



2015

VINYASA

Volume - 1

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Editorial

Dr. K. Prakash

Professor & Head
Department of Civil Engineering
S.J. College of Engineering, Mysuru-06
Staff Advisor



I am glad that the first volume of the magazine of the Department of Civil Engineering, Sri Jayachamarajendra College of Engineering, Mysuru is being brought out by the department. The purpose of this magazine is to share the department information as well as the talents / achievements of the students / staff with the stake holders. The magazine includes information about the activities / achievements of the faculty / students of the department, technical articles and also a section meant to showcase the hidden talents of the students in the fields of literary and art.

In this era of globalisation of education, the administration of Sri Jayachamarajendra College of Engineering has planned to go for getting accreditation by NBA as per Washington accord. This requires the implementation of OBE system at SJCE. As a part of this move, this magazine projects the Vision, Mission, Programme Educational Objectives (PEOs) and Programme Outcomes (POs) of the department of Civil Engineering, which have been formulated in consultation with various stake holders of the department.

Mr. Beno J Jacob and Ms. Navya Anu Varghese, the student editors of this magazine, are instrumental in getting an appropriate name for this magazine. They carefully scrutinised a number of proposals received from the students in response to our request for suggesting an appropriate name for the magazine and finally, they have come out with the name 'VINYASA'. My congratulations to the entire student community of the department in general and the student editors in particular for their useful contributions for making the department magazine a reality.

Student Editors

Beno J Jacob and Navya Anu Varghese

IV Year B.E. (Civil)



We are very happy to release the first volume of 'VINYASA' –magazine of the Department of Civil Engineering. We are thankful to all our teachers and student friends of the department for their encouragement through useful contributions to the magazine.



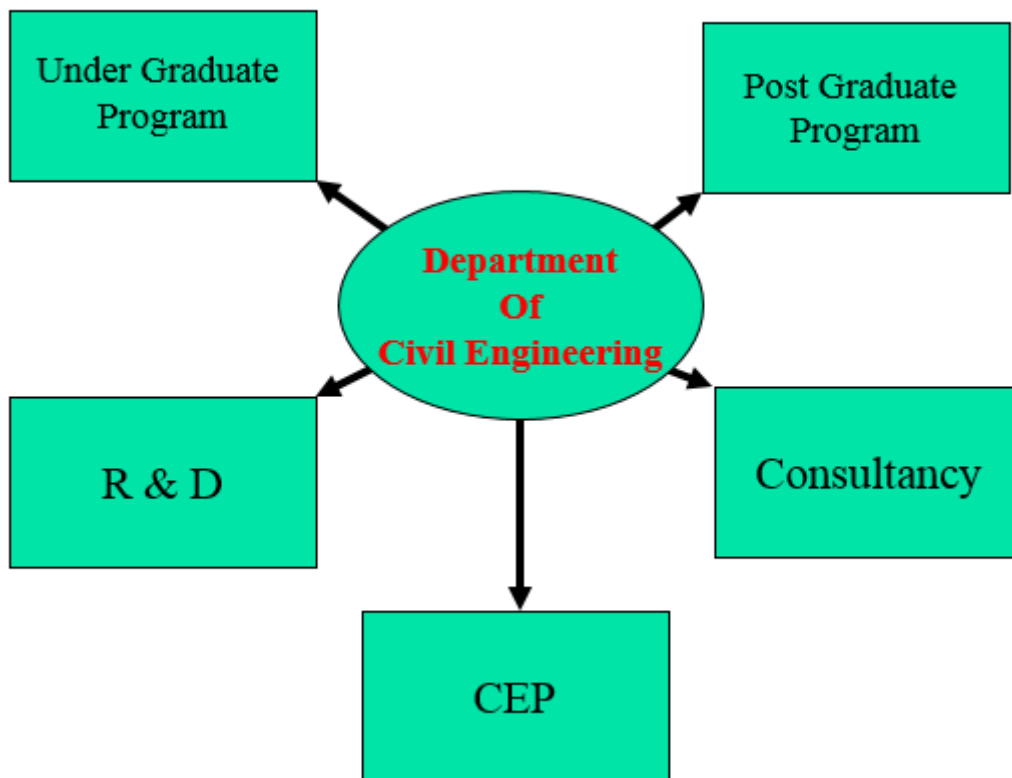
DEPARTMENT OF CIVIL ENGINEERING

SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING, MYSURU – 570 006

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Mission and Vision of the Department

VISION

To produce engineers having professional and leadership qualities with capacity to take up research and professional assignments in Civil Engineering and allied fields with focus on inter-disciplinary and innovative approach and to compete in Civil Engineering profession at the global level.

