

CHARTERED ENGINEERS

BY

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In the June 1966 edition of the Journal appeared a remarkably shrewd, though lighthearted article, 'The Professional Approach'. The author 'Amateur', in highlighting the very topical query 'What is a Professional?', certainly showed he was no amateur. Admiral Tracy's most apt reply that a professional 'needs an essentially flexible approach to any problem, determined by logical thought and based upon comprehensive training and wide experience' can hardly be bettered. An American concept is that a professional engineer is a custodian of a fund of knowledge—and to this fund he has three responsibilities:

- (a) *To generate and add to it;*
- (b) *To utilize it in the service of society;*
- (c) *To teach it.*

However one looks at it, the borderline between the technologist and the technician is a tenuous one: 'the engineer' to the public at large is someone between a Whittle and the man who mends the mechanism of Big Ben. And it is (inter alia) towards establishing and maintaining common standards for professional engineers that the recently-formed Council of Engineering Institutions (C.E.I.) has directed itself.

The Professional Engineering Institutions

The history of the professional engineering Institutions is a long and fascinating one, with a very varied pattern. The oldest, the Institution of Civil Engineers, was formed in 1818 with the great Telford as its first President, interesting itself in civil works such as bridges, dams, canals and lighthouses, as opposed to military engineering which dealt with fortifications. It defined engineering as 'the art of directing the great sources of power in nature for the use and convenience of man', a definition which is still used.

The story goes that a party of engineers watching locomotive trials sheltered from the rain in a platelayer's hut near Bromsgrove and decided to start their own society, since the Civil Engineers had no great interest in the steam engine, and George Stephenson had been rejected from becoming a member of the Civils as being insufficiently educated, or some say as being too uncouth. The Institution of Mechanical Engineers was accordingly founded in 1846 with George Stephenson its first President, followed by his son Robert and, later, by great names such as Whitworth.

In somewhat the same way the Institution of Gas Engineers was formed in 1863, concerned among other things with the provision of lighting for Westminster Bridge, then regarded as a highly dangerous experiment. And in 1866 the Royal Aeronautical Society was founded to bring together all those who had an interest in affairs aeronautical, which at that time was confined to ballooning. The Society, incidentally, in celebrating its centenary, is the oldest such organization in the world: unlike the other engineering Institutions it does not confine itself to aero engineering matters and covers the interests of such differing fields as astronautics and guided flight, rotorcraft, man-powered flight and air law.

Electricity was becoming fashionable about the same time, leading in 1871 to the formation of the Society of Telegraph Engineers, later to become the Institution of Electrical Engineers, who with the Civils and the Mechanicals tended to be regarded as the 'Big Three', a feature which has perhaps had unfortunate after-effects as will be mentioned later. Other Institutions naturally arose to meet specific needs such as those of the Municipal Engineers with a formidable coverage of interests, particularly in this age of rapid urban expansion, the Chemical Engineers, the Mining Engineers (confined to coal mining), and Mining and Metallurgy (dealing with metalliferous mining). Still others arose, perhaps unnecessarily, as the result of disinterest by the older established Institutions, or the view that their activities were not truly professional. The Institution of Structural Engineers, dealing with the problems of the mammoth buildings of today, owed its existence to the distaste of the Civils for reinforced concrete. The Institution of Electronic and Radio Engineers, the newest of the constituent Institutions, owes its emergence to the military needs and developments of the last War. The Institute of Marine Engineers (the only *Institute* incidentally among the bodies of C.E.I.) and the Institution of Production Engineers one might think justifiably, with hindsight, were really dealing with making or running machinery, mechanical or electrical, but they fulfilled the unsatisfied needs at the time of their formation, and have gone from strength to strength. The only newcomer to the original thirteen bodies in the Council of Engineering Institutions (C.E.I.) is the welcome one of the Royal Institution of Naval Architects.

Each of the bodies of C.E.I. possesses a Charter acknowledging the Institution concerned as being the recognized body dealing with that particular activity, and through By-Laws stipulating certain conditions for membership: each corporate member was entitled to call himself a chartered (mechanical/electrical, etc.) engineer according to the Institution to which he was elected.

