

Supporting Your Industry
Through Innovation

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15
ANNUAL REPORT

Heavy Engineering Research Association

About HERA

HERA is the Research Association for the New Zealand metals engineering industry. Established in 1979 under the Heavy Engineering Research Levy Act as a member-based, not-for-profit Research Association, HERA today serves 600-plus industry members as their leading resource support centre.

HERA PURPOSE

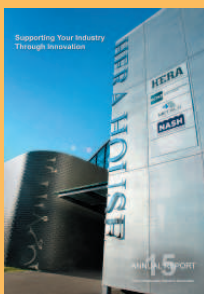
- Service heavy engineering sector interest
- Facilitate access to markets
- Provide Research & Development, technical training, advice and support
- Provide a respected voice for the aspirations and concerns of members
- Lead the movement towards a sustainable and internationally competitive industry

HERA Executive 2014/2015:



From left: Sean Gledhill, Bernard Hill, Dr Troy Coyle, Prof Thomas Neitzert, Dr Wolfgang Scholz (HERA Director), David Moore, John Frear (HERA Chairman), Peter Hutton, Noel Davies (HEERF Chairman), Paul Bryant, Terry Duff, Alistair Fussell, Simon Ward (inset), Mike Lehan (Deputy HERA Chairman)

Name	Company Affiliation	Membership Representation
John Frear (Chairman)	Best Bars Limited	Ordinary & Associate Members
Mike Lehan (Deputy Chairman)	Page Macrae Engineering	Ordinary & Associate Members
Peter Hutton (Past Chairman)	Fitzroy Engineering Group	Ordinary & Associate Members
Paul Bryant	Steel & Tube Holdings	Ordinary & Associate Members
David Moore	Grayson Engineering	Ordinary & Associate Members
Prof Thomas Neitzert	Auckland University of Technology	Ordinary & Associate Members
Bernard Hill	Hawkins Infrastructure	Ordinary & Associate Members
Terry Duff	Southern Cross Engineering	Ordinary & Associate Members
Sean Gledhill	AURECON	Ordinary & Associate Members
Noel Davies	Hydraulink Fluid Connectors	Heavy Engineering Educational & Research Foundation (HEERF)
Dr Troy Coyle	NZ Steel	Representing the President NZ Steel
Alistair Fussell	Steel Construction New Zealand	Co-opted representing SCNZ
Simon Ward	A-Ward Attachments	NZ Manufacturing & Exporters Association (NZMEA)



About the Cover - Supporting Your Industry Through Innovation

Looking back, 2014/15 was a real confidence boost to HERA and its industry with increased business activity, demonstrated leadership and greater membership engagement. Great outcomes have been achieved as demonstrated, for example, by the delivery of the Steel Fabrication Certification (SFC) scheme, with outstanding company participation including corresponding personnel training, the progressing of sector-wide research and its implementation in standards and guides, and also the delivery of the first-ever Above Ground Geothermal & Allied Technologies (AGGAT) Global Conference. And to crown the excellent year, a newly-refurbished HERA House showcasing our industry's capability, will for years to come provide a proud place for our industry to meet and engage with HERA; the association the industry owns and drives.

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HERA STRATEGIC FOCUS:

INDUSTRY VISION

To have New Zealand’s Metals Engineering Industry achieve world-class standards for profitability, quality and sustainability

HERA MISSION

HERA to be the catalyst for research, innovation, growth and development in New Zealand’s Metals Engineering Industry

This report follows the five focus areas of the 2014/15 HERA strategy as identified in the diagram.

- Maintain industry input in research roadmaps in each of the research-focused HERA divisions Structural Systems, New Zealand Welding Centre and Industry Development
- Develop NZ industry’s *competitive advantage*
- Use HERA Roadmap Process to develop Clean Energy business opportunities
- Drive and support *Securing the Future of NZ Metals Engineering Industry* programme
- Better use of technology to improve delivery of key messages and communications, e.g. improve online presence of HERA and metals industry
- Use Standards as a means of innovation and through harmonisation to access to new markets
- Develop and implement programmes to enhance productivity in key areas of metals fabrication, such as welding and construction
- Grow business opportunities through Certification
- Product development work that embraces international best practice to facilitate export opportunities





John Frear
HERA Chairman

Heavy Engineering Industry Activity – A Year of Outstanding Growth

Heavy steel usage in New Zealand rose by 9% compared to last year, bringing the total consumption to over 157,000 tonnes. The major growth was in sections with over 11% growth, being indicative of the buoyant building and construction sector. Furthermore, plate usage was also considerably up with 7% growth as compared with last year, indicating strength in the non-steel construction market of our industry. At the same time, the landed cost of imported steel stayed at the previous year's level, assisting in steel-based products remaining cost competitive.

Metals-based Exports and Imports Shrank

The heavy engineering import-export collective showed exports in our tradable items sector shrank by an alarming 25% but imports declined even further with a 30% reduction.

sector is the increase in imported prefabricated structures (7308) by 32% to \$155m. This followed a 25% increase in the previous year, and is confirming that not only do we need to focus on our industry's competitiveness, but also that the imports are conforming to our New Zealand requirements in terms of standards, and fair and equal trade.

Assuring Quality of Fabricated Steelwork

The Steel Fabrication Certification (SFC) scheme established last year jointly by HERA and Steel Construction New Zealand (SCNZ) also took centre stage this year within HERA activities. HERA set up a separate organisation, HERA Certification Ltd, which now incorporates the industry-governed Authorised National Body for Company Certification (ANBCC) to IIW/ISO 3834.

Industry leadership and engagement in the SFC scheme has been

simply outstanding with a total of 16 companies now having achieved certification. This represents the majority of New Zealand structural steel fabrication capacity and is a step change in the conformance and confidence industry clients can have when sourcing products from the SFC scheme supply chain.

HERA is driving this industry-focused QA systems development with the view that our industry can only remain competitive locally against alternative materials and/or systems, and equally against imports if a rigorous quality assurance regime with *Get it Right First Time* principles is dominant in New Zealand. HERA's roles of training the people who are responsible for the co-ordination of welding operations, and auditing the actual implementation of the SFC scheme, have been instrumental in companies achieving certification. We wish to single out the contributions made by the NZ Welding Centre (NZWC) team of Dr Michail Karpenko, Alan McClintock and Peter Hayward for achieving this result.

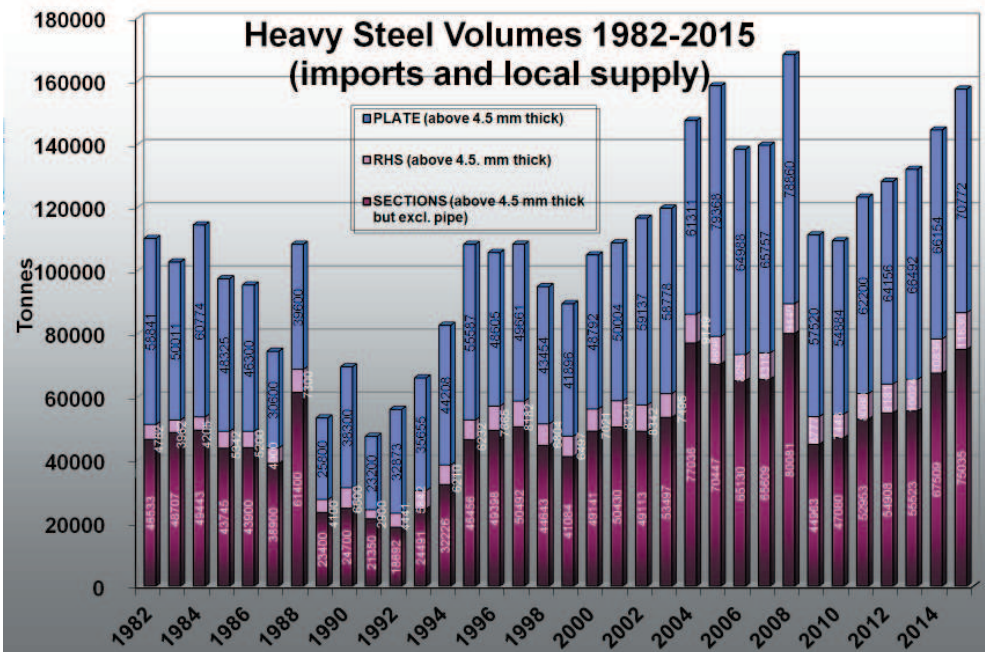
HERA and SCNZ have also focused on raising awareness of the SFC scheme's benefits particularly amongst consultants, where the responsible engineer no doubt carries the biggest share of the product conformance risk. The building systems regulators have also been targeted but much more needs to be done to ensure that government agencies set, monitor and enforce a level playing field in terms of conformance of construction, whether it is from local operators or from imports.

R&D Outcomes
• Steel Construction Research

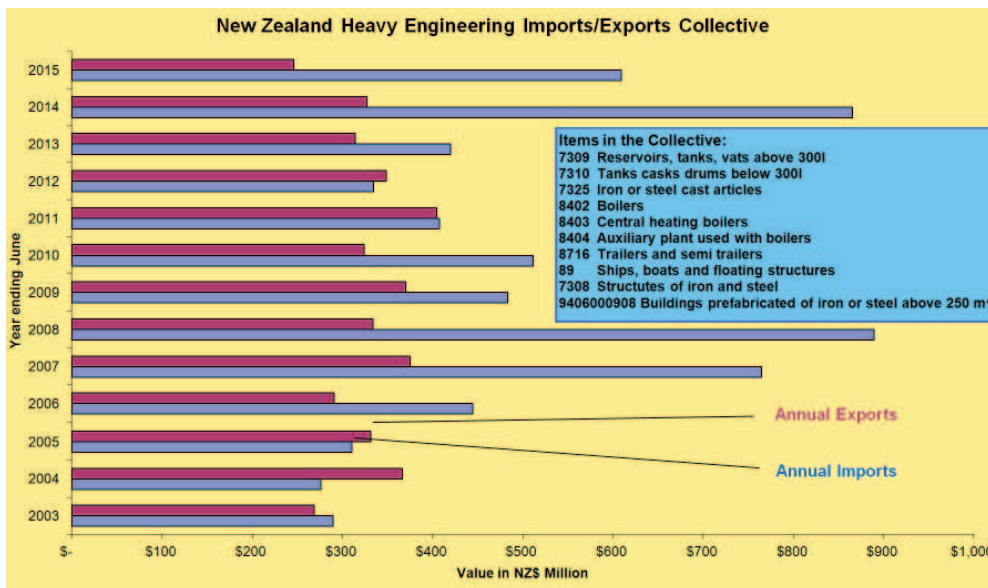
The main direction of HERA's steel construction research was on the improvement of steel construction standards and design guidelines for multi-storey buildings. Additionally HERA was successful in its bid on a NTZA project on evaluating the load capacity of existing composite bridges. It also won the Building Research Levy and NASH project on developing design guidance for multi-storey light steel framed housing.

Major progress was made on the joint Australian and New Zealand steel-concrete composite design standard for buildings, AS/NZS 2327 that is nearing completion. This included calibration and development work on composite slabs in fire conditions, resistance of composite columns in both normal and fire conditions, and safety factors for composite beams and overseas steel sections.

Several commercial research projects were performed for industry members and overseas clients, including overseeing loaded fire tests at Warrington UK, supplemented by HERA FEA support, which resulted in SG\$180k savings to 40-storey building in Singapore.



Source: Statistics New Zealand / HERA



Note: Exports from NZ Steel and the NZ Aluminium Smelter are not included

• **General Heavy Engineering**
About half of HERA's members operate in the diverse heavy and metals engineering industry sectors. Following the setting of priorities in previous years, the R&D focus on renewable energy continued.

The establishment of a New Zealand Marine Energy Centre has generated a lot of international interest with the potential to involve many HERA member companies. The business case is currently under consideration by Government. Other opportunities such as fish farming technology, the *Factory of the Future* concept, and the opportunities around a hydrogen society have also been explored.

The government co-funded Above Ground Geothermal and Allied Technologies (AGGAT) programme successfully passed its second year review and entered its third year. Earlier challenges managing the alignment between funding, academic and commercial outcomes have been overcome, and the first AGGAT Global Conference was successfully run in Auckland.

• **Welding Technology R&D**
The NZWC's R&D focus was on the AGGAT programme identifying materials solutions for power plant componentry used in geothermal environments. A comprehensive literature study has been conducted on the topic. Work on a materials database has been started to make this information available to AGGAT partners. In cooperation with research partner University of Auckland and industry members, the field-based material test rig has been designed.

Other research supported the adoption of the IIV/Eurocode 3 fatigue design provision in the AS/NZ 5100.6 bridge standard. The NZWC in cooperation with Structural Systems and Prof. Adolf Hobbacher of Germany, have developed new fatigue provisions for this standard. Work on AS/NZS 5100.6 has now been completed, with the draft for public comment due from Standards Australia.

• **Securing the Future of New Zealand Metals Engineering**
HERA's strategic focus on securing a sustainable and high value metals engineering industry is an ongoing activity achieving attention from not only staff but also the HERA Executive. The annual HERA Strategy Review led to a re-arrangement of priorities and will increase focus and simplify reporting.

The advocacy function in the *Securing the Future of New Zealand Metals Engineering* programme has been fully handed over to Metals NZ CEO Gary Hook (see his report on page 13), however HERA has continued its financial and in-kind support for the programme.

HERA also maintained research and support activities in the government

procurement reform space and tried to provide clarification on how the new Government Rules of Sourcing are being implemented by those making procurement decisions and correspondingly by the tendering industry. Particularly the requirement to consider the *Five Principles of Government Procurement* with the *Get the Best Deal for Everyone* principle, which includes the requirement for *Balanced Decision Making* and *To Consider the Economic, Social, and Environmental Impacts of a Deal*, needs further promotion.

Potentially these legal requirements make complying tender submissions more competitive, and it is likely that bids with high local content can meet them more effectively. During the year, HERA developed and published a template to assist tenderers in outlining the contribution of a bid to meet the *Balanced Decision Making* criteria of the Rules.

