25 YEARS OF HERA

PART 1: AN ACCOUNT FROM THE BEGINNINGS

BY GAVIN FLETCHER

PREFACE

The Heavy Engineering Research Association, the organisation better known as HERA, was formed in 1978 and therefore completes in 2004 its 25th anniversary. The trustees of the associated Heavy Engineering Educational & Research Foundation (HEERF) have commissioned this HERA history and have asked me, as former Director of HERA, to put an account of the last 25 years together.

This organisation had its genesis after a period of torrid and destructive industrial relation disputes during the period 1965-77. These disputes had closed many old companies (some had been in business for over 100 years) and had caused complete destruction of the creditability of the structural steel industry as part of the construction industry in New Zealand. The boilermaker faction of the union movement had no regard for company integrity or industry welfare but took it upon itself to destroy those companies servicing the heavy engineering requirements of the country. The public also had a bad impression of the structural steel industry and little sympathy.

The Government of the day called for a commission of enquiry which found very much in the companies favour. The days of the militant Boilermakers Union was fast coming to an end. It was a time for a new era to begin. The birth of HERA coincided with this rebirth and in many ways nurtured it. But the damage had been done. While HERA and the structural steel part of the industry have resurrected structural steel as an equal if not preferred building structural material, the old diehard companies have almost disappeared. A new generation of entrepreneurial leaders are now refocussing the industry and are doing really well.

This history traces the changes in HERA that have accompanied these market and industry changes. It has a proud record in changing the way steel structures are designed, fabricated and erected; in upgrading the welding skills and welding knowledge of the industry; in catalysing CBIP inspection services, and as a hub for the wider manufacturing engineering companies as well as an important resource for construction designers, architects and consulting engineers.

I hope that I have reflected these achievements and changes sufficiently for the reader to grasp the huge changes that have occurred in the heavy engineering industry and in New Zealand during these 25 years.

CHAPTER 1 - THE GENESIS OF HERA

During the 1960's and 1970's the industry was being wrecked by an increasing number of industrial relations problems. In the over employment and full trade union control of the workforce environment of the time, key workers and union officials were making it increasingly difficult for contracts to be completed on time and within estimates and led to the closure of several boilermaking establishments. (See Appendix 1 Ref. 1).

In March 1976 R.F.Gapes and W.D.Rose published an industry study entitled 'The Heavy Industry in New Zealand" (Appendix 1 Ref. 2) which was prepared for the advisory committee on the Heavy Engineering Industry and the Minister of Trade and Industry. This committee was formed in 1968 largely at the instigation of industry which had itself been concerned about its future and about the extent of importation of equipment and plant capable of being manufactured in New Zealand.

The Gapes and Rose report contained recommendations covering seven areas of industry activities. The main recommendations were:

1. Industry Organisation
   That an association be formed outside the existing industry associations of the time. "It should have responsibility for a range of functions including the executing or commissioning of continuing industry

wide market and resource studies as well as facilitate research at both process and products levels. The association should be funded by a levy on imports of mild steel."

2. Protection
   There should be an essential departure from the present idea of blanket protection (by import licensing) towards the use of cost conscious formula, protected by reference to a guaranteed minimum quota for manufacture in New Zealand, and the balance of payments

3. Government purchases and production
   There is a need for attention to the comparative cost criterion in deciding whether Government work should be allocated to State or private engineering shops. This carries implications in terms of public sector costing and tendering practices.

4. Plant management
   The industry must set higher criteria and attain an improved return on capital……Improved attention must be given to product quality; and to deliver on time, coupled with improved standards of subcontracting practice. Companies should improve their selling positions by specialising more in their offerings

5. Training
   There must be substantially increased training of top and middle management to rectify deficiencies concerning modern techniques. The training of engineering undergraduates, technicians and apprentices requires more effective treatment of matters pertaining to good management, productivity and the advantages of good industrial relations.

6. Research
   There is a need for increased research and development effort at both product and process levels.

7. Unions
   The unions must define clearly their role for the future, and extend their participation in schemes to improve the industry by positive means.

This report led to a Commission of Inquiry into The Heavy Engineering Industry. Submissions were presented by companies, unions and interested parties and a report published in April 1977. One of the recommendations of the Commission was that an industry organization be formed.

The Department of Trade and Industry established an Advisory Committee of the Heavy Engineering industry (HEAC). Chaired by Jim Donald of Robt. Stone and Co, this committee met regularly during 1978 - 80 providing a forum for the industry representatives to discuss with officials the concerns relating to industrial disputes, the use of structural steel , the outflow of skilled labour, export incentives and tendering and the forthcoming major developments.

Contemporaneously, the Department for Science and Industrial Research (DSIR) took up the initiative and following discussions with key industry and the NZ Manufacturing Engineers Federation, called a meeting in June 1978 of interested parties to form a proposed Heavy Engineering Research Association. The inaugural meeting of the NZ Heavy Engineering Research Association was held in the rooms of The Royal Society, Turnbull Street, Wellington on 30 June 1978. This meeting was chaired by Dr. M. Probine and resolved to proceed with the formation of The New Zealand Heavy Engineering Research Association together with the preparation of its rules for registration as an incorporated society, the election of an interim committee and attendant matters.

The interim committee consisted of Dr. M. Probine (ably assisted by his assistant Mr. L. P. Chapman), Messrs J. Donald, T.W. Just, C. W Baker, R. O'Hagan (whose place was later taken by Mr. D.R.K. Smith) and Mr. G. R. D. Stairmand (NZ Manufacturing Engineers Federation).

They met twice and on 28 November 1978 a general meeting of interested parties was held at which an Executive was elected, the first research subject was decided upon (an industry capability survey to be undertaken by Mr. W.D. Rose), and the future programme of HERA discussed. Membership stood at 12 ordinary members and 19 associated members. At the Executive meeting which followed, Mr D.R.K.Smith was elected chairman, the levy set at $1.50 per tonne and the redefining of the industry survey project took place. Discussion on the future housing of HERA staff in Auckland was covered.

The second meeting of the Executive was held on 9 March 1979 at Price-Norsteel (Fabricators) Ltd when the appointment of Dr. Robin Shepherd as the inaugural Director was approved.

During 1977-8 Mr. Keith Smith, Mr Cyril Baker, Mr Jim Donald, officials from the Department of Trade and Industry, and members of other government departments involved in heavy industry and industry associations, met with officials of the DSIR who helped in the formation of HERA. The first hurdle was to find money to run such an organisation. A levy on imported steel was agreed to and an Act (The Heavy Engineering Research Levy Act 1978) giving authority to make such a levy was passed through Parliament. This Act also described the type of organisation and many of its features (See ref 2).

During these formative stages Dr. Probine advised that the Government Ministers concerned had turned down any suggestion that HERA be directly involved in industrial relations bargaining work, but this did not prevent it from assisting during training seminars or the investigating social aspects of the industry to provide data bases on industrial relations. This set the path for HERA as far as the biggest problem then facing the industry. HERA has subsequently never been involved in anything to do with industrial relations other than training the workforce at all levels. Rather, HERA has concentrated on market related activities such as design of steel structures, codes of practice and marketing.

The first meeting of the HERA Executive, with Dr. M. Probine (representing the DSIR), Messrs C.W Baker, J. E. Donald, T. W Just, D.R.K. Smith (Industry) C. Campbell, (MWD), D.H. Tyler (DTI), E.N. Sims (NZMEF), was held after the general meeting of interested parties on 28 November 1978. Mr Keith Smith was elected as Chairman of the Executive of the Association. This Executive then proceeded to appoint the first Director, to find premises for the Association's staff and work with Peter Chapman from the DSIR on implementing the collection of the levy and other legal matters.

Dr. Robin Sheppard ME, PhD, FRIE, FNZIE was appointed to commence duties as HERA's inaugural Director in March 1979. As a result of accepting a university position in California Dr. Sheppard's resignation was accepted on 27 May 1980. During his time as Director, many foundation organisational aspects of appointing key staff, establishing an office, relationships with industrial members, the Structural Steel Panel, the Pressure Vessel Panel, the Market Research Project Panel, the commencement of the collection of the steel levy by HM Customs and the financial support of the New Zealand Institute of Welding were put in place.

Membership grew rapidly from the initial 12 in July 1978 to over 50 by the end of 1979.

The first research project approved by the Executive was an update of the Gapes and Rose report. This was received in October 1979 and distributed to interested parties.

In February 1980 research projects at the University of Canterbury School of Engineering (Steel Structures and Materials Engineering) and with Mr Gurley (Standardised bolted joints) were commenced. The support of university research was based on the belief that in order to have design engineers familiar with steel structures, where better to start than during their professional training. Thus started a long procession of research projects and supported professional staff within the two Schools of Engineering.

In March 1980 the first public seminar sponsored by HERA took place. It addressed the area of Structural Steel design and was the first signal to the consulting engineering profession that HERA had arrived with the message that steel structures had a role to play in New Zealand multistorey construction. This was a most important message as the use of steel in such structures had been destroyed by the disastrous industrial relations on the BNZ building in Wellington. The strategy of replacing on site welding of structures with bolted structures was introduced.

This was a most important message as the use of steel in such structures had been destroyed by the disastrous industrial relations on the BNZ building in Wellington. After considerable consultation with academics and structural steel designers the strategy HERA staff adopted to reverse this situation was to give emphasis to bolted connections on site and do as much welded fabrication as possible in fabricators' workshops. This meant that a huge amount of work had to be done so that such designs could easily be used by designers, estimators and fabricators.

During the 1970s the press had been somewhat negative towards the industry and it was common to see statements like" The heavy engineering industry …is unable to cope with the forthcoming work from the workload stemming from the energy and petro-chemical developments" that were envisaged over the next few years. Mr Smith, at the AGM in May 1980, expressed the opinion that all opportunities should be taken to refute these allegations and that stress should be placed on the positive contribution which local industry can

make to the development of this country's resources. This gave a spurt for HERA to play a pivotal role in marketing (including market research, industry analysis and code interpretation) for the industry in this new era of international standard construction.

The appointment in 1979 of Michael Hall, a mechanical engineer with a broad Ministry of Works background, to service industrial technical enquiries including pressure vessel standards and to later survey the industry for workload capacities, gave HERA some creditability. The concurrent appointment of market researcher David Beard gave the organization some authority to undertake research and education. These appointments were a giant step in the establishment of HERA as an industry organization.

CHAPTER TWO - THE GAVIN FLETCHER YEARS 1980-86

OVERVIEW

This period in HERA's development was notable for the major energy related, petrochemical, and industrial projects which occurred during 1981-86. It gave the industry a much needed workload and HERA a role to play as the industry information centre. Thus the emphasis was on exposing industry capability and capacity to contractors as well as developing HERA as a national focal centre of the Heavy Engineering Industry. At the same time a base was built for the redevelopment of structural steel as the preferred method of construction. Most of the departments, activities and international associations HERA continues to have or service were created during this period.

This period also saw a fundamental change in New Zealand's trading with the abolition of import licensing and a protected home market to the development of an open market led economy without any border protection.

From 1985 very few opportunities for true heavy engineering arose in New Zealand and some efforts were made to reorient some members of the industry to export.

EXECUTIVE

In August 1980 Mr. J.G. Fletcher was appointed Director. The period 1980 to 1986 saw huge growth in the number of, and the complexity of activities of HERA. It was an exciting time for the industry with a host of major projects drowning the industry and the simultaneous evolution of bolted steel structures.

It is fair to say that the Executive had to reign in the staff on several occasions as the tempo of enthusiasm increased. Through this period the Executive was very ably led by Keith Smith (Chairman 1979-82), Tom Just (Chairman (1982-84) and Cyril Baker (1985-86)

Incidentally it was in 1983 that Chairman Keith, at an Executive meeting, introduced the term FAX and FAX numbers. Facsimile machines led to the demise of the cumbersome telex which the office had been using.

Other innovations introduced during this era were the concept of computer aided design, computer controlled cutting machines as well as data assembly and analysis. Goods and Service Tax was introduced in 1985 and the Executive asked the staff to "undertake a case study on the effects this tax will have on members."

One key decision taken by the Executive was to increase the steel levy from $1.50 per tonne to $3.00 per tonne in 1981. This had the effect of substantially increasing the income of HERA over the period of the major projects when a significant increase in steel was recorded. In 1984 the levy was increased to $5.00 per tonne, the maximum allowable under the current version of the HERA Levy Act.

In February 1981 the first HERA development plan was introduced to the Executive who agreed that it should form the basic HERA research policy document. This laid the direction of HERA for the coming decade and beyond. It also noted that the first of a series of meetings with Government Ministers was to be held with the Minister of Energy and the Minister of National Development. These meetings were arranged by HERA staff in response to the industry wanting to have a higher level of recognition especially at senior political decision making level.

In July 1982 the scope of activities of HERA staff had become quite wide and the Director was having difficulty in keeping many "balls in the air" at once. The understanding Executive gave direction by resolving that HERA remain a non-political professional research association giving the highest priority to the long term

goal of increasing the industry's workload. Other topics considered of medium priority were: increasing efficiencies and productivity of member companies, increasing HERA's efforts in technology transfer and of lessor priority: commercial research, an awareness of industries other than ours and industry cohesion.
As research topics became more technical and covered a wider field a Research Committee of the Executive was established in February 1982 to consider all proposals and make recommendations to the Executive.

HERA PROMOTIONS

In October 1981 it was decided to improve HERA's communications with its members and the heavy engineering market. A structure for HERA publications was developed. Thus was born HERANEWS, HERABULLETIN, HERA GRAM, HERA Research Reports, HERA collected (research) Papers, an improved Annual Report, and numerous seminars, courses and meetings/discussion groups.

One of HERA's strongest strategies was to try and influence university structural undergraduates that steel construction was preferable over other methods. One part of this strategy was to fund undergraduate and graduate research, to fund lectureships / professorships. Another was to decorate the University of Auckland's School of Engineering foyer with a large montage of coloured photographs of steel structures. This display together with corridor wall pictures stayed in place for over 10 years.

STEEL STRUCTURES

Following the initial research grant to Colin Gurley, a follow up grant was made in 1981. Sadly, later in 1981 it was agreed with Mr Gurley that the project was not achieving its goals and was terminated. It was HERA's first research failure. But what it did highlight was a need for more stringent conditions of contract and the need for a structural steel staff member because the topic needed a lot of time to be spent on it.

Following the relatively short appointment of the first HERA structural engineer, David Best who introduced microcomputers to the staff and industry, HERA was fortunate to employ, in August 1983 Charles Clifton, a young enthusiastic graduate from the University of Canterbury. He had had experience in Wellington and London and came with the full support of his alma mater. His appointment and the work that he has undertaken and led has been a major turning point in thinking and development of design in the evolution of the acceptance of steel structures since 1985.

In 10 years he turned a struggling policy of influencing undergraduate and professional design engineers that steel structures could be the preferred building material of choice into a well established practise. He has been ably supported by the **Structural Steel Panel** (including such doyens of structural steel design as Kevin Spring, George Butcher and John Little.) and HERA sponsored lecturers and research students.

During this period the Executive approved that the Director visit Japan to attend the Fourth International Symposium of the Japan Welding Society, held in Osaka. This visit started a long and vigorous relationship with Japanese steel designers, heavy industries and academics and HERA arranged visits for them here to teach and learn.

This programme resulted in a realisation that bolted joint steel structures were a feasible alternative to onsite welded joints and members. This would have the effect of removing boilermakers from sites back into fabrication shops and only having riggers on site. This major policy change has had huge implications. First the designs for such joints had to be formulated and tested. This led to a series of tests, codes, standards, countless seminars for designers, the First **Pacific Structural Steel Conference** (PSSC), HERA Structural Steel Design Service. The PSSC was a HERA initiative and was held in 1986 at the Sheraton Hotel in Auckland. This Conference has been held every two years since in various countries on the Pacific Rim (Australia, USA, Korea, China) and is planned to come back to New Zealand in 2006.

Craig McIlroy was employed by HERA to organise this event which was seen at the time as being a major milestone in the promotion of structural steel and lead to a change of attitude towards structural steel by consulting engineers. It also provided a platform for HERA to showcase a lot of its research to date.

INDUSTRY PROMOTION

In 1981 the first promotional display panels were approved by the Executive. These were used at the 1981 NZIE conference and subsequent opportunities. This conference saw the heralding of HERA and the first industry promotion ever undertaken.

Also in 1981 the First **Steel Design Awards** were organised by HERA as a joint venture with the NZ Steel Merchants Stockholders Association, NZ Steel Ltd and Pacific Steel Ltd (together forming **The Steel Promotion Council**). These awards continued annually for some years. The purpose of the awards was to expose steel in its many facets and increase the awareness among architects, design engineers and other decision makers that steel could be a first choice in many situations. The awards were part of a complex series of activities to raise steel's profile across many fronts.

INDUSTRY RESEARCH AND THE MAJOR PROJECTS

Following the initial Industry survey and publication of capability, HERA saw that it could play a useful part in alerting the industry to the opportunities which the major projects were promising. Michael Hall's specific task was to expose the industry capabilities to major project contractors and to work on the dissemination of information about pressure vessel codes.

