THE CIVIL ENGINEER

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The Institution of Civil Engineers (India)

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The Civil Engineer

OUR INTELLECTUAL PILLARS

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Chairman of the Institution
Dr. S. L. Swamy

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IN THIS ISSUE...

From the Editor-in-Chief's Desk

The wait for the recent issue of the Civil Engineer is over, it is in your hands. This News Letter covers the normal features which are contained in our News Letters. This issue contains articles dealing with various areas of interest. The first article is about the Self Compacting Concrete (SCC) which is an innovative construction material, its advantages and disadvantages aptly dealt by the author.

An article on The Role of Building and the case for whole design, is quite enlightening. The article on Ethical Issues in Civil and Environmental Engineering: Code of conduct for Engineers is not only worth reading but also needs to be followed by the engineering fraternity in the letter and spirit.

For the leisure some interesting questions: find out how many you can answer has been incorporated. A thought provoking Add to your vocabulary will also apprise you why Civil Engineering is called Civil Engineering.

Snippets would give you a glimpse of ICE (I)'s contribution to various National and International Activities. Photo gallery which is also a normal feature of this news letter will give you eye soothing photos.

Before I conclude, ICE(I) wishes to place on record its heartfelt condolences to the people of Uttrakhand and the families who have been affected by such natural calamities. May God rest the deceased in peace and give enough strength to the bereaved families to bear the loss. Give wisdom to all of us to safeguard the environment to avoid such furry. ICE(I) is actively thinking of holding a National Seminar on the eve of ensuing Engineers' Day "Sustainable Development with Ecological Balance", details of which will appear in different quarters for the information of all concerned.

I take this opportunity to wish you best of luck in the just concluded summer 2013 examination.

With my regards to you all.

Dr. S.L. Swamy

Chairman

From the Editor's Pen

Welcome to the first issue of 2013 of the newsletter "The Civil Engineer". You are aware that real estate has emerged as a critical driver of economic growth with multiplier effects on the Indian economy. It is the second largest employment generating sector after agriculture. Presently, real estate in India is growing strongly on the back of rapid urbanization, positive demographics and rising income levels in the domestic market.

Recently, the Union Cabinet cleared the Real Estate (Regulation and Development) Bill. Amongst the provisions, importantly the Bill seeks to set up a real estate regulator. A real estate regulator — to be set up in every state — will ensure that private developers get all their projects registered with it before sale and only after obtaining all necessary clearances. The Bill can be expected to provide clarity on the project standards and timelines for completion thereby bringing in greater transparency and compliance in the sector. Let us watch the details.

Alumni Engagement is at the core of the Institution of Civil Engineers (India). Keeping this in mind, the institution has worked towards building a strong alumni community and will continue to work in this direction. I would like to take this opportunity to remind the candidates whose certification has been completed and have not yet submitted their Alumni Membership Form are requested to get in touch with us at the earliest. You may glance at the list of Alumni members as it appears in this issue.

Some of the important activities during this period are worth mentioning:

The President of Association of Professional Engineers and Geo Scientists of Manitoba Canada Mr. Grant Koropatnick along with Ms. S. Robym L. Koropatnick Senior Supervision Engineer visited ICE (I) for exploring the areas for mutual understanding and cooperation.

The Indian Council of Agricultural Research (ICAR) Govt. of India has nominated the Director (Academic) Dr. S.D. Sharma as Member in the Research Advisory Committee (RAC) of the Directorate of Water Management (DWM) Bhubaneswar. He has also participated in XI Agricultural Science Congress.

ICE(I) has made their erudition full contribution at the ACECC meeting at Taipai, Taiwan wherein it was represented by the Chairman & Director.

ICE (I) was represented by the Secretary General and Director (PR) at the Foundation Day Ceremony of the Engineering Council of India where the eminent Engineers Awards were also presented.

ICE (I) has successfully completed the conduct of summer 2013 examinations across the country. I am sure that the candidates who appeared in this examination will be eagerly waiting for the results for their hard work. I take this opportunity to wish them best of luck in the examination.

With my wishes for your enriching career!

Prithipal Singh

Secretary General

Self-Compacting Concrete

Introduction to Self-Compacting Concrete

Self-Compacting Concrete (SCC) is an innovative construction material that does not require vibration for placing and compaction. It is able to flow under its own weight, completely filling formwork and achieving full compaction, even in the presence of congested reinforcement. SCC is compacting itself alone due to its self-weight and is de-aerated almost completely while flowing in the formwork. In structural members with high percentage of reinforcement it fills completely all voids and gaps. SCC flows like "honey" and has nearly a horizontal concrete level after placing. The hardened concrete is dense, homogeneous and has the same engineering properties and durability as traditional vibrated concrete.

SCC offers a rapid rate of concrete placement, with faster construction times and ease of flow around congested reinforcement. The fluidity and segregation resistance of SCC ensures a high level of homogeneity, minimal concrete voids and uniform concrete strength, providing the potential for a superior level of finish and durability to the structure. SCC is often produced with low water-cement ratio providing the potential for high early strength, earlier de-moulding and faster use of elements and structures.

