ENGINEERS AUSTRALIA
AUSTRALIAN ENGINEERING ACCREDITATION CENTRE

CONSIDERATION OF UNDERGRADUATE PROGRAMS LEADING TO THE

BACHELOR OF ENGINEERING, and
ASSOCIATE DEGREE IN ENGINEERING TECHNOLOGY

implemented in the

COLLEGE OF SCIENCE, ENGINEERING AND HEALTH

at the

RMIT UNIVERSITY

MELBOURNE CITY AND BUNDOORA EAST CAMPUSES

REPORT OF ACCREDITATION VISIT

18-19 AUGUST, 2009
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1 EXECUTIVE SUMMARY

This document reports on the consideration of Bachelor of Engineering and Associate Degree in Engineering Technology programs implemented at the RMIT University at the Melbourne City and Bundoora East campuses. This scheduled general review accreditation visit followed the previous general review of programs conducted in May of 2004 and subsequent limited reviews in April 2008, covering new Associate Degrees in Engineering Technology and Bachelor of Engineering programs.

The report has been prepared by an Engineers Australia evaluation panel as follows:

1.1 Visiting team

<table>
<thead>
<tr>
<th>Panel Member</th>
<th>Program Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor Chris Cook, BSc.,BEng.,PhD</td>
<td>Chair</td>
</tr>
<tr>
<td>University of Wollongong</td>
<td>Electrical, Electronic, Communication &amp; Network Engineering, Biomedical Engineering</td>
</tr>
<tr>
<td>Mr Tim Macoun</td>
<td></td>
</tr>
<tr>
<td>Macoun Environmental Consulting</td>
<td>Environmental, Civil and Infrastructure Engineering</td>
</tr>
<tr>
<td>Mr Paul Mitchell, FIEAust, CPEng</td>
<td></td>
</tr>
<tr>
<td>Whittlesea City Council</td>
<td>Environmental, Civil and Infrastructure Engineering</td>
</tr>
<tr>
<td>Dr Philip A. Schneider,</td>
<td></td>
</tr>
<tr>
<td>James Cook University</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>Mr Michael Flood, BE FIEAust CEng</td>
<td></td>
</tr>
<tr>
<td>College of Biomedical Engineers</td>
<td>Biomedical Engineering, Electrical &amp; Electronic Engineering</td>
</tr>
<tr>
<td>Mr John R. Page, MSc MRAeS, SMAIAA,</td>
<td>RAESnominee</td>
</tr>
<tr>
<td>MIEAust, CEng</td>
<td>Aerospace and Mechanical Engineering</td>
</tr>
<tr>
<td>University of New South Wales</td>
<td></td>
</tr>
<tr>
<td>Mr Solomon Dent</td>
<td></td>
</tr>
<tr>
<td>Ford Motor Company</td>
<td>Automotive, Advanced Manufacturing and Mechatronics Engineering</td>
</tr>
<tr>
<td>Professor A.D. (Tony) Lucey</td>
<td></td>
</tr>
<tr>
<td>Curtin University of Technology</td>
<td>Advanced Manufacturing, Mechatronics and Mechanical Engineering</td>
</tr>
<tr>
<td>Em. Professor Neil Page, FIEAust CEng</td>
<td>Visit Manager</td>
</tr>
<tr>
<td>PhD MEngSc BE</td>
<td>Advanced Manufacturing, Mechatronics and Mechanical Engineering</td>
</tr>
<tr>
<td>Em. Professor Alan Bradley, FIEAust CEng</td>
<td></td>
</tr>
<tr>
<td>Australian Engineering Accreditation Centre</td>
<td></td>
</tr>
<tr>
<td>Engineers Australia</td>
<td>Electrical, Electronic, Communication, Computer &amp; Network Engineering, Biomedical Engineering</td>
</tr>
<tr>
<td>Mrs Jill Kiley</td>
<td>Logistics</td>
</tr>
<tr>
<td>Australian Engineering Accreditation Centre</td>
<td></td>
</tr>
<tr>
<td>Engineers Australia</td>
<td></td>
</tr>
</tbody>
</table>
The panel was joined by representatives of the Institution of Chemical Engineers (IChemE) to conduct an independent evaluation of the Bachelor of Engineering in Chemical Engineering.

IChemE VISITING TEAM:

Professor Keith King Chair
Professor Moses Tade
Professor Colin Webb
Mr Paul Taranto

The panel was also joined by representatives of the Washington Accord, to audit the accreditation visit and process.

WASHINGTON ACCORD OBSERVERS TEAM:

Mr Basil Wakelin, New Zealand (Chair), Dr Yen, Jia-Yush, Chinese Taipei and Mr Peter Roche, Ireland

The conclusions of the Engineers Australia panel are based on a detailed consideration of accreditation documentation submitted by the University and the subsequent campus visit, conducted over the period 18-19 August, 2009.

This report has been prepared primarily to provide the Accreditation Board with the necessary background, depth of analysis and rationale to support the recommendations of the panel, but is also intended as a resource to the University.

In addition the report will serve as a record of events for future accreditation review cycles.

