

## Proposal for the Redevelopment of the Diplomas in Engineering

### Purpose

The purpose of this paper is to outline the reasons why the Diplomas in Engineering should be redeveloped and to propose a model for consultation with members of each diploma consortia, their respective national advisory committees and the relevant Industry Training Organisations (ITOs).

### 1. Background

- 1.1 Three consortia formed between 1985 and 2005 to oversee the development and delivery from a provider perspective of the Diplomas in Engineering which replaced the NZCE. Each consortium was responsible for one of the disciplines in the diploma – civil, electrical or mechanical. The diplomas began as unit standard-based national diplomas developed by an ITO, however the Civil Engineering Diploma is now an achievement-based diploma.
- 1.2 Separate governance structures were set up for each consortium. Representatives from the Institutes of Technology and Polytechnics (ITPs), Universities, relevant ITOs and industry became members of the advisory groups to the consortia. Over the years, little communication has occurred between the consortia on the development and delivery of the diploma in each discipline.
- 1.3 In the civil discipline there are two separate qualifications – the academic diploma which is an achievement-based qualification (not unit standard-based) and the applied “experiential” diploma. The academic diploma (240 credits) is called the New Zealand Diploma in Engineering (NZDE) (Civil) and is recognized by Infratrain and the Institution of Professional Engineers New Zealand (IPENZ) as the benchmark theory qualification for civil engineering. It is being redeveloped to 15 credit papers. The National Diploma in Engineering (NDE) (Applied) is administered and awarded by Infratrain and embodies the work experience component (120 credits) of the old NZCE. Qualification learning outcomes are aligned with the IPENZ competence standard for engineering technicians and graduates from the qualification are eligible for Associate Membership of IPENZ (AIPENZ) and Certified Engineering Technician (CertETn) registration through IPENZ without further assessment.
- 1.4 The National Electro Technology Education Consortium (NETEC) has been in existence for 23 years. The NDE (Electrotechnology) has recently been redeveloped with the intent that an achievement-based assessment process would occur with cross-crediting to unit standards. At this time there is no clear indication that the Electrotechnology ITO (ETITO) will accept this diploma. NETEC has formally advised ETITO that they will not be offering the National Diploma in Engineering (Electrotechnology). Instead it is likely a consortium diploma will be offered however this is simply a series of local diplomas offered by individual ITPs.
- 1.5 The consortium for the NDE (Mechanical) is the most recently formed consortium (2005). AUT, as the lead provider, wrote the common programme document for the mechanical discipline, although this was later adapted to more closely align with the underlying unit standards. This diploma has achievement-based assessment which cross-credits to relevant unit standards. There is also an NDE (Applied) which is an optional 60 credit endorsement on top of the theory qualification completed in the workplace. The consortium’s joint

industry/ITO/provider advisory group is recognized by Competenz as the group responsible for the diploma, associated unit standards and the moderation of assessment.

## **2. Reasons for the Redevelopment of the Diplomas in Engineering**

- 2.1 In November 2008, a consortium of representatives from NZCED<sup>1</sup>, CETTENZ<sup>2</sup>, ITOs, IPENZ and industry was successful in gaining funding from the Tertiary Education Commission (TEC) to develop a National Engineering Education Plan (NEEP Project). The overarching issue behind the project is the severe shortage of engineering skills in New Zealand. OECD comparisons show New Zealand to have significantly fewer engineering graduates than comparable countries, despite a difficult geography and dispersed population that might indicate the need for greater numbers rather than fewer. Research to date has shown a complex range of issues to be contributing to this situation:
- 2.1.1 There is a lack of clarity on pathways from senior secondary school, and a lack of consistency in entry requirements to engineering programs.
  - 2.1.2 Career pathways are unclear from particular qualifications and this is hampering the provision of quality careers advice and qualification promotion (particularly in relation to level 6 and 7 qualifications).
  - 2.1.3 Engineering schools with low enrolments (particularly at level 6 and 7) cannot maintain the critical mass of students to adequately cover specialist areas within the institution.
  - 2.1.4 There is little co-ordination of offerings to ensure a national network of provision across institutions, or to maximise use of resources.
  - 2.1.5 There is a growing international trend, and increasing support nationally, to increase the academic level of professional engineering qualifications beyond the current four-year Bachelor of Engineering to better prepare professional engineering graduates for practice at the forefront of the profession, driving leading-edge design and innovation.
- 2.2 The goal of the Governing Group for the NEEP project is to recommend to the TEC in June 2010 an engineering education plan and a network of provision for New Zealand.
- 2.3 Another desired outcome is to achieve greater commonality and harmonization between the Diploma and the Bachelor of Engineering Technology. It is important to give stakeholders (prospective students, current students and industry) consistent messages about engineering education.
- 2.4 The Metropolitan Group of ITPs<sup>3</sup> has collaborated from mid-2008 to develop a common framework and structure for the Bachelor of Engineering Technology (BEng Tech) with majors in civil, electrical and mechanical. These ITPs intend to gain programme approval and site accreditation from ITPQ and IPENZ to deliver the BEng Tech from 2010. The six ITPs are consulting with the other ITP providers of the BEng Tech (WITT (NZIHT) and the Open Polytechnic) during the development process.

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<sup>1</sup> NZCED is the NZ Council of Engineering Deans, for Universities offering four-year professional engineering qualifications.

<sup>2</sup> CETTENZ is the Council for Engineering Technician and Technologist Education New Zealand, a bipartite council of the Engineering Deans or Heads of Department from the ITP and university sector responsible for three-year degrees (Sydney accord criteria) and two-year Diplomas (Dublin accord criteria).