HERA continued to make advocacy contributions to a number of submission requests including helping shape the National Science Challenge for *Building Better Homes, Towns and Cities*. HERA also made representation to what we believe is an anomaly in public sector R&D funding; that industry R&D funding from collective, levy-based contributions is excluded from being able to attract government co-funding, whereas company-specific R&D funding qualifies.

• **Financial Performance – High Level of Industry Activity Creates Surplus**
This year, HERA ended up with a surplus of \$540k on the back of better than budgeted industry activity translating into higher levy income and also better than budgeted self-generated income. Unfilled vacancies planned for new activities but not able to be activated due to the challenge in obtaining the specialist staff required also contributed. With three new staff members appointed towards the end of the year, this imbalance has now been partially corrected.

• **HERA House Refurbishment**
From a HERA perspective, we are delighted that the HERA House owner, the Heavy Engineering Research and Educational Foundation (HEERF), has completed the HERA House refurbishment which was started last year. As HEERF Secretariat, HERA was intimately involved in the project management. HERA staff and its sub-tenants had to go through a very trying time being temporarily housed in the HERA House conference rooms while the refurbishment was going on.

HERA House tenants and every visitor so far agree that we have achieved a superb result achieving a contemporary and future-proofed office space, which at the same time displays our industry's capabilities. Thanks to excellent industry sponsorship and despite significant unexpected variations we stayed very close to the budget of \$1.8m for HEERF and \$200k for HERA for the office fit out. Our thanks go to everyone involved, and this includes Minister Hon Steven Joyce who assisted us in a great re-opening function.

Outlook

With the overall construction industry pipeline looking to be extended by slightly increased demand largely from Auckland growth at least to 2017, the steel construction sector no doubt will be pleased. Our ongoing effort to meet this demand cost effectively while maintaining and demonstrating the required quality will maintain confidence and trust. Due to the encouraging development in non-structural heavy steel sales during the last year, HERA expects steel volumes in the non-steel construction sector for the coming year to at least match this year's levels.

While HERA has confidence as to its own levy-funded activities, particularly in steel construction, leveraging public sector co-funding for our R&D programmes will reach a critical phase in the next year. The Structural Systems division effort for the development of a steel construction innovation research partnership proposal did not come to fruition due to the MBIE requirement that such a proposal must have an export focus. In the current funding landscape and, with our industry's unwillingness to commit to export-related development activities when the focus is on staying competitive in the buoyant local market, this proposal was rejected. So it will be very much business as usual in structural steel R&D, with the exception of an industry requirement for HERA to sort out easy access to steel construction design software which meets our local requirements.

For the Industry Development division, the government co-funded AGGAT programme will start the last year, and pressure is on HERA and its research and industry partners to deliver the outcomes, including two operational ORC pilot plants. Hopes are high that a strong industry commitment will trigger the development of a successful co-operative research proposal which will find future public sector co-funding. Additionally, other industry business development opportunities largely in the renewable energy space will be explored.

For the NZ Welding Centre, the contribution to the AGGAT materials research aim will dominate research activities. A new research focus will be aiming to answer the question "How can the increased industry focus on quality assurance in welded steel fabrication be used to get efficiency gains on the welding inspection side?". Also continued research into seismic steel framed solutions is on the R&D work plan.

Acknowledgement

Looking back, 2014/15 was a real confidence boost to HERA and the industry with increased activity, demonstrated leadership and greater engagement. For example, as demonstrated by the SFC scheme participation, a generally confident and innovation-focused industry, and a newly-refurbished HERA House, great outcomes can be achieved by our industry.

This would not be possible without the incredible support of our members, including the many individuals who freely give of their time for the common good. This also applies to individuals from our partner organisations and key stakeholders outside the industry, from Government and its departments to the many research providers we interface with. Our thanks go to all of those who contributed, and this includes HERA's committed team of around 20-plus in staff, visiting scholars and students, and associated contributors.




Dr Wolfgang Scholz
Director

FOCUS: GROWTH & INNOVATION

As stated in its Mission, HERA is to be the catalyst for research, innovation, growth and development in New Zealand's metals engineering industry. The close interaction between industry members and HERA staff, and the fact that industry governs HERA and charges it with the execution of its strategy, assists HERA in being exactly this catalyst.

Steel Construction Innovation via Standards Development

HERA steel construction research and development provides sector-wide benefits particularly when implemented in codes and standards. HERA is represented on the respective Australian or joint Australian/New Zealand standards committees by the Structural Systems General Manager Dr Stephen Hicks. This year saw progress in the following areas:

• Fire Code Requirements

Recent changes to fire code verification documents have increased the fire rating requirements for steel-framed car parks. As a result, passive fire protection is now being specified. Dr Stephen Hicks has participated in an SCNZ-led industry working group to agree on a methodology and approach to permit the use of unprotected steelwork in steel-framed car park buildings.

Holmes Fire has been engaged by Steel Construction New Zealand (SCNZ) to

develop the guidance document and a draft has been developed. The working group has reviewed the draft guidance document, which has been put forward for endorsement by the Ministry of Business, Innovation and Employment (MBIE).

• Design Guide for Multi-storey Light Steel Framing

In a commercial programme, HERA successfully obtained research funding totalling \$100k from the Building Research Levy Investment Programme and NASH to develop a design guide for multi-storey steel framed buildings. The proposed design guide will enable New Zealand designers to unlock the benefits of modern methods of construction using multi-storey light steel framing, which has been successfully used in the northern hemisphere as off-site manufactured panelised and volumetric (modular) systems.

• Steel Material Standards

Since 2012, the Standards Australia BD-023 Structural Steel Material Committee has been working on revising AS/NZS 1163, AS/NZS 3678, AS/NZS 3679.1 and AS/NZS 3679.2. These drafts have gone to ballot and it is expected that the new standards will be published later in 2015.

• Bolting Standards

The Standards Australia ME-029 Fastener

Committee is reviewing many aged fastener standards, including the Australian and New Zealand Standard AS/NZS1252 *High-Strength Steel Bolts with Associated Nuts and Washers for Structural Engineering*. Working closely with the Australian Steel Institute (ASI) and the Australian Technical Infrastructure Committee (ATIC), a proposal was submitted and accepted by Standards Australia to revise AS/NZS 1252 to align with the EN 14399 suite of bolting standards.

• Composite Design Standard for Buildings

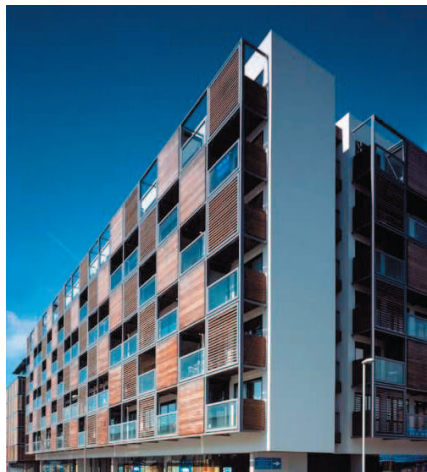
The Standards Australia BD-032 Composite Construction Committee had progressed development of the new joint Australian and New Zealand steel-concrete composite design standard for buildings AS/NZS 2327, which will replace the existing NZS 3404 Section 13. In addition, as the standard is reaching maturity, a software working group has been established by HERA to ensure that design software tools that support the new standard will be available upon its release. Drafting is scheduled to be completed in 2015, with the draft for public comment becoming available early in 2016.

• Steel and Composite Design Standard for Bridges

Dr Stephen Hicks chairs the Standards Australia BD-090-06 Steel and Composite Construction Committee responsible for the



Dr Stephen Hicks' keynote address on 'New Design Practices for Steel and Steel-concrete Composite Bridges in Australasia' at National Road and Rail Infrastructure Symposium, CIES, UNSW



Demonstrating multi-storey light steel framing potential: 102-flat Moho building in Manchester, UK using six-storey stacks of self-supporting light steel framed modules



HERA member D&H Steel Construction fabricated the steelwork for the new Christchurch bus exchange



University of Auckland Science building by Fletcher Construction, steelwork fabricated by Graysons Engineering and welded structural beams from Steltech Structural, all HERA members

forthcoming AS/NZS 5100.6 design standard for bridges. The results from Beca work on fatigue loading of New Zealand road bridges that is summarised in NZTA Research Report 547 have been incorporated within the new fatigue provisions through collaborative work between Structural Systems and the NZ Welding Centre.

In addition, in collaboration with the University of Western Sydney and University of New South Wales, the structural reliability work which supports the use of the non-AS/NZS steel products that are currently recognized in NZS 3404.1 was published as a peer-reviewed paper in the Australian Journal of Structural Engineering.

• Steelwork Execution Standard

Although quality management has long been recognized in the reliability standard ISO 2394, which underpins the load and capacity factors given in AS/NZS 1170.0, this is now being formalised in international steelwork fabrication and erection (or 'execution') standards such as EN 1090 and the forthcoming ISO 17607. The current trend internationally is that, rather than changing the capacity factors used in design, the designer specifies the Importance Class for the structure under consideration which, in turn, affects the level of quality management required in the execution.

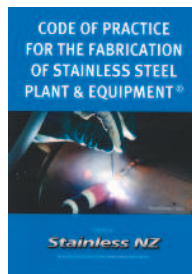
In line with these international developments, the Standards Australia BD-001 Steel Structures Committee is currently developing a new joint Australia/New Zealand steelwork execution standard AS/

technical and quality framework for the Steel Fabrication Certification scheme.

• Welding Standards

HERA's New Zealand Welding Centre (NZWC) via its General Manager Dr Michail Karpenko represents New Zealand welding fabrication interests on the joint AS/NZ Welding Standards Committee WD-003 Welding, WD-002 Welding Consumables and ME-001 Pressure Equipment, making a significant contribution to the update and development of relevant welding standards. Five updated parts of the AS/NZS 1554 standard series on Structural Steel Welding have been published last year, with some of them including important changes for New Zealand steel fabricators. The updated standards were:
Part 1: Welding of steel structures
Part 3: Welding of reinforcing steel
Part 4: Welding of high strength quenched and tempered steels
Part 5: Welding of steel structures subject to high levels of fatigue loading
Part 7: Welding of sheet steel structures

• NZSSDA Blue Book Contribution



The NZWC contributed to the revision of the NZ Stainless Steel Development Association's (NZSSDA) Code of Practice for the Fabrication of Stainless Steel Plant & Equipment, referred to as the Blue Book. The Blue Book has established itself as a key document for the specification of stainless

steel plant in New Zealand and assists industry to achieve the quality, structural integrity and food safety requirements necessary for stainless steel plant and equipment. Section 10 of the Blue Book addresses welding aspects of stainless steel. It also includes commentary on the standard AS/NZS 1554.6:2012 *Welding of Stainless Steel for Structural Purposes*.

Steel Fabrication Certification Scheme Gains Acceptance

To maintain a competitive edge and to ensure safety and reliability of steel structures in New Zealand's seismic environment, SCNZ and HERA jointly developed a quality compliance scheme known as the SFC scheme. Following best international practice, the SFC scheme takes a risk-based approach, introducing four Construction Categories for steel structures covering a wide range of applications.

The certification services for the scheme are performed by the HERA ANBCC, the International Institute of Welding Authorised National Body for Company Certification for NZ. All activities of the HERA ANBCC including the certification process are controlled by an independent Governing Board that includes representation from the NZ fabrication industry, with the actual certification activities being performed by NZWC staff under its Manager Certification Dr Michail Karpenko. To better cater for the assigned role, a new HERA subsidiary called HERA Certification Ltd. has been established with the view to transfer the HERA ANBCC function into the new structure in the coming year.



Pelton Turbine Runner for a 3.4MW Hydro scheme to be installed in central Otago designed and built entirely in Christchurch with all the machining completed by HERA member Hydroworks



Award of SFC certificates to the representatives of HERA companies (from left to right; rear): Whakatiki Engineering Ltd, MJH Engineering Ltd, Jensen Steel Fabricators Ltd, Red Steel Ltd, Eastbridge Ltd, (front) D&H Steel Construction, John Jones Steel Ltd and Chapman Engineering Ltd



MBIE CEO David Smol (right) and NZWC General Manager Dr Michail Karpenko (left) present a IIW MCS AS/NZS ISO 3834 certificate to Whakatiki Engineering Ltd Director Murray Scaife, one of eight awarded in 2014



HERA member Stevensons Engineering re-built the Lion-Tiakitahuna rocket just south of Palmerston North, in commemoration of the 150th anniversary of its creation

FOCUS: GROWTH & INNOVATION

The launch of the SFC scheme at the SCNZ AGM in September 2014 was an important milestone for our industry. Eight fabrication companies signed up and received IIW MCS ISO 3834.2 certification from the CEO of MBIE, David Smol. A further eight companies went through the HERA certification process and at the time of writing this report were close to achieving their certification.

Industry Development

The HERA Industry Development Division is responsible for business opportunity and general industry development in the heavy engineering industry sectors not associated to steel construction. It is focused on developing broad support platforms around emerging export market opportunities, particularly in the clean energy and renewables sector. Companies are supported through use of the Industry Development Roadmap Process, which identifies market opportunities, enrolls companies to pursue them, and develops and manages the research required.

• Above Ground Geothermal and Allied Technologies

The Above Ground Geothermal and Allied Technologies (AGGAT) programme is HERA's major research programme outside steel construction. It continues to be developed as a science and technology platform to support innovation and growth in New Zealand companies interested in developing their own products for export/energy markets, but also for technology end-users such as energy producers. AGGAT research is covered in detail under the Research & Development Focus.

• Marine Energy and Ocean-Related Engineering

General Manager Industry Development Nick Inskip continued in his role representing the metals industry on the Executive of the Aotearoa Wave and Tidal Energy Association (AWATEA). He chairs the working group on the development of a New Zealand Marine Energy Centre (NZMEC), and has been active in promoting the long-term industry opportunities that will accrue from the successful establishment of the centre. Additional information was provided in support of the business case for the establishment of the NZMEC, which is currently with MBIE for review.

Nick also presented on progress and opportunities of the NZMEC at the Aotearoa Wave and Tidal Energy (AWATEA) Conference held in May 2015. The conference was followed by a Callaghan Innovation-supported workshop on business opportunities around marine energy. Most recently and just outside the reporting period, Nick visited the European Marine Energy Centre (EMEC) in Orkney, Scotland, who are joint venture partners in the prospective centre. He also met with government representatives involved in policy and administration of marine resources, and with a company interested in joint venturing with local industry on the testing of an offshore wave-powered fish farm concept.

