

Legendary Charter

Progression of Indian Engineering

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Learned Society
Initiatives



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ITCA is envisaged to be a platform for Technologists (Researchers and Professionals), Entrepreneurs, Academia, and Investors to identify contemporary and emerging technology issues and develop best practices. This collaborative platform will foster a culture of innovation, progress, and excellence with emphasis on continuous improvement. To facilitate the collective growth of the engineering profession, ITCA will endeavor to stimulate interdisciplinary research, promote knowledge transfer to the member fraternity, profession, and build effective cross-disciplinary synergies. ITCA would also conceptualize and promote activities that would progress the interests of the technology profession.

Note

The cover page image is designed to symbolize and epitomize the contribution of Royal Charters to the collective growth of the engineering profession. The images on the cover pages (front and back) of this publication depict the Charter organizations that have played a stellar role in growing the engineering profession in their regional geographies.

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A profession in an intellectual society can be distinguished as an agglomeration of individuals having knowledge defined in a specific frame of reference, possessing a repertoire of skills, performing unique functions, and addressing comprehensively documented obligations. The profession is a summation of formal recognition by the government's regulatory establishments, administered by professional bodies and the acceptance of public for the contributions made by the practitioners to the societal and economic advancement of the nation.

Numerous professional bodies have been established to monitor and regulate a profession for serving the society and addressing its evolving needs. Some of the professional organizations owe their origin to royal patronage, and through the years, have become elite organizations performing their mandate of ensuring compliance with globally recognized standards of competence. These legendary Royal Chartered associations established worldwide have contributed immensely to the growth of engineering profession including in the Indian milieu.

This publication emphasizes the magnificent saga of the Indian engineering profession, elucidates incorporation and propagation of the objectives of the Charter. Publication also chronicles the crusade of Indian engineering as a profession, progress accomplished and articulates the way forward in the global high-tech era through an inclusive and collaborative approach.

Keywords

Charter Engineer, Royal Charter, Professional Engineering, the Institution of Engineers, Privy Council, Industrialization, Indianization

Prologue: The Profession

Professionals enjoy extraordinary respect, recognition, and reverence in society as they promote public well-being, provide civic amenities and protect citizens from unanticipated catastrophes. Professional serves citizens by executing specific actions through the application of intellectual skills, competency, and performing the specified duties with dedication, dignity thereby inspiring confidence. Profession goes far beyond accepted accountability; it kindles the notion of continuous knowledge acquisition and an approach to enhanced life. Honesty, integrity, ethics, reliability, qualifications, experience, research, and quality go hand-in-hand with the performance of a profession to meet the expectations of the society and people. It is important to note that the dexterous judgment in the context of a well-defined professional holds substantial significance in constitutional, governmental and public outlook, and is accepted as a fact.

To establish the baseline of competence; continuous up-skilling; and compliance with ethical standards, individuals on the acquisition of academic credentials choose to register with professional bodies or regulatory agencies formed under statutory provisions of their respective countries. It is only on such enrolment with the appropriate professional organization that an individual is entitled to describe oneself as a proficient in the chosen field. Time-honoured professional bodies govern and administer the standards of the associated profession and register professionals on a consistent and continuous basis. They

serve an essential purpose by licensing eligible individuals to represent the profession for delivering public benefit.

Throughout the world, the granting of Royal Charters have conveyed reverence for professionalism. Charters have been recognized as a proven method to bestow rewards on professionals for their association, champion their cause, and highlight their contribution to the growth and practice of a discipline.

Engineering has been the basis for the development and progress of humankind. Qualified and practiced specialists are adroit in elucidating and structuring solutions to diverse engineering challenges to achieve the common goal of service to society. Engineering has emerged as a harmonized process and has become imperative to the anthropological development of the civilization in addition to moulding proficiency in practice. This expertise and talent of hands-on knowledge having been validated by a body of competence *the Professional Body* highlights the efficacy of Royal Charter incorporation.

An assay of Chartered in Indian engineering timeline will reiterate that the grant of the Royal Charter has played a significant role in the progression of the profession to become protuberant in the global context. Indian Engineering has become an acclaimed and sought-after profession, propelling the nation on a growth trajectory following the incorporation by the Royal Charter in 1935.

Recapturing Heritage and Legacy of Royal Charter

Referring to the Oxford dictionary, 'Chartered' means Qualified as a member of a professional body that has a Royal Charter. Professional organizations are formed to oversee and regulate related practices to defend public and as well as the profession. These professional organizations have consistently standardized their activities through statutory and legislative provisions of the respective nations. Practitioners affiliated with these agencies are sworn to adhere to and comprehend the designated guidelines to serve the society. Such professionally acclaimed organizations have bestowed titles to create a superior status to support affiliated members. Over centuries, Charters have been conferred on organizations of eminence and world-class learned institutions representing the values of excellence, honor, and consistency. Royal Charters through generations become synonymous with establishing standards of competence; creating a system for enduring professional advancement; playing a recommendatory role in persuading the Government to promote education, research, and careers in technology and engineering; and recognizing the professional expertise by extending credibility and standing to individuals who have enrolled in Chartered bodies.