Agreement was reached for the Director to replace Jim Donald on the Major Projects Advisory Group which was established to advise the Minister of Energy so that the projects ran smoothly. This allowed HERA to arrange many very popular seminars about each project and to work with contractors on sourcing, interpretations of standards and quality issues.

These projects with a combined value of over $3 billion were concentrated into 36 months and were the strong focal point for capacity and capability activities. HERA hired a market researcher to research the history and achievements of the industry.

This work resulted in 1981 to the release of "The NZ Heavy Engineering Industry", a major publication for HERA at the time, detailed the historical achievements and capabilities of the industry. It was complemented by an audio/slide show and was launched in Wellington with many key people in the audience. This publication laid the foundation for HERA's creditability as a source of information.

During 1982 an audio visual of members' capabilities was produced for overseas (and local) contractors who were made aware of members' capabilities.

HERA's industry engineer Michael Hall, continuously advised the Department of Trade and Industry as well as contractors on industry capabilities and also advised the industry of opportunities. He believes that over $10 million worth of extra work was placed in members workshops as a result of his and David Beard's efforts. His updated industry capability and workload reports were a valuable asset to both members and contractors to the major projects. Michael was also in charge of the burgeoning membership list.

With the abandonment of import licensing of steel in 1986, the market entered a new supply phase during which steel became more competitively priced and steel fabrication had a new lease of life. One of the more innovative projects was entitled "Plums and Punches" which was to be self selecting members' project seeking out export opportunities. It set an example of how a group of complementary companies could form consortiums to bid on offshore work.

PRESSURE VESSEL PANEL

This was established in 1980 when there was confusion and little bit of ill feeling between the industry and the Marine Surveyor's department who used to approve pressure vessel designs. It is pleasing to note that this forum allowed the parties to talk out their problems and for CBIP to be formed and play an enormously important role in approving NDT standards, examining and certifying competence. (See under CBIP)

This panel was restructured as the Fabricators Panel in 1982.

MARKET RESEARCH

The appointment of David Beard to HERA's staff as a market researcher resulted in a steady flow of researched information being made available in the form of research reports to the industry. His standard and style set the standard for HERA publications at the time and they were well regarded by all concerned. Almost alone, as few members, designers or other people associated with the industry had marketing personnel, he would seek out detailed information resulting in his seminars being well attended. This activity drew many new members especially in the associate and affiliate categories to HERA as no one else did this type of service.

The Market Research panel established in May 1981 gave a link between the work of HERA staff and members. It was used as a consultative body so that projects of urgent interest to members were undertaken.
With the passing of the major project era the needs of members changed and the market research activity refocused on export opportunities. In February 1985 the Executive suggested that the staff try and identify offshore projects which involved major New Zealand consultancies and to identify opportunities for fabrication work emanating from them.

Paul de Abaitua joined HERA staff in 1986 and sparked new life into finding opportunities for the industry. Later he spent much of time helping to run a very successful market research project initiated by the Director called FORCE FIVE.

CERTIFICATION BOARD FOR INSPECTION PERSONNEL (CBIP)

The formation of the Certification Board for Inspection Personnel was initiated by the Director in discussions with the Marine Surveyor Jack Critchley. Its purpose was and is to improve the quality and reliability of NDT testing of steel vessels and structures. The establishment of CBIP required funding and staffing. This process was led by the first CBIP Chairman Frank Kenny, Chief Engineer of NZ Forest Products Ltd and a few key industry protagonists including John Wilson (Shell BP Todd), with HERA making the commitment to part fund and house its staff in August 1983. A Memorandum of Understanding with the Non Destructive Testing Association formed the basis of integrating and covering the NDT interests.

Contacts that the Director had made with The Welding Institute in England, the Danish Welding Institute, the Australian Welding Research Association, and various Japanese heavy industry companies provided the starting point for the programme of standards and training that CBIP got underway. The appointment of Peter Hayward, who was trained in the UK and came with a wealth of experience, immediately gave CBIP credibility. As Technical Manager of CBIP he developed in conjunction with the Board over the years a comprehensive range of certification schemes covering most inspection disciplines. Parallel to the CBIP certifications he developed a complimentary training programme, which was administered by HERA and is still today forming a main stay of the HERA training activities.

NZ WELDING CENTRE

Of all the technical areas associated with heavy engineering, welding is arguably the most critical. While New Zealand had a large number of able welders, several Polytechnics which taught trade welding, and the NZ Institute of Welding as its focal organization, there was no formal structure for the training and recognition of advanced welding. Also, while the DSIR employed a materials scientist with welding expertise in Dr. Neville Miller in Auckland, there was no depth across the country.

After supporting the NZ Institute of Welding since its inception and subsidising its annual subscription to the International Institute of Welding (IIW), HERA decided to take up full IIW member ship in 1981. This then gave a reason and focal point for the development of the science, art and skills of welding within the organisation. Ultimately these activities led to the creation of the New Zealand Welding Centre and employ a tertiary qualified welding engineer to head it up. The Executive considered this proposal in November 1983 and Paul Kelly joined the staff as a welding manager in November 1985, however left already soon afterwards.

As the last staff engagement made by the Director before his departure from HERA, he appointed Dr. Wolfgang Scholz, a professional mechanical engineer from the Technical University of Stuttgart, Germany with a PhD from the University of Auckland in automation technology and a welding engineers degree from the German Welding Society. Wolfgang joined the HERA staff at the end of 1986 to set up the NZ Welding Centre as an internationally accepted centre for welding expertise.

Funding for the Centre was secured through a new levy schedule in the HERA Levy Act. This was achieved through the support of the welding consumable suppliers and the welding fabrication industry and assisted to get the legislative process through parliament. The new levy was scoped for up to 5 cents per kilogram of welding consumable and was then set at 2 cents per kilogram..

HERA TRAINING CENTRE

Because out of all good research comes the need to communicate its findings, this Centre was created to provide a focal point for HERA's seminar, teaching and examinations programs.

Each key staff member and invited guests have used this umbrella to promote pertinent activities. This was especially important for CBIP which has both educational and qualification roles. Thus CBIP could arrange its teaching /seminars etc under the HERA hat and its examinations /certifications under its own auspices.

HERA INFORMATION CENTRE

As the organization began to grow and accumulate a “library” it became apparent that an information holding and dissemination activity was fast becoming an important aspect of HERA.

One directive the Director made early on was that HERA would not have a “library” of information which only the staff or a closed group could have access to. It was important that members understood that the information HERA held, it held it on behalf of members and its library was to be available to all members without restriction. This meant that designers through to inspectors all had ready access to its information. Thus it was deliberately called an Information Centre rather than library.

Eleanor Bentley was the first professional librarian to join the staff in that capacity in 1982 and she passed her 20 years employment flag in 2003. That the philosophy of information dissemination has formed such a large part of HERA’s success is in large part owed to her high standards and dedicated service to staff and members.

Early in HERA’s development regular communications with members was deemed to be very important not only to gain credibility with members, but also to see if what HERA staff were doing was relevant and valued by industry members. The 1983 Publications Listed, lists over 86 publications available for members. The staff publications and access to overseas publications has been the outstanding achievement of HERA. The steady increase in membership is vouchsafed to that.

By becoming the sales agent or New Zealand representative for many overseas steel oriented trade and research organizations such as the Australian Welding Research Association, The Welding Institute (UK) , The Danish Welding Institute, Japan Welding Society, HERA established itself as the New Zealand authority on all matters of steel and welding. This meant that its information centre quickly became the national treasure chest whose information was sought by many sectors of NZ industry and the consulting professions.

By 1983 HERA staff had published at least 14 reports on market opportunities, 3 on quality assurance topics, 3 major handbooks of members capabilities, 8 on structural steel topics, 2 on the applications of microcomputers to heavy engineering, 2 on welding and 8 reports on impending major projects.

It was under the banner of the HERA Information Centre that information on many Symposia, Seminars on the Major Projects when project opportunities were divulged and other market opportunities was disseminated. These activities were to place HERA at the centre of information dissemination about New Zealand’s industrial development during the 1980’s. Much staff effort was spent on exposing the capabilities of members to prospective contractors and infrastructure developers.

It was quite common for monthly mail outs to members to weigh in excess of 1 kilogram and contain up to 10 items including the monthly newsletter, HERA NEWS, and more in depth HERA BULLETIN, research publications and information on forthcoming seminars etc.

PROTECTION OF STEEL STRUCTURES

The rusting of steel is always high in one’s mind when the topic arises. Conscious of this, the Director set out early to educate consulting design engineers and architects on how to avoid such problems. One strategy adopted was a programme of research into ways of preparing steel against corrosion, and another to establish a Course leading to a Certificate in Steel Protection. This was created and offered through polytechnics using information mainly from The Steel Structures Painting Council in Pittsburg, USA, (which the Director visited and established a working relationship) together with New Zealand experiences.

HERA CORRESPONDENTS

In order for HERA members to be informed about current issues in other countries a group of correspondents (modelled on the BBC correspondents) was put in place. They were in Australia, Japan, UK, Singapore, and Germany. By far the most successful of these was an expatriate studying at Cambridge University, Crispin Hales. His monthly newspack was eagerly awaited and influenced many HERA activities and new bulletins as well as providing links to key industry people.

DEVELOPMENT OF THE APPLICATION OF MICRO COMPUTERS TO HEAVY ENGINEERING

With the appointment of David Best to the staff as Structural Engineer in 1982, together with market researcher David Beard and engineer Michael Hall, HERA had a team that quickly saw the benefits of the new technologies arriving based upon Apple and later Microsoft software. They spent much time developing programmes that could be the basis for industry applications. This led to many industry seminars and also to Computer News a publication for members as well as publishing BEAM (business and engineering applications for micro) together with holding seminars and workshops

For example, when the Apple computer appeared on the market, HERA staff quickly tried to find ways as to how this machine could be of assistance to members and design engineers. The staff spent many long hours learning Visi calc and Visi word, programmes which are now long gone. This heralded an attitude of innovative service to members. However, this aspect of HERA's work came to a major crossroad in 1986 when Apple systems were largely superseded in industry by Microsoft systems. HERA had to dig deep to replace its Apple hardware and software and adopt new (but ever changing) computer hardware and software to continue its services using computers.

This was a classical instance of where an industry organization could spearhead the introduction of a new technology of benefit to a wide number of industry members. Later, the introduction of computer aided design and subsequently the introduction of semiautomated computer controlled machines for cutting structural steel are further examples.

HERA HOUSE

In 1978, Keith Smith secured rented premises in Friendship House, a new building in the developing South Auckland centre of Manukau City. Commencing with two staff in 1979 and rapidly growing during 1980-83 this accommodation quickly became too limiting. The staff had always taken the view that the HERA offices and facilities were the showpiece and image of the industry, and so had to reflect the very best that could be afforded. The accommodation had to provide for an office/meeting room for the Director, and administration office, offices for senior staff, a meeting room for seminars etc and a room to house the HERA Information Centre.

During the period 1980-82 the Director kept the Executive up to date with funding developments for Research Institutes as a result of him meeting with other research directors and DSIR personnel each year. It was becoming increasingly obvious that the winds of change were blowing in that continued subsidy through vote DSIR was becoming less certain. It was discovered that through this subsidy system the Government would fund capital expenditure on a one for one basis. The Director successfully persuaded the Executive to take advantage of this scheme to build its own premises as the leased area in Friendship House was progressively becoming too small. A subcommittee of the Executive started its work after the Executive meeting in November 1983.

Following the purchase of some land next the southern motorway a competition was held among HERA member architects for a design for HERA House. The successful design was won by Angus Construction on a contract, design and build basis for $1,053 000 giving the total project a value of $1,300,000. HERA House was opened by the Minister of Science and Technology on 6 December 1985.

It has proved to be an outstanding winner for HERA. Its design incorporating an atrium to separate the public from the staff working areas has been well received and the staff have found it a delightful place in which to work albeit with some air-conditioning problems and the "visitor meeting" room being referred to as "the fishbowl". Although it has had many maintenance problems it is still of contemporary design.

These years were notable for the close relationship developed between members of HERA and the HERA staff. Members were actively courted and involved in the many activities in which the Association was involved. The Executive was extremely supportive of the staff and gave freely of their time and expertise.

CHAPTER THREE - THE DR. W. LEW RICHARDS YEARS 1987-1996

OVERVIEW

This period in New Zealand's development saw the completion of the Major Infrastructure Projects started in the early 1980s, a building recession following the Share Market crash of 1987, a major change in

Government management of its departments, resulting in the termination of 200 000 jobs and Governments that embraced the free market philosophy promoted by a "born again" Treasury.

These changes had a huge effect on HERA and its members, but HERA after several years of stagnation continued to grow if not "explode" in the last 3 years of Lew's leadership as a result of changes relating to the acceptance of consulting engineers as HERA Ordinary Members (Appendix 3).

During this period fewer initiatives were commenced than in previous times and initially a period of consolidation took place followed by a prolonged expansion. As the emphasis on Major Projects diminished, and with the collapse of the remaining big heavy engineering companies as a result of the share market crash in 1987, a wider industry base was secured, a wider range of projects undertaken and the structural steel division of HERA expanded.

EXECUTIVE

Don Jones of Robt. Stone and Co. was Chairman of the Executive when Dr Richards took over the Director's reigns at the close of 1987. When the 39th Executive meeting was held in February 1987, HERA was operating as a fairly mature organisation. It had its own building, a well established income stream but a short term cash flow problem caused in part by the necessity to refund a levy which had been incorrectly charged and because of downturn in steel imports. It had a stable staff, many research projects were underway and reports were regularly being published. But there was a lot more to be done in the ever changing area of engineering and construction.

The HERA planning group which had met several times in 1986 presented a report which caused the Executive much discussion and finally they resolved to reconfirm "that while the Association's fundamental role is to service the NZ Heavy Engineering Industry, it could explore the possibilities for a wider funding base, and thus provide services to a wider group of engineering companies. As well it was to charge more for its services, develop as a national centre of excellence for New Zealand in selected areas of engineering and strengthen HERA's network throughout New Zealand and the world."

This new mandate was to be the basis for HERA activities for the next 15 years.

Later in 1987 the share market crashed and a difficult financial time was then experienced for some time. The heavy engineering industry's workload was down as the major projects had finished and largely only maintenance work as well as minor constructions were being undertaken. HERA tried to mitigate this effect by increasing the pressure on the construction industry by promoting steel structures. The industry bought CAD and its associated automatic cutting machines as well as being responsive to design engineer's requirements.

It was with some sadness that in May 1987 the Executive and staff farewelled Cyril Baker, Ted Sims, and John Knox all of whom had given a huge amount of service to the heavy engineering industry through various organizations over 30 years. The other stalwart Jim Donald (Robt. Stone and Co.), who had been through the roughest times of the industry, had been previously farewelled, but returned to be a Trustee of the Heavy Engineering Educational & Research Foundation.

During the late 1980s that dynamo stalwart of Production Engineering, John Fraser was Chairman of the Executive for 3 years. In his annual report for 1989, John notes: "With the severe loss of membership and the decline of heavy engineering activity, the services and skills of HERA are now being offered to other sectors of engineering mainly through the Welding Centre…." So although the staff at HERA had worked hard to increase the heavy engineering workload for its members, the market for new, renovated and expanding New Zealand's industrial base had fallen from favour as the country was opened up to worldwide competition, and the demise of the manufacturing sector. It was deemed by Treasury and other Government drivers that New Zealand's future was to be found in other sectors. This was in deep contrast to Australian companies who had the continued support of their Government and have continued to service their country.

John was followed by two of the up and coming entrepreneurs of the industry Peter White Robinson of Fitzroy Engineering, New Plymouth and in 1995 by David Band of Trax Co (later Track Industries Ltd). Both continued the outstanding quality of HERA leadership. This played an enormous part in HERA's success, even when times were financially tough.

The HERA Act had to be changed to reflect the changing times of Government Departments and the growth of HERA to service industries related to heavy engineering in New Zealand. This in turn required the Director to develop a "corporate plan". Among the changes was the establishment of the Heavy Engineering

Educational & Research Foundation, a Trust which took over ownership of HERA House and the land it stands on. Keith Smith, Gavin Fletcher and Jim Donald together with the Chairman and Deputy Chairman of HERA were the initial Trustees.

In addition, the composition of the Executive changed to reflect the changing membership. In 1992, Ordinary Membership was widened to include designers and consultants, as well as product suppliers and service providers. Many of these were previously classified as Affiliate Members.

FUNDING

A major change to the basis for funding occurred in 1988. The subsidy which HERA had enjoyed by being a recognised Research Association was allocated on a competitive basis for research associations from March 1988. This was a watershed decision time for HERA. The uncontested 1:1 subsidy had been a fortunate funding basis for nearly 10 years and allowed HERA to build its own handsome home as well as undertake a large variety of studies for the industry and its associated design and inspection consultancies.