Objects of the Institutions

From the days of the formation of the guild system of apprenticeship in the thirteenth century, there has been a mutual tendency for those with similar technical interests to form associations to safeguard their status, exchange knowledge and protect their standards. The education of the young apprentice was confined to matters concerned with a particular trade or craft; no seat of learning troubled to concern itself with anything other than the traditional Arts subjects, a situation that continued well into the nineteenth century, the effect of which still persists today. Few of the great engineers of the last century studied at a university; Mechanics Institutes and then Technical Colleges were formed, and the Colleges enabled young practical men working in industry to acquire an education which was denied to them at a university. Late in the last century the more progressive universities had opened the door wide enough to admit a very few to read pure science—it was left to the Technical Colleges, encouraged by the professional engineering Institutions to meet the increasing needs of the technologists and of those who were applying science for the benefit of society.

The Institutions generally have similar objects—acting as learned societies to promote interest and exchange information, to regulate the standards for professionals, and to elect to membership. Requirements for election to corporate membership include a minimum age, passing the Institution examination (for which exemption is usually obtained), and a period of training. Most Institutions also call for a period of responsible experience. In all, the education requirements play a very significant part.

The Formation of the Council of Engineering Institutions

But it was natural that each Institution, with its own strong traditions, had differing standards, requirements, and average age for membership. It was natural, too, that powerful specialist interests in the traditional civil, mechanical and electrical fields tended to freeze out newer fields of technology and to ignore the need for professionals to be increasingly aware of developments in fields other than their own. For instance, no engineer in the future can afford to be ignorant of the use of computers, and all should know the fundamental processes in making things. Fields such as lubrication or nuclear energy now cut right across the traditional engineering disciplines. With the many new fields in technology there was a grave danger that the inevitable splinter groups and diversification of effort could lead to lack of any cohesive policy or unity as a profession.

In rather the same way as the Navy with its four branches in 1956 adopted the General List, the thirteen (now fourteen) professional engineering Institutions in 1965 obtained a Charter to found a federation—in the form of the Council of Engineering Institutions, the purpose of which is ‘to enable representatives of the bodies concerned to meet together to consider and take action upon matters of common interest relating to the advancement of engineering and the dissemination of knowledge in that field. They also aim to establish a sound and useful channel of communication between professional engineers, the Government, the public, and national and international bodies concerned with engineering’.

Associated with the granting of the Charter to the Council, of which H.R.H. the Duke of Edinburgh is the Founder President (and a very active one), was the institution of the title Chartered Engineer, accorded to all those professional engineers who were already corporate members of the constituent Institutions on Charter Day, and thereafter to those who become eligible for corporate membership of one of the Institutions and hence for entry on the Council’s Register. The qualifications necessary are:

- (i) A minimum age of 25
- (ii) An academic qualification of a standard equivalent to that of the Council’s Examination, which will be that of a degree of a U.K. university
- (iii) A period of training and experience (acceptable to the Council) not less than 3 years in aggregate.

In addition to devising the examination syllabuses to cover the widely differing interests of the original 13 member Institutions, details of which have been announced, the Council has already made its influence felt in many ways with various Government and Schools organizations, but it is not appropriate to outline these here. (In passing, it may be of interest that negotiations are proceeding at national level towards the recognition of Chartered Engineers in Europe, which may well be significant if the U.K. were to join the Common Market.)

It should be noted that the Council and the Institutions are precluded by their Charters from covering personal services to professional engineers in relation to salaries, legal problems, pensions, etc., which come within the sphere of The Engineers Guild: they are also precluded from any form of Trade Union activity.

