PEO 1: The graduate of the program will possess competency in their professional career stretching from laying of foundations of constructions to making world class infrastructures by continuously thriving the pursuit of higher technical education and research.

PEO 2: The graduate of the program will possess an ability to address the complexity of real life engineering problem and be able to formulate/design solutions that are technically sound, economically feasible and environmentally sustainable.

PEO 3: The graduate of the program will possess capability to work, communicate efficiently in team in cross cultural perspective leading up to becoming entrepreneurs.

PO(PROGRAMME OUTCOMES)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to oneâ€™s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

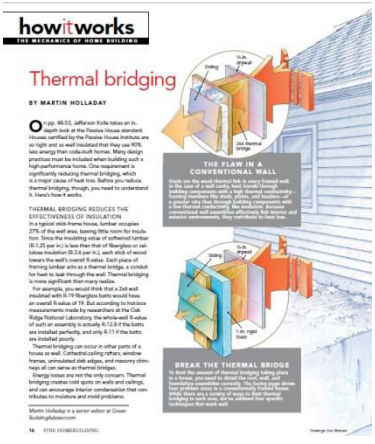
PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

NEW TECHNOLOGIES IN CIVIL ENGG.

1. Self-healing concrete

Cement is one of the most widely used materials in construction, but also one of the largest contributors to harmful carbon emissions, said to be responsible for around 7 per cent of annual global emissions. Cracking is a major problem in construction, usually caused by exposure to water and chemicals. Researchers at Bath University are looking to develop a self-healing concrete, using a mix containing bacteria within microcapsules, which will aid building innovation by germinating when water enters a crack in the concrete to produce limestone, plugging the crack before water and oxygen has a chance to corrode the steel reinforcement.

2. Thermal bridging


howitworks
THE MECHANICS OF HOME BUILDING

Thermal bridging

BY MARTIN HOLLADAY

On pp. 48-53, Jefferson Kolle takes an in-depth look at the Passive House standard. Houses certified by the Passive House Institute are so tight and so well insulated that they use 90% less energy than code-built homes. Many design practices must be included when building such a high-performance home. One requirement is significantly reducing thermal bridging, which is a major cause of heat loss. Before you reduce thermal bridging, though, you need to understand it. Here's how it works.

THERMAL BRIDGING REDUCES THE EFFECTIVENESS OF INSULATION

In a typical stick-frame house, lumber occupies 23% of the wall area, leaving little room for insulation. Since the insulating value of softwood lumber (R-1.25 per in.) is less than that of fiberglass or cellulose insulation (R-3.6 per in.), each stick of wood lowers the wall's overall R-value. Each piece of framing lumber acts as a thermal bridge, a conduit for heat to leak through the wall. Thermal bridging is more significant than many realize.

For example, you would think that a 2x6 wall insulated with 6.19 fiberglass batts would have an overall R-value of 19. But according to hot-box measurements made by researchers at the Oak Ridge National Laboratory, the whole-wall R-value of such an assembly is actually R-12.8 if the batts are installed perfectly, and only R-11 if the batts are installed poorly.

Thermal bridging can occur in other parts of a house as well. Cathedral-ceiling rafters, window frames, uninsulated slab edges, and masonry chimneys all can serve as thermal bridges.

Energy losses are not the only concern. Thermal bridging creates cold spots on walls and ceilings, and can encourage interior condensation that contributes to moisture and mold problems.

Martin Holladay is a senior editor at Green Building Advisor.com.

16 FINE HOMEBUILDING

THE FLAW IN A CONVENTIONAL WALL

BREAK THE THERMAL BRIDGE

Efficient insulation material is becoming increasingly important throughout the construction industry. Heat transmission through walls tends to be passed directly through the building envelope, be it masonry, block or stud frame, to the internal fascia such as drywall. This process is known as “thermal bridging”. Aerogel, a technology developed by Nasa for cryogenic insulation, is considered one of the most effective thermal insulation materials and US spin-off Thermablok has adapted it using a proprietary aerogel in a fibreglass matrix.

3. Photovoltaic glaze

One of the most exciting new technologies used in civil engineering is building integrated photovoltaic (BIPV) glazing, which can help buildings generate their own electricity, by turning the whole building envelope into a solar panel. Companies such as Polysolar provide transparent photovoltaic glass as a structural building material, forming windows, façades and roofs. Polysolar's technology is efficient at producing energy even on north-facing, vertical walls and its high performance at raised temperatures means it can be double glazed or insulated directly. As well as saving on energy bills and earning feed-in tariff revenues, its cost is only marginal over traditional glass, since construction and framework costs remain, while cladding and shading system costs are replaced.

