



Engineering Council of India

PROCEEDINGS



4th National Conference
Towards International Competitiveness of
Indian Engineers - Challenges Ahead
December 15, 2006



Raman Auditorium, Technology Bhawan
(Department of Scientific and Industrial Research)
New Mehrauli Road, New Delhi-110016

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4th National Conference

Towards International Competitiveness of Indian Engineers - Challenges Ahead

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Introduction

In the present day world, technical breakthrough has revolutionized engineering activity. Modern Engineering areas include high-rise buildings, dams and irrigation networks, energy conversion and industrial plants, environmental protection works, infrastructural facilities like roads, bridges, railways, airports and seaports, satellite and satellite launching stations, onshore and offshore oil terminals, ships and aircrafts. Engineering technology and new materials are emerging at an accelerated pace. With the use of latest formwork and ready-mix concrete technology, the construction time of modern buildings can be reduced by 80%. To quote example, the structure of 45-storey City Tower Hotel in Tel Aviv, was constructed at the rate of one storey every five days. A German ready-mix supplier poured over 16000 m³ of concrete within 24 hours for a 8.5 ft. thick reinforced concrete mat foundation. The new materials in the market that have added new dimensions in construction practices include curtain walls structural glazing, aluminum replacing wood, high performance concrete (going up to 100 MPa), high strength reinforce and structural steel, multi-variety customized pre-cast members, multi-utility chemical admixtures and large varieties of finishing products and utility components.

Engineering profession is a complex function of knowledge, skills and attitude. The knowledge base of every profession keeps expanding with the passage of time. Globalization of engineering profession is unavoidable. In the WTO environment, an engineer is required to continually upgrade his skills to enhance his/her technical competency together with a commitment to providing an efficient ethics based service to the client, customer/society.

Object of the Conference

The main mission of the Engineering Council of India (ECI) is to work for the advancement of engineering profession in India to the level obtainable in the competing developed countries. The Indian economy is growing fast and the trade in services, including engineering services, is going to be highly competitive with the foreign multi-nationals. The equivalency of the competency, continuing development of the Indian Engineers and ethics and morality will have to be as per the ECI Systems and Procedures, which are generally conforming to the international Engineers Mobility Forum (EMF). These Systems and Procedures can be viewed at ECI website : www.ecindia.org

It is the need of the hour to bring the competence of our engineers to the level and standards that of the developed countries. This raises many issues. This Conference aims at deliberating on the various issues to develop a strategic framework for its implementation.

Issues Facing the Engineering Profession

- What are the implications of WTO on engineering profession in India?
- How do we ensure that our engineering profession develops in conformity with international standards and requirements?
- How to ensure continued professional development of engineers?
- How to ensure commitment by professional engineers and engineering organizations to the code of ethics?

Programme

0900 to 1000 Hrs	REGISTRATION
1000-1100 Hrs	OPENING SESSION
	Welcome and Overview Dr. Uddesh Kohli, Chairman, ECI
	Address by the Guest of Honour T. Ramasami, Secretary, Science and Technology
	Inaugural Address by the Chief Guest Dr Kirit S. Parikh, Member Planning Commission
	Vote of Thanks Chander Verma, President, International Council of Consultants
1100 -1130 Hrs	COFFEE / TEA
1130 1300 Hrs	TECHNICAL SESSION-I Professionalisation of Engineers in WTO/GATS Environment and Challenges Ahead
	Chairman Prof. V. N. Rajasekharan Pillai, VC, IGNOU
	Co-Chairman P. R. Swarup, Director General, CIDC
	Keynote Speaker Dr. Ram Upendra Das, Fellow, Research and Information System for Developing Countries
	Keynote Speaker John Tripllet, Senior Consultant, Delhi Metro Rail Corporation
	Keynote Speaker Ratnavel, Chairman Engineers Bill Committee, ASCE(I)
	Discussion
1300 1400 Hrs	LUNCH
1400-1515 Hrs	TECHNICAL SESSION-II Professional Engineers Competency Criteria and Continuing Professional Development
	Chairman S. Ghosh, President, Consulting Engineers Association of India
	Co-chairman A. K. Sehgal
	Keynote Speaker Col Sunil V. Gaopande, Director Personnel (Management), Engineer-In-Chief's Branch, Army Headquarters, New Delhi
	Keynote Speaker Prof C. V. Ramakrishnan, Prof. Emeritus IIT, New Delhi
	Keynote Speaker Prof K. Munshi, IIT, Mumbai
	Discussion
1515-1545 Hrs	COFFEE / TEA

1545 - 1645 Hrs

TECHNICAL SESSION-III

Professional Engineers Code of Ethics and Role of Engineering Associations, Corporate and Academic Institutions

Chairman	Lt. Gen. D. P. Sehgal, Chairman, IETE
Co-chairman	N. S. Ganeshan, Past President Broadcast Engineering Society (India)
Keynote Speaker	Dr M. Kalgal, Secretary General, ACCE (I)
Keynote Speaker	Gurudev Singh, Superintending Engineer, Engineer -In-Chief's Branch, Army Headquarters, New Delhi
Keynote Speaker	Prof K.K.Agrawal, Consultant, Structural Designing and Construction Management
Keynote Speaker	Dr. V.Ramprasad, SMIEEEE(USA), Director of Info- Sciences, Dayananda Sagar Institutions, Bangalore

Discussion

1645 -1745 Hrs

TECHNICAL SESSION-IV

Enactment of the Proposed Engineers Bill and Conclusion

Chairman	Dr Uddesh Kohli, Chairman, ECI, CIDC and CDC
Co- Chairman	Dr. Jose Kurian, Vice President, Indian Concrete Institution
Panelist-1	Mahendra Raj, MD, Mahendra Raj Consultants Pvt Ltd & President, Indian Association of Structural Engineers
Panelist-11	Mahesh Tandon, President Indian Concrete Institute & MD Tandon Consultants Pvt Ltd
Panelist-11I	Sudhir Dhawan, Chairman & CEO, Tractabell Engineers and Contractors Pvt Ltd.
Open House	Discussion

ENGINEERING COUNCIL OF INDIA (ECI)

OBJECTIVES

The main objectives of ECI are to work for the advancement of engineering profession in various disciplines and for enhancing the image of engineers in society. To this end, ECI will be focusing on quality and accountability of engineers.

In the emerging WTO/GATS environment, mobility is becoming an important issue. Mobility of Indian engineers for delivering engineering services in other countries will be hindered unless expertise of Indian engineers is recognized and accepted at the international level. Conforming to internationally laid down norms is essential also for protecting employment of engineers in internationally funded projects, multinational corporations and large companies in India.

According to its Memorandum of Association, the objectives of ECI are as follows :

1. To promote the science and practice of engineering for national development, collectively along with constituent members.
2. To encourage engineers to serve the needs of the society.
3. To promote advancement of education of engineering in the country.
4. To promote the practice of continuing education and training to upgrade the quality of engineering professionals.
5. To identify and undertake activities of common interest to the engineering profession.
6. To encourage inventions, investigations and research; and promote their applications for development of the national economy.
7. To identify and undertake activities directed to enhance prestige of engineers in the country, and to secure for them their rightful place at various levels of planning, administration etc.
8. To promote steps to attract bright persons of the younger generation to the engineering profession.
9. To assist Associations/Professional Societies in normalizing criteria for membership so as to make these nationally equitable and internationally acceptable.
10. To establish a common "Code of Ethics" for professional and consulting engineers adoption by Association/Professional Societies and to evolve the strategy for its enforcement.
11. To interact with the government at State and Central levels and help adoption of policies for betterment of the engineering profession.
12. To represent engineers and engineering professionals of all disciplines, at National and International levels.
13. To maintain a National Register of "Professional Engineers" and a National Register of "Consulting Engineers" who are engineering organisations employing professional engineers where principal occupation is the independent practice of engineering.

14. To act as a Nodal Body, representing India, for bilateral/Multi-lateral recognition of "Professional Engineers" and "Consulting Engineers" on mutual and reciprocal basis.
15. To identify and encourage the implementation of best practices for the development and assessment of engineers intending to practice as professionals in domestic as well as foreign markets.
16. To standardize criteria to be adopted for according status of "Professional Engineer" and "Consulting Engineer" and to accord licence/accreditation to practice engineering in India.
17. To identify major engineering disciplines in which substantial cross-border mobility is expected and to cater to those disciplines in which substantial cross-border mobility is expected and to cater to those disciplines in ECI's policies, practices and their registers/sub-registers.
18. To identify barriers to professional engineers' mobility and to develop and promote strategies, to advice and, if required, assist Central and State Government Departments, in managing those barriers in an effective and non-discriminatory manner.
19. To develop mutually acceptable standards and criteria for facilitating cross-border mobility of experienced Professional Engineers and Consulting Engineers among WTO signatories.
20. To establish such committees, as may be necessary, for reciprocal joint activities with similar professional bodies in other countries who are signatories of WTO and other related agreements.
21. To network and cooperate with other such international bodies/for a who are engaged in similar activities.
22. To perform any or all other acts, deeds and things, which may become necessary to be performed at any stage to achieve the main objectives of improving the image of the engineering profession and of the professional engineer and to serve the needs of the society.

TASKS

In order to meet its objectives, ECI task include the following :

- Certify the competence of engineers for undertaking professional activities.
- Certify the competence of organisation offering engineering consultancy services.
- Integrate continuous development programme with the certification process to upgrade expertise continuously.
- Lay down norms of professional conduct and take appropriate action promoting and ensuring compliance.
- Join international networks such as Engineers Mobility Forum for protecting the interests of Indian engineers in the emerging international scenario.

ENGINEER'S BILL

ECI has prepared a draft Engineer's Bill for the consideration of the Government of India, which lays down the criteria for the process of registration of Professional Engineers and Consulting

Engineering organisations and provide necessary statutory framework for the same. The draft is being processed by the Ministry of Human Resource Development.

MEMBERSHIP

Membership of the ECI is open to societies/organisations of engineers who meet the following requirements :

- having been established statutorily or registered in accordance with law.
- having atleast 100 corporate members.
- having existed for atleast four years.
- the accounts being audited annually.

4th National Convention
Towards International Competitiveness of Indian Engineers
- Challenges Ahead

INAUGURAL SESSION

INAUGURAL SESSION

1.1 Welcome address : Dr. Uddesh Kohli

At the outset, I welcome our chief guest Dr. Kirit S. Parikh, Member Planning Commission, Guest of Honour, Mr T Ramasami, Secretary, Science and Technology and all the participants to this 4th National Conference organised by ECI.

In engineering profession, we do not have well defined and recorded engineering standard and professional ethics like other professions such as legal, medical, architecture , etc,. We do not have any statutory body which could license practicing engineers and enforce professional standards and ethics. Engineering is a very important profession as the number of engineers is much more than any other profession, which are having statutory bodies. It is for this reason that the Engineering Council of India (ECI) has been formed by, a large number of associations/societies of engineers. ECI drafted the Engineers Bill and submitted it to the Government of India. After it is passed by the Parliament, it would become the law. It would then be possible to have statutory body of engineers just like Medical Council or Bar Council or Council of Architecture.

Another reason for forming a statutory body is to have an international status for Indian Engineers; as engineers from India were having problems in practising in some countries, because of their requirement for registration or certification of professional engineers. But this is not the case in India. In our country, we do not have any restriction. In India, we find that any body from other countries can come and practise here because there is no such restriction. But our engineers cannot go and reciprocally practice in these countries. This type of handicap is felt by the Indian engineers. It is this handicap that the ECI is contemplating to remove.

As many of you know that there are two international agreements; one is related to 'engineering education' and 'the other engineering profession'. One is called the Washington Accord (WA) and the other is the Engineer Mobility Forum (EMF). WA relates to the engineering education standards and it enables reciprocal recognition among its member countries. The member countries of WA have developed the common standards and requirements for certification for their engineering educational courses. India is not a member of WA. In India , the educational part of engineers is looked after by the AICTE. Though the AICTE has applied for the membership of the WA, it has not been able to get it so far; unfortunately, even it has not been successful in getting the provisional membership. The Indian degrees are not recognised by the WA; and thus, I would say that we do have this problem.

On the professional side, the international forum is the Engineer Mobility Forum (EMF) - a world grouping of countries recognising mutually professional engineers of their countries. It has laid down

Dr. Uddesh Kohli is Chairman Engineering Council of India. He is also the Chairman of Consultancy Development Centre and Construction Industry Development Council. He is the President Emeritus of Indian Society for Training & Development (ISTD). Dr. Kohli is former Chairman and Managing Director of Power Finance Corporation (PFC); Advisor, Planning Commission; Chairman of Standing Conference of Public Enterprises (SCOPE); President of the Council of Indian Employees (CIE) and President of All India Management Association.

Dr. Kohli is recipient of the Eminent Engineer Award of the Institution of Engineers (I), for his significant contribution in the engineering field.

that for recognising an engineer as the Professional Engineer (PE) and registering he / she as PE, a person should have an experience for seven years as an engineer and also a record of continuing professional development.