The elimination of vibrating equipment improves the environment on and near construction and precast sites where concrete is being placed, reducing the exposure of workers to noise and vibration. The improved construction practice and performance, combined with the health and safety benefits, make SCC a very attractive solution for both precast concrete and civil engineering construction.

Historical Development

In Japan in the early 1980's, because of the increasing reinforcement volumes with smaller bar diameters and a reduction in skilled construction workers, full compaction was difficult to obtain or judge, leading to poor quality concrete (Okamura1999). For several years beginning in 1983, the problem of the durability of concrete structures was a major topic of interest in Japan. The creation of durable concrete structures requires adequate compaction by skilled workers. However, the gradual reduction in the number of skilled workers in Japan's construction industry has led to a similar reduction in the quality of construction work. One solution for the achievement of durable concrete structures independent of the quality of construction work is the employment of Self-Compacting Concrete (SCC), which can be compacted into every corner of a formwork, purely by means of its own weight and without the need for vibrating compaction. The necessity of this type of concrete was proposed by Okamura in 1986. Studies to develop SCC, including a fundamental study on the workability of concrete, have been carried out by Ozawa and Maekawa at the University of Tokyo (Okamura et al. 1993).

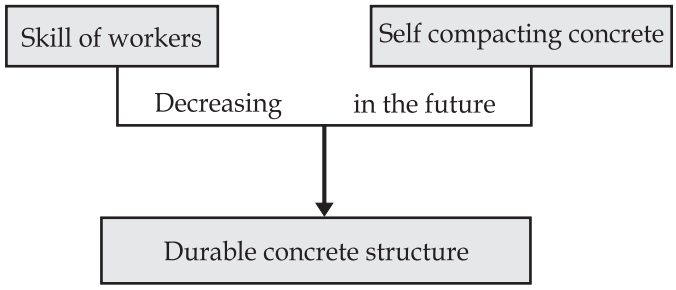

Fig. 1.1 Necessity for Self-Compacting Concrete

The prototype of SCC was first completed in 1988. The prototype performed satisfactorily with regard to drying and hardening shrinkage, heat of hydration, denseness after hardening and other properties.

Okamura (1995) proposed a concept for a design of concrete independent of the need for compaction. Ozawa and Maekawa produced the first prototype of SCC at the University of Tokyo in 1988. Since that time SCC has gone from a laboratory novelty to practical applications all over

the world. The increasing numbers of papers published every year that deal with all aspects of SCC, e.g. mix design, and physical properties and applications in practice, indicate research on this technology is thriving. Recommendations on the design and applications of SCC in construction have now been developed by many professional societies, including the American Concrete Institute (ACI), the American Society for Testing and Materials (ASTM), Center for Advanced Cement-Based Materials (ACBM), Precast Consulting Services (PCS) and Réunion Internationale des Laboratoires et Experts des Matériaux, systèmes de construction et ouvrages (RILEM) etc. Symposiums and workshops on this topic have been organized by these societies and several test methods have been or are in the process of standardization.

Advantages and Disadvantages of SCC

Self-Compacting Concrete has numerous advantages and disadvantages over normally compacted concrete. The same is discussed below:-

Advantages of SCC

Some of the advantages of SCC over normally vibrated concrete are:-

1) Can be placed at a faster rate with no mechanical vibration and lesser need of spreading, resulting in savings in placement costs.
2) Improved and more uniform architectural surface finish with little to no remedial surface work.
3) Ease of filling restricted sections and hard-to-reach areas. Opportunities to create structural and architectural shapes and surface finishes that are not achievable with conventional concrete.
4) Improved consolidation around reinforcement and bond with reinforcement.
5) Improved pump ability.
6) Improved uniformity of in-place concrete by eliminating variable operator-related effort of consolidation.
7) Labor savings.
8) Shorter construction periods and resulting cost savings.
9) Reduction or elimination of vibrator noise potentially increasing construction hours in urban areas.
10) Minimizes movement of ready mixed trucks and pumps during placement.
11) Increased job-site safety by eliminating the need for consolidation.

Disadvantages in Using SCC

The biggest disadvantage in using SCC is the cost involved to make this type of concrete. The material cost is higher since admixtures must be used. The aggregate also needs to be a smaller size than that commonly used. The mixture requires a large percentage of fines and filler material to avoid segregation. SCC is also sensitive to variation in the aggregate and this needs to be well controlled for consistent quality and grading. The initial cost to set up the mixing plant can also be significant.

The material sensitivity of SCC means that strict quality control is necessary at the batching and mixing operation. The material used in the mixture needs to conform to a very narrow specification. This necessitate careful grading and washing of sand to control the fines content of the mixture. If the fines content of the sand is not controlled, the water demand and admixture content will be affected and the end product cannot be predicted. This could lead to a mixture that either segregates or does not flow satisfactorily. Mixer operators must be well trained and always aware of the sensitivity of this product.