Royal Charters, established by the Sovereign on the advice of the Privy Council of Britain, have a vintage antiquity going back to the 11th century. The foremost objective of a Royal Charter was the acclimatization and creation of public or private establishments and defining their privileges and purpose. It

would be pertinent that the British Monarchy used to grant “Letters Patent” as a formal credential articulating the ‘right to power’ to body corporates including educational institutions, municipalities, religious foundations and learned societies.

Royal Charters are characterized as a high-quality work of inscription on vellum; and while over the years 980 such Charters have been incorporated, roughly 750 are still functioning. The earliest one was granted in the year 1066 and the latest one awarded to The Chartered Institute of Ergonomics and Human Factors.

Amongst the recipients of the Royal Charter, the University of Cambridge (1231), Royal College of Physicians (1518), British Broadcasting Company (1926), among others, are still predominant and leading in excellence. The best-known educational institutions that have been granted the Royal Charter include the University of Oxford (1248), Yale University (1701), Princeton University (1746), University of Columbia (1754), University of Toronto (1827); University of Sydney (1858), University of South Africa (1877), amongst others spread across the globe.

Prominent among the professional societies in the engineering sector that received the Charter are the Institution of Civil Engineers (1828), the Institution of Engineering and Technology (1921), the Royal Engineers, Corps of the British Army (1923), The Institution of Engineers India (1935), Engineers Australia (1938), and the Engineering Council, UK (1981). Professional

societies incorporated by the Royal Charter are acclaimed as '*Learned Societies*' and are renowned for their consistent highest-order attainments and accomplishments.

Charter is a legal document that has its specific classification, and 'Chartered status' is a recognizable mark of quality, set standards of competence and depiction of performance. The allure of a charter for professional societies is that they can award the title 'Chartered' to its members, which is exclusive to and governed by the body that confers it and is recognized as a de-facto reserved title.

While the incorporated Royal Charter bodies are unique by their distinguishable set of objects, they are common in their connotation that they represent global reputation of excellence to respective professions.

The description of Charter is closely intertwined with education and training, and as a trademark is immensely popular in the United Kingdom (UK), Commonwealth nations and the erstwhile countries ruled by Great Britain; and no other marque, brand, and label come close to recognizing eminence and excellence as the term 'Chartered.' The legacy of Charter has made it possible to create a blossoming community of contemporary professions comprising engineering, law, accountancy, science, business management, amongst others with enormous, illustrious and diverse comradeship across the world. With the Chartered status, professions have attained a

higher social status, become more respectable, lucrative, and essential for practicing and growing one's career.

Professional organizations that have received the Royal Charter have an exceptional track record of consistent excellence, and the Charter is a documentary evidence of achieving the gold-standard in their profession. The Charter serves to assure the citizens that the organization is well-established and has a framework of regulations that ensure that its' members act in the public interest, and have the necessary power and authority to enforce accountability. Charter underwrites the qualifications, experience, and competency of the members of the organization, and has emerged as the hallmark of quality and superiority of highest order for any profession.

There are prerequisites that an organization needs to meet before it can be granted a Charter, that include ample demonstration of its pre-eminence in the chosen area of specialization, significance, and relevance of its expertise to humanity. Guaranteeing that the objectives and proficiency of one professional body do not perceptively overlap with those of other Chartered professional bodies, is another requirement.

Currently, several organizations are incorporated by Royal Charter to feature the distinct capabilities and empower congregation of like-minded professionals to a global workforce. City and Guilds of London Institute; Geological Society of London, commonly known as the Geological Society; The British Council; Institution of Civil Engineers; Institution of Chemical

Engineers; Institution of Engineering and Technology; Institute of Directors; Royal Academy of Engineering; and the Engineering Council UK are some of the prominent institutions that have been granted the Royal Charter, and have an impeccable track record of contributing to the expansion of the domain and the growth of the engineering profession across the borders.

Chartering the Global Engineering Profession

The incorporation by the Royal Charter has contributed to the structuring and shaping of various professions including medicine, law, finance, and administration throughout the erstwhile British Province, and built the association of the 'Chartered' body endorsing the individual's professional excellence. Having been recognized for the niche that the Chartered organizations have created for themselves, each professional body has striven to maintain and build on the standards outlined in their respective Charters.

Engineering as a practice can be dated back to the Medieval Period. Conversely, the Industrial Revolution of the 19th century in Europe has been considered the precursor to engineering becoming a formal profession with the advent of numerous technological innovations being comprehended for public use as products and solutions.

Engineering shapes modern world and engineers have continuously supported and developed innumerable initiatives for the advancement of the society. Many of these contributions

have had a far-reaching influence on the philosophical, cultural and attitudinal outlook of society and the individual; economic, social and technological characteristics of nations; and it has now become imperative for defining conformance of the practice of engineering with the established guidelines and regulations of civil society.

Engineers have grown to become an indispensable part of the society, and have for hundreds of years influenced the ethos and culture across all nations. Building on the traits of engineering, engineers have been recognized for their creativity, imagination, talent and resourcefulness; and these have been successfully utilized to develop systems and solutions to improve the living standards of the citizens. Engineers make things work and are successful in bringing ideas from the drawing board to real entities that positively impact people, and help them visualize the benefits of engineering. Engineers have obligations to the public, their clients, employers and the profession.

Chartered Engineering license is one of the most recognized credentials in the context of international movement of engineers. The Chartered authorities have precisely defined the standards for a particular profession; and specified the criteria that classify and reflect the competency, expertise, and skills; and most importantly, articulate the roadmap for continuous learning to remain up-to-date with the advancements in the profession.