After ECI was set up, we developed standards, systems and procedures for registration of PE, code of ethics and the procedure for continuing professional development of engineers which are equivalent to that of the Engineers Mobility Forum (EMF). ECI and the Institution of Engineers (IEI) applied for the provisional membership of EMF, got the provisional registration in the name of IEI after ECI and IEI signed an agreement accepting that ECI would register PE in India after the Engineers Bill is enacted. This provisional membership is yet to be converted into full membership. However, the recent decision of the EMF is that for any country to be full member of EMF and to be registered in the international level register, the country should also be full member of WA as EMF prescribes that the educational qualification must be accredited and must be recognised by the WA standards. Since India is still not a provisional member of WA, the question of full membership of EMF would come later. So this is the international scenario. Professional Engineers registered under the standards, systems and procedures developed by the ECI would be recognised and accepted as such worldwide.

ECI submitted the draft of the Engineers Bill to the Ministry of HRD nearly two years back. First of course, there was a problem to identify the Ministry dealing with this case. It took almost a year and half to settle that issue and it was decided within the Government that the Ministry of HRD would be dealing with the issue. The Ministry of HRD set up a small drafting committee to look closely at the Draft Engineers Bill of the ECI. It completed its work and submitted the revised draft of the Bill to the Ministry of HRD. At the same time, the Ministry of HRD also said that no registration by any agency is valid unless it is done by a legally-constituted statutory body. But, the Bill is yet to be processed because some objections were subsequently raised by the IEI and the Ministry of HRD said that first let there be consensus within the engineering profession. After that only the Bill would be processed. We are still hopefully waiting that it would happen soon. I thought I should present this background because many of you may have not have attended the previous conferences of ECI. Meanwhile, ECI has been working together with its member organisations. The type of framework which we have developed is very much on the lines of UK where there is Engineering Council which is an apex body and which has developed the standards. The member institutions for various disciplines like Chemical, Civil engineering, etc. undertake the actual registration process following those standards and guidelines but with the stamp of the apex body that is the Engineering Council. I am happy that in this conference, we are discussing some of the issues that are particularly related to the international competitiveness.

1. 2. Dr Kirit S. Parikh

We are just about to launch the Eleventh Five Year Plan. We have had four years of rapid economic growth at an average of 8 percent per annum. We are targeting the average growth rate of 9 percent per annum for the Eleventh Plan. If we continue to have that kind of growth for five years, the per capita income in this country would double within 10 years. We have recognised that it is not enough that we have only rapid economic growth but at the same time, the fruits of this growth must cover all sections of the society and it must be ensured that no one is left out from the benefits of the growth.

The fruits of this growth must be shared by all sections of the society. Attempts are being made to empower people by educating and training them through schemes like Sarva Shiksha Abhiyaan, an element of the programme called Bharat Nirman which aims to fill the infrastructures gap, education

and skill gap, health gap, public goods gap, the capability and functioning gap, that exist between urban and rural India. Needy people, who have already crossed the school-life-period, are being helped through the schemes like National Rural Employment Guarantee Programme according to which every family is assured of employment of at least 100 days at minimum wages and is compensated by giving wages in case they are not given employment. Special programmes meant for bringing up the health and education level of backward regions have been devised and are being implemented.

The question one might ask is that are we really going to get this 9 or 10 percent growth rate. We can achieve this growth rate provided we first take care of agriculture, which continues to be the basic sectors of our economy. For this, I think that the agricultural growth rate needs to be pushed up from around 1.8. % per year during the last five years to around 4 % per year . It assumes added significance in view of the fact that over 60% of our population depends upon agriculture. The other important area that we need to tackle is the rural infrastructure. For this the Bharat Nirman Programme has been taken up under which the rural infrastructure is being upgraded The programme aims at doubling the irrigation growth rate so that by the year 2009, we can bring in 10 million hectare of land under irrigation which is twice the rate of normal expected growth. And if you bring 10 million hectare additional land under irrigation, you can expect about 3.5 percent of agriculture growth per year. Then if we concentrate on areas where you have indeed good technical potential but are not really getting the kind of help, like in the eastern region of India, this would give another 0.5 percent of annual growth. So, we have comprehensive package which, we think and we believe, can deliver a 4 percent of growth of agriculture per annum. Further, the growth of agriculture would be stimulated by other developments including rationalization of the rural infrastructure connectivity

But, the important question that every body asks is: can the industries grow given the infrastructure that we have? Here, really we need to encourage investment in industry through appropriate policies. We need to upgrade the infrastructure to global standards and build more plants. We need modernisation of railways with respect to the building of flat corridors connecting various Indian cities. Apart from highway programme to connect east-west- north-south, we really need to concentrate on the proper maintenance of roads. Here, engineers have got a very vital role to play.

The road construction, as you see, is being done largely through public-private partnership. So, this is quite a remarkable change in which you are asking private engineering and consulting firms to help in the building of these roads and also to maintain them. The public-private-partnership is required to ensure the efficiency that private sector can bring in. But, at the same time, you want a transparent, accountable process. You want to see that the people generally recognise that this is the best way of executing the works related to infrastructure. I think, we need a very transparent procedure for providing a level playing field to all kinds of national and international engineering firms. I think, internationally, what has happened is that the World Bank and other multilateral agencies require global tendering for many of the projects. I think that, over the years, a large number of Indian firms have been able to bag international contracts. I think, we also need to operate in the competitive mode, which requires more entries of firms into the market including from abroad. Our policies of competition, therefore, would have to be consistent. We would have to ensure this. Another factor which plays a very healthy role in the bagging of industrial contracts / projects is its timely completion. It is an achievement on the part of the Indian firms that they have been able to bag a number of international contracts by virtue of their performance.

One of the reasons due to which Indian consulting engineering profession has suffered in the past is that the public sector companies got a most favoured treatment in our development policy frame work, which discouraged the private sector firms in the business, particularly of consulting engineering. Doing business this way by the public sector units has also been one of the important factors of high cost of the public sector works. Fortunately, this is no longer the practice. I think, the idea to provide a level playing field is very important for the engineering profession. I know that in the past, public sector firms had really no competition in that sense and they ran away with large and interesting projects. In order to attract people to the engineering profession, it would be necessary to provide them with interesting and challenging projects apart from ample scope to make money in a consistent and competitive policy frame work.

Railways are going to be modernised to build dedicated freight corridors between Delhi and Bombay , between Delhi and Kalkota. We really need to invest thousands of crores of rupees in our infrastructure. And for that, we will need to do a lot of engineering, a lot of designing and a lot of construction work. But, it is not just engineering, we need to increase production in our factories and our exports. For that, all types of engineering will be in a great demand. In the country, I think, there is a great opportunity for the consultancy sector to grow. Indian consulting engineers have already acquired prestige in international projects. I think it is no longer the case that we cannot compete internationally. We have before us the achievements of IITians abroad, who have been acclaimed internationally. But, I think, a big challenge for us is as to how to upgrade our education standards in the engineering colleges which will be comparable to the best available in the world. We will have to work in this area so that our engineers are recognised as world class.

Dr. Uddesh Kohli has referred to the two international agreements. I have some suggestions relating to education. We have a large number of engineering colleges; these colleges produce a lot of engineers. There are general beliefs that while 20 percent of engineering colleges are of some satisfactory standards, the other 80 percent are not so. Well, the AICTE is accrediting engineering and other colleges. I am told that about 15 percent of the programmes have been accredited so far; and at this rate accreditation of all the Indian engineering colleges will take many more years. In order to upgrade the engineering education standard to enable the engineers from the other engineering colleges also to compete internationally is a challenge for us. It has generally been seen that the general standard of the engineers from the majority of the Indian engineering colleges is not up to the mark. Much is to be done in order to enhance it. If we entirely rely on the market where graduates, who come out from colleges are employed by firms and if they find an engineering graduate from a particular college useless, tendency will be there for them to generalise this impression and not employ graduates from that particular college. It will take many years before market can sort out the problem of the quality of different institutions of engineering education this way. We can accelerate this process. For this, I think that under the present circumstances, all the relevant information like the number of students appeared in the final year of engineering, the class of their passing out of the final year, details of their extra-curricular activities, etc., should be given a wide publicity through the respective college websites to enable the people and industry to have the detailed idea for placement of their wards and for the recruitment by industry respectively. I think, this will automatically lead to the enhancement of the engineering education standard of these universities/colleges.

I think the certification of professional engineers, as referred to by Dr Kohli, is quite important and we should establish a body which would award Professional Engineers certificate. Systems for testing for

certification are well - known. Today, with the possibility of being able to administer this test any time on the computer in an effective way, it will be easy to make sure that the people know the quality of test that is being done. So, I think, certification should be done.

The second question is that if the Government says that it cannot be done till it sets up a statutory body to recognise it. One way out from this situation will be to try to get recognition from the Government; the other way will be to ask yourself that if the Government does not recognise, the world will recognise it if the quality and test is good. We have seen that bodies like NIIT giving certificate for training in software technology skills have been very successful and it is useful for getting a job. If the quality of the test is excellent, I don't think it is important whether the Government certified it or not. We need to get much more self confident, self-assured and less dependent on the Government.

I do hope that the engineers recognise the numerous contributions they have been making and tremendous competition and challenges that is ahead of them and let us work to make the engineering profession really one of the most vibrant professions that contributes to the growth of this country and also for ourselves.

1.3 Dr. T. Ramasami

The number of people who get engineering education in this country is significantly large. I had a meeting yesterday with the foreign minister of Norway and he said that they have employed 4000 Indian Marine Engineers in their ships and that is close to 20% of the total number of engineers they have hired. He spoke highly of the quality of engineering education and the quality of professionalism displayed by our engineers. He went on to extend the argument further that the Indian engineers are globally required. That kind of message you get from any one who addresses this question.

Given the fact that 54% of our population constitutes young people and a large number of them opt for engineering education, it is necessity on our part to ensure that the engineering education that we provide opens up the entire global opportunity for our engineers.

It is one thing to have the people and another thing is to supply skilled work-force to meet the demand at par with the global standards. I understand in our structure, the concept of professional engineers and the concept of certain standards are being pushed into the system. So, therefore, when we look at the global opportunity that emerges on the basis of trade agreements and other protocols, there is great opportunity for good professional engineers to contribute to the growth of the profession and country as a whole. I think we have a number of tasks to initiate and develop further. And I congratulate the Engineering Council of India for having set a nice programme where the questions are being addressed in the form of professionalisation, in term of building competency criteria and, of course, the of code ethics for engineers and the kind of legal framework that is necessary for such a process to happen. There are statements being made that one can get admission in MIT in U.S.A. but not in IIT in this country. It is, therefore, one thing to recognize that our engineers are super when one looks at the Indian Institute of Technology (IIT) brand equity in the world, it is the other thing to make engineers super internationally who come out from the other institutions in the country. We, therefore, have to look at the quality of the large numbers, which come out of other engineering institutions. This is what is the important issue that we have to resolve before we can fully participate in the market of engineers both the indigenous and international.

I congratulate the Engineering Council of India (ECI) for undertaking the various steps in order to meet its set objectives of primarily making the professionalism of the Indian engineers reputed nationally as well as internationally. I wish all success to the ECI in its future endeavors.

1.4 Chander Verma

It is indeed pleasure to propose a vote of thanks on behalf of ECI and myself. As you all know that the ECI was formed by the coming together of a large number of organisations and Institutions of Engineers to work for the advancement of engineering profession in various disciplines, focusing on quality aspects and the accountability of engineers and to enable the recognition of the expertise of Indian engineers and their mobility at the international level in the emerging WTO and GATS environment. Since then ECI has been organising seminars and workshops as per its set objectives.

The 4th National Conference is being held today with the main theme: Towards International Competitiveness of Indian Engineers. The Conference will focus on the professionalism and development of engineers and technologists. Dr. Kohli has already given us an overview of the Council and Conference.

We thank Dr. Kirit S. Parikh, Member, Planning Commission, for having accepted our invitation to be the Chief Guest despite his busy schedule. According to him, the next five years seem to be very interesting time with higher growth rates in agriculture and economy on the whole.

I thank Dr T Ramasami, Secretary (Science & Technology), for accepting our request to be the Guest of Honour and giving his valuable address which, I am sure, will guide us for our future work.

I thank all the Session Chairmen, Keynote Speakers and Panelists for accepting our invitation and, I am sure that they will make their thought provoking presentations which will help in a great measure ECI in its future endeavors. We will be looking forward to these deliberations during the day.

I thank all the distinguish Delegates, Honoured Guests and Invitees who have come from all over the country and, I am sure, that their contribution will be valuable and meaningful. Last but not the least, I thank the Department of Science and Technology for providing the venue for the conference.