Furthermore, special formwork is required when using SCC. The formwork must be stronger to support the concrete at early ages since form pressure is higher than with conventional concrete. Formwork needs to be near watertight to prevent loss of fines from the concrete mixture.

***The views expressed by the author are his own**

Mr. Dilraj Singh
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NIT, Jallandhar, Punjab

The Role of Buildings and The Case for Whole Design

Buildings are deceptively complex. At their best, they connect us with the past and represent the greatest legacy for the future. They provide shelter, encourage productivity, embody our culture, and certainly play an important part in life on the planet. In fact, the role of buildings is constantly changing. Buildings today are life support systems, communication and data terminals, centers of education, justice, and community, and so much more. They are incredibly expensive to build and maintain and must constantly be adjusted to function effectively over their life cycle. The economics of building has become as complex as its design.

Whole Building Design encompasses all of these issues and programs and is an essential way of approaching building projects. Understanding Whole Building Design concepts will enable you to think and practice in an integrated fashion to meet the demands of today's as well as tomorrow's high-performance building projects.

The Philosophy and Components of Whole Building Design

The concept of "wholes" is not new. In 1926, Jan Christian Smuts, a South African Prime Minister and philosopher, coined the term "holism". He believed that there are no individual parts in nature, only patterns and arrangements that contribute to the whole. Buckminster Fuller also said back in 1969 while working on the space program: "Synergy is the only word in our language that means behavior of whole systems, unpredicted by the separately observed behaviors of the system's parts or any subassembly of the system's parts."

Whole Building Design draws upon these concepts of synergies and interconnectedness and consists of two components: an integrated design approach and an integrated team process. The "integrated" design approach asks all the members of the building stakeholder community, and the technical planning, design, and construction team to look at the project objectives, and building materials, systems, and assemblies from many different perspectives. This approach is a deviation from the typical planning and design process of relying on the expertise of specialists who work in their respective specialties somewhat isolated from each other.

Whole Building design in practice also requires an integrated team process in which the design team and all affected stakeholders work together throughout the project phases and to evaluate the design for cost, quality-of-life, future flexibility, efficiency; overall environmental impact; productivity, creativity; and how the occupants will be enlivened. The 'Whole Buildings' process draws from the knowledge pool of all the stakeholders across the life cycle of the project, from defining the need for a building, through planning, design, construction, building occupancy, and operations.

The Integrated Design Approach

Each design objective is significantly important in any project, yet a truly successful one is where project goals are identified early on and held in proper balance during the design process; and where their interrelationships and interdependencies with all building systems are understood, evaluated, appropriately applied, and coordinated concurrently from the planning and programming phase. A high-performance building cannot be achieved unless the integrated design approach is employed.

Design Objectives of Whole Building Design

In buildings, to achieve a truly successful holistic project, these design objectives must be considered in concert and in balance with each other:

- **Accessible:** Pertains to building elements, heights and clearances implemented to address the specific needs of disabled people.
- **Aesthetics:** Pertains to the physical appearance and image of building elements and spaces as well as the integrated design process.
- **Cost-Effective:** Pertains to selecting building elements on the basis of life-cycle costs (weighing options during concepts, design development, and value engineering) as well as basic cost estimating and budget control.
- **Functional/Operational:** Pertains to functional programming-spatial needs and requirements, system performance as well as durability and efficient maintenance of building elements.
- **Historic Preservation:** Pertains to specific actions within a historic district or affecting a historic building whereby building elements and strategies are classifiable into one of the four approaches: preservation, rehabilitation, restoration, or reconstruction.
- **Productive:** Pertains to occupants' well-being-physical and psychological comfort-including building elements such as air distribution, lighting, workspaces, systems, and technology.
- **Secure/Safe:** Pertains to the physical protection of occupants and assets from man-made and natural hazards.
- **Sustainable:** Pertains to environmental performance of building elements and strategies.

Whole Building Design provides the strategies to achieve a true high-performance building: one that is cost-effective over its entire life cycle, safe, secure, accessible, flexible, aesthetic, productive, and sustainable.

Through a systematic analysis of these interdependencies, and leveraging whole building design strategies to achieve multiple benefits, a much more efficient and cost-effective building can be produced. For example, the choice of a mechanical system might impact the quality of the air in the building, the ease of maintenance, global climate change, operating costs, fuel choice, and whether the windows of a building are operable. In turn, the size of the mechanical system will depend on factors such as, the type of lighting and controls used, how much natural daylight is brought in, how the space is organized, the facility's operating hours, and the local microclimate. At the same time, these same materials and systems choices may have an impact on the aesthetics, accessibility, and security of the project. A successful Whole Building Design is a solution that is greater than the sum of its parts.

The Integrated Team Process

To create a successful high-performance building, an interactive approach to the design process is also required. It means all the stakeholders—everyone involved in the planning, design, use, construction, operation, and maintenance of the facility—must fully understand the issues and concerns of all the other parties and interact closely throughout all phases of the project.