A wave of change was about to overcome HERA. The major projects of the early 1980's were a distant memory, some large engineering shops has closed (eg Price Motherwell) others were struggling and the mood was not optimistic. However the tonnage of plate and structural steel was continuing to climb after a serious dip in 1986-7.

In February 1988 the Director announced that from then on the reporting of financial information would be described in terms of cost centres as well as the cash flow budget system which had been the only method up until then. By May 1988 a cost centre costing system was in place, capital expenditure was separated from operational accounts and depreciation was shown separately. The accounts now reflected the private sector rather than government sector as it had previously. By the beginning of 1989, specific cost centres were established and the accounts were recast into an Income and Expenditure format.

When Lew started in 1987 HERA had a staff of 10 and basically nothing in the bank as HERA House was just completed. When he handed over the reigns of HERA in December 1996, HERA had a staff of 17 and a healthy bank balance of over $400,000 (including the HEERF), the funding base was secured, and the future cash flow looked positive. This showed that the organization had successfully adjusted from a Government subsidised (1:1) organization to one which, because its services were valued by its members, had grown in membership and turnover in an open market situation.

STEEL STRUCTURES

On the other hand, because of the work HERA had put into steel structure design and encouragement of semiautomated fabrication plant during the period 1980-87 and beyond as well as a continuing demand for industrial and growing demand for high rise buildings, designers were increasingly turning to structural steel.

This reflected HERA's work in bringing forward on site bolted steel structures and a new stability in the industry workforce.

The developing success of Charles Clifton in getting the steel structures design framework together largely concentrated on getting standards and design tools available for designers. It got to a stage where there was a distinct change in the public attitude towards steel framed structures.

Under two long term government funded research programmes the properties of a steel frames under fire and separately, earthquake conditions were studied, reported on at seminars held throughout New Zealand. This resulted in fire protection of steel beams and columns being largely eliminated, and confirmation that bolted joints and stud welding were satisfactory methods to use.

As a result of the fundamental research approach taken in the late 1980's and early 1990 in the government funded projects, the structural steel projects approved by the Executive took on increasingly jargoned titles such as " Project design examples for an eccentrically braced frame seismic resisting system" and "Verification of design of ductile web-side plate connections'; "Inelastic rotation capacity of I shaped columns", while others seemed straight forward eg "Design examples for standard structural connections".

These indicated that HERA staff was now well into the redesign of the design parameters for steel frames so much so that in 1989 the first HERA Design Guide Volume 1 was revised into limit state design format. This was complemented by "Guidelines on the safe erection of multi story building steel work". This led to HERA

being the centre for preparing national design codes for adoption through the SANZ process reached a milestone in 1993 when the new Steel Structures Standard was published. This provided a powerful elegant means of structural steelwork design and enabled steel to be utilised in its widest applications. This work gained HERA international reputation and our New Zealand Structural Steel Design standard developed under HERA's leadership was the draft document for several overseas standards.

In 1992 through the funding support of the HEERF and the government funded structural research programme, a senior lectureship at Canterbury University was created. Peter Phelan was appointed to this position and for fours years he contributed to making structural steel transparent to the students and contributing to the HERA research programme. Due to ill health of Peter the lectureship unfortunately had to be discontinued.

Following the outstanding success of the First Pacific Structural Steel Conference organised by HERA in 1985, the second one was held in Brisbane in 1989. They have been held ever since at four yearly intervals. HERA structural steel design staff has always been prominent among presenters.

Another initiative which had its origins in a Director's visit to the American Institute of Steel Construction in 1984, was the establishment of a Project Analysis Service (Later called the Steel Structures Analysis Service) which was financially supported by BHP New Zealand Steel. This service has been exceptionally successful in that it assists in the evaluation of the steel costs of a project. Martin Feeney can take a lot of the credit for its start up success.

In 1992 a new Building Act and Authority was established. This was accompanied by a new Occupational Health Act. This meant that HERA had to review a wide number of construction topics to ensure that the construction industry was aware of its obligations thus giving the organisation another opportunity to provide a valuable service to its ever growing membership. The HERA Fire Manual published in 1995 was direct result of intensive investigation both here and in the UK on the effects of fire on steel structures and the related effectiveness of insulating materials/systems.

By 1995 steel tonnages were back to close where they were in the heady days of the major projects (Appendix 3). This was largely because most major building was now considered as steel framed rather than reinforced concrete.

MARKETING

In 1986 the Director had put together a project called "Peaches and Plums" which looked at the export possibilities in the Pacific Islands on behalf of a number of member companies, who would join together as a consortium and explore. From this grew a more effective consortium called Force Five, led by business development Manager Bruce Redell and largely funded by the industry participants. It was disbanded in 1995 as a HERA activity and continued on industry driven under a new configuration called JV86.

INDUSTRY WORKLOAD

The continuance of a steady workload for members had always been am important goal for HERA staff and was in the background of HERA's activities. HERA's whole purpose was to increase that industry's workload and regular surveys and reports "Workload and Capacity" was Michael Hall's base job.

Despite all the good work done by HERA during the 1980's, by 1989 the industry workload had deteriorated such that HERA was again asked to be stronger public mouthpiece for the industry. This was a role it filled during the build up to the major project era of the early 1980s. This deterioration was brought about by factors over which HERA, nor the industry, had any control.

INTERNATIONAL OBLIGATIONS

With the rising prominence of HERA in the engineering/structures Industry throughout New Zealand, and in "Steel" circles around the world, together with the money it had at its disposal, HERA staff increased their international activities bringing their expertise to higher prominence on the world stage. This included representing New Zealand at the annual meeting of The International Institute of Welding, at International Seminars and Conferences (where papers describing staff research was presented) overseas as well as arranging seminars etc for visiting academics and other experts of interest to members.

NEW ZEALAND WELDING CENTRE

The appointment of Dr.Wolfgang Scholz was almost contemporaneous with that of Dr Richards in 1987.In February 1987, the New Zealand Welding Centre was born with wide agreement for a levy on welding consumables of $ 0.02 per kilogram. An Industry Advisory Panel helped formulate activities, priorities and the subscription for members.

The Welding Centre soon made its mark and the need for a welding technician was realised and supported by the Executive in November 1987. In 1989 part of the building was converted into a Training Centre Workshop. This became a very valuable asset.

It was with some pride that on 28 July 1988, Tom Hallen, President of the New Zealand Institute of Welding (NZIW), presented to the first graduates the New Zealand's Certificate in Welding Engineering for professional engineers. Four people graduated, including Peter Hayward (CBIP) and Michael Hall. This milestone stamped the Welding Centre's mark on the quality of welding and opened a new era for HERA as the authority on welding not only in the Industry but also on structural engineering as a whole.

To celebrate the 50th anniversary of the NZIW, Tom presented HERA with a copy of the DVS (German Welding Society) "Guide to Welding". This publication proved to be a very valuable teaching tool of international standing.

In 1989 a reciprocity agreement with the American Welding Society which also included the NZIW consummated a developing relationship started in 1984 when Gavin Fletcher visited their offices in Miami.

In 1990 the Centre started with the development of a welding expert software system aimed at facilitation the development of cost effective welding procedures. This was in the form of student projects in conjunction with the University of Auckland. By June 1992 the Proweld computer software was ready for first use by its members. This was an ambitious project which at this time offered lots of promises for improving the daily work of the welding engineer. It resulted from a huge effort by Thomas Pinn and later by Adam Hunter both PhD students receiving HEERF scholarships.

In addition a series of welding training modules were created to be used by Polytechnic Institutes throughout New Zealand. First developed as an independent New Zealand welding training scheme it quickly was adapted to serve as training resource for the new Unit Standards developed by HERA under contract to the Engineering Industry Training Organisation (later COMPETENZ). The sales of training modules developed by the Centre were in 1996 in universal use throughout New Zealand polytechnics and companies.

The Centre's diverse income streams grew to exceed the direct cost of the Centre and make a, significant contributing to HERA's overheads. By now over 51% of its income was self generated mainly through consulting, training and the supply of training materials and self developed software, 26% based on research grants and 23% based on the levy.

By 1997, the Centre's 10th year, it had grown to be HERA's "strongest "division with three full time and up to four temporary staff. Calling itself New Zealand's Centre of Excellence for welding it reflected Wolfgang's objective to make provide a comprehensive service to the industry improving its competitiveness.

Government supported research projects included first productivity related projects focusing on the use of the wire feed arc welding processes in all common material groups, and more sector specific research such as the development of a new improved welding methods for the joining of stainless steel for the dairy and food processing industry and the performance of welded moment resisting connection details under earthquake conditions (low cycle, high strain rate fatigue) in large steel structures.

Consulting work continued to grow above expectations showing the need for staff expertise. During 1996/97 the main emphasis was on failure analysis work often with the assistance of HERA's metallurgist (Martin Newby), and a significant proportion of work involved assisting fabricators in the development of specialist welding procedures.

INDUSTRY SUPPORT

By the end of 1987 steel volumes were increasing again. As part of the Government's privatisation policy the NZ Railways was sold off and that great heritage of apprenticeship training and heavy engineering workshops was gradually disbanded to the detriment of New Zealand's industrial capabilities. The Ministry of Works likewise devolved and these changes resulted in two Executive positions becoming vacant. This gave a chance for the Executive to involve more industry members.

In 1992 the Industry Facilities Handbook was republished featuring fabricating members and a separate Facilities handbook for non-fabricating members mainly targeted at engineering design consultants.

In 1996 the interest in, and growth of, members' exports had grown to a stage that an industry team visited Britain. In previous years HERA had been helpful to members in providing a conduit through which visiting British companies had been introduced to appropriate members.

HERA TRAINING CENTRE

This Centre was brought about as a result of the increasing training activities HERA was undertaking both directly for staff of members and for CBIP, and maybe other third parties in the future. The Training Centre was established in 1987 to coordinate all courses and technology transfer seminars offered by HERA, the New Zealand Welding Centre and CBIP.

During the early 1990s the whole of the New Zealand educational scene went through a series of changes. These involved the Director in representing the wider engineering industry in discussions on how best training for industry trades could be best undertaken. Also, CBIP widened its scope and a new range of inspector courses were offered by HERA.

HERA MEMBERSHIP

HERA membership had grown steadily during the 1980's and in 1988 the Executive discussed at length the membership composition, the alternatives and the range of industry segments now (and in the future) wishing to be served by HERA. The possibilities of levies on other products were discussed so that the financial burden would fall fairly. In February 1988 the Director was given the clear instruction to look at means for expanding membership.

Member numbers exploded in 1991-4 with the change in rules and services offered and the admission of consulting engineering companies as Ordinary Members (Appendix 3). With a steady flow of structural steel design guides, welding processes, market research reports, and the expanded HERA Information Centre and numerous seminars and interest group meetings, the activities of HERA were attracting requests for membership from a wide range of engineering companies and consultants including some overseas memberships.

CHAPTER FOUR - THE DR JOHN MEIKLE YEARS 1997- 2000

OVERVIEW

Dr Meikle had been a member of the HERA Executive for 12 years representing the DSIR. This organization restructured in the late 1990's and John became available to take over the reigns of HERA in December 1996.

When John arrived as Director he found a staff of 17, money in the bank and a turnover of nearly $1.6 million per year sourced from many places, a membership of over 400 representing not only heavy engineering fabricators but a wide range of companies and consultancies with a common interest in engineering. When he left in 2000, staff number was at 15 and the turnover was again close to $1.6.million, membership stood at 531 members with the majority (369) being membership fee paying Ordinary Members.

Indeed it was because of the activities of HERA staff that such a wide group had been attracted. Consulting and training income, nonexistent ten years previously, was now a significant income source as was contestable contract research funding. HERA had grown to now serve the entire metals engineering industry

The Meikle years were noteworthy because of the very difficult trading period for New Zealand industry that his term covered and were characterised by a shrinking steel consumption (Appendix 3). With private enterprise focussed on day-to-day survival it was hard to get people to devote time to thinking, planning and investing in the future. Members had gone through such periods before but now operating in a market open to dumping, cost cutting and international competition, times were not easy. HERA had a large challenge in getting the attention of its members and it was only in the last year of John's tenure that industry activity improved and the membership's workload forecast also improved their interest in HERA activities.

In reviewing these years it is clear that HERA staff have drifted away from mission based research and education programmes which have a great deal of immediate impact, to one of long term research projects and sophisticated research projects which required time to produce usable results. For example, the number of original HERA research reports being issued monthly has by now dropped to a trickle, but the number and quality of Design Guides and standards, training manuals and industry capabilities reports rose significantly.

EXECUTIVE

Duncan Fraser from Acme Engineering, Petone became Chairman of the Executive at the same time as John commenced his duties. This new team wanted more emphasis on innovative seminars to increase information transfer. Graham Ridley became Deputy Chairman. At this time the composition of the Executive was: eight elected members, one representing the NZ Engineering Federation, one representing BHP New Zealand Steel Ltd and one representing the HEERF.

At the same time as the appointment of Dr Meikle, Dr Wolfgang Scholz was appointed to the new position of Deputy Director. This reflected both the standing of Dr Scholz in the organization as well as the growing complexity of HERA.

Because of prevailing market conditions and a Government which was quite out of touch with industry, the Executive tried to increase HERA's activities to promote the industry and its capabilities. This strategy was a rerun of that taken in the early 1980s and had a similar dismal result.

The sentiment that the industry had the capability to provide much of New Zealand's engineering needs was as strong as it had been for the previous 50 years. In the present market circumstances, all the Government had to do was ensure that "the playing field was level." With the Australian (for one) Government giving significant inducements, subsidy and protective barriers to its industries, it was anything but a level playing field. Unfortunately, apart from providing some basics statistics, HERA did not respond strongly to this fundamental request.

STEEL STRUCTURES

In 1997 a substantial revision of the Steel Structures Standard, NZS 3404 was published as a result of many years of hard work (both theoretical and practical) led by HERA's Steel Structural Engineer and the Steel Structures Panel. Its publication gave a focus for the Structural Steel division's education programme for the next two years

The launching of HERA's Structural Steel Estimating Guide in 1998 was a major accomplishment of the Structural Steel Advisory Service (SSAS) commenced some five years before. This service providing free preliminary structural steel design to conventional design options, was aimed at designers to make their design decisions easier and more favourable to steel.

This was followed in 1999 with a very popular Structural Steel Work Connections Guide. This trio of publications gave an increased boost to the use of structural steel throughout New Zealand.

In 1999Ms Nathalie Robert was appointed as HERA research fellow, Department of Civil engineering, University of Canterbury, to work on research into the performance of steel structures in severe fires. This continued the strong interface which had been developed between HERA and University Schools of Engineering.

Also in 1999 HERA engaged Nandor Mago an applied research engineer in engineering analysis. Specialist modelling capabilities were needed as part of HERA's research projects on the seismic performance of steel buildings. He added ABAQUS / Standard / CAE and to a lessor extent MSC / Nastran for Windows to the capabilities of HERA. This finite element analysis service has been recognised by its acceptance by members and by international specialists in this field.

SCI-NZ

The Steel Construction Industry – New Zealand (SCI-NZ) is an interest group of fabricators and suppliers to the steel construction industry with the aim of increasing structural steel usage in the building industry. This group emerged form those fabricators and merchants which supported BHP-NZ Steel in giving direction to the SSAS service at HERA and in October 1998 started to use the name SCI-NZ. By end of 1999 the group had some 40 members who pledged financial support to fund their activities.

The SCI-NZ was governed by a very active committee which meet monthly and cooperated closely with the HERA in the activities run by the SSAS. In addition a fabricator committee was driving supporting actions considered of importance. Some of the priorities set by SCI-NZ such as market research to determine future workloads, were very similar to those which were given to HERA staff previously, however main focus now was to actively drive business development to increase the market share and was a response to lack of resources made available within a funding constraint HERA to structural steel services.

NEW ZEALAND STAINLESS STEEL DEVELOPMENT ASSOCIATION

Mainly as a result of the NZ Welding Centre work a close relationship had been formed over the years with stainless steel sector interest. During 1998/99 as the result of a HERA initiative, a committee was formed representing wide interest from the stainless steel fabrication industry and stainless steel merchants and met regularly at HERA. This group incorporate as the NZ Stainless Steel Development Association in 1999, and was since its inception serviced by HERA as the Secretariat. Dr. Meikle's main achievement was to drive the development of the constitution and rules and to assist in the incorporation process. Mark Thompson, Managing Director of Sandvik NZ and the industry leader in the establishment of the NZSSDA became its first Chairman.

MARKET RESEARCH

Market Research declined in this period due to the funding constraints experience with a shrinking levy income combined with the ongoing inflation cost. The main emphasis was on the marketing of structural steel to designers which included the SSAS, which due to the lack of funding from HERA was mainly externally funded.

INDUSTRY SUPPORT

During the late 1990s the education system in New Zealand underwent profound changes. This had a big impact on HERA as it is heavily involved in education services to its members and the design professions. By 1998 HERA had produced some 40 educational unit standards and evidence guides needed to comply with the requirements of the new NZ Qualifications Authority. In addition 15 welding and fabrication training modules and teacher guides were produced which continued to form the backbone of welding education throughout New Zealand.