• Industry Capability Promotion

Industry capability is showcased through HERA's online Capability Register and through the 2015 edition of HERA Report R5-35 *Geothermal Capability Register*, which is available as a hard copy or downloadable from www.hera.org.nz



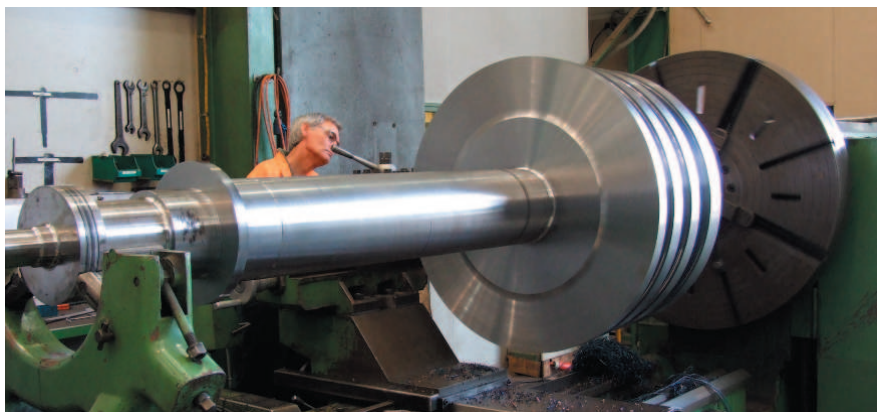
Media tour of the Waterview Tunnel being constructed by a consortium including HERA members Fletcher Construction, McConnell Dowell Constructors, Beca Infrastructure and Tonkin & Taylor



HERA member Calder Stewart Steel's innovative award-winning new structural steel fabrication facilities in Christchurch



HERA member EHL Group fabricated the entire unit for this wave energy device tested at the US Naval Testing Grounds off the coast of Hawaii



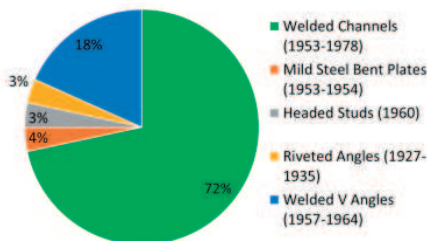
A replacement turbine rotor manufactured by HERA member Allied Industrial Engineering. The scope of work was comprehensive, including procurement of the rotor forging, procurement of the blades, machining of the rotor, fitting of the blades, fitting of the shrouds, peening, final machining and balancing

HERA R&D is closely linked to the growth and innovation focus described previously and advanced across all HERA divisions.

Structural Systems Research

• Design Resistance on Existing Composite Bridges

HERA was successful in being awarded a significant new research project by NZTA to develop a design guide for existing steel-concrete composite bridges. Working in collaboration with Opus International Consultants, the project has identified the many different shear connector types that have been used in New Zealand since the 1920s. Design rules are currently being developed to enable engineers to make an assessment of the load capacity of existing bridges, thereby permitting HMPV and 50MAX vehicles to have wider access to the existing highway network. It is intended that the resulting design guidance will be included in the Transport Agency's Bridge manual.



Proportion of different types of shear connectors in 60 composite bridges located in Canterbury and the West Coast

• Concrete Filled Tubular Steel Columns Fire Performance

The numerical simulation work commenced in the previous year was continued with several experimentally tested composite columns fire resistance ratings (FRR – expressed in minutes up to failure) being predicted accurately. The know-how methodology is based on normal and high strength confined concrete material properties sourced from research not described in EN 1994-1-2:2005 +A1:2014, which covers unconfined concrete.

Following the validation of the finite element analyses, a highly utilised slender column FRR was extensively investigated for gradually increasing axial force eccentricity. HERA Report R4-148 summarises the work and the key findings have been submitted to an international journal for peer-review.

Furthermore, a detailed matrix has been set up with all possible combination of composite



Former HERA Structural Engineer Raed El Sarraf now at HERA member Opus Consultants oversees the first use of the Ternmarst corrosion protection coating on a suspension bridge in the rugged west coast of New Zealand

columns, from which cases most relevant to structural engineers will be analysed in the coming year to make the column selection process for desired FRR a simple one.

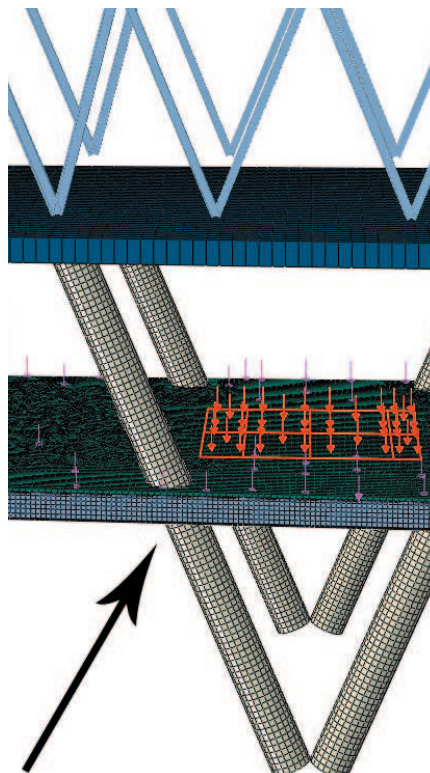
• Temperature Distribution in Typical Composite Slabs Under Standard Temperature-Time Fire Condition

For typical New Zealand composite floors using profiled steel decking, Temperature-time (T-t) curves and temperature contour plots in accordance with the ISO 834 have been calculated and presented in tabulated format. The temperatures in 10-minute intervals up to the requested fire resistance rating have been reported throughout the slab cross-section to form the basis for a simplified calculation method; this method can be used to calculate the design fire resistance of composite slabs with reinforcement within the ribs, and replaces the guidance formerly presented in HERA R4-82. It is proposed that this methodology will be incorporated within the fire section of the forthcoming composite design standard AS/NZS 2327.

• Floor Vibration Assessment Due to Rhythmic Activities

A particularly interesting commercial research project demonstrating the depth of Structural Systems' research expertise was for an overseas application. HERA Finite Element Analyst Nandor Mago and General Manager Dr Stephen Hicks assisted the designer of a multi-billion dollar overseas project to select the composite floor together with tuned mass dampers (TMD) for rhythmic activities. TMDs were mounted underneath the ballroom floor slab to reduce the amplitude of mechanical vibrations mostly due to various dancing functions.

Their correct position, stiffness and damping prevent discomfort, damage, or outright structural failure due to fatigue cracking. Advanced dynamic analyses helped to design the floor system to avoid vertical accelerations greater



Floor vibration assessment with tuned mass dampers performed by HERA finite element analysis service

than 0.5m/s². The applied methodology was based on SCI Publication 354, of which Dr Hicks is a co-author.

Welding Technology Research
• Weld Fatigue Design and Performance Research

NZWC in cooperation with Structural Systems have developed new fatigue provisions for Section 13 of AS/NZS 5100.6, in close cooperation with the world authority on fatigue design Prof. Adolf Hobbacher from Germany. The new fatigue provisions eliminate the existing tedious calculation procedure of damage accumulation by the use of damage equivalent factors. The calibration models were established and calculations performed by a German Masters student. Work on AS/NZS 5100.6 has now been completed and the draft for public comment is awaited from Standards Australia.

• Design of Seismic Joints

Work on seismic issues involved fracture mechanics modelling of the behaviour of typical welded joints used in NZ seismic steel construction design. A simplified engineering assessment procedure to evaluate the risk of brittle fracture in welds has been developed. The approach is based on the modified BS 7910 procedures that include a shift in the transition temperature due to the strain hardening introduced by high-strain cyclic loading. The approach was used to assess the critical crack size in active links. Conclusions were made with respect to the critical crack size as a function of material properties, service temperature, strain hardening and other critical factors.

• Reliability of Fabricated Steel Work – Quantity of NDT

Visual welding inspection and non-destructive testing are an integral part of the quality assurance framework of New Zealand structural steel design and fabrication standards. The current inspection requirements of the standards do not, however, take into account formal quality management efforts of fabricators.

Welding quality management systems have continuously evolved over the years and international best practice suggests that fabricators, maintaining weld quality management systems as e.g. to ISO 3834 as intended, have significantly improved weld quality and deliver products complying with the specification as standard output. As reported, ISO 3834 certification has now been successfully introduced in New Zealand as part of the SFC scheme, and the majority of NZ steel construction capacity is now covered by SFC scheme-certified fabricators.

During the year a new research project has been developed and approved which, based on the analyses of weld inspection data of companies having implemented ISO 3834, aims to optimise the quantity of visual and non-destructive testing (NDT) inspection specified in the relevant standards with the ultimate aim to ensure reliable and safe fabrication, while at the same time improving productivity and reducing fabrication cost. The project has started with collecting NDT statistics from ISO 3834 certified companies.

AGGAT Research Programme

The Above Ground Geothermal and Allied Technologies (AGGAT) programme has the primary objective to enhance the manufacturing capability of Organic Rankine Cycle (ORC) products for low enthalpy power generation in NZ via heavy engineering companies, thereby contributing to the international product offerings and increase NZ presence internationally. The programme has long-term intentions and this report covers Year Three of a four-year NZ government co-funded programme.

AGGAT is being run in collaboration with a number of partners including universities, HERA member companies and heat resource providers as end-users of ORC technology. It has the aim of providing a platform of research and development of tools, facilities and capabilities to support engineering companies in the process of developing their own products with associated IP.

A number of objectives have been set up to span the breadth of AGGAT. Regular monthly progress updates have been provided via HERA News and are summarised as below:



The AGGAT Research Team at the AGGAT Technical Advisory Board Meeting in HERA House

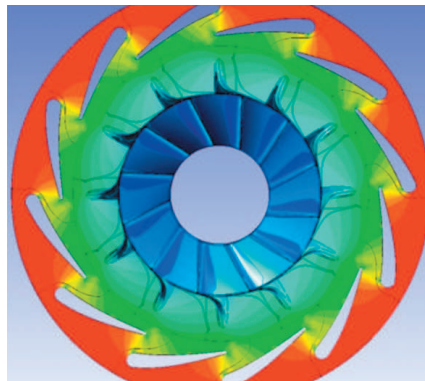
• ORC plant manufacturing has begun in NZ this past year. Industry partner ABS negotiated turbine supply with their preferred supplier from the UK and are on track to deliver their waste heat power generation pilot plant. Partner PFS Engineering has completed short run times with their geothermal ORC pilot plant.

• Following a successful AGGAT research team restructure, the programme has increased its level of co-operation between research and industry partners, and built a solid capability level in low enthalpy power generation research.

• Turbo-machinery R&D capability has been established. The extent of this research moves beyond developing fundamental analysis of turbo-machinery performance, heading into exploring now local turbine manufacture.

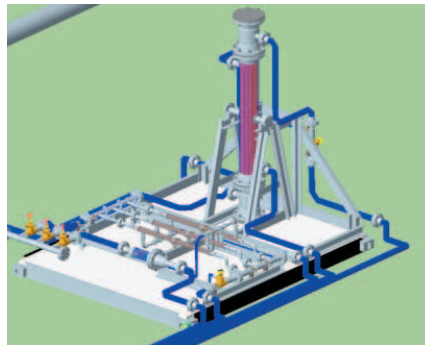
• International recognition as emerging authority: AGGAT researchers attended and presented on AGGAT research achievements locally and internationally. International researchers and industry players have acknowledged our work and attended our first AGGAT Global Conference, which led to enhanced networking opportunities.

• Significant progress has been made in designing and installing AGGAT test rigs in workshop, lab and the geothermal fields of NZ geothermal energy generators.



Proposed aerodynamic design for the AGGAT Turbine

Whilst these rigs are still in the process of installation, momentum has increased in stakeholder engagement, co-funding contribution and materialising of planned activities.



Materials Scaling and Corrosion Testing Rig Design, verified and ready for fabrication and installation at the Ohaaki Thermal Kilns site in partnership with Contact Energy supplied geothermal brine

• Career pathway for two AGGAT post-graduate researchers transitioning into NZ business have been achieved, which is a first in the programme.

• Heat transfer innovations have been developed for industrial application. Concepts were validated through CFD analysis and empirical engineering assessments.

• Significant end-user engagement has been secured via MoUs around the installation of the two AGGAT pilot plants and the AGGAT field test rigs.

• AGGAT publications included one journal, fourteen conference papers and two internal AGGAT reports.

2014/15 HERA Publications:

- Kang W-H, Uy B, Tao Z, Hicks S. *Design Strength of Concrete-filled Steel Columns*. *Advanced Steel Construction*. 2015. 11(2), pp. 165-184
- Hicks S, Peltonen S. *Design of Slim-floor Construction for Human-induced Vibrations*. *Steel Construction*. 2015, 8(2), pp. 110-117, DOI:10.1002/stco.201510015
- Kang W-H, Hicks S, Uy B. *Safety Factors for the Resistance of Steel Sections*. *Australian Journal of Structural Engineering*. 2015. 16(2), pp. 116-128, DOI:10.7158/S14-020.2015.16.2
- Hicks SJ, Pennington AF. *Partial Factors for the Design Resistance of Composite Beams in Bending*. *Journal of Constructional Steel Research*. 2015. 105, pp. 74-85, DOI: 10.1016/j.jcsr.2014.10.023
- Uy B, Hicks S, Kang W-H. *Australasian Advances in Steel & Composite Structures to Enhance Cross-border Practice*. 17th ASEP International Convention (17AIC), 28-30 May 2015, Pasig City, Philippines
- Hicks S. *New Design Practices for Steel and Steel-concrete Composite Bridges in Australia*. (Keynote Lecture). National Road

and Rail Infrastructure, CIES Symposium, 6 November 2014, University of New South Wales, Sydney, New South Wales, Australia

- Hicks S, Uy B. The new joint Australian and New Zealand bridge design standard AS/NZS 5100 – Part 6: *Steel and Composite Construction*. 9th Austroads Bridge Conference, 22-24 October 2014, Sydney, New South Wales, Australia.