Continuing Education

In a *Journal* such as this there is no need to emphasize the astonishing pace of advance of the technologies of today. It has been said that unless a professional engineer who qualified 10 years ago spent 10 per cent of his time developing

knowledge beyond the level of his first qualification, he could not compete in value with the newly-qualified man—and this is assuming that he retains his early expertise. Allowing for decay from neglect or disuse as 10 per cent per year, an engineer is then faced with the task of assimilating new knowledge at the rate of 20 per cent per year to remain of equal value to his employer and society. This basic truth, of course, overlooks the fact that any engineer, and certainly a serving officer, is gaining in experience and stature every year; and that competing with an obstinate feed pump or intermittent radar fault in the heat of the Red Sea is hardly conducive to providing the time or the inclination to improve oneself. But the need is none the less there.

A noted metallurgist, Dr. Zay Jeffries, once wrote: 'Our progress depends to a considerable extent on seeing to it that the simplifying processes move forward in approximate balance with the complicating processes. If this can be accomplished, the individuals with given ability can expect to go forward indefinitely without becoming the casualties of their own complexity'. Perhaps a wide and generous education can largely provide the answer to the problem of keeping the simplifying processes in line with the complexity that seems so overwhelming.

Naval Technological Education

The Navy in its wisdom took the decisive step of raising its sights to degree standard for its technical officers some years ago; it may be some years before the full effect on the Fleet is evident.

To digress on a personal note. The education and training given at Keyham in the early 1930s to the writer met the current needs admirably, since its primary purpose was to allow for the needs of watchkeeping officers for simple, robust and standardized machinery of the Fleet at that time.

The Engineer-in-Chief's Department consisted of under half-a-dozen officers crowded into two rooms in Whitehall: their duties, largely approving drawings and occasionally checking basic designs called for little more than the Keyham training, which, by modern lights, was somewhat limited. The writer well remembers now the details of the riveting of the water drum and the number of bricks in an Admiralty Yarrow 3-drum boiler, and could almost have drawn blindfold the details of either a Williams-Janney or Hasties steering gear. It came as a shock to find later that there were actually other types of equipment in use. With hindsight, I realize now the great debt of gratitude we owed to the Instructor Branch, so many of whom combined great ability with the priceless facility of being able to impart knowledge to others, and to make them think. But it was probably only later training at Greenwich which really got down to principles rather than detail. It can be argued, that such training justified itself by the way the Fleet kept at sea in the last War, and many still argue that 'this degree stuff is all very well, *but . . .!*' With the present pace of change the writer is convinced that the primary professional requirement is the ability to think, and that education to at least degree standard is now the minimum acceptable. The introduction of the C.N.A.A. Degree at Manadon is a most welcome change, affording the proper balance between fundamentals and their application. (It is sincerely hoped that it includes some form of project, or 'Design and Make' exercise, now increasingly in use throughout the country. *This* is surely the right place to learn the importance of details.) Such a qualification may result in going to sea perhaps in a slightly 'greener' state than used to be acceptable, but the net gain in versatility and adaptability should rapidly pay its reward.

The problem of continuing education is indeed even more formidable than for the engineer in civil life due to frequent changes of appointment. On the other hand, the opportunities to learn in new fields may be even greater due to

the diversity of employment. It may well be that young serving officers can benefit themselves appreciably by joining an Institution as Graduate or even as Student members.

Joining an Institution

The position of officers serving in H.M. Forces is unlike that obtaining in civilian life, where, as any daily paper will show, most engineering posts are offered only to those with professional qualifications. (Indeed in certain sectors of the public service advancement is sometimes only open to those who qualify for corporate membership of the Institutions, a pernicious system since corporate membership itself depends, with most Institutions, on holding a post of demonstrable professional responsibility.) Advancement in the Forces is rightly not directly dependent entirely on professional qualifications; but the Navy has correctly for several decades insisted that all its General List engineer officers qualify academically to the standards required by the Institution of Mechanical or of Electrical Engineers, now to be at degree level. Any General List engineer officer is free to obtain professional recognition as soon as he fulfils the various other requirements of whichever Institution he chooses to join.

The question arises therefore, 'Just what good will it do me to join an Institution? Is it worth the subscription?' Each officer must decide for himself, but it is worth considering the following points.

