ıference
on Engineering Heritage,
Melbourne, 20-22 May 1985

Nineteenth Century Australian Engineering Societies

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SUMMARY During the 1850s, several attempts were made in Victoria, and in one instance in South Australia, to establish societies having some connection with engineering, but these early efforts were not successful. Against this many engineers maintained a relationship with the Royal Society of Victoria in the decades after the 1850s. Several of these early societies had a membership which included architects, surveyors and engineers. After the establishment of the Engineering Association of New South Wales in 1870, and the Victorian Institute of Engineers in 1883 a proliferation of engineering societies began to take place, and by the Great War some Australian states had several societies. All of the engineering societies formed in Australia followed the British model in that they were independent of state control. In 1919 most of these bodies amalgamated to form the Institution of Engineers, Australia.

1. THE BRITISH HERITAGE

Britain at the beginning of the Nineteenth Century, was the leading industrialized nation in the world. This had largely come about due to the *laissez-faire* approach to economics adopted in Britain, which allowed the rapid application of technological advances to proceed with minimal government interference. In contrast to this the major European states of France, Germany and Austria had followed a path of state intervention. This resulted in the state in those countries becoming involved in the education of engineers at a much earlier period than occurred in Britain. For example, the *Corps des Ingenieurs* was founded in 1716 to develop an extensive road network throughout France. To train these engineers, the *Ecole des Ponts et Chausses* was founded in 1747, and taking its place alongside existing military and naval schools provided France with a body of well educated engineers. In this way the European states were able to control entry to the engineering profession. In contrast to this the learned societies which emerged in Britain were invariably independent of any form of state control, in keeping with the *laissez-faire* approach to economic matters. Thus when Thomas Telford assumed the office of President of the Institution of Civil Engineers in 1820, he stressed the importance of the Institution remaining independent. He said, 'in other countries, (alluding to France and Germany) similar establishments are instituted by the government and their members and proceedings are under their control'.[1] As the state did not control entry to the engineering profession in Britain, in time this role fell to the engineering societies, although it was to be well into the Twentieth Century before this was effective. This is not to say that the British engineering societies had no connection with the state. Invariably all societies of any consequence sought a Royal Charter, not as a mark of subservience to the state, but rather to gain recognition.

After the initial British settlement in 1788, the Australian colonies established in the following decades adopted many practices from 'the old country'. Most of the early engineers who practiced in Australia, came from Britain and many held memberships in British engineering societies. The early engineering societies which emerged in Australia after the end of the 1840s generally drew on earlier developments in Britain, and those societies which were established did so without any involvement with the colonial governments of the day.

Another aspect of the British heritage was the practice of some form of apprenticeship, not only at the trade, but also the professional level. This method of training had evolved over the centuries, but began to breakdown in Britain during the Industrial Revolution. Many tasks previously performed by tradesmen were mechanized or were subdivided so that workmen could be kept at aspects of a task which maximized production and subsequently profits. Engineering was less effected by the decline in apprenticeship than other industries, due to the one off nature of many tasks, and as a result tradesmen continued to serve apprenticeships in the workshop, and engineers served their articles as pupils in the office. Those who served articles often had a good general education by contemporary standards, perhaps studying at a private grammar school until fifteen years of age, and gaining some understanding of geometry, algebra, trigonometry and languages. As a substantial premium was required for young men serving articles, they tended to come from families with means. In contrast to this, those apprentices who entered the workshop often had received little elementary education, and usually came from poorer families. Nevertheless tradesmen having a flair for organization and innovation also rose to become respected engineers. The barrier of formal qualifications was not to emerge to any extent until well into the Twentieth Century.

The foundation of mechanics institutes, compulsory elementary education, technical colleges and schools of mines in Australia was also a reflection of British practice, and all first appeared in Australia within a few years of such initiatives being introduced into Britain.

2. THE RELATIONSHIP BETWEEN ARCHITECTURE, ENGINEERING AND SURVEYING

Until late in the Nineteenth Century the distinction between engineers, surveyors and architects was not clear cut and many individuals trained and practiced or moved between two or all three of what today are quite separate professions.

To cite a few examples of this situation. Augustus Alt, who arrived with the First Fleet in 1788, had the title Surveyor of the Territory of New South Wales, not only carried out a considerable number of surveys, but also became involved in the design of bridges, roads and public buildings.[2] William Weaver who practiced as an engineer and architect in New South Wales during the 1850s, had trained as an engineer and architect in Britain.[3] He also had considerable experience in surveying.[3] William Wardell who was appointed Government Architect for the Colony of Victoria in 1859, had originally trained as an engineer-surveyor in England.[4]

As settlement expanded in Australia, many surveyors extended their work to include road construction, bridge work and similar tasks associated with civil engineering.[5] The relationship between architecture engineering and surveying was to be reflected in several early Australian societies having a connection with engineering. However by the end of the Nineteenth Century, in the face of technological change, these professions had clearly separated. Indeed by the turn of the century, engineering itself was beginning to separate into new disciplines as a consequence of increasingly complex scientific discoveries.