- Hicks S, Uy B. The new joint Australian and New Zealand bridge design standard AS/NZS 5100 – Part 6: *Steel and Composite Construction*. 37th IABSE Symposium, Madrid 2014, International Association for Bridge and Structural Engineering, Zurich, 2014, pp. 1663-1670. DOI: <http://dx.doi.org/10.2749/222137814814068120>

- Uy B, Hicks S. Australia/New Zealand standard for composite structures, AS/NZS 2327. Australasian Structural Engineering Conference 2014 (ASEC 2014), 9-11 July 2014, Auckland, Structural Engineering Society New Zealand (SESOC)/Engineers Australia (EA)/ Institute of Professional Engineers New Zealand (IPENZ)

- Mago N, Hicks S. *Eccentrically Loaded Concrete Filled Slender Tubular Steel Columns in Fire Condition*, HERA Report R4-148, 2015

Mago N, Hicks S. *Temperature Distribution in Typical Composite Slabs under Standard Temperature-Time Fire Condition*, HERA Report R4-147, 2014

- Karpenko M, Fussell M: *New Zealand Steel Fabricator Certification Scheme "ISO 3834 PLUS"*. SC-QUAL-209-14.

- Karpenko M, Baumgartner F and Mago N: *Brittle Fracture Assessment of Welded Seismic Connections – A Practical Approach*. 4th IIW Welding Research and Collaboration Colloquium, Wollongong, 5/7 November 2014.

- Karpenko M: *Corrosion Resistance of Alternative Stainless Steel Grades*. *Australasian Welding Journal*, Volume 60, Second Quarter, 2015

- Proctor W., Yu W., Young B., *Simulation of Set-point Feed Forward Control of Wellhead Valves in an Organic Rankine Cycle Geothermal Power Plant*, *Asia-Pacific Journal of Chemical Engineering*

- Habib B., Inskip N., Chen, L., Karpenko M., Farid M., Young B. *Above Ground Geothermal and Allied Technologies – Paving the Research Roadmap*, ASME ORC Conference, Poster Presentation Belgium, 2015

- Chen L., Habib B., Inskip N., *Development of Geothermal Turbine*, ASME ORC Conference, Poster Presentation, Belgium, 2015

- Habib B., Young W., Yu W., Zheng H., Proctor M., *The Conceptual Development of an Expert Process Design Tool for Above Ground Power Generation Technologies*, New Zealand Geothermal Workshop, Taupo, 2015

- Chen L., Habib B., Inskip N., *Aerodynamic Design of Radial Inflow Turbine for Medium Scale Organic Rankine Cycle System*, New Zealand Geothermal Workshop, Taupo, 2015

- Abbas H., Habib B., Farid M., *Development and Validation of Annual Finned Tubes Evaporator for Cross-Flow Co-current Exhaust Gas – R245fa ORC system*, New Zealand Geothermal Workshop, Taupo, 2015

- Heinzl H, *Development of a Field-based Materials Test Rig*, New Zealand Geothermal Workshop, Taupo, 2015

- Sharma P., *Waste Heat Resource Mapping in New Zealand and Recovery using Organic Rankine Cycle Technologies*, HERA Report R5-57:2015, HERA

Eight conference papers at AGGAT Global Conference 2015:

- Heinzl H., AGGAT Materials Research

- Chen L., *Modelling and Design of a Radial Inflow Turbine*

- Wong C., *Exploration of Turbine Technologies for Organic Rankine Cycle – Expander Selection and Implementation (ESI) Method*

- Habib B., *Developing and Expert Design Tool*

- Sharma P., *Standardised Technology Concepts in Organic Rankine Cycle*

- Proctor M., *Optimisation and Control of Geothermal Organic Rankine Cycle Plants*

- Farid M., *Heat Exchanger Innovations*

- Zarrouk S., *Scaling in Geothermal Environments*

The current HERA business model is based on three income streams. The first is research and development (R&D) funded from the industry research levy (53% in 14/15). This is complemented by the second R&D-related income stream from public sector funded research (22%). The third income stream is self-generated income (25%) that includes training, certification, commercial industry research projects, consulting, but also income from membership fees, HERA House and the grant from the Heavy Engineering Research and Educational Foundation (HEERF) for research and scholarship support.

The HERA expense streams are shown in the diagram for the four HERA divisions: Structural Systems, Industry Development and the NZWC. Note

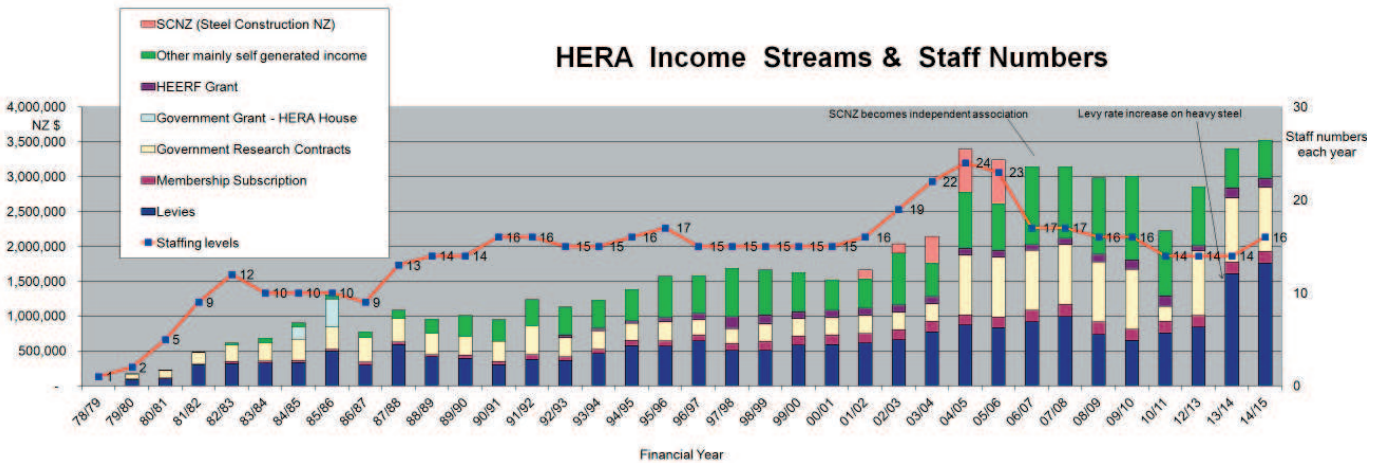
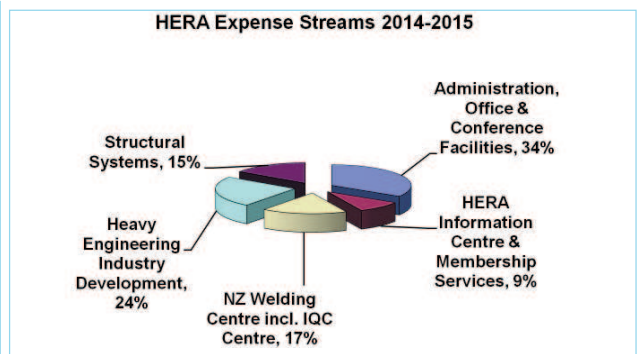
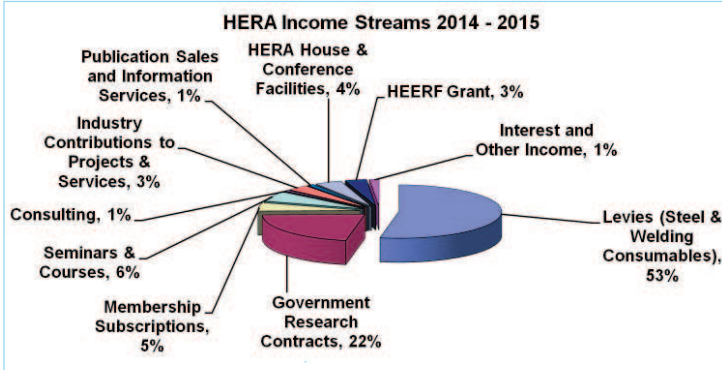
that the office and overhead cost for each division are in the administration/office cost element shown. This year the admin/office cost element was 7% over the usual basis, due to cost related to running separate HERA offices during the HERA House refurbishment activities.

Financial Performance

With the reported increase in industry levy funding, more emphasis has been put on the levy-funded activities but as strategic direction, it is recognised that the aim remains to maintain the previous relationship between industry/government and self-generated income, meaning growth in HERA capability and staff.

Finding and committing to the appropriate staff has been a challenge for the respective division leaders due to the

specialist nature of personnel sought, and during much of the year budgeted positions stayed unfilled. Only towards the end of the financial year, Structural Systems and AGGAT research staff demands have been met and as a result the staff budget has been underspent, which contributed to nearly half of this year's surplus of \$540k. The other half of the surplus was made up from better-than-budgeted industry research levies and self-generated income. This is a very pleasing result assisting in paying back the HEERF loan of the previous very tight years, and begin building again a financial reserve to shelter HERA from natural fluctuations in the business cycle that provides the HERA research levy income stream.



Minister for Science and Innovation Hon Steven Joyce unveiling the HERA House re-opening plaque with HERA Director Dr Wolfgang Scholz



The re-opening of the newly-refurbished HERA House was well-attended by members, Government and industry stakeholders

FOCUS: TRAINING & EDUCATION

HERA uses its research staff in an extended role to provide tailored education and training for its industry members. In this way, HERA fills the gaps that are not provided by conventional education providers.

This best applies for the NZWC which provides technology courses that comply with national and international best practice and also lead to formal qualifications. Courses include the popular AS 2214 Welding Supervisor Course and the International Welding Inspector IWI-B and IWI-S courses.

A total of 76 welding professionals attended HERA's training courses in 2014/15, with the majority of them seeking International Institute of Welding (IIW) and AS 2214 qualifications via the IIW Authorised National Body (ANB) for New Zealand the HERA ANB (see also HERA ANB Chairman Report).

As a significant contribution to facilitate training, a distance learning IT platform has been developed by the NZWC. The platform is now used successfully for the distance learning component of the AS 2214 Welding Supervisor and IWI-B Welding Inspector Part 1 course.

As in previous years, NZWC General Manager Dr Michail Karpenko also contributed to university education by providing a series of lectures titled *Welding in Steel and Aluminium Marine Structures* at the Mechanical Engineering Department of the University of Auckland.

In 2014/15, NZWC contributions to the HERA technical events calendar attracted more than 160 professionals. A seminar series on *Quality Management in Welding Fabrication* was held in conjunction with SCNZ at five locations across New Zealand. The seminar raised awareness of the SFC scheme and of compliance in steel fabrication.

The HEERF-sponsored visiting scholar series covered *Engineering the Repair and Retrofitting of Steel Structures* with Robert E. Shaw from the USA. Robert has been in front of our membership before and is an internationally-recognised expert on welded and bolted connections for seismic applications.

The *Fitness for Service* course aimed at covering the basis for assessment of pressure plant equipment for continued service in accordance with API 579 was offered by Quest Integrity in co-operation with the NZWC.

HERA ANB Chairman's Report 2015



Phil Stacey
Chairman HERA ANB



To maintain a competitive edge, New Zealand's fabrication industry requires a skilled workforce provided through tertiary education. The industry also needs welding coordination and welding inspection staff with specific technical knowledge that is not usually available within New Zealand's standard technical education.

This is a unique and very important niche market that has been successfully filled by the HERA ANB, the International Institute of Welding (IIW) Authorised National Body (ANB) for New Zealand. The HERA ANB implements the training and examination requirements for

international and national welding related qualifications.

All activities of the HERA ANB including the examination process are controlled by an independent ANB Governing Board that comprises representation from the NZ fabrication industry, training providers, universities and other interested parties which have a valid interest in the programmes.

During the 2014/15 year, the HERA ANB issued 15 diplomas for the International Welding Inspector qualifications IWI-B and IWI-S, and a record 39 certificates of AS 2214 Welding Supervisor qualifications. HERA's welding supervisor and welding inspection qualification programme is also central to the Steel Fabricator Certification (SFC) scheme jointly developed by HERA and SCNZ. The scheme is based on IIW's world-class Manufacturer Certification Scheme IIW MCS ISO 3834 that requires certified fabricators to have appropriately qualified staff in place.

Challenging the Next Generation of Our Professionals

HERA's Structural Systems sponsored the ArchEng 2015 Workshop in association with BRANZ, and the concrete and timber industries. The ArchEng initiative brings together the best students from New Zealand's final year Architecture and Engineering schools to experience the value of cross-disciplinary collaboration.

The students work in partnerships on a design challenge over three days. Twenty-two students participated this year at the event hosted by Victoria University, and responded to the simple brief 'to design 'an iconic waterfront project'. The prize-winners were Simon Gouley (Architecture, University of Victoria) and Ashley Jones (Engineering, University of Auckland). They created *The Outcrop*, an extraordinary movable floating walkway designed to extend 150 metres into the Wellington harbour.

The Hon Jo Goodhew, Associate Minister for Primary Industries, hosted this year's prizegiving at Parliament House on 10th July. Associations represented at the event included IPENZ, SESOC, NZIA, HERA, CCANZ, the NZ Timber Society, the Wood Manufacturers Association, Engineers Wood Products Australasia Timber.