TECHNICAL SESSION - I

Professionalisation of Engineers in WTO/GATS
Environment and Challenges Ahead

TECHNICAL SESSION - I

PROFESSIONALISATION OF ENGINEERS IN WTO/GATS ENVIRONMENT AND CHALLENGES AHEAD

Chairman - Prof V. N. Rajasekharan Pillai

Co-Chairman - P. R. Swarup

2.1 Trade in services and RTAs

Dr. Ram Upendra Das

Since the topic of this conference organised by the ECI is towards international competitiveness of Indian engineers, it is appropriate to actually understand what the global regime in trade and services is going to be or what it is at present and take advantage of promoting trade in services as far as India is concerned.

Trade in services is a very broad term and it is in this context that I would focus on the engineering services where we have a competitive advantage but it is also going to meet competitiveness challenges. Therefore we have to put our thoughts together as to how to optimise on the benefits of the global trading regime as well as minimise any possible risks that may arise out of the global competition for our engineers. My presentation is divided under the following heads:

- Importance of Services
- Difference between Goods and Services
- Trade in Services needs a Unique Approach
- Uniqueness of Services captured in GATS
- GATS: Some Features
- Negotiating Procedures
- Present Status of Negotiations

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P. R. Swarup is the first and founding Director General of CIDC and has been responsible initiating several projects for the welfare of Indian Construction Industry. These include Grading of Construction Entities, Establishment of Construction Equipment Bank and Creation of Lending Norms for Construction industry. He is in the Governing Boards of ECI, Indian Society of Trenchless Technology and National Real Estate Development Council. He has served in various capacities in number of prestigious organisations. His articles appear in several leading National dailies such as Economics Times, Hindustan times etc.

2.1.1 Importance of Services

Services are important component of the day-to-day activities and the share of services is perhaps more when compared to the manufacturing sector. Further, service sector gains more prominence as it has direct link with the real sector.

- Global Importance. Services contribute 60 percent of GDP in developed countries and 50 percent of GDP in developing countries. Global Trade in commercial services is of the order of \$2 Trillion (roughly 1/4th of merchandise trade).
- Importance in India. India's core advantages in services is the availability of trained English speaking workers, low cost of service and established infrastructure and competence in IT and IT enabled services. This means that India is well placed to take advantage of the emerging situation of manpower shortage in the developed world.

In this context, engineering services have a very important role in the overall development framework of the economy. There are various other service sectors where there are no real economical activity e.g. financial services that change hands in terms of trillions dollars a day world wide but generally do not always maintain connection with economic activity. WTO Classification of Services sector lists Engineering services and Integrated Engineering services under Professional services. In addition, there is a separate category on Construction and related Engineering services. Trade accelerates knowledge exchange, and, in a continuing development process, it benefits through technology, or engineering practices.

2.1.2 Difference between Goods and Services

There is a very important distinction between goods and services. Services as opposed to goods are intangible and non replaceable and there is some kind of simultaneity between demand and supply of services. WTO general agreement on trade in services (GATS) regime actually identifies trade in services by classifying them.

One major distinction between trade in goods and trade in services is that goods are regulated or legalized through tariff which is a price measure whereas services are regulated or legalized not through tariff but through domestic regulations. Regulations are very difficult to quantify, tariff on goods as we know is easy to quantify in import or export.

2.1.3 Trade in Services needs a Unique Approach

It is due to:

- Unique characteristics of services
- Non-tradability
- Necessity of movement of factors of production

Dr. Ram Upendra Das, Fellow, Research and Information System for Developing Countries.

He is currently working in Research and Information Systems for developing countries set up by Govt. of India. It is a think tank for economic research for the various engagements that India embarks upon with other countries. This organisation also provides input to the Govt of India to articulate some of the negotiating positions on various international economic cooperation issues in WTO regime

- Capital movement
- Labour movement
- Cross-border movement

2.1.4 Uniqueness of Services captured in GATS

Now the unique characteristics of services in terms of non tradability, indivisibility and simultaneity in demand and supply also make it relatively less tradable as compared to the movement of goods. Because services entail human beings rendering the services and human beings are not goods, therefore, the movement of goods is much faster and much easier to do as compared with the movement of natural persons. Services may also necessitate movement of factors of production so it entails capital movement --there is another category like an engineering consultation services, which might be stored in a CD ROM. The cost of CD ROM might be only 15 rupees but the services entailed in the CD ROM might be worth millions of dollars. So we have to understand the broad nature of movement of services. It is because of this reason that under GATS, there are four modes of supply of services:

- Mode 1 cross border supply,
- Mode 2 consumption abroad where you consume some service.
- Mode 3 commercial presence through joint venture and there an engineer is employed and renders service.
- Mode 4 movement of natural persons for short term or long term work.

2.1.5 GATS : Some Features

In GATS, each country has a policy, where it can state the area of service it wants to legalise so that its professionals can talk about these services.

The commitments under GATES are binding, but we must also understand that we have a choice to requests and offers binding commitment. This is an area where ECI can play an important role to explore as to what are the real choices for Indian engineers to tap in the global market.

The requests and offers approach in WTO regime happen in all 3 levels i.e. bilateral, purely lateral and multi-lateral.

2.1.6 Present State of GATS Negotiation

You know that we have an edge in engineering, construction and related services but the developed countries are more in business, financial and banking services. We have to keep that in mind and we have to push our agenda where we have a competitive advantage and we need to articulate our agenda and that demands urgency. This has led to number of negotiations to define the principles. Hong Kong Ministerial Meeting outlined the following:

- Any outstanding initial offers shall be submitted as soon as possible.
- Groups of Members presenting requests to other Members should submit such requests by 28 February 2006 or as soon as possible thereafter.

- A second round of revised offers shall be submitted by 31st July 2006.
- Final draft schedules of commitments shall be submitted by 31st October 2006.

2.1.7 Present Status

India has negotiated Services Agreement as under:

- India-Singapore CECA
- India-Sri Lanka CEPA
- India-ASEAN
- India-Malaysia JSG on CECA
- Other countries
- India-EU CECA

2.1.8 Broad Implications for Engineering Profession :

The Way Ahead to sum up the broad implications and challenges ahead are under :

- Mutual Recognition: Degrees/Competence/Quality of work
- Temporary Movements: time-frame
- Domestic Regulations: Contents: Exports and Imports (Emergency Safeguards)
- Proposed Engineers Bill
- Integrating real and services sectors

2.2 Mr. John Triplet

I am an engineer from U.S.A. In U.S.A. you have to be registered as a Professional Engineer (PE) to sign drawings in a lead project, where you are legally responsible for the assignment. PE's endorsement implies that professionally this project is right. PE's verification of signature shows that he has engineered this project properly. In USA, you take the examination while working under other professional engineers and in five years' time you get the professionals status after passing examination. That is the U.S.A. system. In USA, a PE has to renew registration after every five years.

I am privileged to work with Delhi Metro Corp. for the last 5 years. I am working with some of the best engineers and managers that I have worked with in my careers. They are of world class but you need the credentials for the professional engineering registration, something to say that I know what I am doing and that I have got the backing of the Engineering Council of India and the Govt. of India. You do not have to go through the tests again.

I encourage you and I ask you please do everything you can to make registration credentials and go all out on making a world-class registered Professional Engineer, to be a part of the world recognized community of professionals.

John Triplett is the Deputy Project Director, Project Manager JC to DMRC that Railways project is being developed here. Phase-I of Delhi Metro Project and he is in Delhi since May 2001 then he is an electrical engineer from United State of America and the Senior Professional Associate, Parsons Brinckerhoff, New York. He has more than 28 years' services in Railway, operating and maintaining engineering.

2.3 Implication of GATS on the Engineering Profession

Er. S. Ratnavel

2.3.1. Development of General Agreement of Trade and Services (GATS)

It contains provisions that impact on the delivery of cross border services by professional engineers and firms. It has a provisions regarding recognition of educational qualifications and quality of experience. The development of GATS is outlined below:

1946	United nations calling conference on international trade. Proposed formation of International Trade Organization.
1947	Creation of GATT, General Agreement on Trade and Tariffs.
1986	Multilateral negotiation initialed
1993	Completed negotiations and created World Trade Organization.
1990	Export of services accounted for more than US \$ 1 trillion (i.e., 20% of world export). Japan, USA, European countries concentrated in service economics.

All developing countries involved in the activities of WTO and involved in multi lateral trading system held discussion in the following locations.

1996	Singapore
1998	Geneva
1999	Seattle
2001	Doha

The early achievements of progressively higher levels of liberalization of trade in services through successive rounds of multilateral negotiations aimed at promoting the interest of all participants on an overall balance of rights and obligations while giving due respect to national policy objectives.

2.3.2 Main Features of GATS

These are:

- Provides legally enforceable rights to trade in services
- No tariffs and other generalized protection mechanisms are applied to services
- Four principal modes of providing international services i.e., cross border supply, consumption abroad, commercial presence and invent of natural persons.

S. Ratnavel is involved in consultancy services for over Twenty years. He is one among very few in systems dynamics and has developed lot of structural modeling for large scale planning systems. His area of interest is Structural designs, soil structure interaction ,corrosion technology, distressed buildings in expansive clay soils and restoring weak structures. He has handled more than 200 turn key projects includes cinema halls, marriage halls, multistoried apartments, mass housing schemes, industrial buildings and restoring of distressed buildings, prestressed bridges and road construction. He has also organized seminars, workshops, technical training program in IIT/Delhi, Chennai and Madurai. He continously interacts interaction with eminent professors, consultants, premier institutions, bureaucrats and industrialists at the national level.

- Allows members to choose the services and limit the degree of liberalization by way of market access and national treatment commitments.
- Opportunity for member from most favoured countries.
- Mutual recognition of qualifications, experience and skills which should not be discriminatory and substitute for protectionism.
- No restrictions on transfer of money on account of payment for services supplied in across border transactions.
- Permission for government to negotiate over specific commitments movement of natural persons, financial services, telecom services and air transport.

2.3.3 GATS Services Classification

It covers the following:

1. Business Services
 - A. Professional Services
 - a) Legal Services
 - b) Auditing
 - c) Taxation Services
 - d) Architectural Services
 - e) Engineering Services
 - f) Urban, Planning and Landscape Architectural
 - g) Medical and Dental Services
 - h) Integrated Engineering Services etc.
 - B. Computer and Related Services
 - a) Software Implementation services
 - b) Data Processing
 - c) Database Services etc.
 - C. Research and Development Services
 - a) R & D services on natural sciences
 - b) R & D services on Social Sciences and Humanities
 - c) Interdisciplinary R & D Services
 - D. Real Estate Services
 - a) Involving Own Least Property
 - b) On a Fee or Contract Basis
 - E. Rental / Leasing services without Operation
 - F. Other Business Services

2. Communication Services
 - A. Postal Services
 - B. Courier Services
 - C. Telecommunication Services
 - D. Audio Visual Services
 - E. Others
3. Construction and Related Engineering Services
 - A. General Construction work for Buildings
 - B. General Construction work for Civil Engineering
 - C. Installation and assembly work
 - D. Building Completion and Finishing work
 - E. Others
4. Distribution Services
5. Educational Services
6. Environmental Services
7. Financial Services
8. Health Related and Social Services
9. Tourism and Travel Related Services
10. Recreation Cultural and Sporting Services
11. Transport Services
12. Other Services not included any where

2.3.4 Implications of internationalization of above Services

- Advantages to developing countries
 - Developing New Exports
 - Development of Infrastructure
 - Improved Productivity and Competitiveness etc.,
- Challenges For Developing Countries
 - Reorienting Educational And Training System
 - Design of Appropriate Regulatory Environment for Services Industry
 - Undertaking Massive Investment in Modern Sectors such as IT,
 - Adapting Technology System to the needs of fast changing economic environment.
 - Provision regarding mutual recognition arrangement
 - Developed countries already invoking provision regarding recognition of qualification, such development have placed countries notably India at a relative disadvantage this issues has been taken by Engineering Council of India.

2.3.5. Issues arising from GATS

These include:

- a) GATS rules for Technical Standards, Qualification and Licensing requirements for Engineering have not yet formulated.
- b) GATS urge members to recognize the educational or other qualifications of service suppliers of other countries.
- c) GATS allow members to negotiate agreements among themselves for mutual recognition with comparable standards and appropriate Internationally agreed standards.
- d) Developed countries are having regulatory mechanism for almost all type of professions and service providers.
- e) Developing countries have to develop regulatory mechanism for Professional like Engineers Integrating all professional Engineers and to create a awareness across the country is a challenge.