MISSION

- To impart quality and real time education to contribute to the field of Civil Engineering.
- To impart soft skills, leadership qualities and professional ethics among the graduates to handle projects independently.
- To develop graduates to compete at the global level.
- To deal with the contemporary issues and to cater to the societal needs.

Programme Educational Objectives (PEOs)

- (A) To impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of Civil Engineering and to serve the society.
- (B) To impart the knowledge of analysis and design using the codes of practice and software packages.
- (C) To inculcate the sense of ethics, morality, creativity, leadership, professionalism, self confidence and independent thinking.
- (D) To motivate the students to take up higher studies and innovative research projects.

PROGRAMME OUTCOME (POs)	
P01	The student has the ability to relate the basic principles of science to solve engineering problems.
P02	The student has satisfactory knowledge of mathematics to develop analytical models in engineering.
P03	The student has the knowledge of management principles, leadership principles, ethics, entrepreneurship, economics, innovative engineering and soft skills to handle civil engineering projects independently.
P04	The student has the ability to plan, analyse and design components of structures.
P05	The student has the ability to use computers and software packages for the analysis, design and detailing of Civil Engineering structures.
P06	The student has the ability to plan, analyse and design the transportation facilities.
P07	The student has the ability to analyse and design water supply & sanitary system and sustainable water management system.
P08	The student has the ability to do estimate and take up quantity surveying of civil engineering projects.
P09	The student has the ability to carry out survey, to adopt economical & durable materials and to take up construction using innovative and sustainable technology.
P10	The student has intellectual and motor skills to handle projects independently and to take up research activities.

List of Faculty Research Publications

International Journals

- Prakash, K., Sridharan, A. and Sheshashayana, M. (2014), "Appraisal of observational method for consolidation analysis", Geotechnical Engineering, Proc. Inst. Civil Engg. (London), Vol. 167, No. GE6, pp. 518-525, doi.org/10.1680/geng.13.00006.
- Naveed, A.G. and Chandradhara, G.P. (2014), "Seismic performance of infilled frames with and without opening", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), e-ISSN: 2278-1684, p-ISSN: 2320-334X, PP 38-44.
- Chandradhara, G. P. and Vikram, M.B. (2014), "Effect of wind load on the aspect ratio of the building", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE),e-ISSN: 2278-1684, p-ISSN: 2320-334X,PP 45-49.
- Raghavendra Prasad M.D., Syed Shakeeb-ur-Rahman and Chandradhara, G.P. (2014), "Equivalent diagonal strut for infilled frames with openings using finite element method", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE),e-ISSN: 2278-1684, p-ISSN: 2320-334X, PP 24-29

International Conferences

- Naveed A.G. and Chandradhara, G.P. (2014), “Effect of position and percentage of opening in infilled frames under seismic forces”, International Conference on ‘Recent Advances in Engineering sciences’ (ICRAES-2014), September 4th and 5th 2014, M. S. Ramaiah Institute of Technology, Bengaluru-54.
- Rashmi, B.S. and Chandradhara, G.P. (2014), “Behaviour of short span reinforced concrete simple slab bridges and T – beam bridge”, International Conference on ‘Recent Advances in Engineering sciences’ (ICRAES-2014), September 4th and 5th 2014, M. S. Ramaiah Institute of Technology, Bengaluru-54.

National Conferences

- Prakash, K., Sridharan, A. and Prasanna, H.S. (2014), “Yield stresses of compacted soils: A comparative study”, Proceedings of the National Conference on Geotechnical Engineering Practice and Sustainable Infrastructure Development (GEPSID-2014), Ludhiana, India, pp. 140-145
- Prakash, K., Prasanna, H.S. and Sridharan, A. (2014), “A study of compaction characteristics of fine-grained soils”, Proceedings of Indian Geotechnical Conference IGC-2014, Kakinada, India, 18th - 20th Dec., 2014, pp. 6-13.
- Chandradhara, G.P. and Prasad, S.K. (2014), “Dynamic behavior of embankment on weak and stiff subsoil”, Proceedings of Indian Geotechnical Conference IGC 2014, 18 to 20 Dec 2014, University College of Engineering, Kakinada.
- Rajesh M.N. and Prasad, S.K. (2014), “Influence of foundation flexibility on the behavior of R C frames using pushover analysis”, Proceedings of Indian Geotechnical Conference IGC 2014, 18 to 20 Dec 2014, University College of Engineering, Kakinada.
- Dinakara K.N. and Prasad, S.K. (2014), “Comparative study of support systems for deep excavation using PLAXIS”, Proceedings of Indian Geotechnical Conference IGC 2014, 18 to 20 Dec 2014, University College of Engineering, Kakinada.
- Prasad, S. K. and N.M. Jagadeesh, (2014), “Slope failures due to human disturbance leading to malfunctioning of infrastructure: Who is responsible?”, Forensic Geotechnical Engineering Preconference Workshop, 10th October 2014, Ludhiana.
- Prasad, S. K., N.M. Jagadeesh and C.N. Yadunandan, (2014), “Case Studies on Failure of Retaining Wall”, Proceedings of the National Conference on Geotechnical Engineering Practice and Sustainable Infrastructure Development (GEPSID-2014), Ludhiana, India.

