THE ENGINEER AND THE COMMUNITY

ROBERT F. LEGGET

THE Engineering Institute of Canada celebrated the fiftieth anniversary of its foundation as the Canadian Society of Civil Engineers in June of last year. A series of meetings and social functions, international in character, was held in Montreal and Ottawa in order suitably to mark the occasion. These proceedings were of interest mainly to the engineering profession, except for some of the addresses at social functions such as that given by the Governor-General, Lord Tweedsmuir, at the official banquet, in the measured and melodious phrasing in which *John Buchan* still delights.

Two unusual speeches were made at luncheons by American engineers, the first surveying the achievements of engineering during the last fifty years, and the other presenting a review of what might be expected of engineering in the next half century. Both were notable statements, but particularly the second, which was read from the notes of the author, Harrison P. Eddy of Boston, who died but an hour or two before the celebrations commenced. Mr. Eddy had outlined the progress which he thought might be expected in some of the leading fields of engineering endeavour, and with the thought of the credit which would be due to engineers for such progress he coupled a reminder of the great responsibilities which will thus be laid upon the whole engineering profession for studying and improving the social implications of its work. Chief among the problems foreseen by Mr. Eddy was that of ensuring the correct use of the increased leisure time which may be expected in the future. Education, extended far beyond present bounds, was suggested as a key to this problem, and in its development the engineer will necessarily be called upon to play a part. In keeping with this suggestion, the speech ended with an appeal to leading engineering societies to "devote more time and energy to the study of economic, social, and governmental problems both national and international," in this way broadening their scope far beyond the confines of present practice.

This forthright challenge, coming from so eminent a civil engineer as Mr. Eddy, had unusual significance. The response

it created, not alone at the Montreal meetings, but during subsequent months in many engineering circles in North America, has therefore a special interest not confined to members of the profession. This interest is enhanced when consideration is also given to President Roosevelt's now famous letter about engineering education, and to suggestions comparable with Mr. Eddy's which have recently been made in other lands. The letter of the President, written in the autumn of 1936, was addressed to presidents of American engineering colleges, and expressed a wish that the training of engineers might better prepare them to meet their social responsibility in finding means to lessen the impact of scientific advance upon society. Are these statements in any way related to an awakening of a social conscience within the engineering profession? The question immediately arises, even though to many it may be tinged with surprise—so long have engineers, as a body, been concerned with their own technical affairs and but little else. It is a question the answer to which is not easy to find or to frame. It is, however, a question to which an affirmative reply is greatly to be desired.

Such an awakening, should it become widespread, will inevitably have a bearing on the future trend of social and political developments. Confirmation of this suggestion is to be found by considering the leading achievements of engineering during the last fifty years, and their social and political consequences. Throughout the latter part of this period it has been a commonplace in idle talk to say that "Machines have become men's masters." Foolish though such a statement may be as one of fact, it does at least indicate that man's control and use of machines has not been as effective as it might have been. It has been by the application of the inventions of scientists, through their practical development, and by means of organizing skill and efficient production management, that modern engineering practice has achieved wonders beyond even the wildest flights of imagination a generation or two ago. Why has such skill been thwarted, and such efficient management been stultified, in those fields of action immediately consequent upon the production and use of the machines themselves, fields of such significant social consequence? The importance of this paradoxical question, even with respect to the proper use of machines, is so vital to public well-being that search for an answer might reasonably be regarded as a sign of the awakening to which reference has been made. Consequently this search might be expected to be a function of professional engineering organiza-

tions. What is found when the records of these great and presumably influential bodies are examined?

Looking first to the Old World, and taking Great Britain as an example, one sees no national body representing the whole British engineering profession. The Institution of Civil Engineers, founded in 1818, originally included within its scope all branches of engineering other than military work. To-day, it is but the leader of a group of diverse societies, each serving one of the main divisions of civil engineering work. The activities of these bodies are confined to technical work, and they have not yet ventured outside this restricted domain, individually or collectively. It is therefore only in such uncensored pronouncements as presidential addresses that any comment on the social implications of engineering is to be found in their records. Some of the leading institutions have recently formed the Engineering Public Relations Committee, but the purpose of this body appears to be merely that of bringing to the attention of the public the achievements of engineering in the modern world. Important though this is, and significant as is the development after a century of aloofness from all thought of courting public interest in engineering, the work of this committee can not be taken as any indication of official recognition of the social consequences of engineering endeavour.