However this was not as easy as it should have been. The numbers of people trained in industry has dropped significantly and engineering apprenticeships have basically ceased to exist and the concept of engaging in framework based traineeships was not understood by industry. It is fair to say that the fact that the industry went though a recession has also not helped to keep costly training requirements up. In June 1999, following a major item in the Director's report, the Executive resolved " To draft a letter expressing concern on behalf of our industry, about the difficulties being experienced by trainees, costs of assessment and the large problem of translating the theory of the new industry training system into a working reality".

HERA has always been strongly committed to, and is actively involved in all levels of industry staff educational and training. A target of HERA training is the consulting engineers which are required to perform Continuous Professional Development (CPD) to maintain their IPENZ registration. In 2000 HERA became an accredited IPENZ training provider which allowed HERA to officially support their training requirements and improve at the time seminar and course attendance. Also courses held by the HERA Training Centre in inspections disciplines to prepare for the CBIP examinations and the NZ Welding Centre activities drew consistent attendance from industry.

The HERA Information Centre maintained its level of service and experienced a very consistent usage rate. It was at the occasion of HERA staff, former Director's and some longstanding Executive members celebrated HERA's 21st that the long-serving Information Centre Manager Eleonore Bentley put a display together of photographs and reports together tracing the history of HERA from its establishment in 1978.

In response to the growing popularity of the internet a HERA web site was developed to be a communication mechanism to members and to the wider engineering community. This site has become a very valuable mechanism for information dispersal. The accompanying email service has also become a fundamental communication method.

In 1999 HERA led a six company trade mission to the UK. The mission leader, Michael Hall retired after twenty years of service to the NZ heavy engineering industry in June 2000 and was the first of the long-serving staff members who retired from their HERA position. Paul Tuckley with a marketing research background from his time with the UK steel industry joined HERA as Michael's successor.

In 1998 the Executive called for more promotion of the industry to Government and Wellington based Government employees. This was a repeat of industry demands in the early 1980's and early 1990's and the Executive discussion focussed on how this could be achieved within the framework of a research association and within the funding constraints of the day. Several attempts were made by the Director to produce a revised HERA strategy document, however economic times were not good for HERA to make major moves and the document kept lying on the table.

INTERNATIONAL OBLIGATIONS

Dr. Meikle, Charles Clifton and Dr Scholz together with other HERA staff regularly attended international meetings, seminars and conferences in structural steel design, welding and metallurgy and to present papers on the New Zealand research work performed. This HERA policy not only helps to keep up to date with staff and international developments it also keeps up New Zealand's presence on the world engineering stage.

RESEARCH FELLOWS

With the formation of the HEERF in 1992, the flow of visiting international experts and a regular research fellow scholarship began. Increasingly the HEERF made funds available to HERA and under Dr. Meikle the scholar hip scheme achieved strong growth using up all funds made available by HEERF.

On of the more outstanding research success stories is that of the PROWELD software developed by HERA Welding Centre using its links with University Engineering Schools. This programme was commenced as a university student research project in 1990 by Thomas Pinn as part of his industrial training requirements. New Zealand and overseas student learned about expert systems and object oriented programming and developed a sophisticated welding expert system able to support the welding engineering in the development of cost effective welding procedures considering our New Zealand and Australian welding standards. Thomas later furthered its development during his PhD thesis while being employed at HERA as did Roger Pook as a ME scholarship holder. The programme later was further commercialised by PhD scholarship holder Adam Hunter and has been of considerable usefulness to users because of its ability to signal prequalified joints, as well as its flexible drawing options, expert advice on joint preparation including applicability, dimensions, tolerances and cross section choices. Many copies have been sold in New Zealand and Australia and are still in use. However, as the ongoing sales and the cost of further development did not match, it was the Executive who decided that further development should be halted and economic assessment principles should prevail.

Over the years several visiting experts have been at HERA. In 1997 it was Dr. Siva Sivakumaran, Professor of Civil Engineering, McMaster University, Canada who worked with the structural devision.. He was followed Dr Volkmar Schuler, Professor at the University of Applied Sciences, Ulm, Germany who spent five months in 1997-8 with the NZ Welding Centre and delivering a comprehensive seminar programme visiting also the regions of New Zealand. His visit was an outstanding success and greatly valued by members.

NZ WELDING CENTRE

The NZ Welding during the John Meikle years continued consistent small growth. Long servicing welding engineer Alan McClintock, Phd student Adam Hunter, Metallurgist Martin Newby, the FEA specialist Nandor Mago all contributed to its activities at times complimented by specialists from overseas such as Dr. Andrei Trykov and Dr. Sergei Sancurov. The latter assisted in fully industry funded research project performing applied research in explosion welding and elctroslag welding. HEERF visiting scholars Prof Volkmar Schuler mentioned above and post graduate fatigue expert Chris Bayley from Canada, both adding depth to the welding activities.

However, reduced industry activity meant income constraints as the result of lower welding levies. Despite the reduced welding activities, HERA membership numbers were considerably increasing during this period placing huge demand on the traditionally free advisory services. Only thanks to excellent self generated income streams mainly from consulting work and training activities was the Welding Centre able to cope without an increase in the welding levy. However as many of the traditionally expected services had to be curtailed, the Executive decided following the advice of the NZ Welding Centre Panel to approach industry to support the raising of the welding consumable levy and this process was started in 1999 by Dr. Meikle.

Government funded research focussed on the seismic performance of moment resisting welded connections which found much international research attention, following the unexpected failures of welding connections in the Northridge and Kobe earthquakes. Our researchers participated in a special IIW working group on the seismic performance of welded connections and made considerable contributions. A host of very interesting and challenging industry funded research projects such as developing welding procedures for a newly developed reinforcement bar complimented the research programme of the centre.

It was in this period that the Welding Centre took over the Secretariat Services for the New Zealand Institute of Welding (NZIW). This role was taken very serious as it was hoped to be able to reverse a dwindling membership. Despite very good offerings in evening seminars including many prominent experts from overseas the interest in the NZIW activities continued to wane and membership continued to fall.

Education and training activities reached new highs with at times outstanding seminar attendance particularly when given by overseas experts. However interest in the more comprehensive and time consuming welding engineering and welding technology courses was reduced, partly due to "market saturation" and also because of the lack of industry commitment to take staff of the shop floor for the extended training times required. Many courses were held in the regions to compensate in cost but it was clear that a reorientation would be required. The decision was taken to follow the international recognition pass of the training activities and to join the qualification route of the International Institute of Welding and to seek accreditation and thus being able to offer truly international qualifications hopefully at increased demand. Although it was clear from the outset that this would take years to achieve it was decided to follow this pass-way.

OUTLOOK

Dr. Meikle left HERA to experience a change in lifestyle and to spend together with his wife some time overseas. He is remembered for his analytical skills and for expressing his views on the political environment which is shaping our industry. In his last annual report Dr Meikle remarked on "the potential and growth of our industry and of manufacturing generally. It seems" he said "that we are entering a new era of competition, positioning and relative advantages. It remains to be seen how industry and government will work together towards our future. What is promising is that certain factors now seem to be recognised and appreciated. The future is unclear, uncertain and yet with opportunity."

CHAPTER FIVE - THE DR WOLFGANG SCHOLZ YEARS 2000 -

OVERVIEW

Dr Scholz took over a healthy HERA in late 2000 and it appeared that the downturn trend in industry activity had been broken. Following 5 years of continued decreases an annual levy increase of almost 18% was recorded. With the economy coming out of recession, HERA found the right environment to take stock and set the goals high for the coming years.

The new Director, who had been on the staff for 15 years, found a permanent staff of 15 complimented by several research students, and an annual income still stuck at just under $1.6 million due the recession ridden past years. In his function as Deputy Director he worked with John Meikle at his efforts to revise the HERA business plan. With new energy and a supportive Executive this long outstanding job has been tackled as the first most important task to give HERA new direction.

Based on the government message that for New Zealand to stay within the top of the OECD countries New Zealand as a nation has to accelerate economic growth, a new direction was conceived, and together with a new logo, a new mission and vision statement integrated into a new strategic plan. The emphasis shifted from focussing on the immediate needs of the heavy engineering sector to the wider metals-based industries, but also for HERA to become an important agent for chance actively becoming involved in activities which would grow the different industry sectors.

The newly created vision statement became "*To advance HERA to be the leading catalyst for innovation and growth of New Zealand's metals engineering sector*;" while HERA's mission statement became "*to grow the New Zealand metals engineering industry by accelerating innovation and by strengthening its combined opportunities through the provision of research, education, marketing information and product development*."

The Executive having adopted the strategy in 2001 set the scene for a new burst of energy which would ignite and excite members. By 2002 several new sector development projects were started including a new

show piece – the New Zealand Metals Industry Conference. At the end of the reporting period permanent staff stood at 22 and the Executive approved a provisional budget for 2004/05 of over $3 million.

EXECUTIVE

Coinciding with a new director's appointment, a new Chairman took over the Executive. Graeme Ridley lead a very long established heavy engineering company (McKenzie and Ridley) and represents the younger generation of industry leaders. This was also true for other members of Executive and in particular for Duncan Fraser (ACME Engineering) and David Moore (Grayson Engineering) who both took over their fathers' legacy of running their family business and to support HERA, but also now to be elected to HERA Executive positions.

In the spirit of the rules of the association heavily contested elections for Executive positions had to be held being an indication of the support and interest in setting the HERA business directions. To date the strategy changes of bringing more sector interests on board have not changed the composition of the Executive. At end of the reporting period 2003/2004 there were 7 places filled by members of the traditional heavy engineering industry, 2 by the consulting profession, 1 by a representative of the NZEF, 1 representing BHP New Zealand Steel, and 1 by the chairman of HEERF.

FUNDING

In 1986 HERA's annual income was $1.35 million. Following considerable fluctuation of industry activity 14 years later in 2000 it was only slightly higher at $1.6 million. At the end of the 2003/04 financial year it had risen to over $2 million.

This rise is the result of increased levy income from a growing industry but equally as important through a considerable increase in self-generated income from sector specific activities such as SCI-NZ and consulting. While government funded research income stayed steady, increase membership income also contributed. For example, since 1994 HERA's steady rise in ordinary (fee paying) members has increased HERA's income from this source from $60,000 pa to $150,000 in 2004.

Past directors, together with a fiscally responsible Executive have maintained an excess of income over expenditure such that HERA and HEERF at the end of 2003/04 have over $2 million in assets including a very fine building and land and including cash reserves of over $600,000. Since its inception Keith Smith has implored successive Executives to maintain this regime so that in the event of a bad turndown, HERA could be downsized in an orderly manner.

However, thanks to continuos surpluses achieved in the last years, the Executive accepted in 2003/04 a $100,000 deficit budget in order to keep true to the HERA growth strategy and to allow key sector growth initiatives such as the HERA Wood Strategy and the Steel Bridge development project to go ahead.

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STEEL STRUCTURES

An important part of the backbone of the success of HERA in changing the public's and the design engineer's views about the use of steel in structures was the Steel Structures Panel. This industry based group has met diligently since the commencement of HERA and has advised and assisted Charles Clifton's Structural Division in their extremely successful endeavours.

By 2000 the success of the structural activities was derived not alone from the HERA Structural Division but also from the efforts of the Steel Construction Industry New Zealand (SCI-NZ), which at this time started to fund the Steel Structures Analysis Service (SSAS) provided by HERA. This combination allowed the industry to tackle promotion of the effective and economical use of steel in buildings from a wide scope, ranging from the undertaking of research to verify standards and codes of practice, through design procedure development, steel estimating support to direct contact with the key end user groups including the provision of free of charge preliminary steel designs. To provide the staff resources required for the ambitious projects, in 2001 Paul Weaver joined HERA as SCI-NZ Business Development Manager, in 2002 structural engineer Kevin Cowie joined the SSAS, and in 2003 two new graduate engineers were appointed, Raed Zaki joined the Structural Division and Xiao Huantian joined the SSAS.

In 2002 the promotion of the "Code of Practice for Structural Steel Work Documentation" for the industry was a major SCI-NZ initiative. In addition in 2003/04 a new user-friendly SCI-NZ website has been developed

incorporation the SSAS developed and well used on-line connection guide and as the latest addition an online estimating package.

The initiation of the development of units of learning for qualifications in constructional steel work that fit the NZQA framework has meant that all the components from design to erection are now covered by documented procedures. As a first outcome a well attended training programme for riggers has been started in 2004 in co-operation with Tai-Putene Polytechnic.

In December 2002 a significant structural change took place within SCI-NZ. A new funding system based on a voluntary levy on structural steel sections was introduced. A formal set of rules was adopted which governed the operation of SCI-NZ as an independent interest group and clarified the relationship with HERA. Following nominations from the SCI-NZ members a new SCI-NZ Executive was elected in February 2003 and four steering groups (fabricators, business development, structural steel analysis service, and structural steel research) were established. And in order to simplify co-ordination of the many structural activities, the HERA Structural Panel was integrated into the SCI-NZ Structural Steel Research Steering Group. It was this group which was responsible for the newest addition of HERA growth activities, by developing the strategy for a new Steel Bridge Development initiative with the aim to increase the use of steel in bridges.

During 2003 SCI-NZ drove a marketing strategy development and a promotion of steel as "Material of first choice" and had a significant impact at the Metals Conference in Christchurch. The strong participation of SCI-NZ members during the conference confirmed that the integrated industry had now matured into a healthy industry with a positive future. This group has revitalised industry development, marketing a confident industry (rather than the whining "we can do it…if you protect us" industry of the 1980's) and acts now as a model for other sector groups to follow.

It is pleasing to see that the structural steel industry has fully recovered from the devastation of the early 1970's and has achieved major growth in the last 4 years far exceeding the highest steel consumptions level of the 80th (Appendix 3). HERA has played a major part in this development. And has certainly vindicated the initiative of DSIR, Keith Smith, Jim Donald and others to start and develop this type of organization.

Research wise the structural activities benefited from the government research projects started in the 90th, which allowed addressing from a fundamental point of view the performance of structural steel under earthquake and fire. This government funded programme can't be recognised enough as it allowed building of the critical mass of structural research capacity and the outcomes contributed significantly to the current success of structural steel.

Finite Element Analyst (FEA) Nandor Mago increasingly demonstrated the value of the FEA tools and has been a major boost for the overall research programme of HERA. In 2001, HERA became a member of The International Association for the Engineering Analysis (NAFEMS) so that it could keep up to date with this complex and rapidly changing field. FEA is now an integral part of HERA's work and consultation services and Nandor contributed papers to local and international conferences demonstrating the benefits of this tool.

However, it was not all plain sailing for the HERA Structural Division. In 2002 the old government supported research programme was running out and HERA failed in its bid to gain further funding of research in the previous area of structural steel development. This constituted a significant loss and seriously challenged the capability of HERA as a credible future structural steel research provider.

In keeping with the newly developed strategy and the "change" message from the government, HERA completely refocused its thinking and looked at the future development potential of the structural metals industry. A new comprehensive research and development programme was devised aiming to establish a new manufacturing sector around steel based Composite Structural Assemblies (CSA) with a very strong product export focus. The funding application to the government was successful and the new program started in July 2004 with a $6 million grant over 6 years matched by an equal contribution from the participating industry and university partners. This program includes participation of the NZ Welding Centre which provides joining and through new staff metal forming expertise. The programme includes from the outset the provision of a business development function also to be covered by a newly to be appointed staff.

MEMBER SERVICES AND INDUSTRY RESEARCH

While the standard task of servicing an ever increasing membership is taking much of the resources, the effective use of the internet and the HERA website development allows to work more efficiently. HERA's membership services officer Paul Tuckley took also on the task to manage the HERA computer system and

at the end of this reporting period a substantial upgrade of the HERA computer network has just been completed.

In keeping with the new HERA strategy, the first comprehensive HERA member satisfaction report has been performed. It is currently being analysed however no doubt customer satisfaction is high and many new ideas have been generated to draw on for further developments.

In 2002 the HERANews format was complimented by an electronic version which is taken up increasingly and, as HERA learned from the membership survey, like the printed copy of HERANews finds many additional readers.

As required by the HERA strategy much more energy is put into making the HERA apparatus more effective. Major gains have been made in the use of the HERA House conference facilities by third parties through extensive marketing. This increases usage is assisting HERA's own income streams however also puts HERA as an organisation on the map.

This is an excellent point to be reminded what great asset HERA House is to its members. Following 20 years of hard use and some shortcomings in the design and built job, a major refurbishment of the roof and curtain walls and a replacement of the air-conditioning systems was completed in 2004 in co-operation with the HERA House owner the HEERF.

Most notable new membership activity was the creation of the New Zealand Metals Industry Conference Concept. Based on the idea to provide a networking opportunity for all metals industry sectors, HERA is responsible for the organisation of the conference venue, and the partnering sector groups are responsible for their own programmes. The concept found exceptional sponsorship support and attracted at its inaugural event in Rotorua in 2000 under the Theme "United to grow the Industry" over 300 participants. Due to the positive feedback received the Executive decided HERA to run this event biannually and much effort went at the end of the reporting time into panning for the second Conference in Christchurch with the theme "Developing Strategies for Growth".