Other Barriers for Movement of Natural Persons are:

- Visa regulations
- Wages Parity Compulsions affecting Indian Competitiveness
- Economic need test (foreigners are allowed when the local persons are not available)
- Double taxation and social security
- Membership of Washington Accord and Engineer Mobility Forum

2.3.6 Washington Accord

The Signatories of Washington Accord agree:

- To the criteria, policies and procedures used by the signatories in accrediting engineering academic programs are comparable;
- To the accreditation decisions rendered by one signatory are acceptable to the other signatories, and that those signatories will so indicate by publishing statements to that effect in an appropriate manner.
- To identify, and to encourage the implementation of best practice as agreed from time to time amongst the signatories for the academic preparation of engineers intending to practice at the professional level;
- To continue mutual monitoring and information exchange by whatever means are considered most appropriate, including :
 - regular communication and sharing of information concerning their criteria, systems, procedures, manuals, publications and list of accredited programs,
 - invitations to observe accreditation visits, and
 - invitations to observe meetings of any boards and/or commissions responsible for implementing key aspects of the accreditation process, and meetings of the governing bodies of the signatories;

- To make every reasonable effort to ensure that the bodies responsible for registering or licensing professional engineers to practice in its country or territory accept the substantial equivalence of engineering academic programs accredited by the signatories to this Agreement.
- To ensure that the admission of new signatories to the Accord will require the unanimous approval of the existing signatories, and will be preceded by a prescribed period of provisional status, during which the accreditation criteria and procedures established by the applicant will undergo scrutiny
 1. Applicants for provisional status must be nominated by two of the existing signatories, and will be accepted only through a positive vote by at least two-thirds of the existing signatories.
 2. Any signatory wishing to withdraw from the Accord must give at least one year's notice to the secretariat. Removal of any signatory will require the affirmative vote of at least two-thirds of the signatories.

WA signatories are responsible for accreditation and professional registration in the respective countries.

2.3.7 Engineers Mobility Forum (EMF)

Its objectives are:

- a) develop, monitor, maintain and promote mutually acceptable standards and criteria for facilitating the cross-border mobility of experienced professional engineers;
- b) establish a decentralized International Register of Professional Engineers which would provide a readily accessible framework for recognition by the responsible bodies of the substantial equivalence in the competence of experienced professional engineers from the participating economies;
- c) seek to gain a greater understanding of the existing barriers to mobility and to develop and promote strategies to help governments and licensing authorities manage those barriers in an effective and non-discriminatory manner.
- d) Encourage the relevant governments and licensing authorities to adopt and implement mutual mobility procedures consistent with the standards and practices recommended by the signatories to such agreements as may be established by and through the EMF.
- e) Identify, and encourage the implementation of best practice for the preparation and assessment of engineers intending to practice at the professional level; and
- f) Continue mutual monitoring and information exchange by whatever means are considered most appropriate, including:
 - regular communication and sharing of information concerning assessment procedures, criteria, systems, manuals, publications and lists of recognized practitioners;
 - invitations to observe the operation of the procedure of other participants; and
 - invitations to observe meetings of any boards and/or commissions responsible for implementing key aspects of these procedures and relevant meetings of the governing bodies of the participants.

The participants considered that, in order to demonstrate the substantial equivalence in competence necessary for listing on the International Register of Professional Engineers, the practitioners concerned would have to demonstrate that they had:

- a) reached an overall level of academic achievement at the point of entry to the register in question which is substantially equivalent to that of a graduate holding an engineering degree accredited by an organization holding full membership of and acting in accordance with the terms of the Washington Accord;
- b) maintained their continuing professional development at a satisfactory level;

And Either

- been assessed within their own economy as eligible for independent practice; and
 - gained a minimum of seven years practical experience since graduation; and
 - spent at least two years in responsible charge of significant engineering work
- or
- Been assessed within their own economy as eligible for independent practice through a competency-based assessment acceptable to the signatories that confirms that they have developed practice skills substantially equivalent to those implied by the prescribed criteria for experience.

EMF members include

- The Canadian Council of Professional Engineers
- The Engineering Council of South Africa
- The Engineering Council, United Kingdom
- The Hong Kong Institution of Engineers
- The Institution of Engineers, Australia
- The Institution of Engineers of Ireland
- The Institution of Professional Engineers, New Zealand
- The United States Council for International Engineering Practice
- The Japan Consulting Engineers Association
- The Board of Engineers, Malaysia
- The Federation of European National Engineering Associations
- The APEC Engineers Coordinating Committee

The admission of new Members will require a positive vote in writing by at least two-thirds of the existing Members and will be preceded by a prescribed period of provisional membership, during which the procedures and criteria established by the applicant, and the manner in which those procedures and criteria are implemented, will be subject to comprehensive examination by the

Members. Applicants for provisional membership must be nominated by two-thirds of the Members. The participants agree that no organization which was already represented on the EMF by or through an existing Member or Provisional Member would be entitled to apply for Provisional Membership of the Forum.

Appropriate Rules and procedures will be established by the members to ensure that the EMF can operate in a satisfactory and expeditious manner. Adoption / amendment to such rules and procedures can be processed at a general meeting only through a positive vote of at least two-thirds of the Members. Further, a general meeting of the EMF will be held at least once every two years.

2.3.8 Other International Initiatives

- a) Sydney Accord. The deliberations of the Ottawa Working Group resulted in the signing of the Sydney Accord, which for technologists is the equivalent of WA for engineers.

The agreement is very similar to WA

The signatories are all the WA countries except USA who at this stage remains an observer.

In Canada, technologists and technicians are dealt with by a separate body, namely, the Canadian Council for Technologists and Technicians.

- b) Engineering Technologists Mobility Forum. The Ottawa Intent Working Group has also been working on the establishment of an Engineering Technologists Mobility Forum (ETMF).

This forum will be similar to EMF. A further intention of the agreement is to recognize those professional technologists as well who attain competence levels through alternate routes.

- c) Dublin Accord. An agreement exists between UK and Ireland, called the Dublin Accord, for educational qualifications for technicians. Canada, Ireland, UK and South Africa agreed in 2001 to continue to explore options and this exercise may lead to Canada and South Africa joining the Dublin Accord.

- d) Asia-Pacific Economic Community. The Asia-Pacific Economic Community (APEC) is developing a method of recognizing professional competence, called the APEC Engineer, for mobility in the Asia Pacific region. Recognition takes place at an advanced level: degree plus seven years experience of which at least two years must be in a responsible position. The framework adopted for APEC engineer is similar to the one evolved for the International Register of Professional Engineers of EMF.

2.3.9 Extra-Territorial Accreditation

Washington Accord is an instrument for recognition of educational programs accredited in the jurisdiction of an accrediting body. Some countries are going beyond their territorial areas for accreditation.

USA and Canada are mandated to carry out visits to other countries which do not have accreditation systems in order to establish "substantial equivalence" of programs to those in their jurisdictions.

The UK Engineering Council undertakes accreditation of universities in other countries at their request and accredits degrees awarded by them. Such accreditation, however, has no standing in the Washington Accord.

United States Council for International Engineering Practice (USCIEP), promotes outside USA practices.

In U.S.A license depends on three elements

- | | | |
|---|-----------------------|-------------------------------------------------------------------------------------------------------------------------|
| 1 | Education | ABET(Accreditation Board for Engineering and Technology) |
| 2 | Examination | NCEES(National Council of Examiners for Engineering and Surveying) |
| 3 | Professional Practice | NSPE (National Society of Professional Engineers). Responsible for Ethical, Competent and Licensed Engineering Practice |

2.3.10 NAFTA North American Free Trade Agreement

It encourages relevant organizations in the respective territories to develop mutually acceptable standards and criteria for license and certification of professional service providers. On 5th June 1995 USCIEP along with three governing bodies namely ABET, NCEES & NSPE made agreement with Canada and Mexico for two years in education, experience and examination requirements that North American Engineers must fulfill to obtain temporary licenses to practice in jurisdiction within the region.

2.3.11 Issues for WA.

- ECI has to directly involve to face the issues arising from WA.
- Since WA deals with specific accreditation of education program in engineering, recognition, registration etc., of professional engineers; ECI should evolve its strategy to deal the issues.
- WA has not given any guideline of distance and Virtual campus programs.
- WA is not clear regarding accreditation
- In case India attempts to join WA, can ECI represent the country? It has to be decided by the government.
- Since GATS emphasis recognition of qualifications of professionals, it is in India's interest to get its own system of recognition and registration made acceptable at the International level.

If the above Issues are not resolved, the Indian Engineers will have to face the following : .

- taking up jobs on their own in other countries, i.e. migration,
- working abroad on projects of Indian companies,
- working in India on internationally funded projects,
- working in India in multinational corporations, and
- working as consultants/advisors with or on behalf of international agencies and foreign governments.

2.3.12 Conclusion

Indian Engineers have to register in the relevant body in another country by paying large amount for registration and renewals.

Entry into WA requires unanimous decision of existing signatories (for provisional status two-thirds of the signatories must agree) Even if one member opposes the proposal; it is difficult for any country to get in.

If ECI cannot represent in WA, AICTE/ NBA should represent (NBA already applied based on the unofficial information).

In the long run, India needs an arrangement so that the task of accreditation registration and recognition are coordinated within our country and abroad. so that we can reap the opportunities out of WTO and GATS as one of the signatories.

The only possible organization to help the Indian Engineers is ECI.

TECHNICAL SESSION - II

Professional Engineers Competency Criteria and
Continuing Professional Development

TECHNICAL SESSION-II

PROFESSIONAL ENGINEERS COMPETENCY CRITERIA AND CONTINUING PROFESSIONAL DEVELOPMENT

Chairman - S. Ghosh
Co-Chairman - A. K. Sehgal

3.1 Updation of Competency

Col. Sunil V. Gaopande

(Presentation of Paper written by Lt Gen BS Dhaliwal, AVSM, VSM, Engineer-in-Chief heading Corps of Engineers and Military Engineer Service.)

Continuing Professional Development (CPD) is defined as 'the systematic maintenance, improvement and broadening of knowledge and skill and the development of personal qualities necessary for the execution of professional duties throughout working life'. CPD describes how professionals maintain their own competence in the workplace. All members of the Engineering fraternity should maintain and develop their competence in the workplace as a matter of course but CPD is the recommended way of achieving this. If you are going to maximise your potential for life-time employability, it is essential that you maintain high levels of professional competence by continually upgrading your skills and knowledge.

CPD comprises updating particular areas of competence, developing personal and management skills and broadening experience leading to new opportunities. The challenges and opportunities of the work experience provide the central mechanism for maintaining CPD. The Engineering Institutions encourage and support its members to maintain their CPD.

Srikumar Ghosh

Srikumar Ghosh, Managing Director of CES. Mr Ghosh is the President of the Consulting Engineers Association of India.

A Graduate in Civil Engineering from Calcutta University (Gold Medallist) and Post Graduate from Imperial College of Science & Technology, UK, Mr Ghosh has, to his credit, well over 50 years of experience, both at the national and international level, in engineering and consultancy practice.

His involvement in infrastructure development projects is unique. He has participated in many projects in India and abroad (Oman, Mauritius, UAE, Myanmar, Indonesia, Sri Lanka, Iran, Russia, Bangladesh & Yemen) and many a times led multi national teams.

He has been associated with various professional bodies both Indian and international -as Fellow of The Institution of Engineers (India); Institution of Civil Engineers, UK; Institution of Structural Engineers, UK; International Navigation Association (PIANC), Brussels where he served as International Vice President of PIANC (2000-2004); he represents regionally Institution of Structural Engineers, UK in India; He has served National Association of Consulting Engineers as the President (1992-94, 1996 & 1997); he is an active member of Civil Engineering Division Council of Bureau of Indian Standards; and an active Member of the Codes and Standards Committee of IStructE, UK. Mr Ghosh has always been involved in varied knowledge-dissemination efforts of the various professional learned bodies he has been associated with. He has presented highly laudable papers in international/national forums.

The passion of Mr Ghosh has ever and always been working for the good of the profession and his fellow professionals.

The presentation is covered under following subheadings.

Continuing Professional Development: Philosophy

What is CPD?

Why should I take CPD?

Role of Professional Institutions

How can mentor help?

What can employer do to help?

3.1.1 Continuing Professional Development: Philosophy

Success as an engineer or technician depends on a number of factors. With increasingly demanding jobs it is critically important to be able to demonstrate continuing competence as a professional. Personal aspirations, developments in technology, changing employment structures, together with increased international competitiveness, require continuing professional development (CPD) to be high on everyone's agenda. CPD can be defined as the systematic maintenance, broadening of knowledge, understanding and skills together with the development of personal qualities necessary for the execution of professional and technical duties throughout the individual's working life.

Individuals have always had to update their knowledge and skills. Although this is important, CPD, as a key part of lifelong learning, has a much wider function. It aims to enhance the potential of all staff by encouraging innovation and enterprise. Engineers must manage technology, be innovative and respond positively to a continuously changing world. Success comes from anticipating needs and recognising opportunities. CPD should be a driving force for change.

3.1.2 What is CPD?

Broadly speaking, Continuing Professional Development (CPD) includes any activity that extends or updates one's knowledge, skill or judgment and enables him/her to:

- Be more productive
- Understand and apply advances in technology
- Face changes in career direction
- Better serve the community.

Col Sunil V Gaopande, FIE, Director Personnel (Management), Integrated HQ of Min of Def (Army), Engineer-in-Chief's Branch is an alumni of Nagpur University having done his B.E (Mech) in 1980. He has joined Corps of Engineers, Indian Army in 1980 and since then held important assignments at various ranks in the Army, Border Roads Organisation and Military Engineer Services. He has varied experience in Combat Engineering, Road Construction in Rocky and Snow-Bound areas of Himalayan ranges, Construction of Accommodation, Infrastructure and allied Installations. He has also held HR and personnel management portfolios involving large number of officers and junior level work force at Army Command and Army HQ level. He was awarded GOC-in-C, Central Command Commendation Card in 2004 and Chief of Army Staff Commendation Card in 2006 for outstanding performance.