Written Discussion

International Journals

- Prakash, K. and Sridharan, A. (2014), Discussion on ‘Atterberg limits and remolded shear strength-water content relationships’ (O’Kelly, B.C., Geotechnical Testing Journal, ASTM, Vol. 36, No. 6, pp. 939-947, doi: 10.1520/GTJ2013001), Geotechnical Testing Journal, ASTM, Vol. 37, No.4, pp. 726-728, DOI:10.1520/GTJ20140008. ISSN 0149-6115

➤ **Workshops / Conferences organized**

Date	Title	Organized in collaboration with	Duration
24.04.2015	One Day National Workshop 'Recent Advances in Geotechnics for Infrastructure – RAGI 2015'	– NIE, ACCE(I), Mysore Chapter and TEQIP-II	1 Day
15.11.2014	Design Safe 2014: One Day Colloquium on Design of Bridges – Concepts and Applications	ACCE(I), Mysore Chapter	1 Day
06.11.2014	Demonstration of CYPE Software by Mr. Amarnath S.N., M/s F.E. Designs, Bengaluru	–	1 Day

➤ **Expert Lectures organized**

Sl. No.	Name of the Invited Speaker	Title of the Lecture delivered	Address of the Speaker	Date of the Lecture
1.	Dr. G.L. Sivakumar Babu	Engineering Properties of Land Fills	Professor, Geotechnical Engineering Division, Department of Civil Engineering, Indian Institute of Science Bengaluru -560012	27.03.2015
2.	Dr. V. Ramachandra	Advances in Finite Element Analysis in Structural Analysis	Zonal Head (Technical) UltraTech Cement Ltd, Industry House, 6th Floor, Fair Field Layout, 45 Race Course Road, Bengaluru - 560 001	27.03.2015
3.	Mr. Pavan Koushik	Sesimic Design	Structural Engineer, Harrison Grierson .Com, Newzeland	05.11.2014
4.	Prof. B.R. Srinivasa Murthy	“Practical Issues related with Geotechnical Engineering” (Prof. Srichand Endowment Lecture)	Professor (Retd.), IISc., Bengaluru,	23.09.2014
5.	Prof. C.V.R. Murthy	“Ensuring Earthquake Safety in India- Role of Engineers” (First K.N Subramaniah Memorial Endowment Lecture)	Director, Indian Institute of Technology Jodhapur	16.08.2014

➤ **Awards / Recognition**

- Ms. Rachana R. Gowda was felicitated by Civil 83 Team for being the topper in B.E. (Civil Engineering), 2013-14 on 17th October, 2014 in a function organised at SJCE, Mysuru.
- Ms. Rachana R. Gowda and Mr. Rajaram Vailaya S. were felicitated by Builders Association of India, Mysore Centre for securing first two places in B.E. (Civil Engineering), 2013-14 on 26th August, 2014 in a function organised at the Office of the Builders Association of India, Mysuru Centre, Mysuru.
- Mr. Jayachandra G.V., VI Semester B.E. student of the department has been selected for the prestigious Indian Academy of Science Summer Research Fellowship Programme of the three science academies of India for the year 2015 under the guidance of Dr. Ashish Juneja, Indian Institute of Technology Bombay, Mumbai.

➤ **Achievements of the Department**

- Won the **Champions Trophy** in the National Level Technical Symposium, *CONCRETE FAIR '14*, organized by the R.V. College of Engineering, Bangaluru, in collaboration with Indian Concrete Institute, on 28th and 29th October, 2014.
- Won the **Champions Trophy** in the National Level Technical Symposium, *AAKAR-14*, organized by the National Institute of Engineering, Mysuru, on 19th and 20th September, 2014.