Who needs to be at the table at the outset of a project to

ensure an integrated team process? Each project is unique and will require the team and expertise to be matched to the goals of the project. The team may include but is not limited to: the Architect, Landscape Architect, Owner, Client, Tenants, Engineers, Programmers, Interior Designer, Contractor, Specialists (Security, Telecom, Acoustics, LEED), Community Members or Other Stakeholders, Operations and Maintenance Personnel, and others such as a Real Estate Buyer.

A design charrette—a focused and collaborative brainstorming session held at the beginning of a project—encourages an exchange of ideas and information and allows truly integrated design solutions to take form. Team members—all the stakeholders—are encouraged to cross fertilize and address problems beyond their field of expertise. The charrette is particularly helpful in complex situations where many people represent the interests of the client and conflicting needs and constituencies. Participants are educated about the issues and resolution enables them to "buy into" the schematic solutions. A final solution isn't necessarily produced, but important, often interdependent, issues are explored.

It is not enough to design the project in a holistic manner. It is also important to determine and measure the effectiveness and outcome of the integrated design solution over the defined life cycle. Consider conducting a Facility Performance Evaluation to ensure that the high-performance goals have been met and will continue to be met over the life cycle of the project. Consider retrocommissioning to ensure that the building will continue to optimally perform through continual adjustments.

Emerging Issues

As the world of buildings continues to change and grow in complexity, additional programs and information will have an impact on the entire design, planning and construction community. Among them is Building Information Modeling (BIM) software that is a continued trend in computer-aided design. Many buildings have been built directly from the electronic models that BIM creates, and some architects no longer create drawings but instead "build buildings inside their computers." BIM has the potential to change the role of drawings for the construction process, improve architectural productivity, and make it easier to consider and evaluate design alternatives. BIM also aids in the process of integrating the various design teams' work, furthering encouraging and demanding an integrated team process.

High Performance Buildings are energy efficient, have limited environmental impact, and operate with the lowest possible life-cycle costs. There are a number of additional ways and tools to achieve high-performance buildings, such as the use of life-cycle cost analysis, integrated design processes, integrated energy solutions for the building envelope, and building commissioning.

Courtesy Websites compilation

Ethical Issues in Civil and Environmental Engineering: Code of Conduct for Engineers

Purpose

The purpose is to enhance the student's ability to identify and critically analyze ethical, human value, and philosophical issues of the sorts that arise in or underlie contemporary civil engineering practice, whether in the environmental/water, structural, or construction areas. Through this article, will strive to do justice to the socio-technical complexity of such issues, identify moral rights and responsibilities of civil engineers, identify factors conducive to exemplary conduct and misconduct in civil engineering, and help students develop ways of avoiding or effectively coming to grips with such issues when they arise

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

II. Rules of Practice

1. Engineers shall hold paramount the safety, health, and welfare of the public.

1. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.
2. Engineers shall approve only those engineering documents that are in conformity with applicable standards.
3. Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law.
4. Engineers shall not permit the use of their name or associate in business ventures with any person or firm that they believe is engaged in fraudulent or dishonest enterprise.
5. Engineers shall not aid or abet the unlawful practice of engineering by a person or firm.
6. Engineers having knowledge of any alleged violation shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.

2. Engineers shall perform services only in the areas

of their competence.

1. Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
2. Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document not prepared under their direction and control.
3. Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.

3. Engineers shall issue public statements only in an objective and truthful manner.

1. Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
2. Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.
3. Engineers shall issue no statements, criticisms, or arguments on technical matters that are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking and by revealing the existence of any interest the engineers may have in the matters.

4. Engineers shall act for each employer or client as faithful agents or trustees.

1. Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.
2. Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties.
3. Engineers shall not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.
4. Engineers in public service as members, advisors, or employees of a governmental or quasi-governmental body or department shall not participate in decisions with respect to services solicited or provided by them or their
5. Engineers shall not solicit or accept a contract from a governmental body on which a principal or officer of their organization serves as a member.

5. Engineers shall avoid deceptive acts.

1. Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint ventures, or past accomplishments.
2. Engineers shall not offer, give, solicit, or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect or intent of influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. They shall not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

1. Engineers shall acknowledge their errors and shall not distort or alter the facts.
2. Engineers shall advise their clients or employers when they believe a project will not be successful.
3. Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment, they will notify their employers.

   or Engineers shall be guided in all their relations by the highest standards of honesty and integrity. of the profession

2. Engineers shall at all times strive to serve the public interest.

1. Engineers shall seek opportunities to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community.
2. Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.
3. Engineers shall endeavor to extend public knowledge and appreciation of engineering and its achievements.

3. Engineers are encouraged to adhere to the principles of sustainable development in order to protect the environment for future generations.

4. Engineers shall avoid all conduct or practice which deceives the public.

1. Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.
2. Consistent with the foregoing, engineers may advertise for recruitment of personnel.
3. Consistent with the foregoing, engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.

5. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.

1. Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the engineer has gained particular and specialized knowledge.
2. Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the engineer has gained particular specialized knowledge on behalf of a former client or employer.

6. Engineers shall not be influenced in their professional duties by conflicting interests.

1. Engineers shall not accept financial or other considerations, including free engineering designs, from material or equipment suppliers for specifying their product.
2. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers of the engineer in connection with work for which the engineer is responsible.

7. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.

1. Engineers shall not request, propose, or accept a commission on a contingent basis under circumstances in which their judgment may be compromised.
2. Engineers in salaried positions shall accept part-time engineering work only to the extent consistent with policies of the employer and in accordance with ethical considerations.
3. Engineers shall not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice.

8. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.

1. Engineers in private practice shall not review the work of another engineer for the same client, except with the knowledge of such engineer, or unless the connection of such engineer with the work has been terminated.
2. Engineers in governmental, industrial, or educational employ are entitled to review and evaluate the work of other engineers when so required by their employment duties.
3. Engineers in sales or industrial employ are entitled to make engineering comparisons of represented products with products of other suppliers.

9. Engineers shall accept personal responsibility for their professional activities; provided, however, that Engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the Engineer's interests cannot otherwise be protected.

1. Engineers shall conform with state registration laws in the practice of engineering.
2. Engineers shall not use association with a no engineer, a corporation, or partnership as a "cloak" for unethical acts.

10. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

1. Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments.
2. Engineers using designs supplied by a client recognize that the designs remain the property of the client and may not be duplicated by the engineer for others without express permission.
3. Engineers, before undertaking work for others in connection with which the engineer may make improvements, plans, designs, inventions, or other records that may justify copyrights or patents, should enter into a positive agreement regarding ownership.
4. Engineers' designs, data, records, and notes referring exclusively to an employer's work are the employer's property. The employer should indemnify the engineer for use of the information for any purpose other than the original purpose.
5. Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminars.

Courtesy Websites compilation

SOME INTERESTING QUESTIONS. FIND OUT HOW MANY YOU CAN ANSWER…!

1. What programming language is GOOGLE developed in ?
2. What is the expansion of YAHOO?
3. What is the expansion of ADIDAS?
4. Expansion of Star as in Star TV Network?
5. What is expansion of "ICICI?"
6. What does "baker's dozen" signify?
7. The 1984-85 season. 2nd ODI between India and Pakistan at Sialkot-India 210/3 with Vengsarkar 94*. Match abandoned. Why?
8. From what four word expression does the word 'Goodbye' derive?
9. How was agnes Gonxha Bojaxhiu better known?
10. Name the only other country to have got independence on Aug 15th?
11. Why was James Bond Associated with Number 007?
12. Who faced the first ball in the first ever One day Match?
13. Which cricketer played for South Africa before it was banned from international cricket and later represented Zimbabawe?
14. The faces of which four Presidents are carved at Mt. Rushmore?
15. Which is the only country that is surrounded from all sides by only one country (other than Vatican)?
16. Which is the only sport which is not allowed to play left handed?

Scroll down for the answer :

1. Google is written in Python
2. Yet Another Hierarchy of Officious Oracle
3. ADIDAS-All Day I Dream About Sports
4. Satellite Television Asian Region
5. Industrial credit and Investments Corporation of India
6. A baker's dozen consists of 13 items-1 more than the items in a normal dozen
7. That match was abandoned after people heard the news of Indira Gandhi being killed.
8. Goodbye comes from the ex-pression: 'god be with you'.
9. Agnes Gonxha Bojaxhiu is none other Mother Teresa.
10. South Korea.
11. Because 007 is the ISD code for Russia (or the USSR, as it was known during the cold war)
12. Geoffrey Boycott
13. John Traicos
14. George Washington, Thomas Jefferson, Theodore Roosevelt, and Abraham Lincoln
15. Lesotho surrounded from all sides by South Africa
16. Polo.

OUR PARTNERS TO CONDUCT PRACTICALS & SUBMISSION OF PROJECT REPORTS

(AICTE approved Institutions In different States/Cities)

✔ Andhra Pradesh

Chaitanya Engineering College,
Chaitanya Valley, Kommadi, Madhurawada,
Visakhapatnam - 530041, Andhra Pradesh

Koneru Lakshmaiah College of Engineering,
Green Fields, Vaddeswaram, Guntur Distt.- 522502
Andhra Pradesh

Kakatiya Institute of Technology & Science.
Opp. Yerragattu Hillock, Vill-Bheemaram,
Mandal-Hasanparthy,
Warangal - 506015, Andhra Pradesh

Sri Venkateswara College of Engineering & Technology,
Chittor, Andhra Pradesh

Chaitnaya Bharathi Institute of Technology,
Chaitanya Bharathi, P.O. Gandipet,
Hyderabad - 500075, Andhra Pradesh

Govt. Polytechnic,
Masabtank, Hyderabad-28,
Andhra Pradesh

Rajeev Gandhi Memorial College of Engg. & Tech.
N.H.-18, Kurnool District, Nandyal-518501,
Andhra Pradesh