Registered Professional Engineers undertake CPD activities in order to maintain and extend their knowledge, skills and judgment. One of the main functions of CPD is to equip one to plan his/her career path. For an activity to qualify as CPD, it must be related to one's career as a Professional Engineer. For many engineers, CPD activities will include both technical and non-technical topics. Non-technical topics include management, accounting, law, economics, and foreign languages by which one carries out business. Functions that are routinely performed as part of one's employment are not normally claimable, for instance university lecturers cannot claim, under Presentations and Papers the lectures they present as part of their employment.

3.1.3 Why should I take CPD?

The job market is changing all the time. You may no longer be able to rely on your employer to identify and satisfy individual development needs. Additionally, you may well move jobs four or five times during your working life. Therefore you need to take ownership of your career and its continuing development.

These changes have increased the demands on people in all walks of life to keep documented evidence of their continued competence; and nowhere are these greater than in engineering, science or technologies which are advancing so swiftly. In your own best interests you should be developing a personal portfolio of your professional activities and their relevance to your job competence and your career ambitions.

- By undertaking CPD you will be:
- Demonstrating your continuing commitment to your profession;
- Developing the good practice of regularly reviewing your professional needs and selecting appropriate learning activities.

3.1.4 How much should I Do?

There is no simple answer to this. It varies from one person to another. The demands of your job and the extent of your personal ambition will determine how much you should do.

Always remember that quality is much more important than quantity. The most important aspect of CPD is the amount of knowledge and skill that you acquire, i.e. the learning outcome, rather than the number of hours of study which you undertake, i.e. the input. If you are to maintain sufficiently high standards of professional competence to keep yourself employable you will need to undertake significant CPD. However, when you consider all the activities, particularly at work and in the form of private study that add value to your knowledge, skills and experience, you will realise that quite substantial amounts are readily achievable.

3.1.5 What should I Do?

Again, this will depend upon your job and your personal ambitions, but in simple terms the answer is anything that adds to your personal store of relevant skills, knowledge and experience.

Therefore, there is no limitation to the range of subjects that can be included, although it is recommended that, in order to develop your expertise on a broad front, you may need to undertake CPD in the following areas.

- Developing your technical knowledge and skills in your current field.
- Broadening your technical knowledge and skills into fields parallel to your own, thus enabling you to move into another job, should the need or opportunity arise.
- Acquisition of non-technical knowledge and skills, e.g. Management techniques, Communication and presentational skills, Law (Health & Safety, Environmental, Employment), Finance, Languages, thus preparing you to assume wider or greater responsibilities when the opportunities arise.

3.1.6 How do I go about it?

Professional Development may be achieved in any of the following ways, depending on your circumstances, learning style and the opportunities open to you.

- At Home : private study, such as distance learning; special projects or structured study, which may involve reading, watching TV and video tapes and / or listening to radio programmes and audio tapes; writing papers for presentation or publication.
- At Work : where, simply by day to day activities, relevant knowledge and skills are acquired by on the job learning and / or company provision.
- At Events : such as presentations, lectures, seminars, conferences and also formal courses of study, whether or not they lead to an examination.

Remember, the activities that count are those that are relevant to your learning needs.

3.1.7 Why should I keep Records?

It is strongly recommended that you maintain a personal portfolio. This will assist you in a number of key aspects related to your career.

- You will be able to provide documented evidence of your commitment to your chosen profession and of your continued competence.
- It will act as an excellent reference, both in the up dating of your Curriculum Vitae and in recalling details of topics you have studied.
- It will be a most useful aid in your career development, providing a means by which you can plan, record and review your relevant activities.

3.1.8 How should I keep my Records?

There are number of ways in which this may be done but the most usual is, quite simply, an A4 ring binder containing

- Your Professional Development Plan based on your identified needs;
- Your Professional Development Record detailing specific activities that have contributed to your CPD.
- Certificates showing the competencies or qualifications you have gained; examples of work which demonstrate your competence; of projects / courses etc you have undertaken and your resultant developing etc.
- Other relevant CPD documentation.

3.1.9 Role of Professional Institutions: Obligation and Benefits

A code of conduct requires registered engineers to take all reasonable steps to maintain and develop their professional competence and knowledge. CPD is, therefore, a key obligation on engineers and technicians. Evidence of professional development and of compliance with the CPD code should be the requirement for registration.

Professional institutions, as nominated bodies of the Engineering Council, are required to promote and support CPD, and to monitor the CPD carried out by their members. They may use opportunities of registration, upgrading and other relevant occasions to review evidence of the CPD planned and undertaken.

Investment in CPD is a central business activity aimed at maintaining and improving the key competencies needed for success. For employers their staffs are more capable, both technically and managerially, and committed to continuous improvement. The benefits for individual engineers and technicians are increased job performance and employability, and enhanced opportunities for career advancement. The overall aims are high competitive performance for industry, and a positive image for the engineering profession.

3.1.10 Maximising the Benefits

Like many things in life, CPD can be organised so that it is carried out [almost] automatically. The Institute can help in advising you how to maintain your CPD effectively. The important thing to bear in mind is that it is a continual process of planning, completing activities, assessment of those activities and review/feedback back to the plan.

You will need to set up a system that encompasses these four core stages. Many employers have a bespoke system in place that performs this function satisfactorily; members can adopt such a system or use the system provided by the Institute. Members are encouraged to include their employers in the CPD process; ideally it should be a partnership that will benefit employee, employer and the company. The annual appraisal interview is the ideal time to plan development targets and assess progress. Notwithstanding it should always be remembered that the detail of CPD is very much the individual's property and one should not rely on the Company (Personnel) system, it may not be maintained properly and is of no support if you no longer work for them.

When completing your CPD plan [in order to achieve the necessary knowledge, skills understanding and attitudes that need to be acquired or developed] you must take into account:-

- Your employer's business objectives
- Your own career intentions, short and long term,
- Your relevant personal interests
- The requirements of the Institute.

You will also need to consider the actions that need to be taken, with responsibilities and time scale, to meet the identified needs. The plan should be developed, where possible, in conjunction with the employer. Account should be taken of the guidance provided by the Professional Institute for the preparation of CPD plans. Record CPD activities and achievements to determine the progress

towards implementing the plan and maintaining professional competence can be demonstrated. The benefits should be evaluated. The plan should be reviewed regularly (at least annually).

3.1.11 How can Mentor help?

A mentor is a more experienced and knowledgeable person who gives dispassionate and objective support and guidance to a learner (or mentor). To be effective, the mentor should not be in a position of authority over the learner. The most important functions of a mentor are to provide positive feedback, offer encouragement and adjust expectations.

Contact with a mentor can be useful in that he or she is someone you can turn to who has knowledge and experience of your situation and no interests to consider other than your own. Being a mentor can be very rewarding and a valuable CPD activity in that it provides a valued outlet for all the wealth of knowledge and experience that has built up over a career and provides an occasion to help others take advantage of some of the opportunities and avoid some of the pitfalls that you as a mentor may have encountered 'along the way'. In terms of Continuing Professional Development, a mentor can be particularly helpful with the following:-

- Conducting a Skills Audit/Gap Analysis
- Determining the knowledge and skills required for a particular job or role
- Setting development objectives
- Assessing learning experiences
- Deciding what should be the next steps
- Offering encouragement and providing motivation to persist with a CPD activity
- Suggesting alternative CPD activities
- Identifying CPD providers

Individuals should initially seek access to a mentor within their own workplace. Alternatively, the Professional Institute may be able to provide a useful contact who can advise you on how to go about planning and achieving your professional development objectives. Both of these sources of support have advantages and disadvantages and you should consider carefully what you require from a mentor. It is expected that mentoring will be particularly useful to those taking responsibility for their own CPD for the first time, those in the early stages of their careers and those contemplating a career change

3.1.12 What can Employer do to Help?

“Every company needs some form of career development programme to produce a succession of motivated, upward-moving employees. Even employees who are destined to remain at the same level may need career development as their jobs change or become obsolete.” Individuals have a responsibility to themselves and their employers to consider what might be required in the future and take steps to prepare themselves to be ready when opportunities occur and when changes are necessary. Employers have a responsibility to ensure that this is provided and managed. All professionals are being encouraged to address lifetime learning issues to make sure that they maintain their professional competence and continue to develop in all aspects of their work. Employees should be encouraged to keep records of their objectives and of the learning opportunities that they have used.

The annual appraisal interview is the ideal time to plan development targets and assess progress but CPD is the individual's responsibility. Employers can start investing in the Continuing Professional Development of their employees by the following:-

- Clarify how your business objectives may best be met by investment in your people.
- Take opportunities such as an annual appraisal to discuss development with individual members of staff.
- Ask them about their commitment to their own development and encourage understanding between you of shared objectives.
- Listen to their ideas and encourage them to consider their own personal goals.
- Aim to create a partnership between you, where you both contribute to their development.
- Set realistic expectations you both will have limited resources of time and money.
- Persevere in this process, continue to encourage your people and review progress regularly. The pay off will be a tangible improvement in productivity and in the competitiveness of your business.
- Establish a mentoring scheme to assist employees in setting medium and long-term career goals.

3.1.13 Conclusion

Fundamental Canon of Code of Ethics is that engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.

Professional Institutions and employers should be dedicated to the advancement of the profession of engineering to enhance the welfare of mankind. Continuing Professional Development can be used to enhance the competence of practicing professional engineers. There is need for commitment to provide leadership, encouragement, and opportunities to achieve Continuing Professional Development. Finally, CPD as integral part of the 'code of ethics' for the Professional Engineers shall be enforced by making the code mandatory for all the registered professional engineers.

3.2 Competency of Engineers and Continuous Professional Development

Prof C. V. Ramakrishnan

3.2.1 Introduction

In the previous conference of ECI, held in May 2005, Prof C. V. Ramakrishna had covered modern delivery system of new technologies like IT and telecommunication systems for imparting CPD and this presentation be considered as continuation of previous presentation.

Engineering Professional activity involves continuous learning on and off the field. With rapid technical advances any conventional engineer becomes completely outdated within 5 years. The reasons are:

- The changes in technologies in the field of specialization,

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- The impact of totally new technical disciplines like IT and telecom on the main subject
- The changes in the professional environment. These environment extend beyond own country and the professionals have to be conversant with the culture of other countries to be competitive.

These factors affect the acquisition of the competencies and are very important. They have to be acquired through Continuous Professional Development (CPD). Unlike the past, CPD programs need to be systematically structured and the level of competencies quantified. A practicing engineer needs CPD to acquire new knowledge and skills to advance in the profession such as:

- To acquire the status of a Professional/ chartered engineer, the professional will have to be evaluated for his competencies at a responsible and complex level.
- The Professional engineer will have to be monitored periodically for the acquisition of appropriate skills at the time of renewal of the certification.

For reasons given above and also for incorporating objective methods of evaluation of competencies it is necessary to

- Categorise and Quantify the competencies
- Quantify into units the CPD program of various types.

In our country, although competency evaluation and CPD offerings are common, these are not objectively quantified.

3.2.2 Competency Categories

Engineers Australia recognizes competencies under the following categories

1. Leadership
2. Strategic Direction and Entrepreneurship
3. Planning
4. Change and Improvement
5. Customer Focus
6. Processes, Products and Services
7. People/ Human resources development
8. Supplier Relationships
9. Information
10. Finance, Accounting and Administration

Under each of the above units, various subunits are identified and assessment has to be carried out.

3.2.3 Continuous Professional Development

This can be achieved through

- | | |
|--------------------------------------|--------------------|
| i) Formal post-graduate programs | Full time |
| and individual tertiary course units | Part time |
| not taken for award purposes | Distance Education |

ii)	Short courses Workshops Seminars and Discussion Groups Conferences Technical Inspection and Technical Meetings	Weightages in terms of hours
iii)	Private study. Core areas of risk management Business and Management skills Areas of Practice	Weightages To be specified
iv)	Service to the profession Panel member for accreditation Interviewer Reviewing Technical Publication Boards & Committees Mentoring	Weightages to be specified
v)	Presentations Courses Conferences Seminars & Symposia	Weightages to be specified
vi)	Teaching and Academic Research Industry Experience	Weightages to be specified

It is important that the unit measure for the achievement of competency should be properly weighted.

3.2.4 Private Study

- An Engineer can take up a program with any Management/leadership institution
- Online presentations, video streams, documents, Audio files, may be utilized.
- Engineering libraries are useful
- Electronic resources
- Library services
- Internet resources

3.2.5 Modes of offerings of CPD

- Structured programs
- Distance Education Tutors, Evaluation
- Self learning programs
- Online multimedia presentations

In all these cases it is necessary to be guided by a tutor who evaluates the assignments and provides guidance. Otherwise the self learning programs should have self-contained chunks of learning for developers and trainers apart from assignments/exercises for trainees.