Legislation in many countries are liberal, and there are no established laws to protect the title 'engineer.' Globally several engineering titles are in convention including Engineer, Professional Engineer, Registered Engineer, Incorporated Engineer, European Engineer besides Chartered Engineer. Established professional bodies are governing and monitoring the engineering titles for enriching the pride and self-esteem of professionals. For the advancement of a profession, it is essential to building a framework with an acceptable level of inherent self-regulation against transgression based on established codes of practices and ethics.

With thirty-six professional engineering bodies as members, the Engineering Council (EC) is recognized by the British Government as the national registration body of the engineering profession in the UK and regulates the occupations of a Chartered Engineer, Engineering Technician and Incorporated Engineers. Registration as a Chartered Engineer and attaining other credentials are voluntary, and the registrants are expected to exhibit a high standard of professional competence embraced through education, continuous learning, and considerable expertise to register. The perception of engineers earning the coveted credential Chartered Engineer (CEng) certification is that they have the competencies and knowledge on par with global standards.

The EC has taken the initiative to codify relevant rules and guidelines through the promulgation and adoption of Standards and Routes to Registration (SARTOR) in the year 1985. This

facilitated creating a new auditing paradigm for the institution to assess the ability of the professional engineering societies to articulate the criteria for professional registration.

The Institution of Civil Engineers (ICE) is the oldest professional body of engineers that has been granted the Charter in the early 19th century and was amongst the first adopters of the Chartered titles way back in 1922. As a licensed body of the EC, ICE can award the Chartered Engineer credential to practice Civil Engineering. Affiliates who are Chartered Engineers of ICE can use the title 'Chartered Civil Engineer.'

The Institution of Engineering and Technology (IET) was authorized the Charter in 1921 and gives the title 'Chartered Engineer' to those who have professionally registered with the EC, and the post-nominal title signifies the attainment of the specified standards of competence and commitment as benchmarked with established yardsticks.

Assessment by EC is meticulous and rigorous, requires credible documentation of the applicant's contribution in addition to demonstrating compliance with the guidelines and standards specific to the selected discipline. Critical attributes evaluated include the ability to apply knowledge to design and problem solving, and the roles and responsibilities of the individual in the project team to include being integral to the businesses' success, and for managing trade-offs between technical and socio-economic factors.

The democratic system in the UK has chosen the route for professions to be self-regulating. While there is no statutory requirement for engineers to be registered, there are areas of practice where public registers are maintained through professional bodies in alignment with government policy. Traditionally professional organizations in the UK prefer the Chartered approach to defend their members' credentials as Royal Charter provides legal protection to Chartered titles. Accordingly, over the years granting of Royal Charters to competent professional bodies for self-regulating and protecting professional ethos has come into practice. As a result, society can have confidence that professionally registered engineers are committed to maintaining excellence while adhering to standards of professional integrity.

Recognized by the Royal Charter, Engineers Australia (EA) awards the Chartered Engineer credentials to those professionals who meet the demanding criteria. EA has also been assessing the skills of migrants applying to work in Australia and has been working with decision-makers in the Government to ensure high standards of professional competence in the immigrant workforce. EA has taken the initiative to enhance the importance of professional credentials and is assessing skills through the Professional Standards Authority to ensure alignment between the workforce competencies and the requirements of the industry. It has also articulated the standards for education, principles of practice and has created roadmaps for aligning the objectives of continuous learning and professional growth.

Through these established models, it is evident that the Royal Charter has provided significant flexibility ranging from statutory provision that imposes legally-enforceable restrictions and requirements, to self-regulation that centered on voluntary codes and ethical practices. It is also apparent that statutory regulation should only exist where there is a legitimate public interest and safety.

Engineers' Mobility is an active transformation, and many countries have joined this bandwagon for mutual recognition of engineering practice and profession in respective nations. International Professional Engineers Agreement (IPEA) is promoting mutual recognition of engineering practice and developing the structure for the creation of an international standard of competency for professional engineering by Member Nations. Currently, nineteen countries have ratified these standards and have signed the agreement including chartered organizations from the UK, Australia, India, Singapore, Sri Lanka, New Zealand and Ireland bringing well-accepted chartered practices from acclaimed global criteria to generate the standards and guidelines for the predefined title "International Professional Engineer" (IntPE).

Recognizing the changing paradigm of engineering practice and the long-standing competency framework assured through the charters, UK's EC representing a conglomerate of Chartered bodies with over 2,35,000 engineering professionals and having more than 75% of its membership designated are Chartered Engineers; has contributed to strengthening the IPEA global

standardization process for engineering practices. The Institution of Engineers, India (IEI), a heterogeneous body with over 2,00,000 Chartered Engineers has played a significant role in the universalization movement for engineering and engagement of engineers through the IPEA platform.

The public recognition besides time-honored CEng credential has helped practitioners play a momentous role in elevating the level of skills and professionalism in the engineering fraternity. IPEA has created a global ecosystem for professional engineers to gain experience by facilitating cross-border engineering practice. While countries across the globe have made use of terminologies to recognize eminence in engineering including Professional Engineer (PE), European Engineer (EUR ING), Registered Engineer (RE), and Incorporated Engineer (IC); the popularity of Chartered Engineer (CEng) has emerged as the premier standard of global engineering excellence.