On the industry research and marketing side there was also a notable change as a result of the new HERA strategy and changed government policies. While the standard tasks of maintaining industry statistics and the HERA membership capability registers (the later ones now also available on the HERA-website) was continued; HERA focused now more on sector development rather than just finding opportunities. Identifying work opportunities for New Zealand companies has been taken up by MED's New Zealand Trade and Industry (NZTE) which runs the Industry Capability Network (ICN) to use their latest name. HERA works closely with these groups particularly related to sector development initiatives and is also demonstrated by them being a conference partner in the 2002 and 2004 metals industry conferences.

The HERA Wood Strategy is a typical example of those sector development initiatives. It aims to created opportunities for the metal industry from processing New Zealand's "wall of wood". Norm Stannard, a consultant contracted for this task, in co-operation with an active steering group which includes HERA, Timber Industry Federation (TIF) and Pine Manufacturing Association (PMA) members, developed group strategy and actions. The first selected initiative to proceed is the development of an energy guide for saw mills which, coupled with a series of energy audits, should identify what investments (hopefully including local technology) sawmills should make to reduce their energy cost.

The HERA Wood Strategy is only one of the many potential initiatives such as those in the light-gauge sheet steel, stainless steel or light alloys sector. HERA recognised to be credible with its ambitious growth strategy it needs to increase its funding base. As the SCI-NZ initiative has demonstrated excellent industry participation can be raised for credible initiatives. However more support is needed to obtain stable and non-contestable funding streams to allow these sector-specific business development initiatives to proceed. HERA has started in 2000 investigating with the Ministry for Research Science and Technology what options there are extending the funding base via additional levy schedules. However it is recognised that this may be a long drawn out process and industry initiatives cannot be beaten.

INSPECTION AND QUALITY CONTROL CENTRE

There was a 20 year tradition for the Certification Board for Inspection Personnel (CBIP) to employ the Technical Manager Peter Hayward as its sole employee, and for HERA to host the Technical Manager and to pay CBIP for his provision of HERA training courses. In adopting a pathway towards international accreditation, the CBIP Board requested separation of the training and examination function and as a result a number of significant organisational changes were agreed with CBIP. The most significant one was the

transfer of Peter Hayward to become HERA staff in 2002 and the consequent provision of the CBIP services under contract to CBIP.

The continued request from CBIP to separate training from examination combined with the requirement for HERA to provide the corresponding industry training led to the formation of the new HERA division, the Inspection & Quality Control (I&QC) Centre. Increased workload and the requirement for successor planning led to the employment of a new staff member Alban Castellino. In order to fulfil the request from CBIP to separate training from the examination function Peter Hayward resigned at the end of the reporting period from the role as CBIP Technical Manager and Alban Castellino took over. This was a hard decision to make for Peter, who in 20 years of services to CBIP, shaped this most comprehensive training and certification system for New Zealand's inspection personnel. CBIP membership and industry at large owe much to Peter for his visionary and tireless contribution.

With the CBIP commitment removed, Peter is now focusing on driving the initiatives of the new Centre which is effectively replacing the HERA Training Centre. Having achieved two level 3 NDT qualifications, which are the highest possible and suited to the requirements of European and American inspection authorities, Peter is well placed to support with new vigour the members in their staff training, quality control and inspection requirements.

NZ WELDING CENTRE

With the appointment of Dr Scholz as Director, a successor had to be found for the NZ Welding Centre. Despite the Centre's welding engineers training activities suitable local welding engineers with the relevant research experience could not be found. Following an international advertising campaign metallurgist Dr Wolfram Woerner was appointed, who also qualified as IIW welding engineer and gained wide welding experience as technical adviser with an European welding consumable supplier. Particularly his sound metallurgy grounding proofed to be a real advantage and as a result consulting activities continued at the same hectic pace.

Following the industry consultation round for a welding consumable levy increase started by Dr. Meikle, Dr. Scholz led further discussion with the consumable suppliers and in 2002 the HERA Executive agreed to approach the Minister for Research Science and Technology to approve the increase of the levy from 2 - 5 Cents per kilogram of welding consumable. The request was approved and came into effect in March 2003 allowing the delivery of some of the many planned tasks aimed to assist the growth of the fabrication industry.

In line with the new HERA policy to add to each experienced senior staff member at least one young and promising graduate for training, Andrew Short was appointed to the Welding Centre complementing seasoned Welding Engineer and the Welding Centre's only "true welder" Alan McClintock. So equipped an extended Welding Centre team was able to tackle new and inherited challenges.

There were two inherited unfinished business. One was the completion of the government funded research on moment resistant welded connections able to withstand earthquakes and the other is the accreditation of the HERA training operation for the IIW qualification schemes.

The research project on welded connection was performed in co-operation with the Structural Division and completed at the end of the reporting period. It provided considerable insight into the understanding of weld joint performance under low cycle fatigue load in the inelastic range as experienced during earthquakes. The work of the Welding Centre was a valuable contribution to the international research efforts on the subject and contributed to the IIW Guideline on the design and fabrication of such connections. Although it is fair to say that this topic is still not fully understood and further research is desirable, the work proofed conclusively the high likelihood for satisfactory performance of our New Zealand structural steel design solutions.

As noted under the Steel Structures section, the application for funding of the seismic programme was not successful and for the next 6 years the Welding Centre will provide research support for the CSA programme and as one of its key activities investigate joining solution for coated light gauge steels.

On the IIW accreditation issues it was of value that the Welding Centre team under the new Management is familiar with the IIW qualification scheme as a result of Wolfram having gone through the system in Europe himself. Thus work on the procedural process to achieve IIW and at the same time NZQA accreditation for the HERA training activities was restarted with new enthusiasm. Early in the development it was recognised that New Zealand could not economically achieve the IIW accreditation on its own and it was agreed to accept the co-operation assistance offered from the Welding Technology Institute of Australia (WTIA) and to

join their scheme having just completed their IIW accreditaion. Considerable progress has been made preparing for the extended training requirements and the first draft of the required Quality Manual has been produced at the end of the reporting period. Dr. Woerner

As a result of changes in the way learning is performed and learning material is presented, the Welding Centre started to put the comprehensive welding training material used throughout New Zealand into a CD Rom distributable format. A time intensive task when one considers that the module development work was started at the time of the HERA Apple Computers and many files need to be recreated.

On a sad note, despite the ongoing efforts of the NZ Welding Centre to support the activities of the New Zealand Institute of Welding (NZIW), membership interest continued the previously mentioned downward slide and it was with regret that the NZIW wound up its operation in 2003. The NZ Welding Centre has taken over some of the functions, completed the previously started NZIW history and keeps a NZIW website open.

HERA INFORMATION CENTRE

Despite a new HERA strategy the HIC function essentially stayed the same. Its Manager Eleonore Bentley completed 20 years service in 2003 and in an admirable fashion follows through with all required changes new technology brings. All books are now scanned when loaned and HERA library literature researches can be performed on the internet.

It was extremely pleasing to note that in the just performed customer satisfaction survey the HIC service is rated very highly. Another proof that the HIC concept derived from the outset of HERA demonstrated its value.

CHAPTER SIX – CONCLUDING REMARKS

GREAT HERA CONTRIBUTOR

It would be quite remiss if a salutation to HERA's father figure was not included in this review. The contribution of Keith Smith to HERA and the heavy engineering industry has to be recognised as the outstanding contributing factor to, in the 1970's the survival of the industry and then during the ensuing period, the growth and success of HERA as an organisation . He has been the father of HERA, mentor to five Directors and their staff, an enthusiastic leader, always highly respected for his integrity and wisdom. He was a driver, in the companies he has led, in the industry especially during the dark years of industrial relations troubles, at HERA, in Rotary and the many other areas of his life.

Without Keith, HERA would not have been nearly so successful nor financially robust as it is today. The industry is hugely indebted to him.

ACKNOWLEDGEMENTS

I would like to acknowledge the help from Paul Tuckley, Eleonore Bentley, Wolfgang Scholz, Keith Smith and Jean Smith in compiling and editing this document.

PART 2: 25 YEARS WITH HERA

BY KEITH SMITH

PREFACE

Having had a continuous association with HERA over the last 26 years, I have been the 'old soldier' of the organisation - the one that knows the background to many of the policies developed in the past. John Fraser, an ex-Chairman and recently a Trustee of the HERA Foundation, suggested at his last trustee meeting, that a history of HERA should be compiled, in particular to capture my knowledge of the past. Fortunately I managed to escape this onerous task, which Gavin Fletcher has undertaken very successfully.

BACKGROUND

The background to the development of HERA is the troublesome times of the 1970's when the militant Boilermaker Union governed the industry's activities, in a climate dominated by import licensing. In those days, it was necessary to maintain a continuous lobby of the Government, on behalf of the engineering industry and also one's own company. 'Steel' was a 'dirty word', imported, and therefore to be used only if there was no other viable alternative. Design of major projects was dominated by Ministry of Works and Development, or by overseas consultants with no real interest in local engineering.

Import licensing, ostensibly protected the local industry, but also provided the 'hot-house' protection which allowed militant unions to exist. Overseas consultants used every trick in their very experienced repertoire, to bypass the import licensing, placing engineering orders overseas on the justification of capacity, quality or the possibility of lack of performance, due to our torrid industrial relations situation.

Initial industry moves were to fund an office on behalf of Heavy Engineering, in Wellington, to lobby Government Ministers and Departments, a move which foundered for lack of funding. This was a by-product of the criticism of the New Zealand Manufacturing Engineers Federation, whose interests were much broader than just heavy engineering.

The real breakthrough originated with Dr Merv Probine of DSIR, who advised us that under the Act for setting up research associations, there was provision for government subsidies of qualifying organisations. This of course required the compromise, that the proposed association had to be genuinely involved in research, and could not lobby Government. This led to a policy in the newly formed association, that "HERA could research the 'bullets', but someone else had to fire them!" The NZMEF, a major lobby group in those days, was supposed to fire them on our behalf.

AUSTRALIAN RESEARCH ASSOCIATIONS

In the 60's and 70's I had attended numerous steel conferences in Australia, organized by the Australian Institute of Steel Construction, where I first met Dr Arch Vetters, Director of the Australian Welding Research Association. My then company, Price-Norsteel Fabricators and the Ministry of Works and Development, were the only New Zealand members of AWRA. Having worked with the AWRA for a period of years, (including participation in their research projects), I admired their research set-up for controlling their projects. Dr Vetters spent time with me and certainly influenced our proposals for Research Panels - even if he did not agree with our system of funding by levy.

Both AWRA and their associated organization, AISC were in those days, mainly funded by BHP, which also enjoyed protection in the Australian steel market. Engineering companies also paid subscriptions, but these were dwarfed by the BHP contribution. New Zealand Steel in those days manufactured little other than sheet steel and square and hollow sections and had no interest in the structural steel market. While for many years, their Chief Executive Officer was represented on our Executive, they initially were unable to support us the way BHP supported their industry.

For a heavy engineering industry of the size that existed (and still exists), in New Zealand, we would never have got off the ground without the levy funding. This was not without its objectors even at the level of the initial $1.50 per tonne of steel. Any expenditure from the levy funds attracted the taxpayer subsidy of 1:2, which in the early days provided an income well in excess of our ability to spend it on research.

THE STEEL LEVY

The Heavy Engineering Research Levy Act of 1978 allowed a levy to be imposed on imported and locally produced steel sections and plate, within a prescribed range of thickness or section size, representative of product used by the 'heavy' engineering industry. 'Heavy' is a relative term. By overseas standards, "heavy engineering" would include shipbuilding, large bridge structures, steel mills, steel mill equipment and the like. But in the New Zealand context, the 'Heavy Engineering' term was used to differentiate from the lighter production engineering industry.

Even so-called 'heavy engineering', by New Zealand standards, includes a range of raw materials, much greater than just steel plate and sections. Stainless steels, aluminium, and products from the foundry, are all used by New Zealand's 'heavy engineering'.

The levy was imposed only on steel plate in excess of 4.75mm or thicker, steel sections and angles with a height of 80mm or more combined with a specific minimum weight per meter for heavier sections. This range, mainly but far from exclusively used by the 'heavy engineering' industry was selected in the interests of simplicity, to allow NZ customs to collect the levy based on a limited number of tariff items. This has led to continuing confusion for HERA members and sometimes members of the Executive, for the levy to be spent predominantly on research on products containing steel.

Both the Act and the HERA rules define 'heavy engineering' in terms of the ferrous and non-ferrous materials within the proscribed range. Consequently we are obliged by the Act and our rules, to spend the levy, produced only from ferrous materials, on the whole range of engineering materials.

This principle was further given effect to, when HERA changed its rules in 1992 to embrace a wider membership and provide research for the whole New Zealand metals industry.

THE EXECUTIVE and RESEARCH PANELS

HERA's administrative system devolves from the Executive appointed Director, to his research staff. Acting as advisors to the Director and staff are the various Research Panels, Structural Steel, Welding, Marketing and so on.

One of HERA's missions is to distribute technology information to the industry. For the staff to remain in touch with the industry's problems and desires for research, they need the Panel system. More often than not, there is competition for membership of the panels, for the contact with other like-interested members, and the direct flow of information from HERA staff.

The Panel system we use is a direct copy of those used by AWRA. It is also the means by which projects are proposed, developed and costs estimated. If the conventional policy is observed, irrespective of where a proposal originates, Executive, Director, staff, panel members or outsiders, it is approved by the respective panel and submitted to the Executive for final approval and implementation.

The Director has authority to bypass this system, but only to a limit of $5,000 expenditure, and that the work is urgently required. It is retrospectively approved by the Executive.

It is also good to see that there is competition for positions on the Executive. There has always been an election for vacant positions. Members of the Executive bring their own business experience to the meeting, influencing what are mostly policy decisions. In return they gain an insight to new developments in their industry, also closer contact with the Director and staff.

The Chairman of the Executive is elected annually and can remain in this office for only 3 years. This was introduced into the Rules of the Association, to prevent any individual "camping" in the position, and stifling change. We have been fortunate in the availability of successive chairman, who have moved from member to vice chairman and then to Chairman, mostly for the 3 year period.

I have been a member of the appointment panel charged with selecting our Directors. Although it has never been a HERA policy, I have indicated to each of the successful candidates, my preference that they consider their appointment, a 5 year term. As with the Chairman, I feel that this is necessary to bring fresh and new ideas into the Association, not to mention a difference in style, which can re-invigorate the organisation. All of our previous Directors have moved on to new challenges, leaving a legacy of change in HERA.

HERA's FINANCES

As mentioned above, the generous 1:2 subsidy on expenditure received through the DSIR vote, allowed HERA to accumulate funds faster than projects could be conceived and qualified staff recruited. This subsidy stood us in good stead, when funds were available to purchase land and build HERA House in 1984-5. I had always been of the opinion that HERA should not be investing in 'bricks and mortar' - our funds should go into research projects. However Gavin Fletcher persuaded me that the 1:2 subsidy on the building was too good to by-pass! With the benefit of hindsight he was correct, and we now have an excellent building.

The Executive has always been aware of the uncertainty of Government funding. This was highlighted when Gavin Fletcher stepped outside his research boundaries to publish an article, critical of the then National Government policy. The response from the Government was prompt! A message was conveyed that Bill Birch was not pleased and had made enquiries as to how HERA was funded!

Our concerns were compounded when in 1988 the uncontested subsidy on expenditure was replaced by contestable awards for specific projects, in which there had to be an element of "public good". HERA has always had a reasonable share of the contestable funds available to our sector, from which most of our research on seismic resistant joints and fire protection were developed. We had a major shock last year, when we lost out completely, in a first round of new 6 year projects that were awarded. Fortunately, hard work strategic re-positioning and a better understanding of the 'system' saw the subsequent award of a $6 million contract over a period of 6 years matched by a similar sum of industry contributions.

Loss of the complete state funded money would have had a disastrous effect on the HERA staff, a situation currently faced by many other New Zealand research organisations. Over the years, Government grants have become a proportionately smaller part of our budget but still significant. Early recognition of this problem led to a policy of creating a reserve fund equivalent to at least one year's equivalent of the grant, so that we had at least that year within which to adjust to the new situation, hopefully regaining additional funding and retaining staff.

We have been successful in maintaining cash reserves of the order of $400,000 to achieve this objective. Since the inception of the HEER Foundation, this reserve has been shared between the two organisations.

COSTING

Costing systems have developed over the years to suit the circumstances. While there is a fully developed departmental cost centre system, the reporting of actual project costs has not been satisfactory. This year has seen the implementation of a time sheet system, which will be the basis of reporting staff costs against each research project, irrespective of the various departments that are working on that project.

Especially now that we have this latest $6 million contract, involving our staff, universities, outside contractors and suppliers, we expect to implement a full job costing system, producing not only costs, but comparisons with original estimates - something any self-respecting member company or consulting group would consider essential to their survival. The system must be capable of withstanding an external auditor's approval - possibly the Auditor- General!