Virtual learning centres may be established by the professional society.

Different delivery systems for distance education and virtual learning centre creation were presented in ECI Conference May 2005.

3.2.6 Issues Related To Regulation

The following questions need to be addressed.

- Should every engineer be periodically assessed by the regulator?
- What would be a reasonable measure of achievement to qualify for a P.E. status?
- How frequently should a P.E. be assessed for renewal of his P.E. status?
- Engineers Australia mandates the maintenance of a professional diary of their CPD activities. An on-line recording facility is made available.
- Compliance with CPD policy is monitored through an honour system of signed declaration. A random audit may be carried out.

TECHNICAL SESSION - III

Professional Engineers Code of Ethics and
Role of Engineering Associations, Corporate
and Academic Institutions

TECHNICAL SESSION - III

PROFESSIONAL ENGINEERS CODE OF ETHICS AND ROLE OF ENGINEERING ASSOCIATIONS, CORPORATE AND ACADEMIC INSTITUTIONS

Chairman - Sudhir Dhawan
Co-Chairman - J. Bhattacharya

4.1 Professional Engineers Code of Ethics Lt Col (Retd) K K Chitkara, AVSM

4.1.1 Why have Code of Ethics

Ethics are the moral principles, governing or influencing the conduct of a person, religious group or profession. Moral principles distinguish between right and wrong in conduct or behaviour. Ethics give rise to a set of values. These values define accepted / acceptable behaviour. Hence there are two parts of Professional Code of Ethic; one is the actual obedience and the other part is the goodness of the behaviour and responsibility. To quote example, the value expectations from an Indian Citizen, stated in the form of duties of a citizen, as enshrined in the Constitution of India are outlined below:

- to abide by the Constitution and respect its ideal and institutions, the National Flag and the National Anthem;
- to cherish and follow the noble ideals which inspired our national struggle for freedom;
- to uphold and protect the sovereignty, unity and integrity of India;
- to defend the country and render national service when called upon to do so;
- to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious; linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- to value and preserve the rich heritage of our composite culture;
- to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures;
- to develop the scientific temper, humanism and the spirit of inquiry and reform;
- to safeguard public property and to abjure violence;
- to strive towards excellence in all spheres of individual and collective activity, so that the nation constantly rises to higher levels of endeavour and achievement.

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Mr. Dhawan has been associated with the development of consultancy profession in India, he represents consultancy profession in the expert panel of Ministry of Commerce on WTO matters. He is former President of National Association of Consulting Engineers and has presented a number of technical papers in conferences in India and abroad.

In the business context, organisations, through their Code of Ethics, establish the ethical values framework for professional behaviour and responsibilities and support these with corporate policy, rules or guidelines to direct their members. It forces its people to think about their mission and obligations as a group with respect to society as a whole. It enables members to conform to these values in professional dealings and decision-making for the specific task / occupation. An organisation Code of Ethics also acts as a vehicle for occupational identity and as a mark of occupational maturity. Most major corporations, and some smaller companies, now have Codes of Ethics. But a survey reflected on a website reveals a sad state of affairs:

Code of Ethics Survey Data on 24-11-06

Business Organisations having Ethics		Barrier to creating a Code of Code of Ethics	
Yes (3013)	38 %	Apathy (851)	16 %
No (3869)	49 %	Cynicism (767)	14 %
Not Sure (1016)	13 %	Lack of know-how (3061)	57 %
		Legal worries (700)	13 %
Total Surveyed 7896		Total Responded 5379	

The need for special ethical values in a engineering professional is the same as the need for ethical principles in an organisation. They are mutually beneficial. They help make mutually pleasant and productive relationships. Ethics is taught in all most all engineering and management institutes, but some of the corporate, consultants and engineering societies still have to formally introduced code of ethics in their organisations. In a recent study reported in ENR (Nov 2003) in USA of A/E/Cs corporates shows that out of those surveyed :

- 81 % did not have formal ethics code.
- 93 % agreed that their should be more ethics training available;
- 85 % advocated that there should be an industry standard code of ethics;
- 95% agreed that industry associations should take a leadership role to help ensure professional ethical codes are available.

4.1.2 Professional Engineers Code of Ethics

The Engineering Council of India (ECI) has developed a code of ethics, which aims at maintaining high standards of personal and professional conduct, developing professional competency and integrity, ensuring ethical conduct in fulfilling social responsibility towards society, the nation and the global community. This is reproduced below:

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Article 1 Social Responsibility to Uphold Ethical Values of the Society

- 1.1 Public Safety- Engineers shall ensure the safety, health and welfare of the public in the performance of their professional duties. Safety of the people must always come first. They should promptly disclose to all concerned the factors that might endanger the public safety or the environment.
- 1.2 Compliance with Social Order- Engineers shall abide by the laws of the land in which the work is performed, respect the local customs, uphold the human rights, safeguard public property and abjure violence and acts of terrorism.
- 1.3 Impartiality and Fairness- Engineers shall treat fairly all persons regardless of such factors as race, caste, religion, state, gender or national origin.
- 1.4 Environment Protection & Improvement- Engineers shall strive to maintain clean, healthy and safe environments and comply with the statutory requirements.
- 1.5 Environment Safeguards- Engineers shall disclose any factor that endangers the environment.

Article 2 Responsibility to Maintain High Standards of Professional Quality-

These professional responsibilities include the following:

- 2.1 Development of Technical and Managerial Skills- Engineers shall maintain state-of-the-art professional skills, continue professional development and provide opportunity for the professional development of those working under their command
- 2.2 Undertake Assignments where Professionally Competent- Engineers shall perform service only in the area of their technical competence or after full disclosure to their employers or clients of their own limitations
- 2.3 Performance Responsibility- Engineers shall seek work through fair and proper methods and shall take full responsibility for the task undertaken by them.
- 2.4 Proper Verification of Documents and Production Processes- Engineers shall approve only those designs, which safely and economically meet the requirement of the client and shall not approve any engineering document, design, materials, and stages of work which they consider it to be unsound.

Article 3 Obligation to Maintain High Standard of Personal Behaviour in a Responsible Manner

- 3.1 Honesty and Integrity in Professional Dealing- Engineers shall maintain a high degree of honesty and personal integrity in all their professional dealings. They shall not accept or give bribes in any form.

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- 3.2 Compensation for Services Rendered- Engineers shall not engage in unhealthy competition.
- 3.3 Professional Opinion- Engineers shall seek and offer honest criticism of technical work, acknowledge errors and give credit properly for the contribution of others. Where necessary, engineers shall issue public statements in an objective and truthful manner.
- 3.4 Professional Relationship with the Employer- Engineers shall act faithfully as trustee of the employer / client on professional matters.
- 3.5 Information Communication with Employers- Engineers shall keep their employer and client fully informed on all matters relating to progress of business including financial aspects, which may affect the assigned work.
- 3.6 Mutual Obligation & Trust- Engineers shall not, maliciously or falsely, injure the professional reputation of another engineer or organisation.
- 3.7 Self Promotion- Engineers shall build their reputation based on the merits of services to the customers and shall not falsify or misrepresent their contribution.
- 3.8 Employers' Business Secrets- Engineers shall not disclose by any means, confidential information of the employer or client, unless otherwise authorised.
- 3.9 Personal Conflict- Engineers shall disclose real or perceived conflicts of interest to affected parties and avoid these where possible.

Professional engineers should act in such a manner as to uphold and enhance the honour, integrity and the dignity of the profession. They must respect the prevalent code of ethics of their corporate and encourage associates, colleagues and co-workers to act in conformity with the code. Professional must be scrupulously honest in the discharge of their duties. But we must remember that good laws, if they are not obeyed, do not constitute good government. Hence there are two parts of Professional Code of Ethic; one is the actual obedience and the other part is the goodness of the behaviour and responsibility. Finally we must abide by our fundamental duties as enshrined in our Constitution.

4.2 Professional Engineers Code of Ethics

Gurudev Singh

4.2.1 Introduction

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. Professional Engineers Code of Ethics are covered under the following heads:

- Role of engineering associations.
- Pledge adopted by national society of professional engineers (USA).

Gurudev Singh, Director, ME(Struct), MBA,FIE,FIV,MIRC,MIBC is Staff Officer to the Engineer-in-Chief, Army Headquarters, New Delhi.

- Institution of engineers: code of ethics.
- Code of ethics: the fundamental principles.
- Guidelines for use with the fundamental canons of ethics.
- Conclusion.

4.2.2 Role of Engineering Associations

Persons registered or enrolled with, or licensed by, or who are the holders of a Certificate or Authorization from, an Engg Association, hereinafter referred to as “practitioners”, shall apply their specialized knowledge and skill at all times in the public interest, with honesty, integrity and honour, and conduct themselves in a spirit of fairness and tolerance when dealing with fellow professionals.

Code of Ethics is a general guide to professional conduct. As such, it is intended to supplement, and is not intended to deny the existence of, professional responsibilities equally important, though not specifically mentioned. Association representatives are available for consultation as to appropriate conduct in specific matters. Each practitioner is required by “The Engineering Professions Act” to subscribe to and follow this Code of Ethics. Non-compliance with this Code of Ethics, or failure to fulfill other professional responsibilities, by any practitioner shall be considered inconsistent with honourable and dignified professional practice, and any such practitioner may be deemed to be guilty of, unskilled practice of professional engineering or professional misconduct, or both, and subject to an action or an order as a result of disciplinary procedures which may be set by the “The Engineering Professions Act”.

4.2.3 Pledge Adopted by National Society of Professional Engineers (USA)

“As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I pledge:

- To give the utmost of performance;
- To participate in none but honest enterprise;
- To live and work according to the laws of man and the highest standards of professional conduct;
- To place service before profit, the honour and standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with need for Divine Guidance, I make this pledge.

4.2.4 Code of Ethics of The Institution of Engineers

The Code of Ethics of the Institution of Engineers is based on broad principles of Truth., Honesty, Justice, Trustworthiness, Respect and safeguard of human life and welfare, and Competence & Accountability. Code of Ethics' is a general guide to professional conduct. It is intended to supplement professional responsibilities.

- a) Professionals should register with Engineering Associations and apply specialised knowledge & skill in public interest. Act with honesty, integrity and honour.

- b) Professionals are required to follow 'Code of Ethics' set by the engineering profession body.
- c) Non compliance of code of ethics by practitioners may be subjected to an action or disciplinary procedures.

The Institutions of Engineers expects its Corporate Members to abide by ethical standards, social justice, social order and human rights, protection of environment, sustainable development, and public safety and tranquility.

The Tenets of the Code of Ethics are:

1. Knowledge and expertise for welfare, health & safety of community.
2. Maintain honour, integrity & dignity in his profession.
3. Act only in the domains of competence with diligence, care, sincerity & honesty.
4. Apply knowledge for employer without compromising to these tenets.
5. No misrepresentation of qualification & experience.
6. Must inform to stake holders of environment, economic, social & other consequences arising out of ones action.
7. Maintain utmost honesty & fairness in giving witness based on adequate knowledge.
8. Shall not injure the professional reputation of other member.
9. Reject offer of unfair practices.
10. Maintenance of sustainability of the process of development.
11. Shall not injure reputation of institution.

4.2.5 Guidelines for Fundamental Canons of Ethics

These are listed below:

Canon One

- No approval to plans not conforming to engg standards.
- Be clear and intimate stakeholders of repercussions.
- Provide standards, test codes & quality control procedure for understanding by public.
- Violation of guidelines be brought to notice.
- Advancement of society.
- Improvement of quality of life.

Canon Two

- Service in area of competence.
- All other phases by qualified consultants.
- Shall not affix sig/ seals to plans beyond their competence.

Canon Three

- Objective and truthful in professional report, statements or testimony.
- Express engg opinion founded upon adequate knowledge.

- No statements inspired by an interested party.
- Dignified and modest in explaining their work.
- No promotion of interest at the expense of integrity, honour and dignity of the profession.

Canon Four

- Avoid conflict of interests.
- No compensation for a job from more than one party.
- No soliciting and accepting gratuities.
- No accepting of contract from a Govt. body having officer of own organisation.
- Maintain confidential information of a board/commission of which you are member.
- Admit & accept errors instead trying to justify.

Canon Five

- No offer or paying any commission, gift & political contribution.
- Rate of compensation commensurate with scope of services.
- No soliciting of employment from clients already having engineers.
- No professional commissions affecting professional judgments.
- Only factual & dignified articles.
- No use of facilities of their employer for outside work without consent.

Canon Six

- Not allowing any fraudulent, dishonest firm/ person to use their name.
- No partnership as 'cloak' for unethical acts.

Canon Seven

- Continuing professional development.
- Encourage employees to further their education.
- Encourage them to register with professional bodies.
- Support professional & technical societies.
- Give credit to whom it is due.
- Endeavour to extend public knowledge of engg.
- Appropriate and adequate compensation for those engaged in engg. profession.