In striking contrast to this inaction in official engineering circles, there exists in Great Britain one of the most active social study groups at work to-day. This is the Engineers' Study Group on Economics, the president of which is Sir Richard Gregory. The group is a non-political body of engineers and associated technical workers. Its purpose is to study, by discussion and research, the relation between the standards of living and of leisure enjoyed by the community in relation to the advance in these directions which science has made possible, and to investigate how the paradox of the existing low standard can be resolved. The group works through the medium of study sections, of which the most active are concerning themselves with a study of productivity, and enquiry into the ethical and cultural questions involved. Through the Research Co-ordination Committee, it aims at keeping in touch with other research organisations, whether political or not, so as to avoid duplication. Although centred in London, where there is a section meeting on almost every evening of each week, the group is slowly expanding, and now has contacts in other British cities. Already it has been responsible for two notable publications, and al-

though of relatively recent origin and "unofficial" in nature, it represents a movement of significance.

Engineering organisation in the United States of America is similar to that which exists in Great Britain, a large number of specialist societies headed by four "founder societies" serving specialized branches of engineering, but confining themselves generally to technical work. There are some national co-ordinating bodies, the American Engineering Council being outstanding. The Council is a non-partisan association of engineering organisations, which provides means for the unification of the engineering profession in thought and action on social and economic questions. It attempts to promote clear thinking amongst engineers about public matters, and distributes information to member organizations, and to both the legislative and administrative branches of federal, state and local governments. Regulation of the profession by means of state licensing legislation is also in process of active development, and the state licensing bodies are already important; in addition, the unionization of the lower grades in engineering service has progressed apace during the last five years, and is now a factor of note. The relation between engineering and the social well-being of the community has naturally received the attention of all these last mentioned groups, and can not therefore be neglected in official professional circles.

The last five years have seen a steadily growing response to this situation, and although progress is still limited, it is not without significance. The American Engineering Council is naturally in the forefront of this movement, all its proceedings being directed to correlating engineering interest and skill with public affairs, and although necessarily limited in its appeal, the work it fosters is of increasing importance. The Council is this year embarking on a more extended programme of activity, which includes the initiation of a series of public forums in co-operation with local engineering groups, the first of which is to be held in Philadelphia, and also on an attempt to determine the effects of technology on employment. The American Society of Civil Engineers within the last two years has commenced to devote the first page of all issues of its monthly journal to a statement on some social subject of importance to engineers. Already these monthly broadsheets constitute a record of unusual interest. At the regular national meetings of this Society, papers have been presented and discussion encouraged on such topical and almost political subjects as the economics of the

St. Lawrence Waterway Project and of some of the major "public works" projects initiated in recent years by the United States Government.

Canadian engineers have an advantage over their fellows in the two countries already mentioned, since their voluntary national body does represent, in general, all branches of the profession in the Dominion. Although originally founded as the Canadian Society of Civil Engineers, it changed its name to the Engineering Institute of Canada in 1918, and at the same time broadened its functions. Despite its favourable position, however, the Institute has been so occupied throughout the intervening years with internal problems (especially those relating to the provincial licensing bodies) that its interest in and influence upon matters of general social concern are negligible. The old Canadian Society of Civil Engineers did go so far as to submit briefs on national matters to the Dominion Government; by way of contrast, mention of public affairs at general Institute meetings rarely takes place, and the pages of the Institute Journal are similarly devoid of social significance. Study of the social implications of their work by Canadian engineers is therefore confined to relatively small groups, essentially private in nature, since as yet there is no equivalent in the Dominion to the Engineers' Study Group on Economics of England.

This brief survey of engineering organizations in English-speaking countries gives some ground for general encouragement, but it shows clearly that great advance has still to be made before the expressions of hope quoted at the outset of this study are realized. Engineering societies are associations of individual engineers, and the search may therefore be pursued, to a degree, in the study of the engineer as an individual. Here may be found a clue to the mysterious social inaction of engineers in the past, and possibly a key to future developments. By his training, an engineer is led to view all problems with an air of scientific detachment, making his observations as objectively as possible, his instruments being his constant servants and main delight. When he finds that emotion, sentiment, and prejudice inevitably complicate social and political problems, he is likely to shrug his shoulders and decide that such affairs can be no concern of his. How often does one hear the remark "Now if only we could deal with this as engineers. . . . ."

It seems probable that this attitude on the part of engineers, of impatience with the vagaries and indefiniteness of social and political development, is the main cause of their lack of

interest in these matters. It is a situation which must be regarded as unfortunate if only because engineers, while not different from other trained workers, might be expected to take at least an average interest in community affairs, so that the benefit of their training might be shared for the commonwealth. In the administration and management of public affairs, engineers would seem to be peculiarly well fitted by their technical training to give good service. Gradually this view appears to be gaining recognition. The development of the city manager system is perhaps the most useful illustration of this development, but appointments such as that of General Markham as Commissioner of Public Works for New York City, and of Dr. T. H. Hogg as chairman of the Ontario Hydro-Electric Power Commission, are—it may be suggested—prophetically interesting. It is a field which borders on the regular duties of engineers employed by public bodies, and so is one which is generally appreciated by the profession and to an increasing extent by the public.