From right: ArchEng winners Ashley Jones and Simon Gouley with Hon Jo Goodhew



WTIA 4th IIW Research and Collaboration Colloquium – award of the certificate of appreciation; Mr Chris Smallbone (right) and Dr Michail Karpenko



Attendees of the joint Welding Supervisor & Inspector Course, IIW Welding Inspection course – NDT Training provided by Jim Watkinson from HERA member SGS New Zealand (left)





Engineering the Repair and Retrofitting of Steel Structures seminar with international expert Dr Robert Shaw



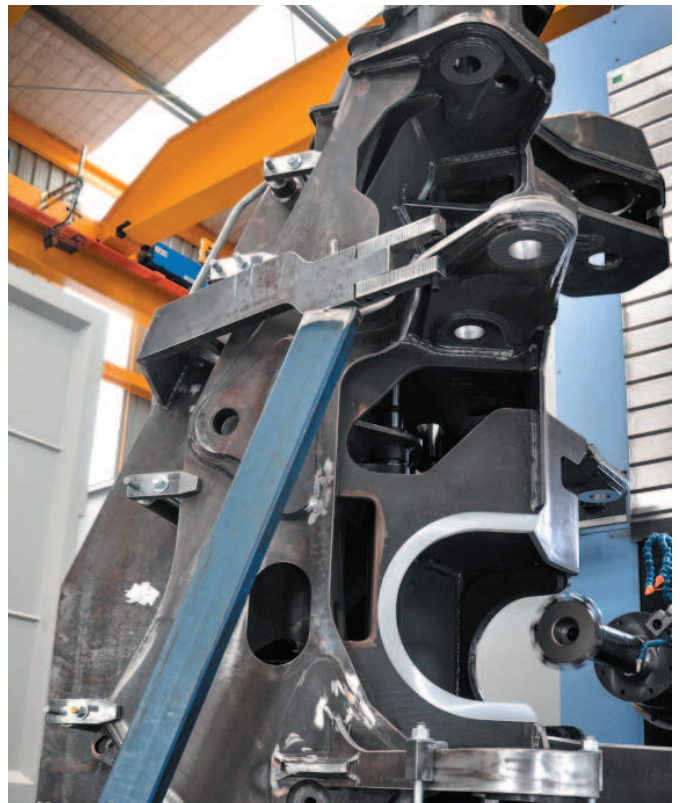
HERA House metal facade frame built and installed by HERA member ISSA Engineering



HERA member Transtech Dynamics built this lightweight bitumen tanker for client and HERA member Fulton Hogan



A technical first with new more cost-effective material: HERA member Acme Engineering's lean duplex stainless steel tank



Component fabricated by HERA member Page MacRae Engineering and machined by Robert Page Engineering's new 48-tonne capacity CNC borer, currently the largest of its kind in New Zealand



Eel Trap footbridge in Mt Roskill Auckland designed and fabricated by HERA members Beca and Eastbridge respectively

FOCUS: LEADERSHIP

Providing leadership through the HERA network stands high on HERA's strategic agenda. This is being done by senior staff playing a key role on boards and committees attending professional and relevant social events but also by engaging in submissions put our way as an industry research association.

Metals NZ

Last year was the first full year of operation by Metals NZ under its CEO Gary Hook. HERA continued to provide substantial Metals NZ support, firstly by funding its *Securing the Future of the NZ Metals Engineering* project, secondly by providing research and general support for industry-wide advocacy, and thirdly for administration support of Metals NZ. This included sponsorship of the new offices for Metals NZ in HERA House (see separate: Metals NZ CEO Report).

In line with the HERA decision to research items for cross-sector industry advocacy, HERA contributed the Metals NZ's Policy document and continued work on government procurement issues, and in particular how our industry should build opportunity from our largest industry client, the Public Sector, introducing new Procurement Rules. However in terms of making submissions, this task has now been handed to Metals NZ for a more forceful and appropriate cross-sector response. As a result, the Director's membership of the Government Procurement Business Reference Group has been handed over to Metals NZ.

R&D Leadership

• Submission to National Statement of Science Investment

HERA responded to the call for submission to the Draft National Statement of Science Investment. HERA's main message was that goals and proposed actions in general are to the point and supported, however the provision of the appropriate funding to achieve this is not provided. Therefore, HERA's main recommendation is that substantially more funding needs to be made available for industry transformation via leveraging from public funded R&D.

• IRANZ

HERA is a member of IRANZ, the Independent Research Associations NZ grouping. HERA actively supports its agenda including its R&D advocacy role.

• National Science Challenge - Building Better Cities, Towns and Communities

The HERA Director attended several workshops representing the building and construction industry in a very researcher-dominated science challenge formulation. The national science challenge numbered NSC 11 has been approved for funding by the Government and while overall aiming at *Building Better Towns and Communities*, specifically includes our industry in one of its five Strategic Research Areas by aiming to *Transform the Building Industry* into a healthy, smart and innovative industry. The challenge remains to influence the NSC11 research leadership to put economic opportunity and sustainability of the sector on the research agenda, in order to be able to seriously engage the building and construction industry sector.

Steel Construction

Steel construction represents the strongest sub-sector within the HERA membership and hence a key focus of HERA activities is providing leadership which benefits this



Metals NZ CEO
Gary Hook

Metals New Zealand is an incorporated society serving the needs of New Zealand's broad metals-related businesses. It continued in 2014/15 to establish a solid platform for industry advocacy and promotion.

Success in this government policy influencing endeavor relies on harnessing the energy and support of existing sector organizations, collecting and utilizing standard messaging and the power of a unified voice. Having an industry presenting itself as 'One', and of significant scale and quality makes this task that much easier.

This year, the **Metals Week 2015** event has been designed and built with these objectives in mind, and more. The event will present the opportunity for all members and stakeholders in the metals industry to come together, network, learn and celebrate excellence from across the various sectors.

There are real benefits in facilitating this and the bigger the involvement, the better. We have designed the concept and event to be scalable, to do all the things we need to do to present ourselves to politicians, the public, regulators and future employees in a way that demonstrates our size and relevancy, capability, togetherness, our quality and our drive for excellence in everything we do. This year the event will be held in September.

The **Government's Free Trade Agenda** has rolled on and during this last year, opportunities were taken to interact with various agencies and regulators on policy matters. The Korean Free trade Agreement, affordable housing inspired anti-dumping tariff suspensions, Customs tariff code adjustments for import statistics on residential building materials, The Public Interest Test policy consultations and associated ATP have been part of that list.

With the Chinese economic slowdown, and continued surge in metals manufacturing installed capacity, there are unprecedented high levels of exports in our regional markets right now with pricing that presents a direct threat to our own metals manufacturing businesses and stakeholders, with products available via these and other low-cost economies and Free Trade channels. Add to this the pending adjustments to our trade policies to include a

Public Interest test, simply illustrates the tough challenges our businesses face this coming year in order to compete and survive.

Metals NZ has, therefore, been active with Customs, MBIE and the Commerce Commission this year generating the necessary relationships and advocacy around policy and product standards very much connected to the current market threat. A project is in the process of being scoped which will look to outline our business options as to how we can ensure that only quality products to standard and building code can be offered in the domestic market. Research will include insights into the events and response by the Australian regulators who are dealing with at least two significant non-standard product failures this year in their building and construction market.

Government Procurement Principles & Rules

implementation is high on the Metals NZ agenda. The Principles and revised V3 *Rules of Sourcing* are now nearly in the form that we believe will drive Government Agency managers and their procurement specialists in their planning and decision making that will ensure our local industries at least have an equal chance winning tenders and delivering on their needs against all offers. But...we do need more focus on the requirements of the new rules to consider all impacts of economic, social or environmental nature in the procurement assessment and procurement decision.

Government procurers have a huge responsibility on behalf of all NZ to implement these Principles and Rules as soon as possible. That is, procuring quality and cost-efficient manufactured items, buildings and infrastructures, and as part of the Government Procurement's business advisory group, Metals NZ will continue to advocate for urgency and completeness.

Metals Industry's Position on Public Policy

Our industry needs to speak with a united voice when it comes to Government agency advocacy. Metals NZ has refreshed its document *Position on Public Policy* which is available to all those that interact with agencies on policy matters affecting their business or association.

The executive committee is made up of representatives from across the metals industry and they offer their time to contribute to sector group advocacy priorities and strategic thought leadership.

Current Metals NZ membership totals 723. This year, we have seen two Associations come off our listing. TiDA is now operating as a company and will therefore transfer to become an ordinary member. LAMNZ have not met for some time but there is the possibility that the aluminum manufacturing sector may come on as an active Association in 2016.



sub-sector. Dr Stephen Hicks is managing steel construction activities at HERA and is a member of the SCNZ Executive, the Construction Industry Council (CIC) and the NASH Board.

Noteworthy other engagements were:
 • Sustainable Steel Council (SSC)



The SSC, which Dr Stephen Hicks manages and chairs, and the Building Research Levy seed-funded the development of the Australasian Environmental Product Declaration (EPD) scheme, which was launched in September 2014. EPDs provide an internationally-recognised format for declaring the environmental performance of a product in a comparable way. Third-party verification ensures all information is credible and consistent, and the choice of product on environmental grounds can be made with more credibility by professionals. It is, therefore, particularly satisfying that the first Australasian EPDs for steel products have been published by BlueScope Steel during this period for the following products: welded beams and columns; hot-rolled coil; and XLERPLATE®.

In addition to EPDs, since 2011, the SSC has been working closely with the New Zealand Green Building Council on the revision of the steel credit in their Green Star rating tool for buildings. The revised steel credit is expected later in 2015.

• Australasian Certification Authority for Reinforcing and Structural Steels (ACRS)

ACRS is the first structural steel product certification body to be accredited by the Joint Accreditation System for Australia and New Zealand (JAS-ANZ) to ISO/IEC 17065:2012. ACRS have been gaining wider acceptance by specifiers and asset owners, which has resulted in a wider range of structural steel producers becoming certified.

New Zealand Steel with parent BlueScope, OneSteel, Tung Ho (Taiwan), Siam Yamato Steel (Thailand), Nippon Steel (Japan), Hyundai Steel (South Korea) have joined the ranks of certificate holders manufacturing steel products to AS/NZS standards. To ensure that New Zealand interests are represented at the board level, Dr Stephen Hicks and Nick Hill of BOINZ have served as ACRS Directors.



• Structural Engineering Society New Zealand (SESOC)

Dr Stephen Hicks has been elected to the SESOC Management Committee. SESOC Membership is now over 1,400 and is targeted at persons having an interest in all aspects of structural engineering. His contribution to technical matters and education relating to steel construction no doubt will be valuable to SESOC and also benefit the steel construction chain.

NZ Stainless Steel Development Association (NSSDA)



Due to the strong link between stainless steel fabrication and welding technology, NZWC

General Manager Dr Michail Karpenko continued his roles as NZSSDA Executive member and its Secretary. Main NZSSDA success story for the year was the issue of the revised Blue Book on SS Fabrication.

Heavy Engineering Industry Development Advocacy

Identifying and developing business opportunities for the metals engineering sector is a task involving many industry sub-sectors and an even greater number of stakeholders. As HERA Industry Development General Manager Nick Inskip has networked extensively across the sector, in particular as a Board member of AWATEA, as the industry link to Callaghan Innovation, and internationally to overseas investors and collaborators.



Education and Training

HERA has been working closely with a number of education providers to ensure the

education of our industry workforce meets its needs. This included representation on the advisory boards of both the University of Auckland and AUT University, and membership to the COMPTENZ Mechanical Engineering Governance group and its working committees. This year, the latter completed the review of all mechanical engineering qualifications.

Internationally, HERA is also playing leading roles on a number of bodies and committees. The most significant one in respect of new HERA activities being those by Dr Michail Karpenko on the Governance Board of the International Institute of Welding (IIW) Qualification Board. These roles not only shape the development of relevant internationally-recognized standards, they also give our staff the confidence that they are up there in competency with the rest of the world.



HERA member Jensen Steel fabricated the steelwork for the award-winning Ratcliffe Riverhouse in Hamilton designed by HERA member Holmes Consulting Group



The stunning stainless steel facade of the award-winning Len Lye Contemporary Art Museum in New Plymouth fabricated and installed by HERA member Rivet Ltd with material supplied by HERA member Steel & Tube Stainless

INDUSTRY SNAPSHOTS



Export success from HERA member Windsor NZ who designed and fabricated five biomass fuel transfer systems installed in the USA earlier this year



HERA member United Engineering fabricated and installed the components for this 80-tonne crane and structure for client VIP Plastics East Tamaki



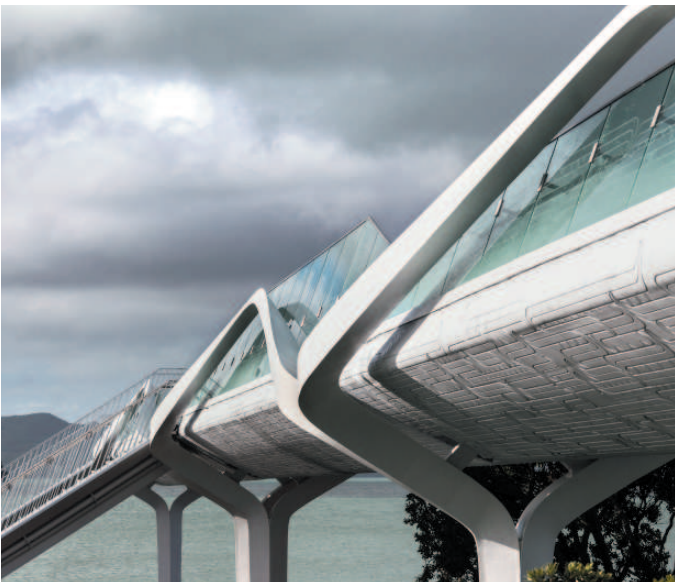
Minister for Energy and Resources Simon Bridges (left) with HERA member BOP Gear Cutters MD Bill Ross stand under a ring gear for a wind turbine



Steel construction innovation: HERA members Donovan Group and Steltech Structural's new Nested Tapered Box Beam solution for portal frames



HERA member Farra Engineering performed the access consultancy, and designed and supplied building maintenance components for export to Australia



Award-winning Point Resolution footbridge designed by HERA member Novare Design and built by HERA member PFS Engineering



Stainless steel tanks designed and built by HERA member Fitzroy Group delivered in halves and then welded on-site at Ballance AgriNutrients, Kapuni

REPORT OF THE INDEPENDENT AUDITOR ON THE SUMMARY FINANCIAL STATEMENTS
To the Executive Committee of New Zealand Heavy Engineering Research Association Inc

The accompanying summary financial statements, which comprise the summary statement of financial position as at 30 June 2015, the summary statement of income statement and summary statement of changes in equity for the year then ended, and related notes, are derived from the audited financial statements of New Zealand Heavy Engineering Research Association Inc for the year ended 30 June 2015.