Mumtaz College of Engg. & Technology
Malakpet, Hyderabad- 36,
Andhra Pradesh

KLR College of Engg. & Tech.
Khammam District, Paloncha
Andhra Pradesh

✔ Assam

Assam Engineering College
Jalukabari, Guawhati-781018,
Assam

Jorhat Engineering College,
Government of Assam,
Jorhat-785007, Assam

Down Town Group of Institution
Assam Down Town University
Sankar Madhab Path, Gandhi Nagar,
Panikhaiti, Guwahati-781026, Assam

✔ Bihar

RP Sharma Institute of Technology,
Patna, RPS Complex, Bailey Road (West) Danapur
Patna - 801503, Bihar

Netaji Subhas Institute of Technology,
Amhara, Bihta,
Patna- 801118, Bihar

✔ Chattisgarh

Ashoka Institute of Technology & Management,
Gram-Torankata, Post-Somni, G.E. Road,
Rajnandgaon-491441,
Chhattisgarh

Dignity College of Architecture
NH-6, Anjora, Opposite Govt. Veterinary Hospital, Durg-491001
Chhattisgarh

✔ Delhi

Chhotu Ram Rural Institute of Technology & Pharmacy,
Kanjhawala, (Ghevra), Delhi-110081

✔ Gujarat

L. D. College of Engineering,
Government of Gujarat, Near Navranpura,
Ahmedabad - 380015, Gujrat

Government Engineering College,
Shamlaji Road, Modasa - 383315,
Gujarat

Sree Tapi Brahmcharyashram Sabha College of Diploma Engineering
Opp. Spinning Mill,Varachha Road,
Surat - 395006, Gujarat

Sardar Vallabhbhai Patel Institute of Technology,
PO. Box No. 22, District Anand,
Vasad-388306,Gujarat

✔ Haryana

M.M. Engineering College,
M.M. Group of Institutions, Mullana Distt. Ambala, Haryana

Lingaya's Institute of Management & Technology,
Nauchauli, Old Faridabad, Jasana Road,
Faridabad - 121002, Haryana

Haryana College of Technology & Management,
P.O.Box No.44 Ambala Road,
Kaithal - 136027, Haryana

Sat Kabir Institute of Technology & Management,
Vill. Ladrawan, Teh. Bahadurgar Dist. Jhajjar,
(Near Qutubgarh-Delhi Border),
Haryana-124507

NCR Polytechnic,
Vill.-Kulasi, Bahadurgarh,
Jhajjar, Haryana

Delhi College of Technology & Management
77 Km Stone, NH-2, Gudhrana, Distt. Palwal
Haryana-121105

✔ Himachal Pradesh

MIT College of Engineering & Management
Bani (Barsar) Distt. Hamirpur
Himachal Pradesh-174384

Baddi University of Engineering Science & Technology
Makhnumajra, Nalagarh, District-Solan,
Baddi Highway, Solan-173101,
Himachal Pradesh

Himachal Institute of Engineering and Technology
Vidyanagar (Near Central University, Shahpur,
District- Kangra-176223
Himachal Pradesh

✔ Jammu & Kashmir

National Institute of Technology & Science,
Indira Nagar, P.O. Miran Sahib,
Jammu - 181001, Jammu & Kashmir

Institute of Engineering & Computer Sciences,
Purkhoo Camp, Domana, Jammu- 181001,
Jammu & Kashmir

Government College of Engineering & Technology,
Old University Campus, Canal Road Jammu-180004,
Jammu & Kashmir

Royal Polytechnic College
55-Gogji Bagh, Srinagar-190001,
Jammu & Kashmir

SSM College of Engineering & Technology
Parihaspora, Pattan, Baramulla
Srinagar-193121, Jammu & Kashmir

✔ Jharkhand

Government Polytechnic
P.O.- B. Polytechnic, Dhanbad-828130,
Jharkhand

Cambridge Institute of Technology
Tatisilwai, Ranchi-835103,
Jharkhand

Government Polytechnic
Ranchi-834001, Jharkhand

Mining Institute,
P.O. - B. Polytechnic, Dhanbad-828130,
Jharkhand

✔ Karnataka

Anjuman Engineering College
Anjumanbad, P.O.Box No.24,
Bhatkal - 581320, Karnataka

Bapuji Institute of Engineering & Technology,
Post Box No. 325, Davangere-577004,
Karnataka

✔ Kerala

Matha College of Technology,
Manakkappadi, N. Paravur,
Ernakulam-683511, Kerala

Mangalam College of Engineering
Mangalam Campus, Ettumanoor
Kottayam- 686631, Kerala

MES College of Engineering, Kuttippuram
Thrikkanapuram P.O.,
Malappuram District. -679573,
Kerala

SSN Polytechnic College
Tirur -676105
Kerala

✔ Madhya Pradesh

Shri G.S. Institute of Technology & Science,
23, Park Road, Indore,
Madhya Pradesh