Administrators are subject to the direction of duly elected representatives in democratically organized communities, and it is from their ranks that engineers are so conspicuously absent. There are exceptions, it is true; the experience of the ex-President of the United States is not perhaps encouraging, but Mr. Hoover's brilliant engineering career can hardly be blamed for economic disorders of world magnitude. In Canada, two members of recent federal Cabinets have been engineers. The present distinguished holder of the Transport portfolio has shown what an engineer can do in the re-organization of his Department, and of the administration of Canada's national ocean ports; but Mr. Howe is one of the only three engineers in the Canadian House of Commons. There are over seventy lawyers. The "Engineering Group" of members in the British House of Commons is significant, but small in numbers, and so in effect. Few though they be, however, such engineers do suggest that there is a place for representatives of the people who can bring to their task, although as subsidiary to the general attributes of those in public life, the specialized training of the engineer. If this technical training can only be linked with an appreciation of what may perhaps be called "human engineering", then a synthesis of great potential value will have been achieved, and a basis for valuable public service well formed.

How can such a desirable result in the case of those engineers who are fitted for public life be achieved? How can the slowly awakening interest of the general body of engineers in the

social scene be fostered and developed? Inevitably these questions arise, even for such a brief study as the foregoing. Inevitably, there can be but one satisfactory answer—education. When once out of college, the average young engineer will find himself swept into the maelstrom of modern industrial life, there to have his technical ambitions so satiated and his interests so fully occupied that he will have little time or inclination to give thought to the social implications of his work and to his responsibilities to the community by reason of his special training. If, however, he acquires his initial technical training in an atmosphere which will not allow him to forget that after graduation he will be a man and a citizen first, and an engineer only after that; if he gains his engineering skill while learning at the same time that the efficient application of such skill could give far greater opportunity for the promotion of the common good than has yet been reached in practice—then alone may the average graduate in engineering be expected to take an interest in the community in which he goes to live and, if he is of a suitable calibre, to aspire to take some part in the direction of public affairs.

The call sounded by President Roosevelt may therefore well echo through the halls of engineering colleges, paying no respect to artificial boundaries such as that separating his own country and Canada. Mr. Roosevelt stated in his letter that "The design and construction of specific civil engineering works or of instruments for production represent only one part of the responsibility of engineering. It must also consider social processes and problems, and modes of more perfect adjustment to environment, and must co-operate in designing accommodating mechanisms to absorb the shocks of the impact of science." The President went on to suggest that the curricula of engineering schools should be so balanced as to give young engineers "the vision and flexible technical capacity necessary to meet the full range of engineering responsibility." An impossible ideal? Possibly it is, if the suggestion were to be considered literally. But as a hint towards the liberalising of engineering education which can be seen to be so necessary, this message from the White House is indeed refreshing. The interested reader can easily confirm the validity of the need for the broadening of engineering curricula by investigating the nature of the engineering training at his local university, contrasting it with the social implications of all engineering work, and so with the social responsibilities of all engineers.

Without advancing specific proof by reference to actual engineering courses, enough has been said to show the need for engineering training to have some contact with social and civic affairs. This conclusion has been reached without mentioning that behind all thoughts of community well-being stands like a spectre the threat of modern warfare, made possible, intensified in all its horrors, and determined in its prosecution by engineers. Considered on the technical aspect alone, the engineering achievements in war preparation are probably superb. It is thus that they are probably viewed by those engineers whose scale of values has been unfortunately, and tragically, restricted to the measure of a technical task well done. How much the more vital, then, becomes the need for all engineers to be truly educated, and not merely technically trained, when thought is given to this appalling misuse of the advance of the centuries! Perhaps nowhere has this thought been expressed in finer words than used in the *James Forrest Lecture* at the centenary celebrations of the Institution of Civil Engineers held in London in 1928, delivered by that veteran scientist Sir James Ewing in a way never to be forgotten by all who heard it.

"The fact remains", the white-haired engineer concluded to his spell-bound audience, "that all our efforts to apply the sources of power in Nature to the use and convenience of man.....leave him at bottom much what he was before. I used to think that the splendid march of discovery.....was accomplishing some betterment of the character of man.....But the war came, and I realized the moral failure of applied mechanics.....I saw that the wealth of products and ideas with which the engineer has enriched mankind might be prostituted to ignoble use..... Surely it is for the engineer as much as any man to pray for a spiritual awakening, to strive after such a growth of sanity as will prevent the gross misuse of his good gifts. For it is the engineer who, in the course of his labours to promote the comfort and convenience of man, has put into man's unchecked and careless hand a monstrous potentiality of ruin."