We expressed an unmodified audit opinion on those financial statements in our report dated 28 August 2015. Those financial statements, and the summary financial statements, do not reflect the effects of events that occurred subsequent to the date of our report on those financial statements.

The summary financial statements do not contain all the disclosures required for full financial statements under generally accepted accounting practice in New Zealand. Reading the summary financial statements, therefore, is not a substitute for reading the audited financial statements of New Zealand Heavy Engineering Research Association Inc.

Executive Committee's Responsibility for the Summary Financial Statements

The members are responsible for the preparation of a summary of the audited financial statements in accordance with FRS-43: Summary Financial Statements.

Auditor's Responsibility

Our responsibility is to express an opinion on the summary financial statements based on our procedures, which were conducted in accordance with International Standard on Auditing (New Zealand) (ISA (NZ)) 810, "Engagements to Report on Summary Financial Statements."

Other than in our capacity as auditor we have no other relationship with or interest in New Zealand Heavy Engineering Research Association Inc.

Opinion

In our opinion, the summary financial statements derived from the audited financial statements of New Zealand Heavy Engineering Research Association Inc. for the year ended 30 June 2015 are consistent, in all material respects, with those financial statements, in accordance with FRS-43.



CST Nexia Audit
Chartered Accountants
Manukau City, New Zealand

STATEMENT OF FINANCIAL PERFORMANCE FOR YEAR ENDED 30 JUNE 2015

	Note	2015	2014
Revenue			
Levies (Steel & Welding Consum.)		1,761,182	1,614,216
Government Research – AGGAT		919,076	919,076
Government Research Contract - Deferred Income		646	828
Consultancy and Industry Project		135,937	129,591
Services to 3rd Party		15,102	22,441
Member Subscriptions		167,148	165,143
Interest		15,911	8,840
Other Income		6,461	49,662
Publications		42,456	39,487
Welding Modules		19,509	21,262
Rent		109,346	77,411
Seminars & Courses		203,420	188,259
HEERF		129,093	147,031
Transfer from Backdated Welding Levy		-	20,320
Total Revenue		3,525,287	3,403,566
Movement in AGGAT Income In Advance	9	(201,114)	29,753
Total Revenue (adjusted)		3,324,173	3,433,319
Expenditure			
Staff Expenses		1,268,162	1,233,534
Member Services		56,410	81,481
Office & Other Expenses		197,150	192,685
Seminar Expenses		117,410	68,581
Consulting Expenses		264,544	299,473
External Research		362,970	675,772
HERA House Refurb Contributions		60,653	-
HERA House Expenses		123,647	88,354
Rent Expenses		241,540	206,860
Depreciation Expenses		88,355	58,926
Impairment of property, plant and equipment		3,304	27,312
Total Expenditure		2,784,144	2,932,975
NET (Deficit) SURPLUS FOR THE YEAR		540,029	500,344
Equity beginning of Year		544,856	44,512
Equity at the End of Year		1,084,885	544,856

BALANCE SHEET AS AT 30 JUNE 2015

	Note	2015	2014
Assets			
Current Assets			
Cash at Bank	2	102,771	8,991
Call Accounts	3	409,803	443,166
Bank - AGGAT		504,003	215,599
Accounts Receivable	4	185,883	160,637
Inventory		8,196	10,931
Other Pre-payments	5	148,394	176,978
TOTAL CURRENT ASSETS		1,359,050	1,016,302
Non Current Assets			
Fixed Assets	6	381,603	124,109
NON CURRENT ASSETS		381,603	124,109
TOTAL ASSETS		1,740,653	1,140,411
Equity & Liabilities			
Accumulated Funds			
Accumulated Funds		1,084,885	544,856
TOTAL EQUITY	7	1,084,885	544,856
Current Liabilities			
Accounts Payable		175,371	201,517
GST Payable		36,132	31,488
Holiday Pay Provision		47,792	49,064
Advance from - HEERF		69,751	100,000
AGGAT Income in Advance		326,722	150,485
TOTAL CURRENT LIABILITIES		655,768	532,555
NON-CURRENT LIABILITIES			
Loan - HEERF		-	63,000
TOTAL EQUITY & LIABILITIES		1,740,653	1,140,411

The specific disclosures included in the summary financial statements have been extracted from the full financial report dated 17/09/15. The summary financial statements cannot be expected to provide as complete an understanding as provided by the full financial statements. A full set of the audited financial statements is available on request from HERA.

HEAVY ENGINEERING RESEARCH ASSOCIATION

NOTES TO THE 2015 FINANCIAL STATEMENTS

1. Statement of Accounting Policies

Reporting Entity

New Zealand Heavy Engineering Research Association Inc. (HERA) is an Incorporated Society and these financial statements have been prepared in accordance with the Incorporated Societies Act 1908 on the 30th day of August 1978.

Basis of Preparation

The financial statements of the entity have been prepared in accordance with generally accepted accounting practice and the Financial Reporting Act 1993.

The accounting principles recognised as appropriate for the measurement and reporting of earnings and financial position on historical cost have been used. Reliance is placed on the fact that the Association is a going concern.

Statutory Basis

These financial statements have been prepared in accordance with "Old GAAP" in New Zealand. Old GAAP comprises New Zealand Financial Reporting Standards and Statements of Standard Accounting Practice that existed prior to the introduction of New Zealand Equivalents to International Financial Reporting Standards.

New Zealand Heavy Engineering Research Association Inc. has chosen to apply Old GAAP because it meets the criteria for doing so; that is, it was applying Old GAAP at 30 June 2012, and it is neither publicly accountable nor large as defined in the External Reporting Board's Standard A1: Application of Accounting Standards.

The Ministry of Commerce has approved a new Accounting Standards Framework (incorporating a Tier Strategy) developed by the External Reporting Board (XRB).

Under this Accounting Standards Framework, New Zealand Heavy Engineering Research Association Inc. is classified as a Tier 3 reporting entity and will be required to apply Public Benefit Entities Simple Format Reporting Standard – Accrual (PSFR - A).

These standards have been developed by the XRB based on current International Public Sector Accounting Standards. The effective date for the new standards for not for profit entities is expected to be for reporting periods beginning on or after 1 April 2015.

This means New Zealand Heavy Engineering Research Association Inc. expects to transition to the new standards in preparing its 30 June 2016 financial statements.

Revenue

Grants and levies received with no conditions attached are recognised as income when received. Revenues with conditions attached are only recognised when the respective conditions are fully met.

Project Sponsorship and Grant monies are recognised as income in proportion to the degree of completion of the respective project.

Fixed Assets

Fixed Assets are recorded at historical cost less accumulated depreciation. Historical cost is the value of consideration given to acquire the assets and the value of other directly attributable costs which have been incurred in bringing the assets to the location and condition necessary for their intended service.

Fixed assets are depreciated using the straight line method at rates:
Office Equipment 15%-40%
Office Furniture 15%
Fixture & Fittings 15%
Training Centre 25%
Motor Vehicles 20%
Metallurgy Lab 15%
House Refurbishment 10%

Accounts Payable

Accounts and other payables are recognised when the Association becomes obliged to make payments in future resulting from the purchase of goods and services or the pledge to award a grant/donation.

Impairment

Annually, the Association assesses the carrying value of each asset. Where the estimated recoverable amount of the asset is less than its carrying amount, the asset is written down. The impairment is recognised in the statement of financial performance.

Goods and Services Tax

All amounts are shown exclusive of Goods and Services Tax (GST) except for receivables and payables that are stated



HEERF and HERA members' support made the HERA House refurbishment possible and successful

inclusive of GST. The GST receivable/payable to the IRD at balance date is shown in the Statement of Financial Position.

Taxation

The Association is exempt from income tax under the Income Tax Act 2007 section CW 49 (1).

Differential Reporting

New Zealand Heavy Engineering Research Association Inc is not publicly accountable and is not large. Accordingly, it has taken advantage of all differential reporting exemptions allowed under the Framework for Differential Reporting, except that items in the Statement of

Financial Performance have been recognised exclusive of Goods and Services Tax.

Changes in Accounting Policies

There have been no changes in accounting policies. Accounting policies have been applied on a basis consistent with previous years.

Comparatives

Where necessary comparatives have been restated due to a reclassification of some items between the different categories of the financial statements. These reclassifications do not have an impact on the net deficit for prior year.

	2015	2014
2. Bank Balance - Current Account		
Current Account	102,771	8,991
3. Bank Balance Call Accounts		
Call Account - HERA	409,803	443,166
4. Accounts Receivable		
Trade Receivable	185,883	160,637
Less Doubtful Debt	-	-
		213,543
5. Other Receivables & Prepayments		
Accrued Income	148,394	163,266
Prepayment	-	13,712
	148,394	176,978

	2015	ACCUM. DEPRECIATION	NET BOOK VALUE
6. Fixed Assets			
Metallurgy Equipment	12,430	12,430	-
Office Furniture	206,481	22,594	183,887
Fixtures & Fittings	84,510	82,974	1,536
HERA House Refurbishment	147,053	97,015	50,038
Motor Vehicles	192,485	88,983	103,502
Office Equipment	169,755	127,570	42,185
Training Equipment	86,399	85,944	455
	899,113	517,510	381,603

	2014	ACCUM. DEPRECIATION	NET BOOK VALUE
Metallurgy Equipment	12,430	12,430	-
Office Furniture	20,306	20,514	347
Fixtures & Fittings	82,955	82,955	-
HERA House Refurbishment	147,053	136,705	10,348
Motor Vehicles	172,896	119,688	53,138
Office Equipment	222,896	163,211	59,685
Training Equipment	86,037	85,808	591
	745,420	621,311	124,109

	2015	2014
7. Accumulated Funds		
Opening Accumulated Fund	544,856	44,512
Net Surplus	540,029	500,344
Equity at End of Year	1,084,885	544,856

8. Related Party

Heavy Engineering Educational and Research Foundation (HEERF) is a related party to the Association.

It is related by the administrative and management expertise the Association provides to the Foundation, in the form of grants provided to the association for the research projects it undertakes. It is also the Association's landlord, owning HERA House.

9. Income in Advance

Majority of Revenue in Advance represent income in advance from various agencies, which funds the Association for research and services.

The funding received for programmes (projects) that were completed during the year is recognised as revenue in that year. The remaining monies yet to be spent on projects in progress are treated as income in advance.

10. BNZ Bank Account

The Association has a Visa credit card facility with BNZ. The limit on all cards is \$29,000. (2014: \$29,000)

11. Audit Fees

Audit fees have been included in office and other expenses to the value of \$5,500 (2014: \$5,000). There was no other remuneration paid to the Auditors.

12. Capital and Other Commitments

As at 30 June 2015 there were no outstanding capital commitments. (2014: \$nil)

13. Contingent Liabilities

As at 30 June 2015 there were no outstanding contingent liabilities. (2014: \$nil)

14. Levies Income

Steel Levy has increased with effect from 1 July 2014 due to an amendment in Heavy Engineering Research levy (HERL) Act.

15. Post Balance Date Events

As at 30 June 2015, there were no significant Post Balance Date Events. (2014: \$nil)




Noel Davies
HEERF Chairman

Chairman's Report

The Heavy Engineering Educational & Research Foundation (HEERF) is a Charitable Trust established by HERA to promote the study and understanding of the use of ferrous and non-ferrous metals in the engineering industry. HEERF receives income from the property *HERA House*, and from an endowment fund created in 2005/06 receiving donations from those interested to support HEERF objectives.

This year saw the completion of a comprehensive HERA House refurbishment which, as well as hugely improving the amenity for the staff, took care of significant deferred maintenance issues. The significance of the refurbishment was recognised with a fantastic formal opening function where Minister Hon Steven Joyce unveiled the commemoration plaque.

We have only received positive feedback on what has been achieved with our refreshing refurbishment showcasing our industry's capabilities. We are pleased to report that thanks to fantastic industry sponsorship, we stayed very close to the \$1.8m budget and now have an efficient, pleasant and contemporary building for many years to come.

In 2014/2015 the Foundation contributed \$113,093 to HERA's research and industry development efforts. Key support was for scholarships for HERA steel construction and the Above Ground Geothermal and Allied Technologies (AGGAT) research programme. In the AGGAT space, HEERF scholarships covered two PhD students, one at the University of Canterbury (UC) and another one at the University of Auckland (UoA). In steel construction, focus was on seismic research also with two PhD scholarships, one new person at UC and one at UoA.

Summary Financial Statement

In line with its objectives, the Foundation funded a number of projects related to the metals engineering industry, including student support for research projects.

Statement of Financial Position as at 30 June 2015

NOTE	2015	2014
ACCUMULATED FUNDS		
Equity funds at start of year	2,440,255	2,388,694
Net surplus for the year	61,042	51,561
Equity funds at end of year	2,501,297	2,440,255
REPRESENTED BY		
Current Assets		
Bank	9,043	251,012
Call Account	-	20,292
Short Term Deposit	-	606,248
Bank -BNZ	91,362	-
Call -BNZ	156,444	-
STD-N.Calavrias	5,611	5,583
Endowment Fund	461	457
Advance to HERA	69,751	100,000
Accrued Income	-	6,986
Accounts receivable	-	-
GST Receivable	9,394	14,504
K.Smith-Bequest	40,635	39,601
	373,603	1,044,783
Total Fixed Assets	3,007,079	1,333,672
Loan - HERA	-	63,000
TOTAL ASSETS	3,380,682	2,441,455
Current Liabilities		
Accounts Payable	107,870	1,200
BNZ Loan	771,515	-
	879,385	1,200
TOTAL LIABILITIES	879,385	1,200
NET TOTAL ASSETS	2,501,297	2,440,255

expected to provide as complete an understanding as provided by the full financial statements. A full set of audited financial statements is available on request from HEERF.

1. Statement of Accounting Policies

(a) General Accounting Policies

The Heavy Engineering Educational and Research Foundation (the Foundation) is a charitable trust established under the Charitable Trusts Act 1957.

The HEERF visiting scholar program supported the well-attended *Engineering the Repair and Retrofitting of Steel Structures* Lecture Series by US-based Bob Shaw, a recognised world authority on the design of welded structures.

In the industry promotion area this year HEERF supported mechanical engineering university student awards at the UoA and Auckland University of Technology. HEERF also supported HERA sponsorship of the IPENZ organised New Zealand Engineering Excellence (NZEE) Awards.