➤ **Achievements of the students**

The students from the department of Civil engineering, SJCE, Mysuru regularly participate in various inter-institute events conducted by many educational institutions and receive prizes / awards / recognition.

Sl. No.	Details of the Tech. Fest	Name of the student(s)	Class	Event	Prize won
1.	DESIGN SAFE – 2014: organized by the Association of Consulting Civil Engineers (India), Mysuru, in association with the Department of Civil Engineering, SJCE, Mysuru on 15th November, 2014	Mr. Karthik S. and Mr. Nagaraj	III Sem. M.Tech. (IS)	Technical Quiz	<i>First Prize</i>
		Mr. Manju Prasad A.R. and Mr. Sachin Patel G.R.	III Sem. M.Tech. (IS)	Technical Quiz	<i>Second Prize</i>
2.	<i>NIRMAAN - 2014</i> , a National Level Technical Symposium, organized by the BMS College of Engineering, Bengaluru, on 26 th and 27 th September, 2014	Mr. Beno J. Jacob And Mr. Vishwas	VII Sem. B.E. (Civil Engg.)	Civil Quiz	<i>Second Prize</i>
3.	SAMRACHANA - 2014, a National Level Technical Symposium, organized by the SJB Institute of Technology, Bengaluru, on 25 th September, 2014	Mr. Dhanush M.L. and Mr. Kiran Kumar	VII Sem. B.E. (Civil Engg.)	Surveying	<i>First Prize</i>
4.	AAKAR-14, a National Level Technical Symposium, organized by the National Institute of Engineering, Mysore, on 19th and 20th September, 2014	Mr. Rakshith M. and Dhanush M.L.	VII Sem. B.E. (Civil Engg.)	Geotechnique	<i>First Prize</i>
		Mr. Beno J. Jacob and Lakshman R.	VII Sem. B.E. (Civil Engg.)		<i>Second Prize</i>
		Mr. Beno J. Jacob and Dhanush M.L.	VII Sem. B.E. (Civil Engg.)	Treasure Hunt	<i>Second Prize</i>
		Mr. Shariq Khan and Ms. Romika R. Kotian	VII Sem. B.E. (Civil Engg.)	Paper Presentation	<i>Second Prize</i>
		Mr. Muruga Swamy S. and Sathish M.K.	V Sem. B.E. (Civil Engg.)	Civil Quiz	<i>Second Prize</i>

Outcome Based Education System

V. Madhava Rao, Associate Professor


Everybody is a GENIUS. But if you judge a fish by its ability to climb a tree, it will live its whole LIFE believing that it is STUPID. In life destination is important than journey.

Outcome Base Education System (OBE) is the holistic approach to convert a student in to a great person, based on designed outcomes and defined goals. OBE is a philosophy that based education around pre-defined goals (outcomes). By the end of educational experience, each student is expected to have achieved that goal. Classes, opportunities and assessment should all help students attain skills. For efficient implementation of OBE needs a system to continuously track outcomes. Each assessment should be tracked based on specific outcomes.

Outcomes: What students are supposed to learn and achieve?
 Motivation: Why should students learn?
 Teaching strategies: How can teachers help students learn?
 Assessment: How the teacher knows the achievement of students?

Learning outcomes provide direction in the planning of a learning activity. Outcomes serve a guidelines for content, instruction and evaluation. Outcomes identify specifically what should be learned and exactly what is to be accomplished.

In OBE, continuous evaluation of skills achieved by the students towards satisfying the goals or outcomes is very important. The continuous evaluation should aim at testing the students skills at different levels or cognitive domains. Bloom's taxonomy is extensively adopted for assessing higher order thinking skills attainment.

	Evaluation	Post Graduate
	Synthesis	
	Analysis	
	Application	Bachelor
	Comprehension	
	Knowledge	

Washington accord is an international accreditation agreement (1989) for professional engineering academic degrees based on OBE. Graduate programmes of one country is recognized by other countries for having met the academic requirement. India is a signatory of Washington accord requirement. Getting accreditation by NBA as per Washington accord leads to recognition of institution and graduates of institution at the global level. OBE curricula has Programme Outcomes (PO), Programme Specific Outcomes (PSO), Course Outcomes (CO) and performance indicators as parameters.