4. Kinetic Footfall

One of the latest civil engineering technologies under development is kinetic energy. Pavegen provides a technology that enables flooring to harness the energy of footsteps. It can be used indoors or outdoors in high traffic areas, and generates electricity from pedestrian footfall using an electromagnetic induction process and flywheel energy storage. The technology is best suited to transport hubs where a large flow of people will pass over it. The largest deployment the company has done so far is in a football pitch in Rio de Janeiro to help power the floodlights around the pitch. It also currently has a temporary installation outside London's Canary Wharf station powering street lights.

5. Kinetic Roads

Italian startup Underground Power is exploring the potential of kinetic energy in roadways. It has developed a technology called Lybra, a tyre-like rubber paving that converts the kinetic energy produced by moving vehicles into electrical energy. Developed in co-operation with the Polytechnic University of Milan, Lybra operates on the principle that a braking car dissipates kinetic energy. The cutting-edge technology is able to collect and convert this energy into electricity before passing it on to the electricity grid. In addition to improving road safety, the device upgrades and promotes sustainability of road traffic.

6. Predictive Software

The structural integrity of any building is only as good as its individual parts. The way those parts fit together, along with the choice of materials and its specific site, all contribute to how the building will perform under normal, or extreme, conditions. Civil engineers need to integrate a vast number of pieces into building designs, while complying with increasingly demanding safety and government regulations. Predictive software can help ensure even the most innovative structures in civil engineering are safe and efficient, by simulating how they will behave. An example of this was work on the structural integrity of the arch rotation brackets at Wembley Stadium, undertaken by Bennett Associates, using ANSYS software, which simulated the stresses on the brackets that hold and move the distinctive arches above the stadium

7. 3D Modeling

Planning and building innovation has been driven by the growth of smart cities. CyberCity3D **(**CC3D) is a geospatial-modeling innovator specializing in the production of smart 3D building models. It creates smart digital 3D buildings to help the architectural, engineering and construction sector visualize and communicate design and data with CC3D proprietary software. The models integrate with 3D geographic information system platforms, such as Autodesk and ESRI, and can stream 3D urban building data to Cesium's open architecture virtual 3D globe. It provides data for urban, energy, sustainability and design planning, and works in conjunction with many smart city SaaS platforms such as City zenith.

8. Modular Construction

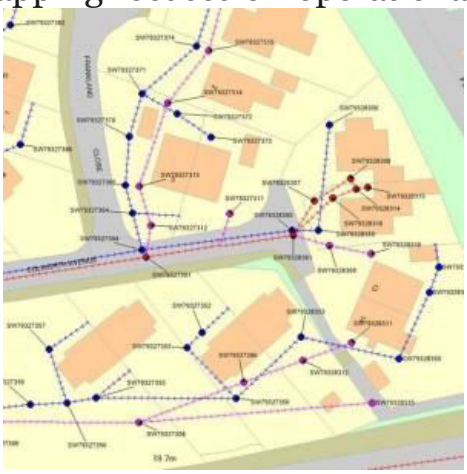
Modular construction is one of the most popular developments in civil engineering where a building is constructed off-site using the same materials and designed to the same standards as conventional on-site construction. This innovative building technique limits environmental disruption, delivering components as and when needed, and turning construction into a logistics exercise. It also has strong sustainability benefits, from fewer vehicle movements to less waste. With up to 70 per cent of a building produced as components, it allows a move towards "just in time" manufacturing and delivery. In use in the United States and UK, Chinese developer Broad Sustainable Building recently completed a 57-storey skyscraper in 19 working days using this method.

9. Cloud Collaboration

Another new technology used in civil engineering is a cloud collaboration tool called basestone. basestone is a system allowing the remote sharing of data on a construction site in real time. It is predominantly a review tool for civil engineers and architects which digitises the drawing review process on construction projects, and allows for better collaboration. The cloud-based collaboration tool is focused on the installation of everything from steel beams to light fittings. The system is used to add "snags", issues that happen during construction, on to pdfs, then users can mark or add notes through base stone. Trials have revealed possible cost-savings of around 60 per cent compared with traditional paper-based review methods.

10. Asset mapping

Not all of the latest civil engineering developments are new construction materials or flashy technological tools. Asset mapping focuses on operational equipment, including heating and air conditioning, lighting and security systems. The process includes collecting data from serial numbers, firmware, engineering notes of when it was installed and by whom, and combines all the data in one place. This system can show engineers in real time where the equipment needs to be installed on a map and, once the assets are connected to the real-time system using the internet of things; these can be monitored via the web, app, and other remote devices and systems. It helps customers build databases of asset performance, which can assist in proactive building maintenance, and also reduce building procurement and insurance costs.