HERA has had the ability and the funding to promote the interests of special sector groups. This is axiomatic from the change of emphasis that we work on behalf of the metals industry, and in keeping with the original objective - "research on behalf of those working on ferrous and non-ferrous metals"

In promoting any group, our levy monies provide the funds to get a project up and running. In the past these project costs have been identified as mainly direct costs only, with the overheads of the operation, carried within the general HERA budget.

Over time, special interest groups have contributed funds to HERA, by additional levies, or grants. Our lack of costing of overheads has led to misunderstandings as to how much can be spent on special sector projects.

It is proposed that the project costing system to be introduced will include a proportionate share of the general overhead of HERA - administration, rental, computers, communications etc. The net result will be to demonstrate the true cost of any project or a service offered. In the case of newly developing group activities, where income is less than cost plus overhead, the differential will be a subsidy generated from the steel levy. In the main, research projects for which we have tendered will be expected to break even or

exceed the cost of the project including overheads.

The main advantage of the proposed cost system is to provide a reliable basis for estimating costs for programmes and projects and demonstrating, if required, the degree of subsidy involved.

THE HEAVY ENGINEERING EDUCATIONAL & RESEARCH FOUNDATION

The share market collapse in 1987 and the subsequent downturn in the New Zealand economy brought difficult times for the heavy engineering industry. Major companies, which had been the mainstay of the HERA Executive membership were closed - William Cable, Hawkins Steel, Steel Construction and my own company, Price Motherwell, plus many smaller companies.

This had the potential to rob HERA of membership, and equally important, the supply of Company Executives who could contribute their time to participate in HERA activities. It also had consequences for our staff, whose positions were at stake.

One of the lessons emphasised by our original mentor, Dr Merv Probine, was the necessity to achieve 'critical mass' - his definition being the number of staff required to feed off one another and stimulate their respective skills. He put this at about 12-15 staff.

We decided that HERA's long term interests would be better served by opening up our membership - to anyone in the metals industry rather than the previously narrow group of steel fabricators, also to members of the consulting engineering industry. Associated companies or individuals, suppliers, service companies, associated trades - these could all become full members, rather than the Affiliate membership available to them previously.

In hindsight, the decision was the right one - membership numbers soared, subscription income increased from about $40,000 to the current annual $155,000. We are well supported on our Executive by representatives of the Consulting Engineers, also associated trades representatives.

We had concerns, that with an expanded membership, the originators of HERA, the heavy engineering fabricators, could lose control of the organization. Two steps were taken to reduce this possibility, firstly, to include in our newly amended rules, that membership of the Executive must include, at least, four persons employed by "businesses or organisations engaged in heavy fabrication".

Concurrently, we wanted to protect the assets acquired over the previous 10 years, in particular, our land and building HERA House. In the unlikely event of a profligate Director and an irresponsible Executive allowing the Association to become insolvent, we wanted to ensure that the HERA House asset was protected.

This was achieved by creating the Heavy Engineering Educational & Research Foundation (HEERF), a charitable trust, formed in 1992, when the ownership of HERA House and land was transferred for the sum of $10.00! The Foundation thus became the landlord of HERA, who paid rent to the Foundation, calculated on an 'arms-length' basis, based on regular re-valuations of the property. Built at a cost of $1.3 million, in 1985, the latest valuation, December 2002, valued the property at $1.95 million.

The Foundation Trust Deed is virtually a copy of the HERA rules, so that if HERA ever failed, the Foundation could step in, take over the residual assets and staff, and continue business as usual. Hopefully this will never happen!

This however assumes that our theoretically irresponsible HERA Executive cannot take over the Foundation. The current Chairman and Vice-Chairman are, ex-officio, trustees of the Foundation. The other three Trustees are appointed, and nomination of these trustees is the prerogative of the HERA Executive. Each appointed trustee's term is 5 years, with staggered terms being created by the first appointments. To date the appointed trustees have all been previous chairmen of HERA or ex-Directors, all of whom have a vested interest in seeing HERA continue and progress.

The HERA Executive thus control the Foundation by virtue of their power of appointment of trustees, but the protection for the status quo of the Foundation is their inability to change appointees quickly, due to the 5 year term of the incumbents.

12 years after the formation of the Foundation, our concerns of 1992 now seem groundless. But in the aftermath of the 1987 share market crash and the change to contestable taxpayer funding, our concerns

seemed very real.

The Foundation's only income is the rent paid by HERA plus interest on surplus funds. HERA's rental agreement is a BOMA type, where all internal and external maintenance is their responsibility. Structural maintenance is the responsibility of the Foundation, and this year, we took a major hit, when short cuts taken by the design and build contractor resulted in replacement of the roof and upgrading of the curtain wall glazing. Additionally, after 19 years service, the air-conditioning system has been replaced and upgraded.

The Foundation plays its part in accumulating reserve funds, as mentioned above. It also makes an annual grant to HERA for research projects, mainly with an educational bias in keeping with its educational aims. By a policy decision, these grants are limited to 70% of the net Foundation income after deduction of other expenses and depreciation. The balance accumulates for future capital expenditure, which, one day will be required to house an ever growing HERA.

STEEL CONSTRUCTION INDUSTRY - NEW ZEALAND (SCI-NZ)

As the saying goes, 'nothing succeeds like success' and the true measure of HERA's success is the wish from other metal groups to promote their interest in the way that HERA has promoted structural steel. Examples of this activity are CBIP, the stainless steel group, the light gauge residential structural framing group and now our move into composite materials.

SCI-NZ developed through the enthusiasm of the fabricator members and their suppliers, to increase marketing and promotion of structural steel, for which additional funding would be required. The Heavy Engineering Act by which steel is levied, was at its limit of $5 per tonne, many years ago. Two years ago, the Director lodged an application to the current Government for a change in the Act, increasing the levy, but this is proceeding very slowly through the legislative programme.

The SCI-NZ group agreed to levy their companies steel purchases voluntarily. After long discussions as to the form the group should take, agreement was reached that they would act initially in conjunction with the HERA Structural Steel Panel, and subsequently in lieu of it - ie they would be a sub-group of HERA.

The agreement also included the proviso that the SCI-NZ levy funds were identified as such and spent according to programmes that their executive group developed. In accordance with our Panel administration rules, any SCI-NZ research proposal is submitted to the HERA Executive for final approval, "which will not be unreasonably with held". The agreement also includes for contributions to the HERA general overheads to be provided from the SCI-NZ levy funds.

The HERA Executive agreed to this arrangement, on the understanding that it did not conflict with the ability of HERA to obtain the HERA Act changes, which would increase the current steel levy. Whereas the SCI-NZ levy funds belong to them as of right, the implication of the increased HERA steel levy was that such funds generated would belong solely to HERA. Such a levy increase would be across the board, including plate, not included in the SCI-NZ voluntary scheme.

The momentum built up by the voluntary levy fuelled by exceptional steel activity last year, will have to continue in the future, for the benefit of both SCI-NZ and HERA. Whether HERA levy monies will just replace the SCI-NZ voluntary levy, or whether SCI-NZ will continue their voluntary levies remains to be seen. Either way, the SCI-NZ enthusiasm should be encouraged, and emulated by other sector groups.

HERA has demonstrated its ability to provide the physical resources, administration processes and experience, to launch and promote research projects. The steel based HERA levy income provides funding to subsidize start-up activities for the various metal sectors, until their own funding can sustain them. Long may it continue!

HERA's DIRECTORS AND STAFF

We have been most fortunate in the quality of our five Directors. They have all come from an academic type background, highly involved in the technology side of their interests. Exposure to our industry has been through direct contact through seminars, research groups and particularly through contact with members of the Executive.

I have had great pleasure in introducing them to the more commercial aspects of the fabrication industry, where the financial responsibility for HERA arises from the development of factual budgets, and the realistic achievement of them. HERA's accumulation of reserve funds is a testament to all the Directors financial

achievements.

Our first Director, Dr Robin Shepherd, came to us from Auckland University. In the short period of his tenure he initiated the establishment of HERA offices, appointed staff and initiated the Panel system. He returned to academia with his appointment to a university position in California, USA. I was sorry, that in spite of sponsorship by New Zealand Steel, Auckland University would not agree to setting up a Professorial Chair that would have brought Robin back to New Zealand.

Gavin Fletcher also came to us from Auckland University, where he had responsibilities for the commercialisation of University developed products. He brought to the position, huge energy and enthusiasm. His propensity to stray across the line, lobbying Government was a by-product of his enthusiasm. Gavin set the path for many of the activities of HERA, combining his enthusiasm with initiatives for new projects. Our HERA House remains as a tribute to his contributions. He left to join his wife in a commercial venture.

I would like to comment on Gavin's comments in his paper, on the HERA influence of the use of bolted joints in on-site steel construction, to reduce site welding and its attendant industrial problems. HERA made a significant contribution to bolted joints, by rationalising and re-designing bolting connections. This work was done in connection with the Australian Institute of Steel Construction. However site bolted joints were used long before the problems of the Bank of New Zealand building in Wellington.

One of the oldest steel companies in New Zealand, until its closure in the 1980's, was William Cable in Wellington, who inherited all the techniques of the rivet age. This included template makers, who constructed in the template loft, wooden templates from which the steel components were marked out and fabricated. This form of steel construction, required skills long since gone, and replaced by the computer and CNC drilling.

Cables originally fabricated riveted structures that were also riveted or bolted on site. As shop welding replaced the shop riveting, Cables (and other major New Zealand companies) continued to use site bolting. Andersons, in Christchurch, produced major bolted arch bridges. The Price Norsteel, Steel Construction, Hawkins Steel and Robt. Stone Joint Venture, produced massive tonnages of site bolted structures for powerhouse and boiler structures, in the 1960-70's. Every one of these holes was marked out by hand, and drilled by radial drill machines. High strength friction grip bolts replaced the rivets and mild steel bolts previously used.

In those days, the Dorman Long and American Institute of Steel Construction handbooks were our bibles for detailing. Standard connections for every size of beam and angle, developed originally for riveted joints, were detailed in the shop drawings. The contribution of HERA and AISC was to evaluate the loading requirement of joints using modern techniques and welding knowledge. The original rivet based joints were demonstrated as grossly over designed in some cases, and replaced with the standardised shop welded - site bolted joint in use today.

The two most significant contributions to steel fabrication technology are the use of computer detailing, and the by-product from that, Numerical Controlled drilling, using the computer developed parameters. Brace to column gusset plates for a 1970's Huntly power station boiler structure, would be approximately 3 metres square, and contain several hundred 22mm diameter holes. Each hole was marked out on a wooden template, punched onto the plate and then radial drilled. The matching holes in columns and intersecting brace beams were separately marked out and radial drilled. It is a testimony to the tradesmen skills of those days that rarely was there a mis-drilled hole in thousands of tonnes of structures, despite the bad industrial relations situation at the time. These days, raw plate would be fed to a machine, CNC drilled or punched, then cut to shape, all with an astonishing increase in efficiency and better still accuracy, techniques which have helped keep steel competitive. Computer design, detailing and CNC marking out and drilling, have revolutionised steel fabrication.

But back to my comments on our Directors!

Dr Llew Richards came from a background in fuel research. He took a while to come to terms with a somewhat different industry, but then continued introducing new initiatives. This was particular through the HERA Structural Engineer, Charles Clifton, and Dr Wolfgang Scholz, who joined HERA with a background in automation and welding, to head the new Welding Centre. Together with Structural and Welding Panels they initiated a whole series of research programmes. Llew continued the contacts commenced by Gavin, developing international relationships with overseas kindred associations, an activity that probably helped

him in his next career move. Under Wolfgang, the Welding Centre blossomed, bringing into HERA international visiting experts and students from Germany and Europe generally. Llew left to take up a position with Telarc and is very much involved now in international accreditation work.

Dr John Meikle joined us from DSIR, but had also been their representative on the HERA Executive for many years. Having guided us on relations with Government Departments over the years, he contributed to this understanding as Director. This period in the late 1990's was perhaps one of consolidation, with a downturn in industry activity. However more innovations were added to the HERA capability - appointment of a finite element specialist, employment of a materials engineer, the beginnings of SCI-NZ and the formation support for the NZ Stainless Steel Development Association. He commenced a strong programme producing welding education standards. John left us to join his wife for an overseas appointment.

Dr Wolfgang Scholz joined us as the first in-house appointment. As we indicated to him at the time of appointment, we had some reservations as to whether he could make the change from expert technologist to administrator. We were wrong! He has brought to the position, a boundless enthusiasm, which tempered by his technical background makes him a very strong Director. He is obviously well respected by industry, and has established a good network of contacts, both within New Zealand and overseas, to keep HERA up with the latest steel and welding technology advances.

HERA is blessed with an excellent group of staff members, some of them long serving. Three people who are still current members of our staff, in particular have made a great contribution to HERA.

Charles Clifton has in many ways spearheaded the rebirth of structural steel engineering in New Zealand, through his work on fire engineering, and latterly, design of construction joints for seismic resistance. Charles' work has been a brilliant contribution to steel technology, recognised both here and abroad, and epitomised by his analysis of the reasons for the Twin Towers collapse on 11 September.

Peter Hayward, employed by CBIP and based at HERA has single-handedly led CBIP since its inception in 1983. His qualifications in the non-destructive testing field are exceptional, and without peer in New Zealand. Relations with some members of the CBIP Board have not been the best over the last few years, culminating in Peter transferring to be a HERA employee. In a difficult job where he was both a trainer and a member of the examining panels, creating a perception of conflict of interest, he has maintained his dignity and integrity. Peter has retained the utmost confidence of Wolfgang and myself.

Eleonore Bentley was our first Librarian in 1983 and has maintained an exceptional service for HERA. Completely unflappable, nothing is a bother; she has produced a superb technical library, well used by the members and industry in general.

In HERA we have an organisation that we as members, as Director and Staff can well be proud of its achievements over the last 25 years. We are well placed to look forward to the future years.

APPENDIX 1

DIRECTORS

1978 - 1979	Dr. Robin Shepherd ME, PhD, FIE, FNZIE
1980 - 1986	Mr. Gavin Fletcher MSc., FNZIC, ANZIM
1987 - 1997	Dr. Lew Richards BSc., MSc. (Hons), PhD, MIPENZ
1997 - 2000	Dr. John Meikle ME. (Mech), PhD, MAIME
2000 -	Dr.Wolfgang Scholz Dipl-Eng, PhD, EWE

CHAIRMEN OF THE EXECUTIVE

1978 - 1982	Mr D.R.K.Smith
1982 - 1985	Mr. T.W.Just
1985 - 1986	Mr. C.W. Baker
1986 - 1987	Mr. D.W. Jones
1987 - 1988	Mr. D.R.K. Smith
1988 - 1991	Mr. R.J. Fraser
1991 - 1994	Mr. P.C. White-Robinson
1994 - 1997	Mr. D. Band
1997 - 2000	Mr. D. Fraser
2000 - 2003	Mr. G. Ridley
2003 - 2006	Mr. N. Davies
2006	Mr. D Turkington
2006 -	Mr. D Moore

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2. The Heavy Industry in New Zealand R. P.Gapes and W.D.Rose 1976
3. HERA Annual Reports 1981-2003
4. HERA Executive Meeting Minutes
5. HERA Members' Annual General Meetings' minutes
6. HERA NEWS 1981-2003

APPENDIX 2

HERA REPORTS

1980

R3-15 Capacity and resources of the private sector of the heavy engineering industry in New Zealand

R4-01 Seismically loaded holding down bolts

R4-08 Report on standardization of bolted moment end plate connections

1981

R3-01 The major projects and heavy engineering demand and capacity 1981-86

R3-02 Major project demand : an update

R3-03 Market report

R3-05 Energy plan 1981 : implications for heavy engineering

R4-10 Bolted end plate beam to column connections under earthquake type loading

R5-01 New Zealand heavy engineering handbook

1982

R1-01 Guidelines for quality assurance in a heavy engineering company

R1-02 Collected papers on quality assurance

R1-04 Guidelines for the introduction of quality assurance into a manufacturing company

R1-05 Commentary on worldwide quality standards

R2-03 Overseas engineering research institutes and HERA related organisations

R2-04 Film catalogue

R3-04 NZ heavy engineering : implications of CER

R3-07 Energy plan 1982

R3-12 Heavy engineering opportunities in the dairy, meat and fertiliser industries

R3-13/1 Project status report. No 1

R3-16 Heavy engineering firms and their marketing performance

R3-19 NZ heavy engineering involvement in the major projects

R3-20 The demand for heavy engineering in the 80's

R4-02 The statistical analysis of mechanical properties obtained on structural steel sections