From Traditional view	To OBE view
<ul style="list-style-type: none"> • Interaction • Inputs and resources. • Knowledge transfer by teacher. • Teacher disperses knowledge. • Teacher and students are independent 	<ul style="list-style-type: none"> • Learning • Outcomes • Knowledge exists in the mind of learner. • Teachers are designers of methods. • Teacher and students work in teams.

Student's role in OBE:

- Active Role – Must come prepared for each class, contribute by teaching others, active participation, learning from instructor / classmates.
- Ethics – respect, trust and openness.
- Committed to continuous learning.

Teacher's role in OBE	<ul style="list-style-type: none"> • Convince the students about POs, PEOs and PSOs. • Convince the students about CO. • Design the curriculum learning methodology etc., • Assess the attainments. • Motivate students to become good citizens. • Assess the attainments. • Guide the students to attain knowledge and skills.
Management's role in OBE	<ul style="list-style-type: none"> • To create all the facilities required to faculty and students. • To create an atmosphere of competitiveness. • To encourage the strong and to support the weak students. • To set goals of organization in par with the goals of other stake holders.
Alumni role in OBE	<ul style="list-style-type: none"> • To provide feedback about their attainments. • To give suggestions on the latest developments. • To participate in curriculum design. • Help Alma mater to raise higher levels.
Role of industries in OBE	<ul style="list-style-type: none"> • Assessing the attainment of graduates. • Giving advice for curriculum design.
Role of parents in OBE	<ul style="list-style-type: none"> • To motivate wards to attain skills and knowledge rather than concentrating only on scores / grades or salaries. • To motivate wards to become good citizens of country.

OBE makes learners more active. Learning is assessed on an ongoing basis. It induces critical thinking, improves reasoning. OBE is integration of knowledge, learning relevant and connected to real life situations.

Non Destructive Testing of Pavements

Dr. P. Nanjundaswamy, Professor

Introduction

Government of India invest thousands of crores of rupees each year on providing and managing the transportation infrastructure, and pavements represent a major component of those assets. Prudent and farsighted pavement investment decision making is one of the most critical, costly, and complex elements. At the heart of the decision making process is the pavement management system (PMS) which is driven by Pavement Evaluation.

Pavement evaluations are conducted to determine functional and structural conditions of a highway section either for purposes of routine monitoring or planned corrective action. Functional condition is primarily concerned with the ride quality or surface texture of a highway section. Structural condition is concerned with the structural capacity of the pavement as measured by deflection, layer thickness, and material properties.

At the network level, routine evaluations can be used to develop performance models and prioritize maintenance or rehabilitation efforts and funding. At the project level, evaluations are more focused on establishing the root causes of existing distress in order to determine the best rehabilitation strategies.

A nondestructive testing and evaluation (NDT&E) procedure can often be utilized to assess the structural adequacy of a pavement and in determining the materials properties for use in designing cost-effective rehabilitation strategies. Structural condition evaluation of existing asphalt pavement serves purposes such as, (i) estimation of its present sufficiency for the purpose served, (ii) estimation of remaining service-life and (iii) decision on the choice of rehabilitation measure. A desirable method is the one which neither causes disruption to traffic, nor causes any damage to the existing pavement structure. For quick acquisition of test data, a reliable and consistent test technique is needed. Nondestructive testing (NDT) methods provide all these features and are ideally suited for application to pavements. With NDT methods, a number of data sets can be acquired at the same point which provides statistical reliability to the experimentally acquired data.

Tools for NDT&E of Pavements

Several NDT systems are available for use in pavement evaluation. Based on the underlying principles, the NDT&E methods for asphalt pavements can be classified as follows:

- Deflection-Based Methods
- Electric/Electromagnetic Methods
- Seismic-Based Methods

- Penetration Methods
- Thermal Methods

In Deflection-Based methods, vertical deflections at various points on the surface of the pavement test-section, due to an applied load, are measured. Type of the load applied may be static, steady state harmonic or transient impulse type. The measurement of deflection at the load point and at locations radially outwards from it, can be done with the help of a dial gauge/linear variable differential transformer, or by using velocity transducers (geophones).

A static device measures deflection at one point under a nonmoving load. Static tests are slow and labour intensive compared to the other devices. Examples of a static device include the Benkelman Beam and other types of plate bearing tests.

Vibratory devices induce a steady-state vibration to the pavement with a dynamic force generator. There is a small static load that seats the load plate on the pavement. The dynamic force is then generated at a pre-computed frequency that causes the pavement to respond (deflect). The pavement deflections are typically measured with velocity transducers. There are several types of steady-state vibratory devices, including Dynaflect and Road Rater.