<sup>3</sup> Christchurch Polytechnic and Institute of Technology (CPIT), Manukau Institute of Technology (MIT), Otago Polytechnic (Otago), Unitec of New Zealand (Unitec), Wellington Institute of Technology (WelTec) and Waikato Institute of Technology (Wintec)

- 2.5 The 360 credit degree has a common core of six papers in the first year, core papers and electives for each major and a 45 credit project in the third year. The ITPs are developing common programme regulations and common entry requirements. The ITPs will share staffing, facilities, and equipment to deliver papers through a blended learning approach of face-to-face delivery, online courses and block courses where ITPs do not have the capability or sufficient student numbers. The outcomes of the degree are aligned to the graduate profile for the Sydney Accord<sup>4</sup>.
- 2.6 The governance structure for the degree consists of a Management Group of engineering representatives from each ITP who focus on the operational requirements; the development of the curriculum; and the overall coherence of the BEng Tech. They report to their Chief Executives and Academic Boards. Local industry advisory groups provide advice on industry needs to each ITP.
- 2.7 This development of the BEng Tech degree demonstrates successful collaboration between the participating ITPs to develop a single degree qualification with three majors in civil, electrical and mechanical.

### **3. Proposed Model for the Diploma in Engineering**

- 3.1 It is timely to review the Diploma in Engineering to meet the goals of the NEEP Project and align it with developments occurring in the BEng Tech.
- 3.2 At a recent meeting attended by the Chair of CETTENZ (John Findlay, Otago Polytechnic), the Chairs and one representative from each of the diploma consortia, a model for a single Diploma in Engineering with majors in civil, electrical and mechanical was proposed. The key features of this diploma are outlined below.
- 3.3 Academic Diploma
- 3.3.1 The two-year theoretical diploma with three majors at level 6 would have 240 credits consisting of 15 credit papers which have achievement-based assessment. There would be no unit standards. This diploma would be an ITP diploma which is the current status of the NZDE (Civil) and would contain content advised by the national advisory committees and industry consultation network of the relevant ITOs.
- 3.3.2 The diploma would be renamed the NZDE with majors in civil, electrical and mechanical. The term “national” would be dropped from the Diplomas in Engineering (Electrical and Mechanical) if the ITOs agree to withdraw the title *National Diploma in Engineering*. Work has begun with NZQA to find out the registration process for renaming the diploma. Information is available at <http://www.kiwiquals.govt.nz/about/nat-nzquals.html> . NZQA would be unlikely to agree to the use of the New Zealand title without ITO support and withdrawal of the National Diploma qualifications, or at least a plan to phase them out with associated transition arrangements.
- 3.4 Applied Diplomas

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<sup>4</sup> IPENZ is a signatory to the Sydney Accord which is an agreement between member countries for mutual recognition of engineering technology degrees.

3.4.1 The applied diplomas in the civil and mechanical disciplines at level 6 would be standardised to 120 credits. Entrants to the applied diplomas would be graduates of the NZDE. The diplomas would have unit standard-based assessment of the practical application of skills in the workplace. Alignment with the IPENZ competence standard for engineering technicians would mean that on successful completion, a graduate may attain AIPENZ membership and CertETn registration through IPENZ.

3.4.2 The applied diplomas would be owned by the relevant ITOs. They would need to decide if they will collaborate to offer one applied diploma with majors in civil, electrical and mechanical or if each ITO offers its own applied diploma.

### 3.5 Governance

3.5.1 The national advisory committees and consortia would remain in place for the three majors of civil, electrical and mechanical.

3.5.2 There would be a new structure formed of consortia representatives from each of the majors who would act as the coordinating group for common areas in the diploma. Changes to the diploma would be approved through the national advisory committees of each major and each ITP's Academic Board which is current practice. The lead developer for each major would remain and continue to play an important role. Each ITO would have one vote on the relevant national advisory committee, which would each have strong national industry representation.

3.5.3 There would be a common policy document for the three consortia and a Memorandum of Understanding between the providers which would cover the governance structure; the roles and responsibilities of the providers and intellectual property.

3.5.4 The governance structure would be similar to the structure for the BEng Tech (refer to 2.6).

### 3.6 Common Attributes of an NZDE

3.6.1 The IPENZ graduate attributes for the Dublin Accord would apply to the NZDE. An accreditation application will be made in 2010 to IPENZ.

3.6.2 There would be core courses in maths, communications and ethics/management. There would be common entry criteria agreed between providers and common bridging courses particularly in maths to get new students up to level 4.

3.6.3 The NZDE would be aligned with the BEng Tech and would have 15 credit papers, common course naming and course codes in levels 4, 5 and 6 where possible.

3.6.4 Ultimately, ITPs would enter into distance learning arrangements with other ITPs to deliver papers of the diploma where they do not have the capability or sufficient student numbers.

### 3.7 Timeline for Consultation and Redevelopment

31 March 2009 The chairs of the consortia have consulted on the proposed changes to the Diploma in Engineering with members of their own consortia and provided feedback to the Chair of CETTENZ.

31 July 2009 Consultation with ITOs on proposal for NZDE and Applied Diplomas offered by the ITOs  
Consultation with respective national advisory committees on proposal for NZDE and Applied Diploma offered by the ITOs

- 30 September 2009 Agreement reached with ITOs and ITP sector on NZDE and Applied Diplomas offered by ITOs
- 30 September 2009 Overall governance structure of NZDE agreed
- 30 November 2009 Framework and curriculum written for NZDE
- 28 February 2010 Approval and accreditation documentation written for the NZDE
- 31 March 2010 Approval and accreditation documentation written for Dublin Accord accreditation
- 30 April 2010 NZDE approved and accredited by providers