R4-03 Steel construction in Japan

R4-05 Literature survey of steel bolted beam/column joints

R4-06 Bolted end plate connections for seismically designed steel frames

R4-09 Steel space frames

R5-02/1 Heavy engineering capacity register March 1982

R5-02/2 Heavy engineering capacity register April 1982

R5-02/3 Heavy engineering capacity register July 1982

R5-05/1 Products register August 1982

R5-05/2 Member companies products register

R5-06/1 Workload and future capacity : February 1982

R5-06/2 Workload and future capacity : report of April 1982 survey

1983

R1-06 Collected papers on quality assurance. Volume 2

R2-06 Calculator/computer design aids

R3-08 Opportunities for the New Zealand heavy engineering industry in the second generation Maui projects

R3-09 NZ offsite heavy engineering involvement in the major projects

R3-10 Opportunities for NZ heavy engineering in the chemical process industries : a preliminary assessment

R3-13/2 Project status report no 2

R3-13/3 Project status report no 3

R3-13/4 Project status report no 4

R3-14 Primary processing : some market opportunities

R3-17 Proceedings of HERA Marketing Seminar June 1983

R3-18 Major projects location timing

R3-24 NZ Steel Development Ltd. expansion stage 2: NZ heavy engineering minimum supply

R3-25 NZ Steel Development Ltd. expansion stage 2: NZ heavy engineering work capabilities

R3-26 Current major projects : guest presentations at HERA'S 1983 fabricator forums

R3-27 Coal mining development in the North Island : a presentation

R4-01 Seismically loaded holding down bolts

R4-02 The statistical analysis of mechanical properties obtained on structural steel sections

R4-03 Steel construction in Japan

R4-11 Structural advantages of steel : a series of articles extracted from 'Steel Today & Tomorrow' published by Japan Iron & Steel Exporters Association

R4-12 The tenacity of beam end plate to column connections under simulated seismic loading

R5-02/4 Heavy engineering capacity register April 1983

R5-02/5 Heavy engineering capacity register October 1983

R5-05/3 Member companies products register

R5-06/3 Workload and capacity of heavy engineering shops : report of April 1983 survey

R5-06/4 Workload and capacity of heavy engineering shops : report of October 1983 survey

R6-01 Collected papers on microcomputing. Volume 1

R6-02 Microcomputer hardware review

R6-03 Collected papers on microcomputing. Volume 2

R6-05 Microcomputer software review : microcomputers available in New Zealand

R7-01 Collected papers on welding volume 1

R7-02 Structural steel fabrication studies undertaken at Auckland University

R7-03 Aspects of welding in Japan

R7-04 Collected papers on steel protection volume 1

R7-05 Collected papers on welding volume 2

1984

R3-21 The NZ Steel Development Ltd expansion stage 2

R3-22 The NZ Steel Development Ltd expansion stage 2: Sourcing schedule

R3-23 The NZ steel development Ltd expansion stage 2: New Zealand heavy engineering opportunities in the forestry processing industry

R3-28 Heavy engineering opportunities in NZ Forest Products Limited Kinleith pulpmill modernisation programme

R3-29 Potential for NZ heavy engineering in major coal mining projects

R3-30 Heavy engineering opportunities in the Ohinewai opencast coalmine project

R3-31 Market preview 1984-1985

R3-32 Heavy engineering opportunities in hydro power generation

R3-33 Proceedings of HERA Australian Market Seminar

R3-34 The Australian market

R3-35 Forum on phase out of import licensing : proceedings

R3-36 Protection : mechanisms and policies

R3-37 Dumping

R3-38 Export finance

R3-39 Incentives

R3-40 Review of development policies affecting the heavy engineering industry

R3-41 Heavy engineering opportunities in medium density fibreboard plants

R3-42 Increase your workload through marketing : proceedings of HERA Marketing Seminar June 1984

R3-44 Heavy engineering steel supplies : the impact of domestic production

R4-13 Steel portal frame knee joints under seismic loading

R4-14 Summary of the 8th world conference on earthquake engineering

R4-15 Summary of the 9th Australasian conference on the mechanics of structures and materials

R4-16 New Zealand structural steelwork design guide, part 3: design of tension members, part 4: design of compression members

R4-17 New Zealand structural steelwork design guide, part 8: torsion, part 9: thin plates

R4-18 New Zealand structural steelwork design guide, part 10.2: connection design: design of moment resisting bolted endplate connection

R4-19 New Zealand structural steelwork design guide vol 1

R5-02/6 Heavy engineering capacity register April 1984

R5-05/4 Member companies products register

R5-06/5 Workload and capacity of heavy engineering shops : report of April 1984 survey

R5-07 Brief survey of steel fabrication in the Federal Republic of Germany

R5-08 A strategic industry study of the New Zealand heavy engineering industry : a discussion document

R5-09 1st Heavy Engineering Development conference

R5-10 Workload and capacity of heavy engineering shops : report of October 1984 survey

R5-11 Heavy engineering capacity register

R5-12 A study of productivity measurement methods relating to heavy engineering industry

R6-04 Use of microcomputers in heavy engineering production management : proceedings of a one day seminar at HERA, 28 March 1984

R7-06 Collected papers on steel fabrication volume 1

R7-07 Collected articles on steel structures 1: grandstands

R7-08 Abstracts and introductions: collected papers on structural stability

R7-09 Collected articles on steel structures 2: bridges

R7-10 Collected papers on welding robotics volume 1

R7-11 Collected papers on welding volume 3

1985

R1-07 Collected papers on quality assurance. Volume 3

R1-08 Quality assurance programme for industrial coatings applicating contractors

R3-43 Heavy engineering opportunities in thermal power stations

R3-44 Heavy engineering steel supplies : the impact of domestic production

R3-45 Heavy engineering opportunities in the transport equipment industry

R3-46 1985 market preview

R3-47 Measures of international competitiveness of the N.Z. heavy engineering industry

R3-48 A marketing plan for steel structures 1985-1990

R3-50 Maui B platform : preliminary heavy engineering information

R4-33 Collected papers on fire protection.

R4-34 Fire protection manual section 7: passive fire protection of steel

R4-35 Recent advances in earthquake engineering relating to structural steel

R4-36 New Zealand structural steelwork design guides, part 19.1: design of unstiffened baseplates for steel towers

R5-13 Lessons learned from the NZ Synthetic Fuels' GTG project : a HERA Christmas luncheon address

R5-14 Heavy engineering facilities in New Zealand - 1st edition

R6-06 Microcomputers in business management proceedings of a one day seminar

R6-07 Collected papers on microcomputing. Volume 3

R7-12 Collected papers on welding robotics volume 2

R7-13 Collected papers on steel protection volume 2

R7-14 Maintenance protection : proceedings of a one day seminar held at HERA 17 April 1985

R7-15 Collected papers on steel structures : large single storey buildings

R7-16 Collected papers on steel fabrication

R7-17 Collected papers on nondestructive testing : volume one

R7-18 Collected papers on welding volume 4

R7-19 Collected papers on pressure vessels volume 1

1986

R1-10 Guidelines for selecting quality assurance levels in welding technology

R3-49 Market survey of future N.Z. boiler demand

R3-51 Heavy engineering opportunities in a triboard plant

R3-52 1986/87 market preview

R3-53 Heavy engineering opportunites in the Martha Hill gold mining project

R3-54 Trading with China

R3-55 Coal mining in New Zealand : long and short term strategies

R4-37 Investigation of the inelastic seismic performance of cold-formed rectangular hollow section. Part 1, preliminary investigation of AS 1163 material of Australian origin

R4-57 Fire resistance requirements for steel framed car parking building

R5-15 Guidelines to greater productivity in heavy engineering

R6-08 Collected papers on microcomputing. Vol 4

R7-20 Collected papers on welding robotics.

R7-21 Collected papers on steel fabrication

R7-22 Collected papers on non-destructive testing. Vol 2

R7-23 Collected papers on health and safety in welding

R7-24 Collected papers on welding volume 5

R7-25 Predictive modeling of submerged-arc weld bead geometry

R7-26 Narrow-gap welding

R7-27 Water-jet cutting

R7-28 Collected papers on offshore fabrication technology volume 1

R7-29 Collected papers on offshore fabrication technology volume 2

1987

R3-56 1987/88 market preview

R3-57 Forestry report

R4-38 Bay of Plenty earthquake March 1987 : HERA reconnaissance team report

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R5-16 The economic impact of the heavy engineering industry

R6-08 Collected papers on microcomputing. Volume 4

R7-30 Collected articles on steel structures : car parking buildings

R7-31 Collected papers on welding. Vol 6

R7-32 Collected papers on health and safety in welding. Vol 2

R7-33 Collected papers on steel fabrication. Volume 4

R7-34 Collected papers on welding robotics. Vol 4

R7-35 Collected articles on steel structures : overseas commercial multi-storey construction

R7-36 Collected papers on synergic MIG welding

1988

R3-58 Market preview

R3-59 Maui stage II development : maximisation of the input of New Zealand's heavy industry

R3-60 Effective industrial marketing : seminar proceedings, held at HERA House, Manukau City, September 6-7 1988 [and] MANCAN House, Christchurch, November 22-23 1988

R4-40 Report on HERA Structural Engineer's visit to UK/Europe November 1987-January 1988

R4-41 Calculation of the fire resistance of composite concrete slabs with profiled steel sheet exposed to the standard fire

R4-42 General specification for the fabrication and erection of structural steel

R4-43 Web side plate connections

R4-44 Stressed skin design seminar

R4-45 Working paper on the proposed HERA educational, research and development plan for structural steel

R4-46 Notes prepared for a seminar on standard structural steel connections

R4-48 Notes prepared for a seminar on constructability and seismic design of multi-storey steel buildings

R4-50 Notes prepared for a seminar on composite construction design and construction.

R5-17 Heavy engineering facilities in New Zealand - 3rd ed

R7-37 Collected papers on thermal cutting processes

R8-1 Aspects of MIG/MAG welding

R9-01 The modeling of electrical current NDT methods and its application to weld testing

R9-02 Practical welding related reports from China

R9-03 Vibration and vibratory stress relief

R9-04 Publications on health and safety in welding. Part 1

1989

R3-61 Market preview

R3-62 Effective industrial marketing : seminar proceedings

R4-49 New Zealand structural steelwork design guide vol 2

R4-51 Report on industrial building cost comparisons and economical steel framed construction

R4-52 Notes prepared for a seminar on economical single storey design and construction

R4-53 Notes prepared for a seminar on the new steel code, NZS 3404:1989

R4-54 Update on the HERA ERD plan working paper after one year in operation

R4-55 Notes prepared for a seminar on the HERA Design Guides : Volume 2

R7-38 Notes prepared for a seminar on paint systems and paint types for steel structures

R7-39 Notes prepared for a seminar on drawbars

R7-40 Notes prepared for a seminar on the do's and dont's of using technical standards and specifications

R8-02 Aspects of Mig/MAG welding. Part 2

R9-05 State of the art of high energy density beam welding

1990

R2-07 Videos available for loan

R4-56 Notes prepared for a seminar on composite floor system design and construction : emphasis on in-service vibration.

R4-58 Manual of standard connection details for structural steelwork

R4-59 Fire protection manuals : sections 1-8. - 2nd ed.

R4-60 Notes prepared for a seminar on stressed skin diaphragm design and construction

R4-61 Fire protection manual

R4-62 Notes prepared for a seminar on design and experimental testing of steel framed seismic-resisting systems

R4-63 The seismic response of steel frames

R4-64 The influence of section slenderness on the inelastic rotation capacity of I-shaped steel columns

R4-65 The effect of lateral and local buckling in steel beams under simulated earthquake loading

R5-18 Heavy engineering facilities in New Zealand - 4th ed

R8-03 Comparison of stainless steel welding processes

R8-04 Notes prepared for a seminar on NZS 4701: metal arc welding of steel structures

R9-06 Improvement techniques

R9-07 Design recommendations for hollow section joints predominantly statically loaded

1991

R3-63 Senior management seminars no.2 : export finance

R4-66 Notes prepared for a seminar on the fire resistance of (unprotected) steel-framed car parks, mixed occupancy and office buildings

R4-67 Notes prepared for a seminar on passive fire protection of steelwork

R4-68 Notes prepared for a seminar on current and recently completed structural steel research

R7-41 Guidelines for the safe erection of multi-storey steelwork

R8-05 Cost effective aluminium welding

R8-06 Transfer from NZS4701 to AS1554.1 : what would this mean to the New Zealand user?

1992

R1-11 Notes prepared for a seminar on QA certification to ISO(NZS) 9000

R2-08 Selected bibliography on health hazards associated with glass fibres 1992

R4-69 Notes prepared for a seminar for reviewers of the limit state steel structures draft code, DZ 3404:1991

R4-70 Background and commentary to the security ratings and related provisions of the acceptable solution for spread of fire, C3/ASI:1992

R4-71 Notes prepared for a seminar on current and recently completed structural steel research

R5-19 Heavy engineering facilities in New Zealand - 5th ed

R8-07 High strength steel : design and fabrication. -2nd ed.

1993

R3-64 Trade and export finance

R4-68 Notes prepared for a seminar on current and recently completed structural steel research

R4-72 The thermal insulation performance of light-weight steel framed external wall elements

R4-73 Notes prepared for a seminar on the limit state steel structures standard NZS3404:1992, February 1993, volume 1 - seminar notes

R4-74(I) Revised security ratings : interim report

R4-76 Seismic design procedures for steel structures

R4-78 Notes prepared for a seminar on current and recently completed structural steel research

R5-20 Directory of heavy engineering companies 1st edition June 1993

R5-21 Directory of consultants and suppliers to the heavy engineering industry

R7-42 Avoiding welding hazards with safe work practices

R8-08 Comparison of weldability of primer systems

R8-09 Duplex stainless steels : properties, welding applications, welding

1994

R1-12 HERA guidelines for the application of ISO/NZS 9002 1994 quality systems within the fabrication industry

R4-79 Report to HERA on the Los Angeles earthquake 1994

R4-80 New Zealand structural steelwork limit state design guides : volume 1

R4-82 Calculation of the design fire resistance of composite concrete slabs with profiled steel sheet under fire emergency conditions

R5-22 Directory of heavy engineering companies 2nd edition - November 1994

1995

R4-76 Seismic design procedures for steel structures

R4-84 Notes prepared for a seminar on 1994 structural steel research

R4-87 Development of moment-resisting steel frames incorporating semi-rigid elastic joints : 1994/95 research report

R5-23 Directory of consultants and suppliers to the heavy engineering industry

R8-10 Stainless steel weld surface finish and industrial hygiene requirements

R8-11 Influence of welding parameters on the surface of plasma arc welded 304L stainless steel

R8-12 Cost comparison of fillet welds welded with the GMAW, FCAW and MMAW processes

1996

R4-83 Fire models for large firecells

R4-88 Development of moment-resisting steel frames incorporating semi-rigid elastic joints

R4-89 Fire protection manual

R4-91 Notes prepared for a seminar on design of steel buildings for fire emergency conditions

R5-24 Directory of engineering consultants 1996

R5-26 Directory of heavy engineering companies and suppliers to the industry 1996

R5-27 HERA trade mission to Britain September 1996

R7-43 Draft health and safety guidelines for fabrication workshops

R8-13 Weld surface finish of PAW and PAW/GTAW welded stainless steel

R8-14 Stainless steel weld surface finish and bio film development : a round robin test

1997

R4-92 Restraint classifications for beam member moment capacity determination to NZS 3404:1997

R4-93 Notes prepared for a seminar on the new steel structures standard, NZS 3404:1997

R5-28 Directory of heavy engineering companies and suppliers to the industry 1997

R5-29 Directory of engineering consultants 1997

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R4-94 Development of perimeter moment-resisting steel frames incorporating semi-rigid elastic joints

R4-95 Behaviour of multi-story steel frames in natural fires

R4-96 Structural steelwork estimating guide

R4-99 HERA specification for the fabrication, erection and surface treatment of structural steelwork

R8-16 Welding in the transport industry : a one day seminar covering design, fabrication and quality assurance requirements for transport equipment built in New Zealand, Auckland 3 March 1998...