Firstly, the interests of engineering can only be fostered at the highest level by the concerted efforts of the Institutions. A great deal is now being done to influence Government opinion and the climate of universities' thinking by the efforts of the C.E.I. Naturally Institutions need an active and thriving membership to support this. Senior naval engineer officers have traditionally played a large part in Institution activities—and continue to do so.

Secondly, in the interests of the individual, it should be abundantly clear that for the successful engineer, continuing education is an absolute necessity. Private reading of the technical Press in periodicals such as *The New Scientist* and *Engineering* can help greatly. But the Journals of the Institutions are full of interest—there is seldom an issue which does not contain, as well as highly-specialized papers of an advanced nature which may be appropriate to those in the technical 'desks' at Bath, articles and correspondence of much general interest. For those with ready access to London in particular, and to the less frequent gatherings in the Branches, attendance at meetings is well worth while; perhaps more for the occasional lecture by some celebrity and for the very frequent informal discussions on a vast range of topics than for the specialized paper which is more formal and may have a limited appeal. It should be remembered that traffic is two-way, and many serving and retired engineer officers continue to make great contributions to the profession, as well as learning themselves.

Thirdly, on a less altruistic note. It often happens an officer defers joining an Institution until shortly before retiring, when the advantages of professional qualifications become increasingly attractive. Nowadays there are few who can live on a service pension, whatever their rank, and sooner or later the unsettling experience of seeking employment comes to nearly all. While the Manadon (or Keyham) academic qualification will continue to be accepted by Institutions if obtained by the end of 1970, those without degrees will only be accepted for corporate membership if they are elected by the end of 1973: (they could, of course, sit the degree level C.E.I. Part 2 Examination, but preparation for this would probably be impracticable). It would appear important, therefore, for those without degrees who have an eye on taking up some form of professional engineering on retirement to consider taking early action to obtain corporate membership of an Institution, and hence to become Chartered Engineers, while their current qualifications are still valid.

Finally, as with so many other things in life, just what an individual gets out of joining an Institution depends largely on what he puts into it: it should not just be a question of being able to use the title 'Chartered Engineer'.

I am indeed grateful to the Editor of the *Journal* for allowing me space for this article. The continuing high standard and general interest of its contributions is evidence of the progressive thinking of the Navy's technical officers. Perhaps an even closer association with the Institutions could both assist them to be aware of developments in the wider field of engineering, and enable them to continue to hold the very high public esteem which they now undoubtedly enjoy.

APPENDIX

THE COUNCIL OF ENGINEERING INSTITUTIONS

CONSTITUENT MEMBERS

<i>The Royal Aeronautical Society</i>	4 Hamilton Place, W.1
<i>The Institution of Chemical Engineers</i>	16 Belgrave Square, S.W.1
<i>The Institution of Civil Engineers</i>	Great George Street, S.W.1
<i>The Institution of Electrical Engineers</i>	Savoy Place, Victoria Embankment, W.C.2
<i>The Institution of Electronic and Radio Engineers</i>	9 Bedford Square, W.C.1
<i>The Institution of Gas Engineers</i>	17 Grosvenor Crescent, S.W.1
<i>The Institute of Marine Engineers</i>	76 Mark Lane, E.C.3
<i>The Institution of Mechanical Engineers</i>	1 Birdcage Walk, S.W.1
<i>The Institution of Mining Engineers</i>	3 Grosvenor Crescent, S.W.1.
<i>The Institution of Mining and Metallurgy</i>	44 Portland Place, W.1
<i>The Institution of Municipal Engineers</i>	25 Eccleston Square, S.W.1
<i>The Royal Institution of Naval Architects</i>	10 Upper Belgrave Street, S.W.1
<i>The Institution of Production Engineers</i>	10 Chesterfield Street, W.1
<i>The Institution of Structural Engineers</i>	11 Upper Belgrave Street, S.W.1

from whom membership details may be obtained.

<i>The Council of Engineering Institutions</i>	2 Little Smith Street, S.W.1
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Erratum:

The DCI quoted on the last line but one on p. 295 of Vol. 16, No. 2 should read DCI 579/64.