Unlike the UK establishments incorporating domain-specific Chartered authorization, many countries including Sri Lanka, Hong Kong, Singapore, and Malaysia have chosen the route of establishing a professional body namely an Institution of Engineers catering to the requirements of engineers across multiple engineering disciplines. India has the unique distinction of attaining the Royal Charter for progressing the entire spectrum of engineering practice, across all disciplines with The Institution of Engineers (India) performing as an enabler. Perhaps it is this exception that has helped to create a favorable environment for engineers from diverse disciplines to engage

and collaborate in a traditional society like India; and for the nation to emerge as having the largest pool of engineers in the global workforce arena.

Indian Engineering and Grant of Royal Charter

The First World War and the wave of industrialization created an upsurge in engineering all through the early years of the 20th century. The second Industrial Revolution as well the emerging industrial requirements made engineering an organized career choice for those entering the workforce. While India had bountiful natural resources, diversified agriculture, and favorable climate conditions, the geographical dividend of a long coastline and undulating topography smoothed the advent of industrialization and accelerated demand for engineers. At the beginning of last century, engineers present in India were mostly European in origin; deployed for building irrigation and canal projects for enhancing agricultural productivity; and to provide infrastructure including roads, railways, and military boulevard requirements. Rapid industrialization catalyzed the need for developing the necessary infrastructure, strengthening the manufacturing competency and building capacity with superior engineering expertise. Industrialization hastened the maturing of the engineering profession by honing the best practices from multiple engineering disciplines, giving impetus to the indigenization of engineering.

In the second-half of the 19th century, due to political compulsions, India became more of a raw material supplier to

the European countries where finished goods were produced by exploiting the establishment of large-scale manufacturing facilities following the Industrial Revolution. Cotton, coal, minerals, and agriculture produce were predominantly promoting trade and commerce between India and Western world. The paradigm shift of manufacturing in India originated in the early 20th Century during war period through the twin benefits of raw material availability and the advantage of low-cost manufacturing. Indian industrial history shows that some of the first manufacturing units repositioned in India were textile mills, iron and steel plants, paper mills and agricultural processing factories. It turns out that the triumph of engineering revolution was amply showcased in establishing large-scale production facilities in India and ultimately leading to Great Britain's emergence as the world's leading textile exporter.

Engineering aptitude and engineers have played a central role in the economic development of the nation, leading to India adopting industrialization in a large-scale manner. All through India's colonial rule, engineering workforce could be categorized into two critical organizational entities, the imperial engineering, and provincial engineering services. These governing entities had the participation of engineers from Great Britain working in tandem with engineers wholly trained in India. The disparity besides inequality in qualifications, expertise, and competency among foreign origin and Indian trained engineers was daunting to the Governments of India and Great Britain. It was this set of employment challenges that emphasized the need for

benchmarking, establishing equivalence, and up-skilling of the Indian engineering workforce that led to the competency development and regulating engineering practice in the country and pathway to the incorporation of Royal Charter.

At that time, three London-based Institutions-The Institution of Civil Engineers (ICE), the Institution of Mechanical Engineering (IMechE) and the Institution of Electrical Engineers (now the IET) were catering to the aspirations of engineers in India for collaboration, networking, and professional enrichment. It is imperative to note that these three organizations had certain similarities including that of being Chartered Institutions for different engineering disciplines, with similar organizational outlines for effective operations. Through 1915, the three professional bodies had a combined membership of about 1200, and out of these, about 10% were native engineers; who were collaborating with personnel from the UK on matters of common technical interest with specializations in Civil, Mechanical, and Electrical domains. Industrial development expansion fortified the need for skills in mining, metallurgy, automation, chemical among the others. Nurturing and adapting these emerging skills required professional bodies to focus on a niche and evolving engineering disciplines, even though the numbers of engineers in these disciplines were insignificant at that period.

To address the needs of industrial requirements and the advancement of the engineering profession in India, an Association of Engineers was indispensable even though few international bodies were active in the country at that time. The

foundation of the establishment of the Institution of Engineers (India) goes to the credit of the First Indian Industrial Commission, headed by Sir Thomas H. Holland, an Educational Administrator and the Commerce Member of the Government of India and along with prominent adherents and doyens including Pandit Madan Mohan Malaviya, Sir Rajendra Nath Mukherjee, and Sir Dorabji Tata.

The Commission strongly recommended an ideal industrialization system, besides establishing a professional association for engineers covering all the branches of engineering practiced in India for the development of the industry and advancement of science, engineering, and technology. The Commission envisioned this professional body to develop the framework for establishing a standard engineering education system; improving the efficiency of executing projects and promoting interaction between public and private entities. Sir Holland made a significant contribution to the establishment and formalization of the constitution of contemporary engineering practice that included structuring of the hitherto Indian engineering profession.

During the formative phase, it was titled the Indian Society of Engineers, and resultant national consultations with engineering benefactors and stakeholders, a well-founded organization named as The Institution of Engineers was formally registered during September 1920 and ceremonially inaugurated on 23 February 1921 by the Viceroy and Governor General of India. The journey of architecting an edifice of a promising profession

had its early steps in the 1920s, and these have laid the foundation for the unstinting Indianized engineering to near complete a centenary of yeoman contribution to the economic, social and political development of the country.