3. EARLY AUSTRALIAN ENGINEERING SOCIETIES

During the early years of settlement the penal nature of colonial life resulted in much engineering work being carried out under the direction of military officers. Most construction took place in the coastal cities that developed, and generally did not extend far from these centres. The rapid expansion of the wool industry in the years after 1830, whilst opening up much new country, did little to stimulate the need for capital works and resultant professional skills, for it was economic to move wool by dray to the coastal cities without the need for roads and bridges.

The discovery of gold in New South Wales and Victoria during the early 1850s completely changed this picture, particularly in the case of Victoria which underwent a period of rapid growth. The population of Victoria reflected this and increased from 77300 in 1851 to reach 460000 in 1861. This in turn stimulated the growth of cities, roads, waterworks, railways, a telegraph network, etc. and manufacturing; changes which demanded engineering skills not previously required to any extent. For the first time numbers of engineers appeared in Australia, even if they had only come in response to the lure of gold.

Perhaps stimulated by the foundation of the Victorian Architects Association in 1851,[6] an attempt was made in Melbourne around 1854 to found the Victorian Institution of Civil Engineers. The objects of the Institution were,

> That an Institution of Civil Engineers be established in Melbourne for the general advancement of mechanical science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of civil engineer.[7]

The first attempt to establish an engineering society in Australia, was not a success. The Institution did not develop, and does not seem to have progressed much beyond publishing its *Bye Laws and Regulations*. It appears to have simply disappeared from view. Even the Melbourne directories and newspapers of the time did not mention the Institution.

Another attempt to establish an organization having a connection with engineering took place in 1857. It was proposed that an Institute of Mining and Mechanical Engineers and Surveyors of Victoria, be established, but this title was quickly discarded in favour of the Mining Institute of Victoria. It appears that the driving force behind the Institute was a certain J. Brache, a civil and mining engineer. First Chairman of the Institute was Count John Dembinski. The Institute had as its main objective the promotion of mining science in Victoria. Full membership of the Institute was limited to civil, mining and mechanical engineers, mining surveyors, metallurgists, assayers, geologists and mineralogists, but associate members could be anybody from 'respectable and intelligent miners' to goldfields magistrates.[8] The Institute set up two groups subject to its control. The first was a *Corps des Mines*, the function of which appears to have been to establish a panel of mining experts. In 1858 of the nine *Corps* members, six were engineers. The second group was a Department of Political Science. Membership of this group was to be drawn from politicians and political economists. This curious organization met regularly for several years, and prior to its demise in the early 1860s, published a single volume of *Transactions* on mining matters.[9] In 1859, the Institute had sufficient standing in colonial society to be requested by Sir Henry Barkly, the Victorian Governor to cooperate with the Royal Society of Victoria in the preparation of information related to the resources of Victoria, for transmission to the Society of Arts, London.[10]

The connection between architecture, engineering and surveying was reflected in the formation of the Geelong Society of Architects, Civil Engineers and Surveyors in 1858,[11] as was the foundation of the South Australian Association of Architects, Engineers and Surveyors in 1858.[12] However within a few years these bodies had also faded.

The failure of these early societies might be attributed in part to the small number of individuals actually engaged in professional practice. The 1857 Victorian *Census* revealed that only 328 persons were working as architects, civil engineers, draftsmen, surveyors, etc. out of a total population of 410766.[13] Nevertheless, the fact that these bodies even appeared, gives a clear indication that some individuals found the need to meet their fellows to discuss professional matters in much the same way that many of them would have been accustomed to do in Britain.

Another factor which acted against the successful formation of an engineering society in Victoria during this period was the foundation of what became the Royal Society of Victoria. This body had its roots in the foundation of the Victorian Institute for the Advancement of Science and the Philosophical Society of Victoria, both bodies commencing their activities in 1854. The Institute had as its objective,

> bringing together persons whose attention was devoted to scientific observations and particularly to those branches of investigation that were calculated to bear directly on the advancement of the Colony of Victoria.[14]

Obviously engineering came within the scope of this objective. Both of these bodies amalgamated in 1855 to form the Philosophical Institute of Victoria, and gaining a Royal Charter became the Royal Society of Victoria in 1860, continuing under that name to the present.