4.2.6 Conclusion

Concluding the presentation, the keynote speaker highlighted that Professional Engineers are required to demonstrate a personal commitment to professional standards, recognizing obligations to society, the profession and the environment. They shall strive to serve all members of the community in enhancing their welfare, health and safety by a creative process utilizing their knowledge, expertise and experience. There is certainly a need for making 'Code of ethics' mandatory for all professional engineers and give it wide publicity as taken up by the media on civil constructions after 2001, Bhuj

earthquake. Finally, one should also consider the personal consequences of yielding on a matter of principle when the result may be severe harm to others. This can cause a lifelong loss of self-esteem.

4.3 International Competitiveness of Indian Engineers, Challenges in Education :

Dr M R Kalgal

4.3.1 Evolution of Engineering Curriculum in India

Education, centuries ago, was for more to seek truth and for personal satisfaction. Today it is principal means for generating employment and livelihood for many. Education has become sub-servant to national economics as well as global economics. Knowledge has fragmented itself to several disciplines-several specialisations. Professionals of today face a great challenge - to know both of the diversity and unitary nature of knowledge and yet possess specialist skills in a highly competitive world.

In Great Britain and Europe Technical Education evolved from Professional Guilds but not so in India. Here, it arose more out of a need to train Engineering supervisors to work in Government works PWD - Railways. Indian Engineers were trained to act as supervisors to British Engineers. The curriculum predominantly included intensive / extensive Drawing exercises, Hands-on workshop practices, study of common machines e.g., Pump, Motors, Field Surveying, Theory of Machines, Departmental Specifications / Contracting procedures etc. In up gradation from diploma to degree level (30's & 40's), it covered Maths (calculus), Physics (Heat, Electro-magnetism), Industrial Chemistry, Design of Mechanisms, Component Design etc. In due course, under Graduate Projects of synthesis type was introduced, this included field work but this. did not change much.

First modernisation occurred at the time of establishment of IIT Kharagpur in the 60's. Professors from USA came to advise, introduce, develop courses, e.g., Solid Mechanics, Fluid Mechanics, Design Engineering, Experimental Methods, Graphic Science, etc., Professional courses got strong analytical base. Design of components was integrated with Design of whole structures or whole Machines. Greater emphasis came on design in the final year Project with less of time consuming field work. There was significant reduction of time given to 'Hands on' courses e.g., Machine Drawing, Irrigation Drawing, Field survey, Workshop practices, Detailed operation of machinery. However, Maths courses were strengthened with Differential Equations, Probability and Statistics. This curriculum actually led to the first wave of Globalisation. Many young Graduates went to U.S.A., U.K., Europe for masters, Ph.D. These Graduates were accepted in equal terms in the International scene. Note also that: graduates of this generation accepted challenges of international work in mid East/GULF/North Africa during the hey days of oil price boom.

Second modernisation was a purely Indian effort (in the 80's and early 90's). This was the result of Curriculum Development Centres of I.I.T.'S and other Univ. of repute. The timing was predicated by the reduction of Degree Program from 5 to 4 years. This was called model curriculum. This curriculum reflected the then advances in technology.

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We are now in the threshold of a third major revision in engineering curriculum. The need of the hour is to turn information into know-how and know-what and perhaps even to know-whether - Kenneth Boulding

The Process of engineering in the new century involves:

- Phase I: Imagining the future and the challenges it will present to engineering
- Phase II: Considering how engineering education should prepare for that future

The Dynamics that are apparent are:

- Digitalisation
- Internet and Information Technology
- E-commerce
- Environmental/Ecology
- Risk : Political, Financial, Local Partners
- 24-Hours work style
- Desk based Jobbery
- Exchange rates, Cultural variations, Hidden costs
- Unknown and unexpected competitions.
- Certifications/standardisation
- Software explosion
- Financial Engineering
- Personal attitudes
- Emergence of multi-disciplinary/multi skills orientations
- New materials & New technologies

4.3.3 Rationale for Re-Design of the Engineering Education System

- Inputs: Today's students' expectations and capabilities to acquire knowledge are different. Faculty is no longer 'unquestioned masters' of knowledge. They are more of facilitators. In many branches faculty with Ph. Ds and PG degrees are in short supply. Teaching is not a prime option for today's graduates. There is general awareness that leadership and vision are desirable virtues, but they are in short supply. In many sectors, private sector participation is likely to be available.
- Output Requirements. There is a transformation in the nature of employment. This is principally due to emergence of knowledge industry and economy, Information and Communications Technology (ICT) enabled outsourcing of manufacture and services. There is rapid obsolescence of knowledge and skills. Several types of jobs have disappeared and new

types of jobs have emerged. There is a fall in full-time employment in certain sectors. However, globalization and internationalization have created potential for domestic as well as foreign employment. These require knowledge of foreign culture, laws, WTO, GATS etc. There is greater emphasis on continuous professional development.

- Environment, Ambience Prevalent Now. There is a significant impact of Technology on Education, Industry, Commerce, Lifestyle, Entertainment, Society etc. On one side there is demand for Mass Education. There is also a widening of disparities. Within the country and between the counties, we can see Technology Divide, Digital Divide, Prosperity Divide, Literacy/Education Divide etc. The importance of Institute-Industry Interaction is better understood now both by the institutes and industry. There is a great potential of ET and ICT for enhancing the effectiveness of Learning. Quality Assurance and Accreditation systems are being put in place. Several Distance Education / Virtual University Initiatives have successfully been taken up. On the work front, there is a visible changing of Employer Employee Loyalty Relationships. Many engineers no longer look at Lifetime employment. Companies very often also resort to Outsourcing, Down / Right-sizing, Hire and Fire tactics, which has an impact on the relationships.

4.3.4 Re-Design of the Engineering Education System

It demands:

Changing and Emerging Roles of:

- Leadership, Governance
- Faculty : Teaching, Mentoring, Assessment
- Support Services

Redefined Goals of Technical Education:

- Quality, Excellence, World-Class
- International Competitiveness
- National Relevance

Redefined Goals of Technical Education :

- Appropriate Technical Education
- Identification of Stakeholders, and Fulfillment of their Requirements
- Emerging Demands of the Profession
- Professional Ethics and Human Values
- Social and Societal Responsibility
- Sustainable Development
- Environmental and Ecological Responsibility

- Resource Conservation

Perspective Planning:

- Manpower Development
- Discipline-wise distribution
- Regional distribution
- Level-wise distribution : Degree / Diploma
- Ph.D and P.G. programs
- Emerging Thrust Areas

Emerging Models:

- Technological Universities
- Deemed Universities
- Virtual Universities / Distance Education
- Autonomous vs. Affiliated Institutions
- Twinning arrangements with foreign institutions
- "Brick", "Click" & "Hybrid" Models.

4.3.5 The New Millennium Paradigm for Engineering Education

The New Millennium Paradigm must incorporate the integration of several features which existed as separated entities till now. These include

Initial Education : Institutional Component, Formal Education, Quantitative Expansion Technology , Traditional Instruction, Print Media , Traditional Libraries , Educational Technology and Teaching + Continuing Education (Lifelong Education): Industry Component, In-formal Education, Training, Quality Assurance, Management, Web-based Instruction, Electronic Media, Digital Libraries, Information Technology and Learning

4.3.6. Conclusions

A major challenges lies in the way of educators. Paradigms have changed as world moves on. Innovative / integrative / broad knowledge / precision in application courses need to be developed. Continuing Education /P.G. programs need to be done more extensively and the Professional bodies should take more responsibility for continuing education.

TECHNICAL SESSION - IV

Enactment of The Proposed Engineers Bill
and Conclusion

TECHNICAL SESSION-IV

ENACTMENT OF THE PROPOSED ENGINEERS BILL AND CONCLUSION

Chairman	-	Dr. Uddesh Kohli
Panelists	-	Mahendra Raj
	-	Dr. Jose Kurian
	-	Sudhir Dhawan

5.1 The Engineers Bill

Mahendra Raj

At the outset, Mr. Mahendra Raj, traced the origin and development of the Engineer bill. During his presentation, he answered the following questions:

- Q.1. Why do we need the Engineer's Bill?
- Q.2. If we do need it, why don't we have it by now?
- Q.3. What, in brief, is the proposed Engineer's Bill for enactment by the Parliament?
- Q.4. What should be done to get the Bill enacted as fast as possible?

5.1. Why do we need the Engineer's Bill?

Without this Bill, in the eyes of the Indian Law, the Profession of Engineering does not exist.

It was amply demonstrated by the recent list of "Professionals" accepted by the Supreme Court in the prevalent "Sealing Era", that is "Architects, Lawyers, Doctors and Chartered Accountants".

This is despite the fact that the Profession of "Engineering" makes the maximum contribution to the development of the country.

Why then are the Engineers excluded from this list? Because each profession in the accepted list has a legislated Regulatory Bill, but the Engineering Profession does not have any.

Is that the only reason why we should have the Engineer's Bill? No, there are other reasons too.

Let us take a look at these reasons. We have requirement at National as well as International level for enactment of the regulatory Engineer's Bill

Mahendra Raj is the member of high-powered committee set up by the Ministry of Urban Development and Poverty Alleviation of the Government of India to draft a comprehensive legislation to Regulate and Control the Activities of Builders and Developers. He is president of Indian Association of Structural Engineers. He has many 'first' to his credit. These include the first skyscraper in Bombay, first large span folded plate structure, the first large span Industrial Structure for the Hindon River Mills in Ghaziabad. In recognition of his contribution to Structural Engineering, he received the "Architectural Engineering Design Award" from the Institution of Engineers (India) in 1989-90, the "GOURAV Award" in 1995, 'Life Time Achievement Award 2001' from the Indian Concrete Institute and "Scroll of Honour" from The Institutions of Engineers (I).

National Level Requirements. We need the regulatory Engineer's Bill

- To identify those with proven competence to practice the profession of engineering in order to ensure safety and welfare of public / society.
- To introduce a system for licensing/ certification of Engineers
- To prevent unqualified/ under-qualified/ incompetent engineers from practicing the profession.
- To safeguard the Society from unethical and incompetent engineers.
- To ensure that professionals follow the prescribed Technical Codes, Standards and Bye-laws.
- To ensure that the level of technical competence of professionals is updated on a continuing basis.
- To introduce and enforce a Code of Ethics
- To ensure accountability of professionals to their clients and society.
- To improve the present distorted image of engineering profession in the society.
- To attract bright young graduate engineers to the engineering profession.

International Level Requirements. We need the regulatory Engineers Bill :

- To fulfill the requirements of GATS & WTO
- To regulate entry of foreign professionals in the Country.
- To ensure reciprocity in exchange of professionals with other countries.
- To become a member of Washington Accord & Engineer's Mobility Forum.
- To establish international equivalence for registration and licensing procedures.
- To facilitate cross-border mobility of engineers.

5.1.2 If we do need it, why don't we have it by now?

In order to answer this question, I have to give you a glimpse of the history of the Engineers Bill.

1970	Barve Committee set up by the Planning Commission strongly recommended enactment of an Engineers Bill no follow-up
1985	Association of Consulting Engineers (India) ACE (I) retrieved this report from the Archives of Planning Commission and drafted an Engineer's Bill.
1985 to 1991	ACE (I) interacted with Planning Commission, DSIR (Ministry of Science & Technology) & other Ministries to identify a Nodal Ministry to sponsor the Bill.
1991	Finally, ACE (I) identified HRD Ministry as the Nodal Ministry to pilot the Engineers Bill. Met the then HRD Minister, Shri Raj Mangal Pandey, who promised to get the Bill processed by his Ministry.

Dr. Jose Kurian, Vice President, Indian Concrete Institute

- 1991 to 1995 Meetings with HRD Ministry officials & AICTE Committees were formed, discussions took place But no progress on the Bill
- 1996 Out of desperation, ACE(I) filed a Public Interest Litigation in Delhi High Court, against HRD Ministry.
- 1998 Institution of Engineers (India) - IE(I) filed an affidavit stating that the Engineers' Bill was not required, because, by virtue of their Royal Charter, IE(I) was competent and equipped to regulate the Profession.
- 1999 HRD Ministry filed an affidavit stating that the Ministry was willing to process the Bill, but there was no unanimity amongst the Engineers that the Bill was required.
- 2000 PIL was dismissed on the basis of affidavits filed by IE(I) and HRD Ministry.
- 2001 24 Professional Engineering bodies, including IE(I), met and decided to form Engineering Council of India (ECI)
- 2002 ECI formed under the patronage of the Planning Commission and convened a series of meetings.
- 2003 ECI prepared a revised draft of the Engineers Bill and requested Ministry of HRD to sponsor it.
- 2004 IE(I) withdrew from ECI and sent a separate draft of the Bill to HRD Ministry
- In view of the prevailing lack of unanimity amongst Engineers, HRD Ministry entrusted the task of regulation of the Engineering Profession to All India Council of Technical Education (AICTE) rather than enact a separate Bill.
- Another PIL against this decision of HRD Ministry was filed by CEAI. It succeeded. The Court decreed that AICTE does not have the mandate to regulate the Profession.
- 2005 HRD Ministry set up yet another Committee with representation from AICTE, ECI and IE(I) to submit one final mutually agreed draft of the Bill instead of the two separate drafts sent earlier by ECI and IE(I).
- 2006 Since then, a number of meetings have been held but unanimity has eluded the Committee.
- The main reason is the shifting stand of IE (I) on various provisions of the proposed Bill.
- IE (I) still has this fixation that it can legally regulate the Profession because it has the Royal Charter.