The motive to establish the Institution of Engineers in India under the Companies Act was that the Government of India desired such a professional body to progress and lead the industrialization of India for which government consent and participation was desirable, even though provisions were existing to establish such an institution under the Societies Act 1860, whereby it could have been a private entity. It fundamentally validates that the government endorsement molded this outstanding professional organization to serve the nation to advance technologically and progress economically by positioning eternally steadfast Indian engineers.

Before and during the War periods, engineers educated in Indian institutions predominantly joined the government services including Railways, Irrigation and Public Works; their job perquisites included social prestige because of their status as government officials. Gradually engineers entering the workforce primarily moved into manufacturing and other allied sectors that were associated with the industrialization of the economy, as this sector presented myriad opportunities for professional contribution, recognition, and growth. The prior formation of the Institution of Engineers with its commitment to enhancing knowledge-based skills of applicants in the context of a scientifically, technologically and industrially emerging India;

gave an opportunity for synergy between the workforce entrants and the practicing engineers.

Linking the engineering sector landscape with the timeline, Indian industrialization during the period 1930-1950s focused on positioning engineering practices and methods for production of sugar, textiles, chemicals, and steel. The diminishing flow of remittances from Britain encouraged Indian entrepreneurs to seize the initiative for pursuing new opportunities for establishing private enterprises with a focus on import substitution. The Government introduced some pro-industrial policies including protective tariffs for selected Indian industries like steel, paper, textiles, and sugar, and this provided the impetus to establish enterprises by private capitalists. It stands out as one of the earliest examples of policy interventions offered by professional bodies, and later became one of the critical objectives of professional societies resembling IEI.

In his maiden address as the first President of IEI, Sir Rajendranath Mukherjee saw the formation of the IEI as heralding an era of equality and lauded 'the spirit of comradeship and cooperation in which British engineers have extended the hand of fellowship to their Indian colleagues.' He also saw the Institution as a means 'to promote the efficiency and training of Indian engineers,' and the vehicle to mold and shape the Indian engineering workforce to harness India's plentiful natural resources for the drive of industrialization. In fact, Sir Mukherjee's election as President in the first full year of the Institution's functioning was itself symbolic of the twin priorities

of Industrialization and Indianization. Opportunities for Indian-origin engineers though limited at that time were expected to grow and expand, as was articulated by the election of Sir Mukherjee, an accomplished engineer-businessman as IEI's first president.

Attempts at large-scale import substitution created demand for capital goods resulting in the structural transformation of the promising Indian industrial economy leading to the production of sophisticated machinery, automobiles, aircraft, ships, locomotives and other capital products. Development of machine tools; drugs and pharmaceuticals; vessels; metals and industrial controls and instrumentation were also initiated with the objective of enhancing productivity, technology indigenization and achieving self-reliance. The establishment of multiple industrial units beyond the traditional engineering domains demonstrated that the Indian engineering industry had reached a level of professional stability, and could progress ingenuities with minimal support from Great Britain.

After about fifteen years' time frame of structured Indian engineering professionalization through IEI, taking a cue from the three London-based institutions already present in India, Indian engineers opined that further growth of the profession would be accelerated through the Royal Charter and augment the credibility of Indian engineers globally. The engineering enthusiasts took upon themselves the responsibility to structure and develop the pivotal document of Royal Charter including its

characteristics and authority, that would envision and advance Indian engineering.

The IEI initiated a resolution with the Privy Council during August 1934 to incorporate IEI through the Royal Charter, with the primary objective of providing leadership to the engineering fraternity across all disciplines of engineering, and facilitate all corporate members earning the title 'Chartered Engineer (India).' The petition was drafted by Sharpe Pritchard & Co., Solicitors of IEI under the Presidentship of Sir Thomas G. Russell.

IEI is a body incorporated under the Charter containing a grant in the form of 'Letters Patent' dated 9 September 1935. The incorporation of Charter by the Royal prerogative was a momentous occasion for IEI and established the international standing and respect for Indian engineers. The evolution of the institutional status through the Royal Charter was transformational for Indian Engineering; positioning the Indian engineering fraternity as a 'learned society,' and this initiated the process of benchmarking Indian engineering performance with global standards.

Granting of the Royal Charter for IEI was an executive role, and as such the By-laws and Regulations have derived their authority from the Charter of 1935, and any revisions to those would have to be accepted first by the Corporate Members with approval by the Privy Council. It was the process by which the first Bye-laws were approved on 31 October 1937, and was an essential requirement to align Indian engineering practice with

the then contemporary needs and leverage the global branding the Royal Charter had created for itself.

The circuitous journey of Royal Charter incorporation for Indian Engineers was not an easy mission. After detailed deliberations in the IEI Council, in consultation with stakeholders at the beginning of the 1930s, legal vetting by solicitors and communications with Privy Council, the granting of the Royal Charter was a voyage well accomplished. The Charter is a time-honored document recognizing IEI's distinct structure and is an authentication for Indian engineers to distinguish their professional proficiency.

In the early years, the mandate of the IEI was to create a '*learned society*' for engineers with a common interest in the demonstration, presentation, and discussion of progressive engineering efforts. Subsequently, by the incorporation of the chartered ship, the objects of the Institution were expanded to include a regulatory functioning, codifying standards for engineers to practice, conducting its examination for admission of individuals to corporate membership, amidst others.