Rishiraj Institute of Technology,
Village- Revati, Sanwar Road, Indore,
Madhya Pradesh

Mansarovar Institute of Science & Technology
Mansarovar Campus, Kolar Road,
Bhopal- 462042,
Madhya Pradesh

Govt. Polytechnic College
Shahdol, Madhya Pradesh

Jawaharlal Institute of Technology,
"Vidya Vihar" Borawan, Tehsil Kasrawad,
Distt. Khargone - 451228,
Madhya Pradesh

Lakshmi Narain College of Technology,
Kalchuri Nagar, Raisen Road, P.O. Kolua,
Bhopal - 462021, Madhya Pradesh

NRI Institute of Technology & Management,
Near Railway Bridge, Jhansi Road, Gwalior,
Madhya Pradesh

Truba Institute of Engineering & Information Technology,
Karond Gandhi Nagar By Pass Road,
Bhopa, Madhya Pradesh

✔ Maharashtra

Pravara Rural Engineering College,
Loni, A/P. Loni-413736, Tal. Rahata,
Dist. Ahmednagar, Maharashtra

Mahatma Gandhi Missions,
Jawaharlal Nehru Engineering College,
N-6, CIDCO, Aurangabad - 431003,
Maharashtra

G.H. Raisoni College of Engineering,
CRPF Gate No. 3, Hingna Road,
Digdoh Hills, Nagpur - 440016,
Maharashtra

Kavikulguru Institute of Technology and Science,
Ramtek - 441 106, Nagpur,
Maharashtra

Bharati Vidyapeeth University College of Engineering,
Pune-Satara Road, Dhankawadi
Pune - 411043, Maharashtra

Aurangabad College of Engineering
Gut No. 52, Tuljapur Shivar, (Savangi)
Jalgaon Road, Aurangabad-431008,
Maharashtra

✔ Orissa

Dhaneshwar Rath Institute of Engineering & Management Studies,
(Diploma Wing), Kairapari, Kotsahi (Tangi), Cuttack - 754022, Orissa

Krupajal Engineering School
Prasanti Vihar, Pubasason, Kausalya Ganga
Bhubaneswar 751002, Orissa

KIIT University,
AT/PO. : KIIT, Bhubaneshwar - 751024,
Orissa

Black Diamond College of Engineering & Technology,
Jharsuguda (BDCET), At : Balijori, L & T Dhutra Road,
Jharsuguda, Orissa-768202

Sanjay Memorial Institute of Technology,
Chandipadar, Via : Bhattakumarada,
Berhampur,Dist.-Ganjam-761003
Orissa

Gopal Krishna College of Engineering & Technology,
I.E.M., Gourahari Vihar, P.O.-Raniput,
Jeypore, Koraput,
Odisha-764005

Orissa Engineering College,
Nabajyoti Vihar, Nijigarh Kurki,
P.O.-Harirajpur, Jatni,
Bhubaneswar-752050, Orissa

Suddhananda Engineering & Research Centre,
At-Nachhipur, P.O. : Bhatapatana,
Bhubaneswar, Dist : Khurda,
Orissa -752115

Raja Kishore Chandra Academy of Technology (Polytechnic),
At/Po : Nilgiri, Dist : Balasore,
Balasore-756040, Orissa

✔ Punjab

Lovely Institute of Technology (Architecture),
Jalandhar-Ludhiana, G.T.Road,
Near Chehru Railway Bridge,
Phagwara, Kapurthala-144402,
Punjab

Desh Bhagat Engineering College,
Amloh Road, Mandi Gobingarh,
Punjab

Guru Nanak Dev Engineering College,
Gill Road, Ludhiana,
Punjab

✔ Rajasthan

Sri Balaji College of Engineering & Technology,
Benad Road (Dadi Ka Phatak),
Jaipur - 302013, Rajasthan

College of Engineering and Technology,
Bikaner, Kani Industrial Area,
Pugal Road, Bikaner-334005,
Rajasthan

Aayojan School of Architecture
ISI-4, RIICO Institutional Block
Sitapura, Goner Road Jaipur-302022,
Rajasthan

Aryabhatta College of Engineering and Reasearch Centre
Ajmer- 305001,
Rajasthan

Saraf Institute of Engineering & Technology
Tibbi Road- Extension,
Hanumangarh Town,
Rajasthan-335513

Siddhi Vinayak Engineering & Management College
E-I, B-1, M.I.A., Institution Area, Alwar-301001,
Rajasthan

SLBS Pollytechnic College
NH-112, Jodhpur- Jaipur Highway, Dangiawas,
Jodhpur-342027

✔ Uttrakhand

Dehradun Institute of Technology,
Mussoorle-Diversion Road,
P.O. - Bhagwantpur,
Dehradun, Uttrakhand

Drona's College of Management & Technical Education
Opposite Rajpur, Bypass, Sahastradhara Road,
PO : Gujarada, Dehradun-248001,
Uttrakhand