Sudhir Dhawan is Chairman and CEO of Tractebel Engineers and Constructors Pvt. Ltd.

(TECPL), a subsidiary of Suez Tractebel, S.A. which is working on a number of large multi-disciplinary projects of GAIL, GSPL, Assam Gas, ONGC, IOC, HPCL, BPCL, GEPL, GPCL etc. He is former Country Director of Edison Mission Energy of USA.

Mr. Dhawan has been associated with the development of consultancy profession in India, he represents consultancy profession in the expert panel of Ministry of Commerce on WTO matters. He is former President of National Association of Consulting Engineers and has presented a number of technical papers in conferences in India and abroad.

This is despite the fact that legally this assertion is not tenable and the HRD Ministry also has said so.

The Royal Charter granted to IE (I) in 1935 does not give it legal powers to regulate the profession of engineering.

We are still hoping that soon this disagreement will be resolved and a mutually agreed draft of the Bill will be processed by the HRD Ministry

5.1.3 What, in brief, is the proposed Engineer's Bill for enactment by the Parliament?

The Bill provides for setting up a "Council of Engineers" to regulate the Profession of Engineering.

The Council will have 41 members and will be constituted as follows :

Members from Professional Societies representing different disciplines	-	25
Nominated Members from different Ministries and IIT's	-	12
Co-opted Members	-	2
Office Bearers	-	2
Total	-	41

The Council will be headed by a Chairman who will be assisted by a Secretary.

The Council will set up an Executive Committee with a membership of 11.

The Council will maintain :

- A Register of Associate Professional Engineers who have the requisite educational qualifications and are acquiring training under Professional Engineers.
- A Register of Professional Engineers who have gone through the specified training period as Associate Professional Engineers and who are cleared through an examination or an interview and qualify to become Professional Engineers.
- A Register of Professional Engineering Organizations which are constituted as stipulated in the Bill.

Only the Registered Professional Engineers and the Registered Professional Engineering Organizations would be legally allowed to practice Engineering.

They would be required to keep their knowledge upgraded through a process of Continuing Professional Development.

They would be required to follow a specified Code of Ethics.

For maintaining these Registers and monitoring Professional Practice of the Registered Professionals, the Council will set up "Functional Boards" representing different disciplines of engineering.

In case of proven unethical practice by a Registered professional or non-compliance with the requirement of Continuing Professional Development, his name would be removed from the "Register" and he would not be able to legally practice the profession.

5.1.4 What should be done to get the Bill enacted as fast as possible?

I will leave this question to be answered by the floor during the discussion session.

5.2 Gist of Discussions

Enactment of Engineers Bill will benefit the society / profession and the individual Professional Engineers. PE's statutory authority will enable the PE's to:

- A. approve engineering studies, designs, drawings, methods, designs, processes, systems, cost estimates, time schedules, resources forecasts, budget allocations and other engineering related documents.
- B. certify that the product related process such as manufacturing/ fabrication/ assembly/ construction etc. are in accordance with the design.
- C. certify the designed quality of the end product or process.
- D. certify the adequacy of safety measures and environmental protection.

A registered Professional Engineer (PE) can enjoy the following benefits.

1. It certifies competency and grants right to practice within the regulatory environment.
2. It demonstrates social commitments including the professional Code of Ethics, the regulatory environment and self-regulatory mechanism in dealing with employer, colleagues, client, superiors, subordinates, and the society.
3. It leads to better prospects in the future career.
4. It adds value to an organisation.

According to Ministry of HRD, registration of engineers is a statutory requirement and can only be undertaken by a statutory body created under the law. Any registration started in the absence of an Engineers Bill, may not stand judicial scrutiny and would not be legal.

5.3 Need for a Consensus

- a) The participants were in favour of having an Engineers' Bill to regulate Engineering Profession. In this regard, the draft Engineers Bill has been prepared by ECI in consultation and full involvement of its professional member associations and it has been forwarded to Ministry of HRD.
- b) All participants were unanimous that Engineers' Bill be enacted in India without further delay and it should be piloted by the Ministry of HRD expeditiously. A few participants stated that it is easy to enact legislation but it is not so easy to implement it.
- c) ECI and IEI should work together. We not only have to rationalize our approach but also to revolutionize it.

- d) We need to institutionalize all the processes so that we can deliver goods to the society. The implementation process should also look into moral aspects and avoid inherent malpractices in the implementation.
- e) The proposed Bill is not against any body, it is for engineers, society and the nation. The proposed Engineer Bill was also discussed in the ECI Workshop held in October 2004 and there was a general consensus that the Engineer's Bill be processed urgently.

In India, the State of Gujarat has enacted Professional Civil Engineer Act 2006. But in the competitive WTO environment, it is the Central Government's responsibility to regulate the engineering profession speedily throughout the country.

List of Delegates

4th National Conference

Towards International Competitiveness of
Indian Engineers - Challenges Ahead

December 15, 2006

S. No.	Name	28.	Chaddha P.
1.	Agarwal Pavas	29.	Chainulu A. V.
2.	Dr. Agarwal Ravinder	30.	Chand D. Naveen
3.	Aggarwal B.B	31.	Chand Hari
4.	Aggrawal Ajay	32.	Chand Nanak
5.	Aggrawal Sitaram	33.	Chander Ram
6.	Ahmed K. Nazir	34.	Chatterjee P. K.
7.	Ajay	35.	Chaturvedi Pradeep
8.	Ambastha S. K.	36.	Chauhan Naresh
9.	Anilkumar C. H.	37.	Chauhan S.B.S.
10.	Arya P. K.	38.	Chawla S. C.
11.	Bali Badal	39.	Chopra A. P. S.
12.	Banerjee S.	40.	Das B. K.
13.	Dr. Bhal N. S.	41.	Dr. Das Ram Upendra
14.	Bhan Veer	42.	Datta S.
15.	Bhardwaj M.K.	43.	Dayachaman
16.	Bhaskar Indu	44.	Deatinger Christian
17.	Bhaskar V. B.	45.	Dhaniram
18.	Bhatia A.C.	46.	Dhanwar Sudhir
19.	Gb.Capt. (Retd) Bhatia H.C.	47.	Dharmpal
20.	Bhatia Pawan Kumar	48.	Dinesh
21.	Bhatia R.S.	49.	Dubey R. P.
22.	Bhattacharjee J.	50.	Dubey Sanjay
23.	Bhattacharya Prabhat K.	51.	Dwivedi Ajay
24.	Bhist D. S.	52.	Dwivedi U. K.
25.	Biswal P. K.	53.	Col. Gaopande S. V.
26.	Bither Ramesh Kumar	54.	Ghate Abhay
27.	Dr. Bodieah B.	55.	Ghosh S.

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|-----|-------------------------|------|--------------------------------|
| 56. | Goel Deepak | 89. | Dr. Kumar P. Srinivas |
| 57. | Gopal R. | 90. | Kumar Raj |
| 58. | Gupta A. K. | 91. | Kumar Rajesh |
| 59. | Gupta Ashwini | 92. | Kumar Shailesh |
| 60. | Gupta N. K. | 93. | Kumar Shyam |
| 61. | Gupta Snehlata | 94. | Kumar Umesh |
| 62. | Gurusamy A. | 95. | Dr. Kumar V. S. Shashi |
| 63. | Hariharan P. R. | 96. | Kumar Varun Vimal |
| 64. | Hiralal | 97. | Lal Murari |
| 65. | Ilango A. B. | 98. | Mahanta B. K. |
| 66. | Ilango T. Anbu | 99. | Maini G. K. |
| 67. | Jain H. R. | 100. | Dr. Maji Subhasis |
| 68. | Jain P. K. | 101. | Mang V. U. |
| 69. | Jain V. K. | 102. | Mitra N. |
| 70. | Jena N. R. | 103. | Dr. Mohanty G. N. |
| 71. | Jethra B. D. | 104. | Mohanty N. R. |
| 72. | Joshi Bipin | 105. | Nagi A. S. |
| 73. | Joshi R. C. | 106. | Nair Anju |
| 74. | Dr. Kalgal M. | 107. | Naseem |
| 75. | Dr. Kamal K. | 108. | Nimje |
| 76. | Prof. Kant Tarun | 109. | Pachauri Deepak |
| 77. | Khandge Pratap | 110. | Pal Ram |
| 78. | Khattar S. K. | 111. | Pande K. K. |
| 79. | Khilari Ram | 112. | Pandey S. K. |
| 80. | Khurana Harcharan Singh | 113. | Dr. Parikh Kirit |
| 81. | Dr. Kohli Uddesh | 114. | Pathak Rajesh |
| 82. | Kotaiha M. | 115. | Prof. Pillai V. N. Rajshekhran |
| 83. | Kritania B. P. | 116. | Pipare A. D. |
| 84. | Dr. Kulshreshtha Manoj | 117. | Pradhan Srinibas |
| 85. | Kumar Ajay | 118. | Prasad Baidhyanath |
| 86. | Kumar Ajit | 119. | Punhani Sudhir |
| 87. | Kumar Anil | 120. | Lt. Gen. Puri A. K. |
| 88. | Kumar Manoj | 121. | Raj Mahender |
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122.	Raju V.	156.	Singh K. P.
123.	Prof. Ramakrishnan C. V.	157.	Singh M. K.
124.	Ramasamy T.	158.	Singh M. M.
125.	Ramjilal	159.	Singh Pratap
126.	Ramkishan	160.	Singh Ranjit
127.	Rana Ravinder Singh	161.	Singh Ravinder
128.	Rao K. Sudhakar	162.	Singh S.K.
129.	Rao KVSP	163.	Singhal Deepak
130.	Ratnavel S.	164.	Singhal K. K.
131.	Rawat Amit Kumar	165.	Singhal V.
132.	Saraswat Ushadevi	166.	Sinha Ranjit K.
133.	Sarkar B. N.	167.	Sreelal K.
134.	Col Saxena N.B.	168.	Subbarao S. V.
135.	Saxena Pradeep	169.	Subhan
136.	Sehgal A.K.	170.	Sudhan Madhu
137.	Selvakumar B.	171.	Sukhram lal
138.	Shali P. N.	172.	Sutradhar Dilip
139.	Sharma Anand Mohan	173.	Swarup P. R.
140.	Sharma B. S.	174.	Taneja A. K.
141.	Sharma C. P.	175.	Cdr. Tater Bhupesh
142.	Sharma R. K.	176.	Thangaraj T.
143.	Sharma R.C.	177.	Tiku M.L.
144.	Sharma Ramendu	178.	Triplett John
145.	Sharma Sandeep Kumar	179.	Tulsi S. J. S.
146.	Sheth B. N.	180.	Tyagi Paritosh
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148.	Singh A. P.	182.	Varma Sureshwar P.
149.	Singh Anand Pratap	183.	Verma Chander
150.	Singh B G Sunder	184.	Verma S. K.
151.	Singh Gurmit	185.	Dr. Verma S. P.
152.	Singh Gurudev	186.	Vikas
153.	Singh I. B.	187.	Wadhwa I. P.
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Prof V. N. Rajasekharan Pillai	Vice Chancellor Indira Gandhi National Open University

Glimpses of Conference

4th National Convention on Towards International Competitiveness of Indian Engineers - Challenges Ahead held on December 15, 2006 at Raman Auditorium, Technology Bhawan, New Mehrauli Road, New Delhi-110016





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ECI has been formed by coming together a large number of professional associations / institutes of engineers. The present members are:

1. Association of Consulting Civil Engineers (India)
2. Broadcast Engineering Society (India)
3. Computer Society of India
4. Construction Industry Development Council
5. Consultancy Development Centre
6. Consulting Engineers Association of India
7. Indian Building Congress
8. Indian Concrete Institute
9. Indian Geotechnical Society
10. Indian Institute of Chemical Engineers
11. Indian Institution of Bridge Engineers
12. Indian Institution of Industrial Engineering
13. Indian Institution of Plant Engineers
14. Indian National Group of IABSE
15. Indian Society for Non-Destructive Testing
16. Indian Society for Trenchless Technology
17. Institute of Urban Transport (I)
18. International Council of Consultants
19. The Aeronautical Society of India
20. The Indian Institute of Metals
21. The Institute of Electrical & Electronics Engineers, Inc., India Council
22. The Institute of Marine Engineers (India)
23. The Institute of Electronics & Telecommunication Engineers
24. The Institution of Surveyors
25. Indian Association of Structural Engineers

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