ENERGY EFFICIENT BUILDING

Energy efficient buildings (new constructions or renovated existing **buildings**) can be defined as **buildings** that are designed to provide a significant reduction of the**energy** need for heating and cooling, independently of the **energy** and of the equipments that will be chosen to heat or cool the **building**.

Energy efficiency over the entire life cycle of a building is the most important goal of sustainable **architecture**. **Architects** use many different passive and active techniques to reduce the **energy** needs of buildings and increase their ability to capture or generate their own **energy**.

Commercial Water Heaters. Heat Pump Water Heaters. High **Efficiency** Gas Storage Water Heaters. Solar Water Heaters. Whole Home Tankless Gas Water Heaters.

Energy-efficient buildings reduce indoor air pollution because they offer cleaner combustion and better ventilation than traditional **buildings**. And because they use less **energy**, they also curb outdoor pollution by reducing the fossil fuel pollution created by **power** generation

Most Energy-Efficient Building Materials

- 1) Recycled steel: Two out of three tons of new steel are usually recycled from old steel.
- 2) Spray foam insulation: ...
- 3) Thermostat radiant barrier sheathing: ...
- 4) Bamboo plywood: ...
- 5) Insulating concrete forms: ...
- 6) Straw bales: ...
- 7) Plant-based polyurethane foam: ...
- 8) Cool roof:

Civil Engineering

Civil engineers create, improve and protect the environment in which we live. They plan, design and oversee construction and maintenance of building structures and infrastructure, such as roads, railways, airports, bridges, harbours, dams, irrigation projects, power plants, and water and sewerage systems.

Civil engineers conceive, design, build, supervise, operate, construct and maintain infrastructure projects and systems in the public and private sector, including roads, buildings, airports, tunnels, dams, bridges, and systems for water supply and sewage treatment.

STUDENT ACHIEVEMENTS

Chancellor award

ANAMIKA PANDEY
(2016-2020 BATCH)

ARCHIT DUBEY
(2014-18 BATCH)

NIKHIL TIWARI
(2018-22 BATCH)

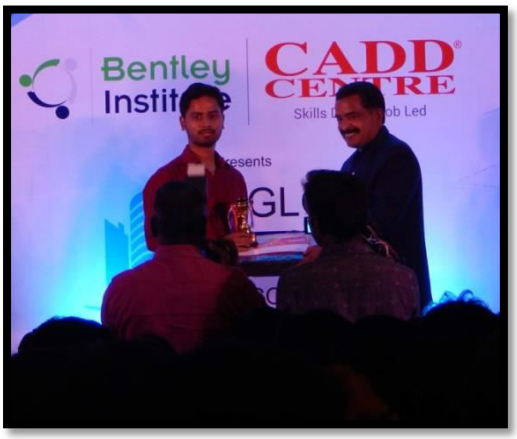
AMIT SAHU
(2016-20 BATCH)

COMPETITIONS

SRIJAN 2018

SRIJAN 2019

CADD CENTRE



NODAL CHAMPIONSHIP

EVENTS

INCINIRATION PLANT

GEOLOGICAL TOUR

BITUMINOUS PLAN

BARGI DAM

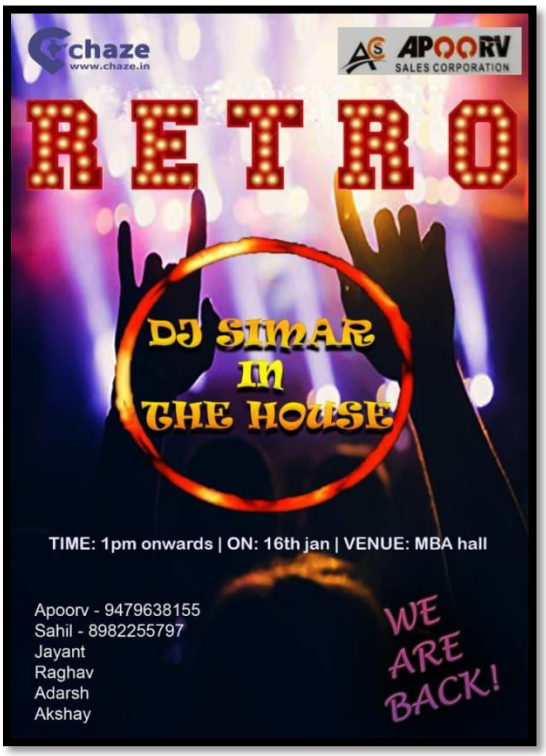
GYANOTSAV 2K20

3 legged race

BAND PERFORMANCE

GULLY CRICKET

DJ PARTY



POSTER MAKING COMPETITION

ON ROAD SAFETY

AICTE CHHATRA VISHWAKARMA AWARDS