With the status of the Royal Charter, members listed with IEI were viewed as those acclaimed for high standards of competence, knowledge and demonstrating the most top ethical behavior. In the medieval to the contemporary period, the term 'Chartered' was used to distinguish a qualified and accomplished person who was recognized by a professional

body having a Royal Charter by being granted its membership, which was entirely consummate for Indian Chartered Engineers.

The Royal Charter is an elaborate regulation, integrated with statutes, incorporating guidelines delineating authority, and establishing validity in global perspective. The Charter's powers, purpose, intents, objectives, framework and its technicalities of providing impetus to catalyzing the growth of Indian engineering.

In India, besides IEI, few other organizations granted the Royal Charter include the Chartered Bank of India, Australia, and China (Standard Chartered Bank); and the Indian Church Trustees (1929). Charters granted to High Courts of Bombay, Calcutta, and Madras, and they were popularly known as Chartered High Courts retaining their legacy and establishing the basis for reformation of the legal profession in India.

As the membership of Institutions with the Charter is considered prestigious and equated with high professional standards, these professional bodies have established strict requirements including practical experience and entry examinations for aspiring members to prevent any occurrence of professional irregularities. IEI has inherited this rich value system and has ensured these principles govern the interactions its members have with society.

The IEI's Royal Charter has deep roots in Indian engineering endeavor, and its established history is intertwined with the prevailing socio-economic fabric of the country. While its status

in India has only been sporadically recapitulated, it has always played the leading role in being the public face of Indian engineering in the pre and post-independence and has set exemplary standards through intellectual integrity, independence, and interdisciplinary focus for nation-building.

The structure and direction of Indian engineering have changed significantly in the time-frame of 82 years following the grant of Royal Charter. Nevertheless, the Institution and Indian Engineering have emerged victorious by adhering to the time-tested uncompromising values, calibrating its procedures and activities in the evolving context. It can be safely concluded that the award of the Charter to India was the first step in the creation of a contemporary profession in the country with the potential for unbridled growth of engineering.

While it was a noteworthy milestone in the annals of the profession by augmenting the stature of IEI, it ushered in greater responsibilities for engineering practitioners, academia and the profession as a whole.

During the British imperialism and pre-independence period, IEI structured the profession to be led by government-officer engineers in the irrigation, public works, railways, and military. Subsequently, recognition and awareness from successful engineering projects facilitated expanding engineering activity to include engineers working in related industries and helped extend the ambit of the relevance of Indian engineering to national progress. The Royal Charter can be seen to have

significantly contributed to the growth and diversification simultaneously across all engineering disciplines, and made inroads into industry, academia, and research besides policymaking.

Considering the changed political scenario following Indian independence, the IEI Council considered addressing the restructuring of the Royal Charter. With the implementation of the Indian Constitution in 1950, the IEI Council decided to refer the way-forward on the status of Royal Charter and propose amendments as may be required. There were also consultations to surrender the same to competent authority as it was imperative given the constitutional position of India. In 1958, the then Attorney General and Chairman of the First Law Commission of India, Shri M C Setalvad confirmed that IEI constituted as a Body Corporate by the Royal Charter continued to be a Body Corporate; notwithstanding the changes in the Indian Constitutional structure. The dilemma of Royal Charter continued post-independence and carries on even today despite several amendments to the Indian Constitution, laws and enactments.

Nevertheless the debate on the current Charter status, the Indian engineering network has reached a stage of maturity and has successfully weathered many paradigm shifts since incorporation. Charter continued to be synonymous with engineering attainments in government, public, and industry and is highly valued in professional circles. The object of the IEI being granted the Royal Charter was to promote and co-ordinate

in the public interest the development of the science, art, and practice of engineering; and leverage engineering for the promotion of industry, commerce, and the overall economy to align with common technology interventions.

Today, engineering in India is an essential socio-cultural factor and has become a tool for upward social mobility. With over 15 Lakh engineering education enrolments taking place in India annually, engineering has become a household movement and a most commonly accepted profession. With the result, perhaps India as the creator of the maximum number engineers globally.

Chartered Engineering Framework

Engineering over the last hundred years has grown into an inter, and multidisciplinary character; with millions of associates participating in several multifaceted engineering developments leading to the collective growth and advancement of the profession. Irrigation, public works, railway and military engineering contributed to the foundation for engineering profession in 19th and early 20th century. Professional societies of Indian and international origin have promoted the expansion and nurturing of numerous engineering disciplines, resulting in the all-encompassing advancement of engineering. These organizations have collaborated to the development of systematic assessment framework, benchmarking the content, and accreditation of a large number of engineering workforce entrants. It has helped in the standardization of engineering and

guaranteed Indian professionals' superiority in the global engineering context.

Charters have primarily been valuable for catalyzing professional registration. Through credential certification, members have gained access to professional titles that command significant prestige, enhance employability, extend influence within the profession, and facilitate the acquisition of globally recognized testimonials. IEI, from its inception, as a Body Corporate, has been addressing the assessment and accreditation requirements through the routes of examination and membership; and its contribution to Indian Engineering is commendable and exemplary. The Royal Charter has been a boon to the fledgling Indian engineering profession, and IEI has distinguished itself eloquently in regulating the practice of engineering; and has emerged as the sole authority in India to monitor and uphold professional registrations including the titles of Chartered Engineer and consequently, the title of Professional Engineer (PE).