R8-17 Collected papers on HERA's seismic research programme involving rigid welded beam to column joints

1999

R4-100 Structural steelwork connections guide

R4-101 Notes prepared for a seminar on the steel structures standard NZS 3404:1997

2000

R4-90 Draft for development : design procedure for the inelastic floor system/frame response of multi-storey steel framed buildings in fully developed natural fires

R5-30 Directory of heavy engineering companies and suppliers to the industry 2000

R5-31 Directory of engineering consultants 2000

R8-15 MRC project

R8-18 Development of small scale test rig to trial the performance of welded beam to column connections under seismic loading

R8-19 Fatigue in welded construction : a one day seminar/workshop on the design and fabrication against metal fatigue in welded construction, Auckland, 23 February; Rotorua, 25 February; Wellington, 29 February; Christchurch, 1 March; Dunedin, 2 March

R8-20 Influence of surface roughness on low cycle fatigue

R8-22 Fatigue in welded structures workshop : a one day seminar/workshop

2001

R4-104 Notes prepared for the tubular structures seminar

R4-105 Notes prepared for a seminar on the behaviour and design of multi-storey steel framed buildings for severe fires. - Rev ed

R8-24 Preparing welding procedures : Rotorua 25 September 2001, New Plymouth 26 September 2001

2002

R3-65 HERA strategic plan : wood based opportunities for heavy engineering interests : position paper

R3-66 Wall of wood : opportunities for New Zealand metals & engineering industry : sawmilling

R4-106 Code of practice for structural steelwork documentation

R4-107DD Draft for comment : Guide to practical aspects of composite floor system design and construction, including concrete placement

R4-110 Finite element analysis of the sliding hinge joint : FEA study

R4-111 Notes prepared for the designing stainless steel structures seminar

R4-112 Report and user's manual for NZFI_Vib1 program (program for the analysis of floor vibration)

R4-113 Notes prepared for a seminar on design and construction of composite steel and concrete floor systems

R8-25 Notes prepared for a seminar on reliability based maintenance

2003

R3-67 HERA wood strategy : energy programme

R3-68 Wall of wood : opportunities for the New Zealand metals engineering industry : opportunities and threats from Scandinavia

R3-69 Wall of wood : opportunities for the New Zealand metals engineering industry : current status of near to market wood waste gasification technology

R4-100 Structural steelwork connections guide . - 2nd ed

R4-117 Finite element analysis of moment end plate connections : revision 2

R4-118 Stage 2 development of the slab panel design procedure

R4-119 Steel structures seminar 2003

R4-120 Verification of revised MEP procedure

R4-122 Shear stud capacity in profiled steel decks

R5-32 Directory of engineering consultants 2003

R5-33 Directory of heavy engineering companies and suppliers to the industry 2003

2004

R4-103 Design guide for openings in composite beams

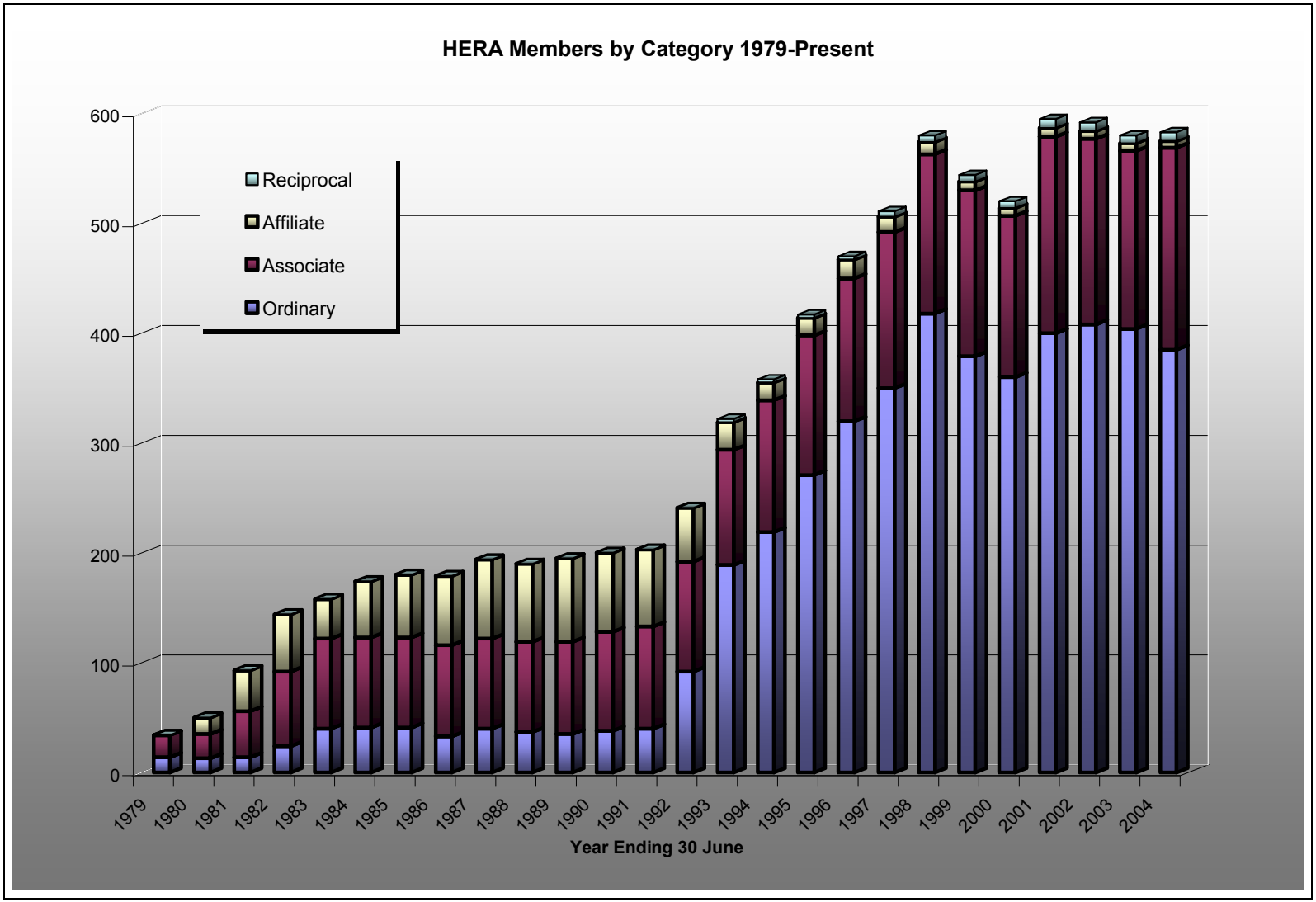
R4-123 Wind tunnel study of crosswind force spectra for low aspect

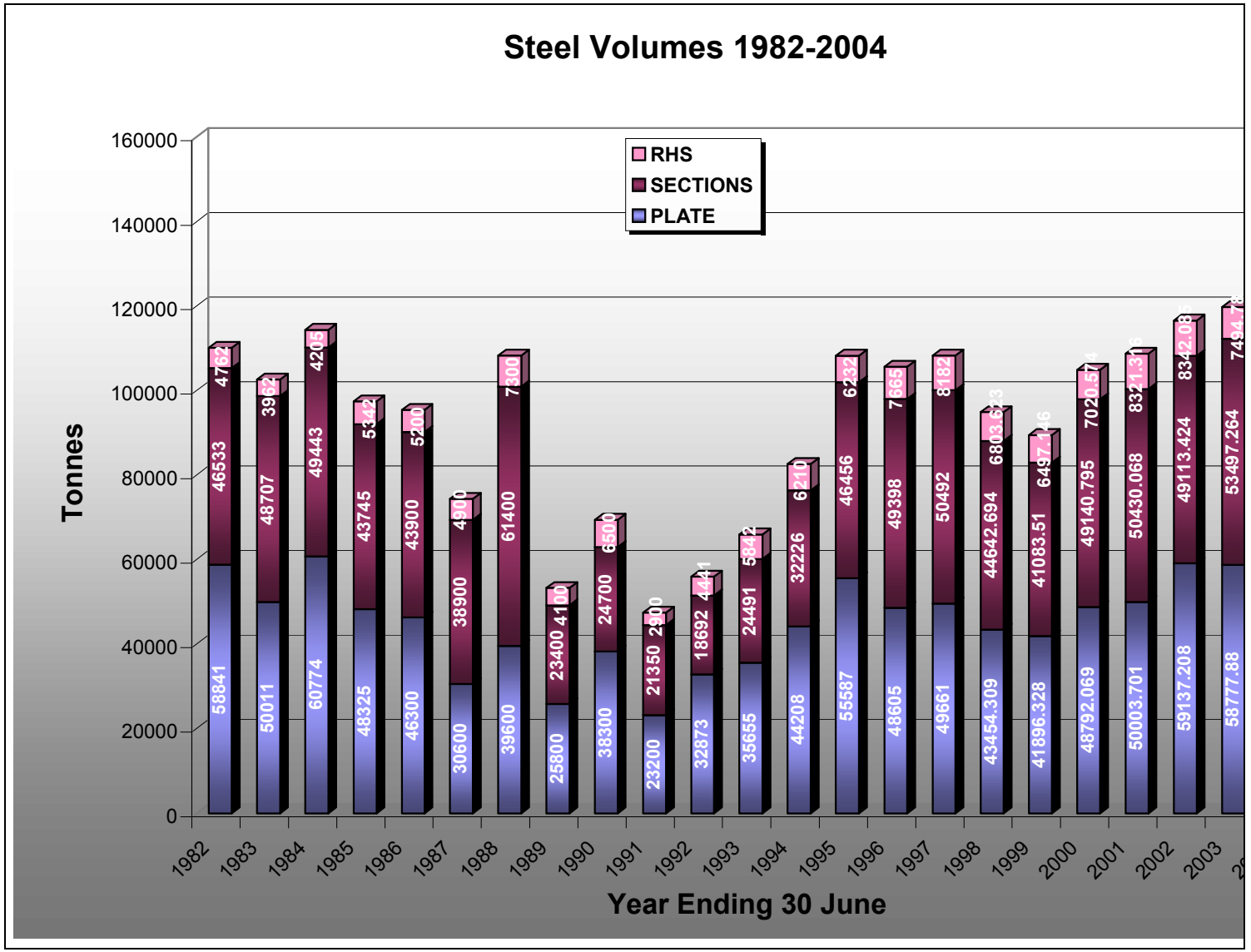
R4-126 Fabricator capability booklet

R4-127 FaST user manual and commentary

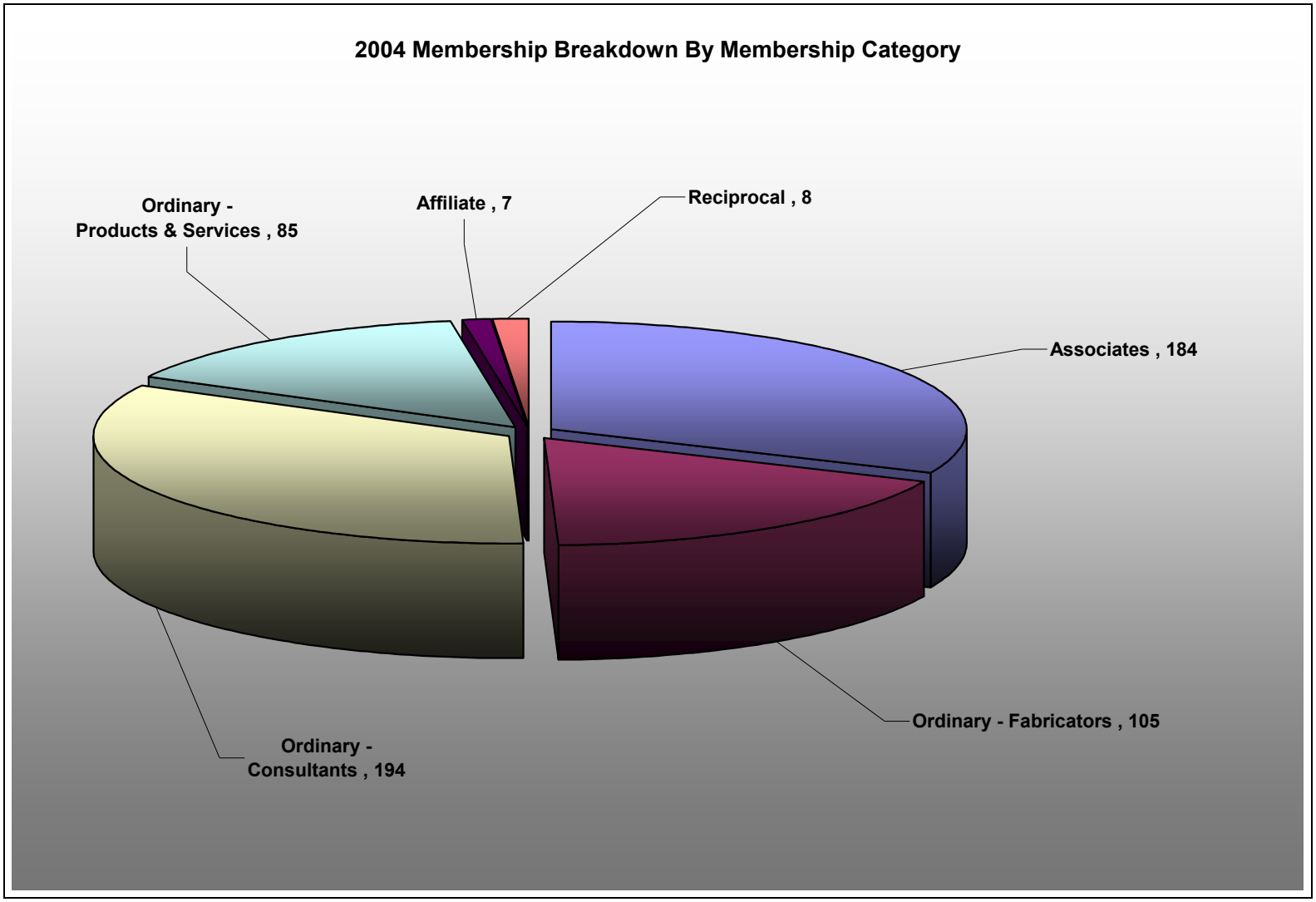
APPENDIX 3

HERA STATISTICS

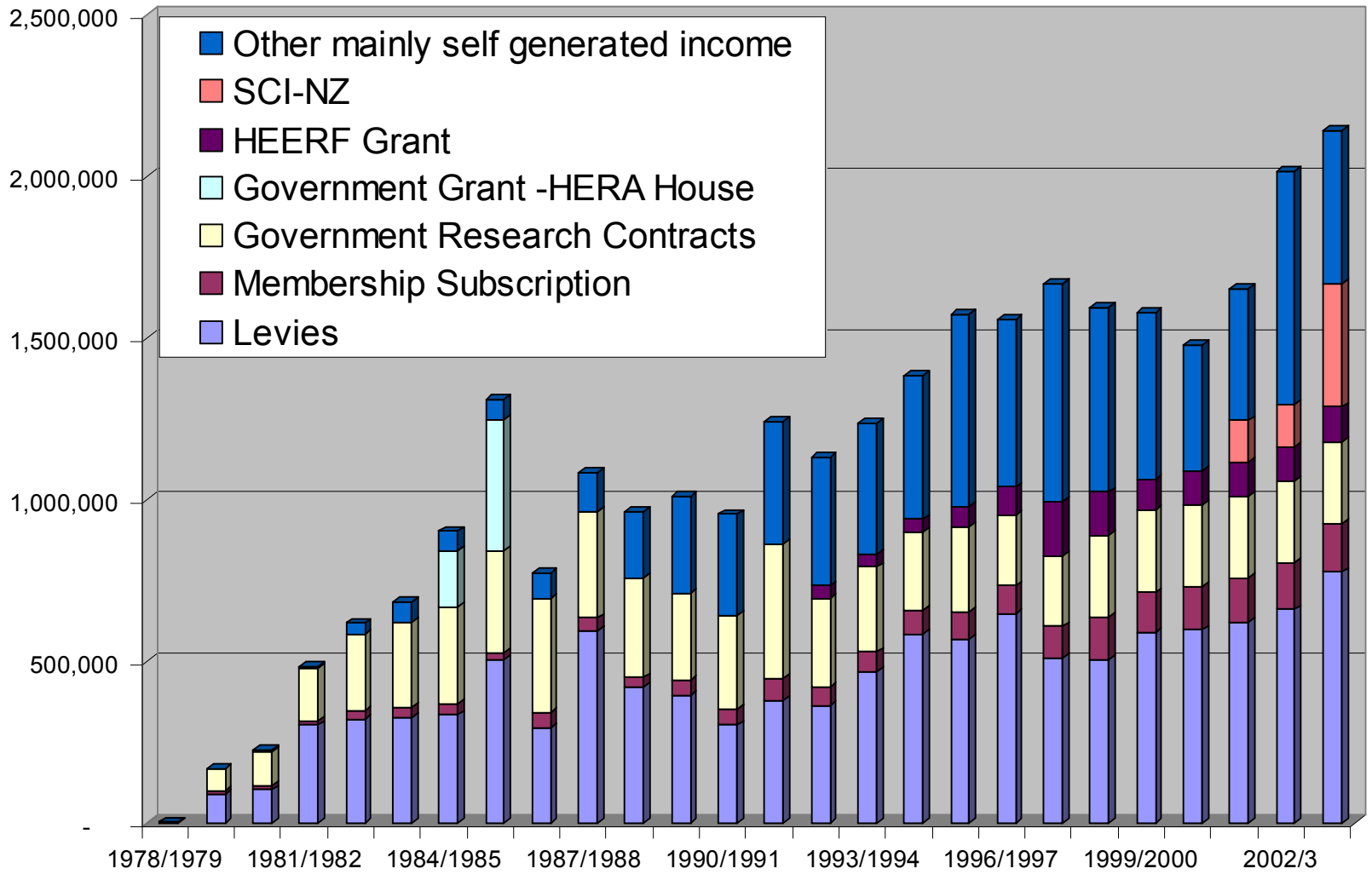




2004 Membership Breakdown By Membership Category



Total HERA Income NZ$



Total Assets NZ $