That the existence of the Royal Society retarded

moves towards the formation of a successful engineering society in Victoria, can be appreciated by perusal of the journals of the Royal Society and its predecessors. In the period up until the end of the Nineteenth Century, many papers concerned with engineering were read before the Society along with those on botany, geology, physics, mathematics etc. For the period 1885 - 1900, Professor William C. Kernot, Dean of the Faculty of Engineering at the University of Melbourne, was President of the Royal Society of Victoria. However by the 1880s, an engineering society had been established in Victoria, and after this time the participation of engineers in the affairs of the Royal Society declined.

An echo of earlier times was the formation of the Ballarat Institute of Architects, Civil Engineers and Surveyors in 1870. Like the other societies established in Victoria in the 1850s it only lasted a few years.[15] As Charles Todd was to reflect, when giving the inaugural address to the South Australian Electrical Society in 1887,

> many a society has been started with a loud flourish of trumpets, and with the best possible intentions, but the new born zeal of its members proved evanescent and died away.[16]

4. LATER ENGINEERING SOCIETIES

The initial if somewhat short lived vigor of engineering societies in Victoria during the 1850s, was not paralleled in New South Wales. However in 1870 the Engineering Association of New South Wales was formed. This was the first engineering society in Australia to last any length of time, unlike the transient nature of the earlier Victorian and South Australian bodies. The decision to form the Engineering Association may have been stimulated by the foundation of what became the Royal Institute of Architects of New South Wales in 1870.[17] This body initially covered civil engineers, and this may have been the reason why many of the original members of the Engineering Association had a connection with mechanical rather than civil engineering. The Engineering Association had as its objects,

> to hold Monthly Meetings, at which papers will be read on General Engineering and Manufacturing subjects, and discussion held thereon; also to watch the progress of Mechanical Arts in other countries, keeping in view their adaptation to the wants of this Colony; and for general diffussion of mechanical knowledge among its members.[18]

The qualification for membership was that members be 'persons engaged in general and mechanical engineering in any of its branches.'[19] The Engineering Association met regularly to discuss technical matters and hear papers delivered. It published a journal which normally contained the proceedings of meetings and papers delivered, on a yearly basis. The Engineering Association took considerable interest in technical education with many references being made in its journal regarding the conduct of classes at Sydney Technical College. The offerings of the University of Sydney were also mentioned from time to time. The difficulties of apprenticeship were ever before the Engineering Association.[20] The successful establishment of the Engineering Association may have been influenced by the fact that although the Royal Society of New South Wales had existed in one form or another from 1821, it did not have any substantial involvement with engineering. Later however, in 1891, the Royal Society of New South Wales formed an Engineering Section, and many papers were read on engineering matters before this body until 1908 when the Engineering Section was disbanded.[21]

The Victorian Institute of Engineers, was established along similar lines to the Engineering Association of New South Wales during 1883. In Queensland, the Mechanical Engineers Association began during 1887, and apart from a brief recess in 1893 during the financial crisis it developed to become the Queensland Institute of Engineers in 1900, at which time it extended its membership to include civil engineers, who were followed by members of the Queensland Electrical Association in 1911 when that body amalgamated with the Queensland Institute.[22]

In the 1890s, a proliferation of engineering societies in Australia began to take place. The Melbourne University Engineering Society was founded in 1889, to be followed by the Sydney University Engineering Society in 1895. The Australasian Institute of Mining Engineers whose membership included geologists, metallurgists and chemists, began at Broken Hill, NSW during 1893. The Electrical Association of Australia, began in NSW during 1891 as the Electric Club of New South Wales and in Victoria in 1906, forming a federation in 1914. In Newcastle, the Northern Engineering Institute was formed in 1891 having members from engineering and architecture.[23] This body went into recess during the 1890s, but was reformed in 1908. An Institute of Local Government Engineers of Australasia was established in 1909, and during the early part of the Twentieth Century engineering institutes were founded in South Australia, Tasmania and Western Australia.[24]

Gradually the nature of these societies was changing. With the wider availability of university and technical college courses, increasing numbers of members had received some form of technical education, above that associated with a trade apprenticeship. Nevertheless it could be said that by and large these bodies were not organizations for professional engineers as the term is understood today. Many of those who joined these engineering societies had no formal qualifications. Writers of the period often considered that there existed only trade and professional levels of engineering. A simple way to view this situation could be that all those working above the trade level were considered to be professional, regardless of qualifications held. Thus the professional group of the time included both qualified and unqualified engineers and draftsmen.