Benkelman Beam



Dynaflect

Impulse load devices, such as the Falling Weight Deflectometer (FWD) or Heavy-Falling Weight Deflectometer (HWD), impart an impulse load to the pavement with free-falling weight. The magnitude of the dynamic load depends on the mass of the weight and the height from which the weight is dropped. The resultant deflections are typically measured with geophones, accelerometers, or linear variable differential transducers (LVDT). The most popular and widely used NDT equipment falls in the impulse-based category.

Electrical/Electromagnetic Testing (ET) family of systems includes those that rely on technology such as electrical sensing fields, impedance, electric current, and radio waves to determine the quality of HMA pavement, base, or embankment. Electrical/Electromagnetic Testing (ET) is the process of inducing electric currents or magnetic fields or both inside a test object and observing the electromagnetic response. If the test is set up properly, a defect inside the test object creates a measurable response.



Falling Weight Deflectometer

In electromagnetic wave method, the reflections of the transmitted waves caused by any changes in the material and/or layer properties, are recorded and analysed to deduce the required information. Infrared thermography (IRT) and ground penetrating radar (GPR) can be identified as two types of NDE techniques that find application on asphalt pavement.

GPR consists of a radar device that transmits electromagnetic pulse. The subsurface anomalies, voids, location of dowel bar (applicable to concrete pavement), void below pavement, depth of bedrock, ground water level, pavement moisture content and frost penetration depth, type of subgrade soil strata, etc. can be estimated by this method. GPR system can be of two types; air coupled (or horn-antenna) and ground coupled system.



Ground Penetrating Radar (GPR)

IRT employs an infrared camera to capture the thermal image from top of the pavement. The subsurface defects affect the heat flow within the pavement, and this in turn affects the temperature distribution of the concerned area. The IRT can capture images of a larger area quickly. To some extent, this method can capture the location and extent of subsurface distresses in the form of cracking, segregation, ageing and construction non-

homogeneity, etc. The test results can also get affected by various field conditions such as time of testing, cloud cover, wind flow, pavement surface texture, solar radiation and sub-surface conditions.

Nuclear density gauges are able to measure the density of an in-place asphalt pavement with little or no disruption of the mat surface. The gauge operates using a small source of gamma radiation placed on the end of a retractable rod that is lowered to the pavement surface. This rod can be used in two modes, a direct mode where it penetrates the mat slightly, or a fully nondestructive mode where it remains entirely within the gauge. As the source emits radiation, the gamma rays interact with electrons in the asphalt mix and are scattered in various directions. Some of them bounce back and reach a detector housed in the gauge. The number of rays detected by the gauge is proportional to pavement density and can be calibrated to actual densities based on pavement cores tested in the laboratory.

Non-nuclear gauges have been developed as an alternative to nuclear density gauges because they do not contain radioactive material or require the same safety controls. The most common type are electrical gauges that send a small amount of current through the pavement to create an electrical field. The gauges determine pavement density by measuring the response to this field. When they were originally developed, non-nuclear gauges generally were not as consistently accurate as nuclear density gauges, but more recent devices have improved significantly. Electrical Density Gauge (EDG), Time Domain Reflectometry (TDR), Pave Tracker, Pavement Quality Indicator (PQI), and other Non-nuclear density gauges are commonly used in construction quality control and quality assurance activities to estimate density and/or moisture of layers of pavement and uniformity in mixtures.

Penetration methods are generally employed to determine moduli of different layers and for construction quality control. The advantage is easy to use with limited training and provides layer specific properties. However, it is not strictly an NDT and Moduli have to go through two levels of empirical relations. The dynamic cone penetrometer (DCP) is a device in which a hardened cone tip is placed on the surface and then a weight is repeatedly dropped on it from a specified height. After a set number of blows, such as every five blows, the penetration of the cone into the surface is measured. The DCP is used primarily on unbound materials such as base or subgrade soil, or weakly stabilized materials. It is considered nondestructive because the test does not affect the ability of the material to support the pavement structure. The DCP test indicates the shear strength of the material based on the measurement of the rate of penetration.

Thermal methods are commonly used to detect anomalies and for construction quality control. The advantage is Rapid and easy to use and covers a large area quickly. Environmental Conditions adversely impact quality of data.