An exciting research and visiting scholar programme has been outlined to the Trustees for 2015/16-year and we are looking forward to ongoing top-class research supporting the future of our New Zealand metals engineering industry. In the past, the Board has discussed establishing a fund to fund an emerging researcher or research project. We held off launching this because of the financial climate at the time but I would like to have another look at establishing a special fund within the next twelve months.

Whilst we don't meet often, I can say that I appreciate the input of my board and the efforts of our Secretary, Wolfgang. It's been a big year as far as the HERA House Refurbishment has been concerned but as funds increase again we will be looking at opportunities to promote and grow the metals industry.

(b) Particular Accounting Policies

The particular accounting policies, which materially affect the measurement of financial performance and the financial position, are:

Income Tax

The Foundation has a charitable status from the Inland Revenue Department, hence is exempt from income tax.

Fixed Assets

Fixed assets have been shown at cost less depreciation. Buildings are depreciated using the straight-line method at 1% of the cost price, Air Conditioning Unit at 6% and Roof & Cladding at 10%.

Differential Reporting

Heavy Engineering Educational and Research Foundation is not publicly accountable and is not large. Accordingly, it has taken advantage of all differential reporting exemptions allowed under the framework for Differential Reporting, except that items in the Statement of Financial Performance have been recognised exclusive of Goods and Services Tax.

(c) Changes in Accounting Policies

There have been no changes in accounting policies. Accounting policies have been applied on a basis consistent with previous years.

2. Commitments & Contingent Liabilities

There are no contingent liabilities as at 30 June 2015. (2014: nil)

HEERF is committed to financially support the operations of HERA to fulfil its financial obligations to its third

Income & Expenditure for year ended 30 June 2015

	2015	2014
INCOME		
Rent	241,540	206,860
Interest	7,797	33,540
Bequest Interest	689	1,045
N. Calavrias Interest	31	117
Other Income	60,653	-
Donation	-	-
Total Income	310,707	241,592
EXPENDITURE		
Blding Maintenance	-	1,150
Blding Managmt Fee	6,000	6,000
Trust Administration	10,000	10,000
Grants to HERA	113,093	127,121
Interest on Loan	38,892	-
Bank Charges	209	149
K.Smith Award	-	-
Audit Fees	2,899	1,200
	171,093	145,620
Depreciation	78,572	44,411
Total Expenditure	249,655	190,031
Net Surplus/ Deficit	61,042	51,561

The specific disclosures included in the summary financial statements have been extracted from the full financial report dated 09/09/2014. The summary financial statements cannot be audited. A full set of audited financial statements is available on request from HEERF.

parties in the foreseeable future and to continue trading as a going concern.

The refurbishment and extension to HERA House was completed early-2015. The total capital expenditure for this project is \$1.94million (exclusive GST), which is funded from the Foundation's cash reserves and bank borrowings. (2014: The total capital commitment on this project was \$800K, which will be funded from the Foundation's cash reserves and bank borrowings).

3. Related Parties

The Foundation is related to New Zealand Heavy Engineering Research Association (HERA). Members of the Foundation are appointed by the HERA Executive. HERA is the tenant of the land and building owned by the Foundation and pays rent. The Foundation pays fees to HERA for the management and administration of the building.

The loan of \$163,000 owing to the Foundation by HERA has been fully repaid during the year. HERA has made a contribution of \$60,653 (Exl.GST) towards the refurbishment being performed by HEERF. The amount owing to HEERF by HERA at year end is \$69,751.

5. Post Balance Date Events

There were no significant post balance date events. (2014: \$nil)

6. Bequest

The income from the bequest is to be applied to a prize which shall be given bi-annually subject to the term set by the late Mr K.Smith. This bequest is deposited with BNZ. This bequest has been recognised as income.

4. Fixed Assets

	COST	ACCUM. DEP.	BOOK VALUE
Land	244,602	-	244,602
Land Development	24,489	-	24,489
Atrium Upgrade*	93,808	-	65,665
Building Upgrade	1,970,502	196,506	1,773,996
Air Condition Units	157,300	102,826	54,474
Building	1,049,091	295,876	753,215
	3,539,972	546,637	2,916,441

*This relates to the Atrium upgrade

HEAVY ENGINEERING RESEARCH ASSOCIATION MEMBERS

Total HERA membership as of June 30, 2015 was 621 members. They are:

AFFILIATE MEMBERS

EnviroWaste Services Ltd	Fulton Hogan Ltd	HTC Ltd	TBS Group Ltd	Welding Technology Institute
Fletcher Easysteel	Hawkins Infrastructure	S & T Holdings	Vulcan Steel Ltd	of Australia

ASSOCIATE MEMBERS

A & S Engineering Ltd	Fruehauf Limited	Otahuhu Engineering Ltd
A W Trinder Ltd	Gamman Industrial Componentry Ltd	Outside Broadcasting
ABB Power Limited	General Engineering North Shore	Pacific Timber Engineering Ltd
Acrow Limited	George Grant Engineering (GGE)	Parr & Co Limited
Action Engineering Ltd	Gisborne Development Incorporated	Patchell Industries Ltd
Active Engineering Ltd	GLG NZ Manufacturing Ltd	Pearson Engineering Ltd
Advanced Plasma Technology	Global Engineering Products Ltd	Peninsula Engineering Ltd
Aimecs Ltd	Global Welding Supplies	Pet Food Division HW
Airwork (NZ) Ltd	Gray Construction	Phoenix Steel Ltd
All Steel Services Ltd	Greenlane Biogas	Piako Transport Engineering
Alloy Yachts International Limited	Greymouth Petroleum	Pilcher Engineering Ltd
ALRO Truck Smash Repairs	Harford Greenhouses	Port of Napier Ltd
Alstom Northern Wagons	Hayes International	Precision Turning & Manufacturing Ltd
Angus Robertson Mechanical	HEB Construction Ltd	Pro Custom Concepts Ltd
Aoraki Polytechnic	Honor Drilling Ltd	Pyramid Engineering
APV New Zealand Ltd	Howard Wright Limited	Quality Auto Machinists (1988) Ltd
ATCO Controls Ltd	Howick Engineering Ltd	Queenstown Engineering 2009 Ltd
ATI Engineering Ltd	Hydraulink Fluid Connectors Ltd	Razos Engineering Ltd
Awesome Awnings Ltd	Hytools NZ Ltd	Read Industrial Ltd
Axiam Engineering Limited	Iain Codling Stainless Steel	Red Steel Limited
Bailey Engineering Ltd	IBA Engineering	Renold New Zealand Ltd
Baker Cranes Ltd	Ipsco Ltd	Rex Barnes Engineering
BBC Technologies Ltd	ISSA Engineering	RNZAF
Bedford Engineering Ltd	J & D McLennan Ltd	Roadmaster Trailers Ltd
Bernie Jordan	J P Marshall & Co Ltd	Rocktec Ltd
Best Bars Ltd	Jay Cee Welding Ltd	ROTIG Ltd
Bitumen Equipment Ltd	JB Attachments Ltd	Ruakaka Engineering
BOP Gear Cutters Ltd	Jetweld Engineering	S.A.F.E Engineering Ltd
Bradken Dunedin	Keith M J Adams	Service Engineers Ltd
Brightwater	Kernohan Engineering Ltd	Sharland Engineering
C J Saunders Engineering Ltd	Kerry Dines Ltd	Ship Constructors Ltd
Calder Stewart Steel	Lakeland Steel Products Ltd	Simpsons Mobile Weld Testing Ltd
Cambridge Welding Service (1953) Ltd	Laser Welding Ltd	Smartweld Ltd
Campbell Tube Products Ltd	Leonard Products Ltd	Snorkel Elevating Work Platforms
Canco Engineering Ltd	Liddells Contracting Ltd	Southern Cross Engineering Limited
CAS Enterprises Ltd	Linear Design	Southern Equipment Centre
CFM Engineering Ltd	Longhare Engineering Ltd	Specialised Container Services
Christian Church Community Trust	Longveld Engineering Ltd	Specialist Energy Engineering Develop- ments
Consolidated Engineering Company Ltd	Mace Engineering Ltd	Stafford Engineering Ltd
Contract Connections Ltd	Machine Part Welding Ltd	Stainless Down Under
Cook Brothers Construction	Maskell Productions Ltd	Stainless Engineering Co Ltd
Courtney Engineering	MB Century	Stark Bros Ltd
Croucher & Crowder Engineering Co Ltd	McEwans (Division of Cut & Fold Ltd)	StaTec Manufacturing
Cuddon Limited	Michael Harris (NZ) Ltd	Steelbro NZ Ltd
Culham Engineering Co	Mike Christie Sheetmetals Ltd	Steelfort Engineering Company Ltd
D R Howells Engineering Co Ltd	Millers Mechanical (NZ) Ltd	Steelpipe Limited
Dan Cosgrove Ltd	Milmeq Limited	Stevensons Structural Engineers Ltd
Dawn Group Ltd	Mobridge Ltd	Stewart & Cavalier Ltd
Dimond	Modern Transport Engineers Ltd	Stud Welding New Zealand Ltd
Domett Trailers	Mooloo Stockcrates Ltd	Superior Pak Ltd
Donovan Group NZ Ltd	Morgan Engineering	Taslo Engineering
Drury Construction Ltd	Morgan O'Shea Engineering	Tasman Engineering Company
DSK Engineering Ltd	Morrow Equipment Co (NZ)	Technical Welding Services (1998)
Duncan Agriculture Ltd	Mouats Engineering Ltd	The 4711 Training Centre
Eastbridge Ltd	MSC Engineering	The School of Welding
Eastern Institute of Technology	Mulcahy Engineering Ltd	Tidd Ross Todd Ltd
Ede Engineering	Multi Engineering	TP Engineering
EHL Group	Murray Landon	Traction Lab Ltd
Electropar	Napier Engineering & Contracting Ltd	Transfleet Equipment Ltd
Engineering Contractors Ltd	NDA Group	Transport & Engineering Ltd
Enterprize Steel	Necklen Engineering Ltd	Trident 2000 Ltd
Eric Paton Ltd	Nelson Reliance Eng Co Ltd	Tru Test DTS Limited
Etech Industries NZ Ltd	Nelson Stud Welding Ltd	Truweld Engineering Kerikeri Ltd
Fairbrother Industries Ltd	Niemac Industrial Ltd	Ullrich Aluminium Co
Fairfax Industries Ltd	Niven Engineering Ltd	Verissimo Engineering Ltd
Farmex Hawkes Bay Ltd	Noble Engineering Services Ltd	Villa Maria Estate
Felix Research Labs	North Shore Towbars 2006 Ltd	W M Ross Engineering Ltd
Fraser Fire & Rescue	NZMP Kauri	Wainuiomata Training Centre
	Otago Polytechnic	

Wallace & Cooper Ltd .T/A Andar Holdings
 Waratah NZ Limited
 Warner Construction Ltd
 Webforge NZ
 Weld Fabrication Engineering Ltd
 Weld Tests Hawkes Bay
 Welding Services Nelson Ltd
 Welding Technology Ltd
 Wells & Boe Ltd
 Westside Welding Ltd
 Whangarei Engineering Company Ltd
 Wilson Bros Engineering Ltd (SAECO Wilson)
 Wilson Precast Construction Ltd
 Windflow Technology Ltd
 Windsor Engineering
 Wyma Engineering NZ Ltd
 Zealsteel Ltd
 Zeanova Ltd

ORDINARY CONSULTANTS

Abacus Engineering Ltd
 ACH Consulting Limited
 AECOM New Zealand Ltd.
 Airey Consultants Ltd
 Allan Estcourt Ltd
 Aurecon New Zealand Ltd
 Babbage Consultants Ltd
 Base Consulting Engineers Ltd
 Batchelar McDougall Consulting Ltd
 Beca Ltd
 Belcher Industries Ltd
 BGT Structures (Auckland) Ltd
 Bill Cassidy & Associates
 BLM Engineering Co Ltd
 Bloxam Burnett & Olliver Ltd
 Blueprint Consulting Limited
 BPL Group
 BSK Consulting Engineers Ltd
 Buchanan & Fletcher Ltd
 Calibre Consulting Ltd
 Centraus Structural Consulting Ltd
 Cephas Rock Ltd
 CGW Engineering Consultants
 Chambers Consultants Ltd
 Chapman Oulsnam Walker Ltd
 Chapman Sanders Consultants
 Charles Consulting
 Chester Consultants Ltd
 Chris W Howell & Associates Ltd
 Civil Engineering Central Ltd
 CLC Consulting Group Ltd
 Clendon Burns & Park Ltd
 Compusoft Engineering
 Coulter Engineering Services Ltd
 Create Ltd
 CSP Pacific
 David Smart Consulting Ltd
 Davidson Group Ltd
 Davis Ogilvie & Partners Ltd
 Day Consultants Limited
 DBCon Ltd
 Design Engineering (SI) Ltd
 Design Management Consultants Limited
 DeZignWorks BOP Ltd
 DHC Consulting Limited
 Dobbie Engineers Ltd
 Dodd Civil Consultants
 Don Thomson Consulting Engineers Ltd
 Dunning Thornton Consultants Ltd
 Eastern Consulting Ltd