The Chartered status for Indian Engineering has helped build a robust value-system and a code of practices that have facilitated to create an ethical structure for performing engineering for societal benefit.

Charters have also facilitated to create a setting for raising the profession by:

- Inspiring entrants to become engineers, to enhance their qualifications to cater the industry and services, structure

appropriate assessing and evaluation system, administer criteria for diverse categories of membership, and to foster an environment for continued professional development and up-skilling

- Enhancing the global recognition, and the status as learned society, with the organization stimulating the collaboration and networking of high-quality professionals through the determination of proficiency in practice, structuring Indian engineering and enhancing contributions to education and industry through public-policy
- Building alignment between the codes of ethical practice in India with that of the world comity to ensure cross-border participation and internationalization of engineering
- Serving as knowledge clearinghouse by establishing information centers, and facilitating growth of knowledge through access to the profession's prestigious publications and conferences
- Promoting research, innovation, and excellence through academic collaborations, advanced technology groups, standards committees, scholarships, incubations, by articulating the role of engineering as a key contributor

To fulfill the established criteria of the Charter, getting membership affiliation was not an easy task even for educationally qualified engineers as it was a rigorous process of documenting, demonstration of experience and competency. Gaining titles including Associate Membership or Memberships was considered a hallmark of identity and recognition of India-

specific acquaintance even for the formerly affiliated members of UK-based institutions. Both Europeans and Indians working in India chose to associate with IEI as it highlighted their experience in Indian conditions and ecosystem, even though some of them were already members of London-based chartered Institutions.

In addition to acquiring IEI membership, the opportunity to gain the 'Charter' status motivated large numbers of engineers to join IEI to assert their elite eminence in engineering.

The granting of the Royal Charter has helped to stimulate rapid industrialization and hasten the Indianization process of engineering. It offered qualifications equivalent to degrees for practitioners who were not formally trained, afforded its corporate members recognition through the title of Chartered Engineer (India), and represented India in imperial and international forums. Although the Institution, as the brainchild of a government-appointed Commission, performed a top-down approach of establishing the engineering profession in the country, and the Indian identity acquired a momentum of its own within the Institution's framework.

Professionals of medicine, architects, lawmakers, pharmacists, finance and accountants, company secretaries are governed by respective professional bodies or institutes which are Body Corporates functioning under the provisions of the individual Acts passed in consonance with the constitution of India. Mere acquisition of legally acquired educational qualifications will not

entitle one to practice oneself unless registered with respective professional institutions and adhere to the regulations and code of conduct. The body or system eventually will protect the interest of members, profession, and society. In case of the engineering profession, the legal status is contentious and debatable. Royal Charter for Indian engineering has offered a route to demonstrate compliance with local statutory requirements and adherence to global standards of excellence. The provisions of the Charter is explicit “to grant certificates of competency whether under any Act of the Government of India or Local governments regulating the conduct and qualifications of Engineers or otherwise howsoever.”

Engineering Chartership for Technology Advancement

The last century has seen rapid strides in industrial advancement primarily with the influence of engineering and engineer's intellectual commitment. The grant of the Royal Charter has given a firm foundation for the establishment of the stable engineering profession and has given the engineering community a broad canvas for rising and developing Indianized engineering during the mainstream of this era. The mandate of the Charter has endorsed the longstanding IEI's primary objective to “promote and advance the science, practice, and business of engineering in all its branches in India.”

Technology, as a product of the art of science, nurtured by engineering tools and techniques, has played a stellar role in powering growth; shaping the culture and transforming society.

Leveraging its ability to architect technology-driven systems for solving real-world problems, engineering has played a pivotal role as a consequence of a coherent set of conceptual interdisciplinary science doctrines. The presence of a large number of successful products, solutions and services is an adequate proof-point that the engineering capability is well entrenched and is contributing in good measure to society. Proficiency in engineering is an important parameter to invent, innovate and discover novel products to transform and recreate civilizations for the future. The grant of the Royal Charter to Indian engineering has been instrumental in assessing, adapting, and standardizing engineering best practices for technology innovations.

IEI, the premier body for engineers in the country while rejoicing the centenary of their existence in 2020, should introspect and critically assess utilizing the Royal Charter framework to address the evolving requirements emanating from the contemporary digital revolution. India is currently on the path of progression and growth, and this societal and economic development will need the application of science, technology, and innovative thinking by engineers to translate ideas to tangible products, solutions, and services.

The proliferation of Internet technologies and the availability of vast amounts of data has put professions under a scanner, with the clamor for accountability and transparency to retain citizen's faith and confidence. In this context, Chartered institutions with a comprehensive set of ethical best practices, a well-defined

vision for the future, demonstrated standards of professionalism, and congruence to social systems would serve as a beacon for setting the directions for effective professional performance in the coming decades.

For the Chartered Body to be competent in future years to serve engineers, it is imperative to embark on the path to an evolving future emboldened by a 'new' mindset. This would require integrating local knowledge with global best practices, and leverage expertise across multiple disciplines while ensuring adherence to the high professional standards set earlier for the purpose.