✔ Uttar Pradesh

Bundelkhand Institute of Engineering & Technology,
Kanpur Road, Jhansi - 284128,
Uttar Pradesh

Radha Govind Engineering College,
Anuyogipuram Near Medical College Garh Road,
Meerut - 250004,
Uttar Pradesh

Gandhi Polytechnic,
Muzaffarnagar,
Uttar Pradesh

Hewett Polytechnic, Lucknow,
Mahanagar, Lucknow,
Uttar Pradesh

Lucknow Polytechnic Lucknow,
Abhiyantrik Upnivesh, Krishna Nagar
Kanpur Road, Lucknow,
Uttar Pradesh

Sevdie Institute of Management & Technology,
(S.I.M.T), Chinhat Deva Road, Lucknow,
Uttar Pradesh

North India Institute of Technology
7th km Bundki Road,Najibabad
Dist. Bijnor,Bijnor-246763,
Uttar Pradesh

Devprayag Institute of Technical Studies,
Devprayag Technical Campus, Phaphamau,
Allahabad, Uttar Pradesh

Jaswant Singh Bhadauria Institute of Technology
Kosi Khurd Bharatpur Road
Mathura- 281005, Uttar Pradesh

Sunderdeep College of Architecture
NH-24, Sunder Deep Nagar
Delhi-Hapur Road Dasna
Ghaziabad-201001, Uttar Pradesh

Goel Institute of Technology & Management
Lucknow -Faizabad Road,
Near Indiara Canal, Lucknow-227105,
Uttar Pradesh

M G Institute of Management & Technology
8th Km. Mile Stone from Amausi Airport,
Lucknow-Kanpur Highway,
Banthara, Lucknow-227101,
Uttar Pradesh

Institute of Engineering & Rural Technology, Allahabad
26, Chaitham Lines, Allahabad-211002
Uttar Pradesh

✔ **West Bengal**

North Calcutta Polytechnic,
15, G.M. Lane, Kolkata-700002,
West Bengal

Camellia School of Engineering & Technology,
Nadibhag, P.O.-Kajipara, Barasat,
Kolkata-700124, West Bengal

JIS College of Engineering,
Block "A" Phase-III, Kalyani, Nadia,
West Bengal-741235

Rajmati Prichand Bothra Memorial Jiaganj
College of Engineering & Technology (RPBM)
At - Hatibhjan, PO.: Jiagan,
Dist.: Murshidabad-742123,
West Bengal

Narula Institute of Technology
81, Nilgunj Road, Agarpara, Kolkata-700109
West Bengal

Sanaka Educational Trust's Group of Institutions
B-150, Columbia Street, Bidhan Nagar,
P.O. Malandighi, P.S. Kanksa, Burdwan,
Durgapur-713212

The New Horizons Institute of Technology
Phase-II, City Centre, South G.T. Road
Durgapur-713208, District.- Burdwan,
West Bengal.

Ideal Institute of Engineering
Kalyani Shilpanchal, P.O. & P.S. Kalyani,
Dist.- Nadia
West Bengal-741235

IMPS College of Engineering & Technology
Malda,

ABSTRACT

S.No.	State	No. of MoUs
1.	Andhra Pradesh	9
2.	Assam	3
3.	Bihar	2
4.	Chhattisgarh	2
5.	Delhi	1
6.	Gujarat	4
7.	Haryana	6
8.	Himachal Pradesh	3
9.	Jammu and Kashmir	5
10.	Jharkhand	4
11.	Karnataka	2
12.	Kerala	3
13.	Madhya Pradesh	8
14.	Maharashtra	6
15.	Orissa	9
16.	Punjab	3
17.	Rajasthan	7
18.	Uttarakhand	2
19.	Uttar Pradesh	13
20.	West Bengal	10
	Total	102

Add to Your Vocabulary

Civil engineering is a branch of engineering that embraces expert practices which work towards creating, maintaining and operating the social, commercial, an industrial infrastructure that sustains a modern society. Such infrastructure includes all building construction, road, railways, canals, airports, harbours, docks, water supply, drainage, flood and erosion control, bridges, tunnels, pipelines, dams, irrigation systems, electricity generation, and industrial facilities.

This branch of engineering uses mathematics, physics, mechanics and the properties of materials in order to provide cost-effective solutions to building problems. This is brought about by combining the standard and best available expertise, labour and materials, keeping in mind the time, cost, hazards and social responsibility.

Historically, military engineers were responsible for the design and construction of roads, fortifications, bridges, and the destruction of enemy facilities by tunneling and explosives. Eventually, this expertise entered the civilian domain, thereby becoming the profession of the civil engineer, which has nowadays become a competitive and quite sought after profession.

The dictionary of civil engineers is made with the intent of creating a ready to use repertoire of the terms used in this branch of engineering. It takes into account almost all the terms that are used as a part and parcel of the subject. The description of each term is kept simple by using a lucid and clear language. The explanation is also supported by examples and pictures to provide the readers with an enriching and healthy learning experience.