Concluding Remarks

The ability to do more pavement testing using nondestructive methods can simplify the process and make some data collection more routine. Nondestructive testing devices are particularly useful for assessing variability in the pavement that may indicate areas of

weakness, and for measuring whether the load-bearing capacity of the pavement is structurally adequate. While some structural properties may require laboratory testing, it's great when some of the pavement evaluation work can be done in the field with nondestructive testing, because there is no need to tear up the pavement.

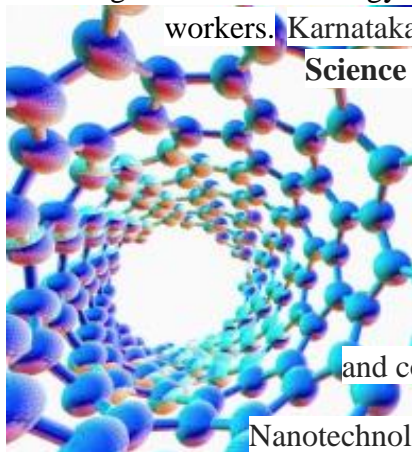
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- Amit Goel & Animesh Das (2008) "Nondestructive testing of asphalt pavements for structural condition evaluation: a state of the art", *Nondestructive Testing and Evaluation*, 23:2, 121-140, DOI: 10.1080/10589750701848697
- Harold L. Von Quintus, Chetana Rao, Robert E. Minchin, Jr., Soheil Nazarian, Kenneth R. Maser and Brian Prowell (2009) "NDT Technology for Quality Assurance of HMA Pavement Construction", National Cooperative Highway Research Program Report 626, Transportation Research Board.

Nanotechnology in Civil Engineering *Sinchana Natesh, IV Year B.E. (Civil)*

Nanotechnology, the future in construction, is the emerging field in science and technology and is poised to bring in revolutionary changes across all spheres of life. Civil engineering comprises of various specialisations such as Building Science and Technology, Construction Engineering and Management, Environmental Engineering, Geomatics Engineering, Geotechnical Engineering, Hydraulic and Water Resources Engineering, Structural Engineering, Transportation Engineering.

As nanoscale science and technology has come to have an increasing impact on many aspects of our daily lives, the opportunities for careers are expanding rapidly. A major challenge of nanotechnology is the education and training of a new generation of skilled workers. Karnataka is home to many such initiatives. **Indian Institute of Nano**



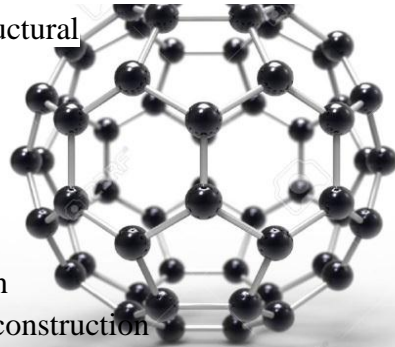
Science & Technology (IINSc) is one such research institution of Nano Science & Technology learning constructed and located in Bengaluru, India. The Indian Institute of Nano Science & Technology aims to support and develop nanotechnology and reap the benefits of this technology. Nanotechnology in India has started to be noticed and has high potential to develop and get importance in both research and commercial fields.

Nanotechnology is a field that is dominated by developments in basic Physics and Chemistry research, where phenomena at the atomic and molecular level are used to provide materials and structures that perform tasks that are not possible using the materials in their typical macroscopic form. The evolution of Instrumentation and Technology as well as its related scientific areas such as Physics and Chemistry are making the research on nanotechnology aggressive and evolutionary. However, the research is mainly moving forward, motivated by immediate profitable return generated by high value commercial products.

Nanotechnology is one of the most active research areas that encompass a number of disciplines including Civil Engineering and construction materials. It has been established by studies that Nanotechnology in Construction ranked 8 out of 10 applications that most likely have impact in the developing world.

Nanotechnology covers the design, construction and utilisation of functional structures with at least one characteristic dimension measured in nanometer. The field of nanotechnology has developed in major leaps during the past 10 years. Traditionally, nanotechnology has been concerned with developments in the fields of Microelectronics, Medicine and Materials sciences. However, the potential for the application of many of the developments in the nanotechnology in the area of construction engineering is growing.

