

CHAPTER 8

THE ENGINEERING REVOLUTION

Much had happened since the first proposition to utilize rail for public transport in Canada. That first grand dream started in 1837, yet in the infancy of rail: it was to connect the port of Saint Andrews to)Montreal. That was sometime prior to the border dispute between New Brunswick and Maine, settled later in a manner to exclude the possibility of using the direct line, already surveyed, through Mars Hill to Montreal. After a series of false starts, the railway eventually did arrive in the province, and finally to Fredericton in 1854. By Nov. 7, 1885 the Canadian Pacific Railway had extended the Intercolonial from Halifax to British Columbia.¹ And in the intervening years and after, the Canadian people were treated daily to stories of top the marvellous feats of design and construction by engineers whose names had become a byword for progress. There was Sir Sandford Fleming who put the Intercolonial together, and whose contributions extended much beyond the realm of railroads: he is remembered throughout the world for conception of the International Date Line, and the inception of time zones. In Canada he is as much remembered as the designer of Canada's first postage stamp as for the railway. What is not as well known are his contributions to higher education, especially at the University of Toronto and at Queen's University.

Others included Sir Casimir Gzowski and Thomas Keefer, who was to become the first president of the Society of Civil Engineers. Henry Ketchum made extensive contributions to the development of the Maritimes, as did Hurd Peters who designed much of the Port of Saint John.

Steam had revolutionized not only land travel but sea travel also. The first steam crossing occurred in 1838, when Isambard Brunel's Great Western made the crossing in only fifteen days. The following year Sir Samuel Cunard established the British and North American Royal Mail Steam Packet Company: and by 1845 the first iron ship was plying the oceans. Designed by Brunel, the Great Britain was prelude to the magnificent steel ships which were to follow.

The country was alive with stories of practical achievement. The first intercontinental telegraph was inaugurated in 1858 from Ireland to Newfoundland with great fanfare. (It failed shortly thereafter to the accompaniment of somewhat less fanfare.) A second cable laid with the aid of Brunel's fabulous iron steamship, the Great Eastern, was continuously successful. Alexander Graham Bell, whose Maritime connections are much romanticized, had invented the telephone in 1876: it arrived in Fredericton in 1879. Dr. Loring Woart Bailey had imported an electric battery from London in that year, enabling himself and John Babbitt to construct an operating model of the telephone.² The first telephone office in Fredericton opened in 1886 with 46 subscribers. The switchboard was located in the back of J.H. Hawthorne's hardware store on Queen St. By 1889 there were over 100 telephones owned and operated by the New Brunswick Telephone Co.³

It was little wonder that the universities, by this time well-established for Civil Engineering, should rise to meet the demands for more engineering skills. Mechanical engineering had appeared as a separate discipline at Pennsylvania in 1854 and was very well established at several schools including MIT, Worcester and Stevens by 1876. The Centennial Exposition held in Philadelphia in 1876 revolutionized the thinking of North Americans about technology; and we do know that there were some Frederictonians who attended that great event, John Babbitt being one. The American Institute of Mining and Metallurgical Engineers was formed in 1871, the American Society of Mechanical Engineers in 1880, and the American Institute of Electrical Engineers, later to become the Institute of Electrical and Electronics Engineers, in 1884.

In Canada, provision for a substantial engineering curriculum had been begun at King's College (UNB) in 1854, at McGill College in 1856, and the University of Toronto in 1858. After years of meagre returns on student enrolments the schools reorganized with McGill taking the lead in 1873, coincidental with the founding of École Polytechnique in Montreal. The University of Toronto followed suit with efforts to establish a strong curriculum in 1878. As well, agriculture was finally recognized as a discipline in 1874 with formation of the School of Agriculture at Guelph.

By 1880 the Faculty of Applied Science at McGill had been formed under the dynamic encouragement of Sir William Dawson, with four departments; civil, mechanical, mining engineering and practical chemistry. But at the same time the School of Practical Science (U. of T.) was running into stiff opposition in the legislature, and indeed was not to enjoy smooth sailing for another dozen years. It was not until the fall of 1889 that Toronto was able to introduce a

department additional to that of civil engineering, when mechanical engineering was offered for the first time. There was a curious development in that curriculum in that electrical engineering grew out of the department of mechanical engineering, although it didn't appear as a separate program until 1896, when the four degree programs, mining, mechanical, electrical and civil engineering, were offered.

In the United States the first electrical program was not offered until 1882, when Massachusetts Institute of Technology recognized it as a separate discipline. However, the first separate department of electrical engineering was not created until 1902 at MIT, although separate departments were founded at Missouri (1886), Wisconsin (1891) and Stanford (1892)⁴. Cornell University had also begun a program. Other polytechnical institutions entered the field at about the same time.

In Britain, the practical arts had fared very poorly: so much so that a Royal Commission on Technical Instruction was established to investigate the matter. The Commission gave its second report in 1884, quoting the great educationalist Herbert Spencer:

"That which our school courses leave almost entirely out, we thus find to be what most nearly concerns the business of life. Our industries would cease, were it not for the information which men acquire, as best they may, after their education is said to be finished. The vital knowledge - that by which we have grown as a nation to what we are, and which now underlies our whole existence - is a knowledge that has got itself taught in nooks and corners, while the ordained agencies for teaching have been mumbling little else but dead formulae." The best technical

education was still to be found only at the polytechniques of France and in the Technische Schule of Germany. Even though the American schools were patterned after the French, and were quickly developing as centres of excellence, it would be several years before they could claim equality with the European schools.