Another type of engineering society which emerged in Australia during the 1870s and 80s, was devoted to the study of some aspect of engineering knowledge, but restricted membership to employees of a particular organization. The first of these bodies was the Telegraph Electrical Society, Melbourne which was founded in 1874 for the 'promotion of knowledge of electricity, especially as connected with telegraphy'.[25] This body restricted membership to employees of the Victorian Post and Telegraph Department. The Victorian Railways Electrical Society, established in 1886 for the 'advancement of its members in Electrical and Telegraphic Science',[26] only accepted as members persons employed by the Victorian Railways. The South Australian Electrical Society, formed in 1887 was also 'established for the advancement of its members in Electrical and Telegraphic Science', was only open to employees of the South Australian Telegraph Department.[27] The early enthusiasm which lead to the

establishment of these organizations waned quickly, and after a few years of life all had disappeared. However each of them held regular meetings and published a journal which contained technical papers.[28] It is possible that other organizations similar to those cited also existed. These bodies could be considered self improvement societies for what today might be regarded as technicians, and fulfilled an important educative role when the provision of technical education was limited. Some of the functions of these early bodies were revived in 1908, with the establishment of the Postal Electrical Society, by employees of the Post Master Generals Department.[29]

5. THE INSTITUTION OF ENGINEERS, AUSTRALIA

As has been mentioned previously, in the period prior to the Great War, the Australian engineering societies had proliferated, and some states had several bodies concerned with some aspect of engineering knowledge. This of course was a reflection of earlier developments in Britain, where the engineering profession had fragmented into discipline based societies. In Australia this trend was complicated by the separate development of what became the states.

By the turn of the century compulsory elementary education was almost universal in most parts of Australia, and with the wider availability of technical college and university courses, it was becoming increasingly common for the members of these societies to have at least attempted a course of study, although course completion was not widespread until after the Great War. With the Australian engineering societies in such fragmented state they were unable to tackle the question of engineering education to any extent. However the question of education became increasingly pressing. Whereas in earlier times much engineering work undertaken was of a concrete nature, technological change created demands for engineers trained to solve abstract problems in a scientific manner.

In the years after Federation in 1901, moves towards a united Australian engineering society began to take place. Around 1910, steps were taken to explore the possibility of some form of co-operation between the various engineering societies in Australia. Apparently the Great War precipitated a quickening of these discussions,[30] and the stage was set for the formation of a national engineering body. Thus in 1918, twelve engineering societies, (including state branches of some societies)with a total of 2552 members were considering amalgamation (see Appendix)31, and in 1919 these efforts were largely successful with the foundation of the Institution of Engineers, Australia. Only the Australasian Institute of Mining, and Metallurgy[32] the Victorian Institute of Engineers[33] and the Victorian Branch of the Institute of Local Government Engineers of Australasia decided not to join, although the Victorian Branch did so in 1926.[34] Whilst not all societies had joined the majority had done so, and as a result the difficulties of a fragmented engineering profession in Australia have by and large been avoided.

The Institution of Engineers, Australia differed from the earlier engineering societies with its clear emphasis on professionalism, which eventually restricted entry to those who qualified by way of its examination or held a qualification recognized by the Institution. Increasingly it was able to influence educational bodies on the engineering courses offered, and as a result control entry to the profession. Yet the Institution was only possible due to the efforts of the foundation societies in reaching the stage where a national body was feasible. The emergence of the Institution then, was linked by a chain of endeavour exhibited by those engineering societies which had existed in Australia back to the 1850s.

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31. HARRICKS, op. cit.

32. The Australasian Institute of Mining Engineers changed its name to the Australasian Institute of Mining and Metallurgy in 1919 and continues to the present.

33. The Victorian Institute of Engineers ceased during the 1940s.

34. When the Victorian Branch of the Institute of Local Government Engineers of Australasia amalgamated with the Institution of Engineers, Australia in 1926 it was known as the Institution of Municipal Engineers of Victoria.

APPENDIX

AUSTRALIAN ENGINEERING SOCIETIES CONSIDERING AMALGAMATION IN 1918

Society	Founded	Membership
Australasian Institute of Mining Engineers	1893	600
Electrical Association of Australia	1891	483
Engineering Association of New South Wales	1870	271
Institute of Local Government Engineers of Australasia	1909	300
Melbourne University Engineering Society	1889	175
Northern Engineering Institute of New South Wales	1891	194
Queensland Institute of Engineers	1900	99
South Australian Institute of Engineers	1913	121
Sydney University Engineering Society	1895	200
Tasmanian Engineering Institute	1918	50
Victorian Institute of Engineers	1883	202
Western Australian Institution of Engineers	1909	194
	Total	2552