Nanotechnology can be used for design and construction processes in many areas since nanotechnology generated products have many unique characteristics. These include products for lighter structures, stronger structural composites for construction of bridges, low maintenance coating, improving pipe joining materials and techniques, better properties of cementitious materials, reducing the thermal transfer rate of fire retardant and insulation, increasing the sound absorption of acoustic absorber and even for increasing the reflectivity of glass. It has been observed to be the most effective form of application in construction materials wherein concrete can have self-healing capacity, glass can have self-cleaning properties, materials can be made fire protective, nanosensors can be used for remote health monitoring and non-destructive condition assessment of existing structures and improving the fracture problems associated with high strength bolts stress risers. All these enhancing properties are brought about by using a few of the nanomaterials, namely CNT [Carbon Nano Tubes], TiO_2 [Titanium oxide], SiO_2 [Nano Silica], Vanadium Nano particle, Molybdenum Nano particle, Copper Nano particle etc.



As with most developing technologies, a major number of challenges exist during the initiation of these applications of the technology into reality. It is important to be realistic and identify and plan for the limitations and challenges inherent in this process. The main challenges and limitations can be defined as fabrication, health, environment and cost.

A number of promising developments that exists can potentially change the service life and life-cycle cost of construction infrastructure. Nanotechnology formed products, have unique characteristics and can significantly fix current problems of construction. Thus, let the future developments in the construction field be associated with the nanotechnology to ensure economic growth and social progress.

KISS THE CHILD GOODNIGHT

Aditya Shankar, III Year B.E. (Civil)

Kiss the child goodnight, tuck her in safe
Lest she should dream of escape
To a world where rainbows circle the skies
And you are not who you have striven to be.

Kiss the child goodnight; make sure you turn off the light
Lest she should be unafraid and bold
In the face of the infectious fear
That flits through your eyes in a dark, alien alleyway.

Kiss the child goodnight, hold her close and tight
Lest she reaches out to the same sun
That burned your naive fingertips
And shattered your lofty castle in the clouds.

Kiss the child goodnight, don't let her open those eyes
Until she is finally lulled to deep slumber
Wrapped within warm blankets
And the beginnings of complacency.

Kiss the child goodnight, watch her sleep in silence.



THE BREEZE

Navya Anu Varghese, IV Year B.E. (Civil)

The light, cool, serene breeze,
Carries with it songs from distant lands,
Sung for both the loved and those hard to please,
On lonely moonlit nights or in loud, robust bands.

It glides along - unbound, free,
Guiding the gloomy leaves into an elegant dance.

It rekindles my thoughts, awakens me,
And draws me out of a momentary trance.

With every gentle touch, it breathes new life.
And blows, undecided, on self charted routes.
All the obstacles it encounters during its strife,
It gently caresses and onward scoots.

Another dull, scorched world it eagerly greets,
Carrying no trails of its spoils from distant lands.
Enlivening every nook and corner it meets,
To far off lands, its journey it then expands.



ಶ್ರೇಷ್ಠರು

ಸ್ಪೂರ್ತಿ ಎಸ್., 4ನೇ ವರ್ಷ, ಬಿ.ಇ. (ಸಿವಿಲ್)

ಜೀವನದ ಕಥೆಯ ಬಾಳು,
ಇಂಪಾದ ಅಕ್ಷರಗಳ ಕಾಳು,
ಪುಟ್ಟ ಪುಟ್ಟ ಹೆಜ್ಜೆಗಳ ಸವಿಗಾನ,
ಕೇಳಿ ಬರುವುದು ತಿಳಿದವರ ಸನ್ಮಾನ
ಕಷ್ಟ ಸುಖಗಳೆಂಬ ಹಡಗಿನಲಿ,
ಬಂಧನೆಗಳ ನಡುವಿನಲಿ,
ಸಾರ್ಥಕತೆಯ ಗುಣ ಮನಸ್ಸಿನಲಿ,
ಉಕ್ಕಿ ಹರಿಯುವ ಪ್ರೀತಿ ಹೃದಯದಲ್ಲಿ,
ಶ್ರದ್ಧೆಯ ಶಕ್ತಿಯ ಭಾವದಲ್ಲಿ,
ಸುಶ್ರಾವ್ಯ ಮಾತಿನಲ್ಲಿ,
ಅಕಾಂಕ್ಷೆಯ ಬದುಕಿನಲ್ಲಿ,
ಪ್ರಕೃತಿಯ ನಡುವಿನಲ್ಲಿ,
ಸಂಸ್ಕೃತಿಯು ಕೈಯಲ್ಲಿ,
ಅಖಂಕಿಯ ಗುಣ ದೇಹದಲ್ಲಿ,
ಭವಿಷ್ಯವನ್ನು ರೂಪಿಸುವ
ಜೀವಿಗಳು ನಾವು, ಶ್ರೇಷ್ಠ ಮಾನವರು.