EMC-2
 Engenium Ltd
 Engineering Design Consultants Limited
 ETS Engineers Ltd
 Evan Douglas Consulting Engineers
 Fairclough and King Consultants Ltd
 Fletcher Construction
 Forbes Consultants
 Fraser Thomas Limited
 GDC Consultants Ltd
 Geoff Kell Consulting Ltd
 GHD Ltd
 Gray Consulting Engineers Ltd
 GVK Design & Engineering Consultants
 Hadley & Robinson Ltd
 Hanlon & Partners Ltd
 Harrison Grierson Consultants Ltd
 Hawthorn Geddes Engineers & Architects
 HFC-Harris Foster Consultants Ltd
 Hill Design Engineering Ltd
 HLK Jacob Limited
 Holmes Consulting Group
 Hugh Barnes Consultants Ltd
 Independent Technology Ltd (ITL)
 Index Engineering Ltd
 Ironhorse Bridge Ltd
 Jacobs New Zealand Ltd
 JAWA Structures Ltd
 Kerslake & Partners
 Kevin O'Connor & Associates Ltd
 Kirk Roberts Consulting Engineers
 KM-Mechanical Ltd
 Kordia Ltd
 Les Boulton & Associates Ltd
 Lewis & Barrow Ltd
 Lewis Bradford & Associates Ltd
 LGE Consulting Ltd
 LHT Design
 LineTech Consulting Ltd
 Lough Downey Ltd
 M.A. Corkery & Associates Ltd
 MacDonald Barnett Partners Ltd
 Manktelow Consulting Engineers Ltd
 Marino Consultants & Associates
 Markplan Consulting Ltd
 Marlborough Engineering Services Ltd
 Matrix Applied Computing Ltd
 MEC Engineering Consultants
 Metal Test Ltd
 MH Design Ltd
 Mighty River Power Limited (MRP)
 Milward Finlay Lobb Ltd
 Mitchell Vranjes Consulting Engineers Ltd
 Motovated Design and Analysis Ltd
 MSC Consulting Group Ltd
 MTL
 MWH New Zealand Ltd
 Nagel Consultants Ltd
 Net Ltd
 Nigel Harwood Engineering Consultant Limited
 North End Engineering
 Novare Design Ltd
 OBD Consultants Ltd
 OCEL Consultants NZ Ltd
 Optimech International Ltd
 Opus International Consultants Ltd
 Peter Swan Consulting Engineers
 PFP Systems (NZ) Ltd
 Plant & Platform Consultants Ltd
 Pont Consultants

Powell Fenwick Consultants Ltd
 Prendos New Zealand Limited
 Pressure Equipment Integrity (PEI)
 Proconsult
 Progressive Engineering Co Ltd
 Protocol Services Ltd
 Q Designz Limited
 R D Sullivan & Associates
 R J Nelligan & Associates Ltd
 R W & V Roberts Consultancy
 Randall & Associates Ltd
 RCR Energy Systems Ltd
 Redco NZ Ltd
 Richardson Stevens Consultants (1996)
 Ruamoko Solutions Ltd
 Sawrey Consulting Engineers Ltd
 Sigma Ltd
 Silvester Clark Consulting Engineers
 Southern QA Ltd
 Spencer Holmes Ltd
 Stephen Mitchell Engineers
 Stiffe Hooker Ltd
 Stiles & Hooker Ltd
 Strata Group Consultants Ltd
 Stratum Consultants Ltd
 Stroude Ltd
 Structural Concepts Ltd
 Structure Design Ltd
 Tasman SV Consulting
 TH Consultants Ltd
 Thorburn Consultants (NZ) Ltd
 Thorne Dwyer Structures
 TM Consultants Ltd
 Tonkin & Taylor
 Transport Design & Certification
 Transport Technology Ltd
 Transtech Dynamics Ltd
 Tse Taranaki & Associates Limited
 UCOL
 URS New Zealand Ltd
 Verstoep & Taylor Ltd
 W Stringer Consulting
 Waikato Engineering Design Ltd
 WH & NF Johnston Ltd
 Worley Parsons New Zealand Ltd
 Zigliani Technologies Ltd

ORDINARY FABRICATORS

A&G Price
 Acme Engineering Ltd
 Advance Boiler Services NZ Ltd
 Allied Industrial Engineering Ltd
 Amtec Engineering Ltd
 Atco Steel Developments Ltd
 Babcock (NZ) Ltd
 BB & Sons Ltd
 BDC Engineering
 Belcher Industries Ltd
 BLM Engineering Co Ltd
 Bromley Steel
 Burleigh Engineering Ltd
 Chapman Engineering Ltd
 Combustion Control Ltd
 Cullen Engineering Co Ltd
 D C Weld Ltd
 D&H Steel Construction Limited
 Design Production Ltd

HEAVY ENGINEERING RESEARCH ASSOCIATION MEMBERS

Dispatch and Garlick Ltd
Downer Utilities New Zealand Limited
E B McDonald Ltd
E4 Engineering
East Coast Steelwork Ltd
Eastland Engineering 2004 Ltd
Energyworks Ltd
Equipment Engineering (2008) Ltd
Ewing Construction Ltd
Farra Engineering Limited
Fitzroy Engineering Group Ltd
Gisborne Engineering Ltd
Gray Brothers Engineering
Grayson Engineering (2015) Ltd
H J Asmuss & Co Ltd
Hornell Industries Ltd
HSM Engineering (NZ) Ltd
Integrated Maintenance Group Limited
J & R Slecht Limited
Jensen Steel Fabricators Ltd
John Jones Steel Ltd
Kawerau Engineering Ltd
Kraft Engineering Ltd
Leading Edge Fabrication Ltd
Lytelton Engineering Ltd
Mahurangi Sheetmetals Ltd
Mainarc Engineering Services Ltd
Marlborough Engineering Services Ltd
Martin Engineering (PN) Ltd
MaxiTRANS Industries (NZ) Pty Ltd
McConnell Dowell Constructors Ltd
McKenzie & Ridley (Kawerau) Ltd
Mercer Stainless Ltd
MGE Engineering Ltd
MJH Engineering Ltd
Modern Construction Ltd
Morgan Steel
New Zealand Steel Ltd (NZS)
Nick Morris Engineering Ltd
NZ Army-Trade Training School
Oceania Aviation Ltd
Otahuhu Welding Ltd
P J Hindin Engineering
P T Industries Ltd
Page Macrae Engineering
Pakuranga Engineering Ltd
Patton Engineering Ltd
Pegasus Engineering Ltd
PFS Engineering Ltd
RCR Energy Systems Ltd
Rees Engineering Ltd
RNZN Operational Support Group
Robert Page Engineering Ltd
S&T Stainless Ltd
Select Technical
South Pacific Industrial Ltd
Speedfloor NZ
Steeled Ltd
Steltech Structural Limited
Stevenson Engineering Ltd
Structurflex Limited
Tanker Engineering Specialists Ltd
TankTest NZ Ltd
Taymac Limited
Ten4 Ltd
Texco Steel Ltd
Titan Marine Engineering
Track Industries Ltd
Tranzweld
Turnco Engineering Limited

United Engineering Services Ltd
Universal Engineering Ltd
Waikato Steel Fabricators Ltd
Warren Engineering Ltd
Weld IT Ltd
Welding & Engineering Ltd
Welding Inspection Services
Weldtrade Engineering Ltd
Weldworks Limited
Whakatiki Engineering (1984) Ltd
Wilkinson Transport Engineers
ZenithTechnica

ORDINARY PRODUCT SUPPLIERS

Advance Boiler Services NZ Ltd
Air Liquide New Zealand Ltd
Akzo Nobel Coatings Ltd
Alfa Group Ltd
Altex Coatings Ltd
Aotea Machinery Ltd
Ballance Agri-Nutrients Ltd
BCD Group Ltd
BOC Gases New Zealand Ltd
Cable Price (NZ) Ltd
Combustion Control Ltd
Crow Refractory Ltd
Denis Cunningham Ltd
Dexion New Zealand
Digitalweld
Dispatch and Garlick Ltd
Downer Utilities New Zealand Limited
FiltrationTechnology (Filtec)
H J Asmuss & Co Ltd
Hobeca Trading Co Ltd
Indepth Technology (New)
Juken New Zealand Ltd (Wairarapa)
Kemppi Australia Pty Ltd
Lincoln Electric Co (NZ) Ltd
Martin Engineering (PN) Ltd
Marubeni-Itochu Steel Oceania Pty Ltd
Modern Maintenance Products Ltd
New Zealand Steel Ltd (NZS)
North End Engineering
Oceania Aviation Ltd
Onesteel NZ Limited
Pacific Steel Group
Pipes NZ Limited
South Pacific Industrial Ltd (SPIIND)
Speedfloor NZ
Steltech Structural Limited
The Fletcher Construction Co Ltd - Trading as Piletech
Traydec (NZ) Ltd
Trustpower Ltd
Vulcan Stainless (formally Sandvik)
Weld IT Ltd
Welding Engineers NZ Ltd
Weldwell New Zealand

ORDINARY SERVICES PROVIDERS

Accurate Instruments NZ Ltd
Advance Boiler Services NZ Ltd
Air Liquide New Zealand Ltd
AKSA Ltd
Alpha Training & Development Centre Ltd
Altex Coatings Ltd
Auckland Council
AUT University
Bay of Plenty Polytechnic
BDS VIRCON
BLM Engineering Co Ltd
CADPRO Systems Ltd
Christchurch Polytechnic Institute of Technology (CPIT)

CSP Coating Systems
Department Of Corrections
Dispatch and Garlick Ltd
Downer Utilities New Zealand Limited
Genesis Energy Ltd
Gisborne Engineering Ltd
Independent Oilfield Inspection Services
KiwiRail Limited
Manukau Institute of Technology
Marlborough Engineering Services Ltd
Materials & Testing Laboratories
Metal Tech Education Ltd
Metal Test Ltd
Motovated Design and Analysis Ltd
New Zealand Refining Co Ltd
Nova Energy Ltd
NZ Army-Trade Training School
NZ Welding School
Port of Tauranga Limited
Prendos New Zealand Limited
RNZN Operational Support Group
Robert Page Engineering Ltd
SGS New Zealand Limited
South Pacific Industrial Ltd (SPIIND)
Southern Institute of Technology
Southern QA Ltd
Steel Pencil Holdings Limited
Stork Technical Services New Zealand Ltd (formally STORK COOPEHEAT)
Structurflex Limited
Survey NZ
TankTest NZ Ltd
Techlogic NZ
Training in Supply (New)
Transport Technology Ltd
Transtech Dynamics Ltd
Trustpower Ltd
UCOL
Unitec Institute of Technology
University of Auckland & UniServices
Victoria University of Wellington
Waikato Institute of Technology (WINTEC)
Wellington Institute of Technology (WELTEC)
X-Ray Laboratories Ltd

RECIPROCAL MEMBERS

American Institute of Steel Construction (AISC)
American Welding Society (AWS)
Australasian Corrosion Association (ACA)
Australian Steel Institute (ASI)
Bioenergy Association of New Zealand (BANZ)
British Constructional Steelwork Association (BCSA)
Building Research Association of New Zealand (BRANZ)
Canadian Institute of Steel Construction (CISC)
Canadian Welding Bureau (CWB)
Competenz
Crane Association of NZ (Inc)
DVS - German Welding Society
Japan Welding Engineering Society
National Association of Steel Framed Housing (NASH)
National Library of New Zealand
New Zealand Geothermal Association (NZGA)
NZ Defence Industry Association (NZDIA)
NZ Institute of Economic Research
NZ Marine Industry Association (NZMIA)
PreFabNZ Inc
Steel Construction Institute (SCI)
Steel Construction New Zealand (SCNZ)
Straterra Inc
Waikato Engineering Careers Association (WECA)



HERA STRUCTURE

The Association is based at HERA House in Manukau, Auckland. Within HERA House are the offices of HERA and associated organisations Metals NZ, NASH and SCNZ, as well as a conference facility which can cater for up to 120 participants.

Through its specialist staff it provides a combination of research, training, advisory, industry development and promotional services, making it the national centre for metals-based product design, manufacturing technology, inspection and quality assurance. HERA is an accredited training provider under NZQA and the International Institute of Welding (IIW) guidelines.

HERA also performs industry advocacy functions developing HERA member

policy on items relating to R&D and heavy engineering industry development and communicates this to Government and other relevant bodies.

Research is selected on the advice of subject-specific industry advisory panels and is usually of applied nature with short- to medium-term implementation. HERA's research activities encompass the areas of steel construction, general heavy engineering, including welding/joining, clean energy technology, industry capability and marketing.

HERA incorporates the activities of the Heavy Engineering Industry Development Division, Structural Systems Division, New Zealand Welding Centre, HERA Certification Ltd, and its Information Centre with the following specific services and activities:

Structural Systems Division

- Sets priorities for NZ steel and composite construction R&D through the Steel Research Panel
- Applied research supporting the use of steel and composite elements and systems
- Input into New Zealand's performance-based *Building Control System*
- Works closely with Green Building Council on revised steel credit in Green Star rating tool
- Technology transfer mainly in the form of advice, training, consultation and including Finite Element Analysis
- Product and services compliance under 'HERA Verified' certification

Heavy Engineering Industry Development Division

- Maintains registry of and promotes capabilities of the membership
- Provides advice on significant issues to the metals industry
- Performs targeted business development initiatives for the heavy engineering sector
- Leads AGGAT research programme

HERA Information Centre

- Library and publication services
- Distribution of HERA and New Zealand and overseas organisations' publications
- Membership management
- Industry capabilities marketing
- Metals NZ Support

New Zealand Welding Centre

- Specialised welding and joining research, including technology transfer to industry of new processes and techniques
- Welding consultation, including practical welding advice
- Educational courses and seminars, including training leading to NZQA and IIW qualifications
- Providing input into national & international welding-related training
- Provision of educational material for training
- Provides SFC scheme support with HERA ANBCC Certification services
- Welding inspection related advice and training

HERA STAFF 2015

Administration

Director Dr Wolfgang Scholz
Accounts Officer Kam Subramani

Information Centre

Manager Brian Low
Resources Officer Gillian Casidy
Receptionist Raewyn Porter

Industry Development

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Senior Research Engineer Dr Boaz Habib
Research Engineer Dr Lei Chen
Research Engineer Dr Haiam Abbas
PhD Student Mustafa Habib

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Senior Structural Engineer Dr Jing Cao
PhD Student Kingsley Ukanwa

New Zealand Welding Centre

General Manager Dr Michail Karpenko
Senior Welding Engineer Alan McClintock
Research Engineer Holger Heinzel
NDT/Inspection Specialist Peter Hayward



Standing, from left: Nandor Mago, Kingsley Ukanwa, Holger Heinzel, Dr Boaz Habib, Gillian Casidy, Mustafa Habib, Raewyn Porter, Alan McClintock, Kam Subramani, Dr Jing Cao, Dr Lei Chen, Dr Haiam Abbas
Sitting, from left: Brian Low, Dr Stephen Hicks, Dr Wolfgang Scholz, Dr Michail Karpenko, Nick Inskip
Inset: Peter Hayward

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