Technology disruption is fast eroding traditional engineering practices and is creating new pathways through standards and modern technologies. A brief glimpse into future will amply demonstrate how Industry 4.0, Additive Manufacturing, Artificial Intelligence, Cloud Systems, Cyber Security, Internet of Things (IoT), Blockchain, Big data, Predictive Analytics, E-commerce, Driverless Vehicles, Smart Medical Devices, amongst several other emerging technologies are restructuring the way engineering performs.

Adoption of present-day technologies will need successfully 'leap-frogging' the technology ladder, which will require further skill assessment, enrichment, certification and licensing. Industry, academia, research organizations, professional engineering societies, and the Government will need to work together cohesively to develop solutions to bridge the skills gap

and create a pipeline of employable future-proof technology professionals.

New standards, novel evaluation mechanisms, code of conduct and revised practices will need to be developed and particularised under the ambit of the Charter to ensure relevance to the prevailing social aspirations.

In conclusion.....

Engineering profession led by the Charter has played a significant role in creating a social order that is more attuned to peaceful coexistence and is equitable, thereby providing an opportunity for the succeeding generations to live with dignity.

While Indian engineering has been prosperous in harnessing the supremacies of Royal Charter to build a resilient and robust engineering framework in the country, several incomplete and fragmentary mandates of the Charter will need to be progressed for upholding the impetus of engineers for future generations.

The world is at the core of a technological revolution shaped by science and engineering, and tectonic shifts are happening in the socio-technological paradigm. Today globally, with the advent of contemporary digital and industrial revolution trademarked as Industry 4.0, and numerous other path-breaking scientific advances are available for positioning as systems, solutions, and services. From the national perspective, the Government of India has embarked on ambitious missions to position India as a global hub for manufacturing, technology, and research through its

flagship programmes and missions including Make in India, Digital India and Startup India that kindle the spirit of technological excellence and entrepreneurship in every self-contained engineer. The Governmental Missions, the upsurge in industrial competitiveness, and academic excellence would create a conducive environment for the development of best-in-class intellectual manpower for global challenges.

Future engineers will have plenty of opportunities to surmount hitches and constraints to build an improved world for the near-term generations. The Fourth Industrial Revolution is bringing in its midst the chance for Indian engineering to undergo a '*Radical Transformation*'; align with global best practices to build sustainable and profitable Factories of the future, to dominate global markets. To realm, the rhythm together with the Chartered Institution, IEI must contemplate implementing comprehensive amendments to Charter to stay aligned with the advancement of a resurgent society by comprehensively address growing national needs.

Engineering is a human performance, and economic prosperity will drive the progress of the society, and this will, in turn, highlight the accomplishments of engineers. The learned professional bodies will play a significant role in articulating the social significance of engineering by networking, publishing and organizing consultations among stakeholders and beneficiaries. Chartered authorities continue to strengthen these symbiotic social and professional linkages to assist civilization by aligning all participants, and augment the standing of engineers.

The Charter is analogous to a magnificent banyan tree that grows, spreads, and cultivates adding to the strength through the accumulation of competent individuals, amassing interdisciplinary knowledge, and expanding across diverse disciplines and geographies to address the comprehensive gamut of collective civic desires.

The current dynamic world demands professional practice with increasing global character. The Chartered credential determinations to facilitate engineers for successfully addressing the global requirements by assimilating individual excellence and adherence to prevailing international technological standards.

Today engineering and technology have become shared connotation and outcomes are spread across the length and breadth of the country. It is conclusive and essential to have a connection with students and practitioners to facilitate effective mentoring and networking, which are necessary and vital to an individual's professional success. This requires Chartered bodies to have a 'point of presence' in workplaces to ensure that continuous networking and bonding among entrants to enhance collective efficiency and participation.

These initiatives could help future-proof Indian engineering and build the resilience to confidently address the volatility, uncertainty, complexity, and ambiguity that have become the new norm of the changing and evolving contexts. As change is the only constant, the Indian engineering profession will also

need to metamorphose as necessary to ensure alignment and remain relevant.

IEI's self-regulated professional title Chartered Engineer is often viewed through a narrow lens to debate its value in the delegation of legal power and the limited acknowledgment for professional bodies contribution to public policy. This approach is defeating, as the tangible and intangible benefits through the regulation of engineering effort for public safety, safeguarding the rights of the services to clients, and creating a favorable environment for individual excellence to thrive and contribute to societal progress, is completely overlooked and lost sight of for meaningful action.

In the competitive world where success is determined by intellectual capital, it is essential for all members of the Indian engineering fraternity to measure our current strengths and build a new Indian engineering paradigm that can create a sustainable competitive advantage. While the Royal Charter has given a broad landscape for promoting Indian engineering, nevertheless has been successful in achieving prospective only in limited areas, while many other opportunities have not been pursued. It is predicted that these new areas will provide significant potential for transformation that would galvanize Indian engineering to the advancement of global leadership position in the coming century.

It is earnestly hoped that a groundswell will be created by practitioners of the engineering profession in building consensus

and arriving at an action plan that will support engineering bodies to work efficiently in taking forward Indian engineering in the global context to greater heights, thereby achieving the objects of the Royal Charter.

'Engineering with Charter' envisions the creation of an equitable world that allows succeeding generations to live with dignity. The sequel to this publication will dwell on the positioning of the Charter for impending engineering era, and advocate the necessity and relevance of 'Chartered Engineering' in the context of technology interventions shaping the world for future generation engineers and society.

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