After setting out the recommendations on accreditation and program details, the report provides a background on the engineering education program offerings at the Melbourne City and Bundoora campuses of the RMIT University. Overall impressions and specific commendations are offered, followed by an analysis of the current engineering programs against the Engineers Australia accreditation criteria and from this the 2009 panel has derived specific recommendations on accreditation for the Accreditation Board.

Concluding recommendations to the College are also distilled from this detailed performance analysis and intended as a reference guide in support of the processes of continuing quality improvement.

Appendix 1 provides the schedule of activities for the visit and Appendix 2 additional notes from meetings of students and staff.

The Accreditation Board considered this draft report at its meeting on 22 September, 2009, endorsing the recommendations of the panel and authorising release of the report draft to the University to identify any errors of fact, or any serious matters that it is felt need to be raised. The Board has emphasised that the Associate Degree programs will only be considered for full accreditation once it is satisfied that the issues raised by the 2008 review panel have been addressed. The need for inclusion of integrating engineering application and professional development experiences such as would occur in a capstone project activity is again reinforced.
2 RECOMMENDATIONS ON ACCREDITATION

The following recommendations on accreditation are made to the Engineers Australia Accreditation Board for programs offered by the RMIT University and taught across the Melbourne City and Bundoora campuses.

For programs marked with an asterisk (*) the panel recommends that the accreditation status be later reviewed in the light of progress reported by RMIT University in addressing weaknesses identified in the capstone project experience, details of which are discussed elsewhere in this report. Details of the reporting requirement are shown in section 2.7 below.

2.1 Continuing full accreditation

Continuing full accreditation of the following programs be accorded at the level of Professional Engineer through to the first intake of students in 2015:

- Bachelor of Engineering (Aerospace Engineering),
- Bachelor of Engineering (Automotive Engineering),
- Bachelor of Engineering (Chemical Engineering),
- Bachelor of Engineering (Civil and Infrastructure),
- Bachelor of Engineering (Electrical Engineering)*,
- Bachelor of Engineering (Environmental Engineering),
- Bachelor of Engineering (Mechanical Engineering),

including combined degree offerings as outlined in Section 4.3.2 below.

2.2 Full accreditation

Full accreditation of the following programs at the level of Professional Engineer be accorded through to the first intake of students in 2015:

- Bachelor of Engineering (Computer and Network Engineering)*,
- Bachelor of Engineering (Electronic and Communication Engineering)*,

including combined degree offerings as outlined in Section 4.3.2 below.

Full accreditation of the following terminating programs at the level of Professional Engineer be accorded through to the end of 2009:

- Bachelor of Engineering (Biomedical Engineering),
- Bachelor of Engineering (Network Engineering),

including combined degree offerings as outlined in Section 4.3.2 below.
2.3 Provisional accreditation

Provisional accreditation of the following program be accorded until assessment for full accreditation can be carried out, following the emergence of the first representative group of graduates:

- Bachelor of Engineering (Electrical and Electronic Engineering)*

including combined degree offerings as outlined in Section 4.3.2 below.

2.4 Continuing provisional Accreditation

Continuing provisional accreditation of the following programs be accorded for limited term, through to the first intake of students in 2011:

- Associate Degree of Engineering Technology (Advanced Manufacturing),
- Associate Degree of Engineering Technology (Civil Engineering),
- Associate Degree of Engineering Technology (Mechanical) previously called Associate Degree of Engineering Technology (Design and Development),
- Associate Degree of Engineering Technology (Electrical/Electronics),
- Associate Degree of Engineering Technology (Network Engineering).

Further consideration of the Associate Degree programs should depend on action taken in addressing the concerns and recommendations of the 2008 review panel.

2.5 Reaffirming accreditation of undifferentiated offerings at other campus locations

The continuing accreditation of undifferentiated programs with titles corresponding to those listed in (2.1 through 2.3 above), and already accredited for implementation on the partnered Hong Kong and Singapore campuses of the RMIT University, be re-affirmed on the basis of the Engineers Australia panel findings for the Melbourne city and Bundoora East campuses, as detailed in this report.

2.6 Programs for which deferral of the accreditation evaluation process is recommended

Accreditation of the:

- Bachelor of Engineering (Advanced Manufacturing and Mechatronics)

not be accorded at this time. The current title does not accurately describe the content of this program. The panel recommends that RMIT University be asked to review the degree title or program content to bring these into alignment.

2.7 Interim reporting requirement

The RMIT University be asked to submit, by 31st August 2010, a detailed report addressing,

1. Progress achieved in addressing the weaknesses identified in this report in the capstone project experience in the BE programs in Computer and Network, Electrical, Electrical and Electronic, and Electronic and Communication engineering.

2. Progress achieved in addressing the recommendations of the 2008 review panel for the Associate Degree programs.
2.8 Ongoing development of the programs

The above accreditations include ongoing development of the programs over the accreditation period, subject to the provisions set out in the Accreditation Management System documents.

2.9 Next general review

The next general review of programs at the RMIT University be scheduled to take place in 2014.

END OF RECOMMENDATIONS
3 PROPOSED WEBSITE ENTRY/CERTIFICATE DETAILS

As a consequence of the above recommendations, the proposed wording for the website listing of accredited programs at the level of Professional Engineer and for the certificate of accreditation is as follows.

For accredited programs at the level of Professional Engineer:

RMIT University (next general review 2014)

The following programs are accredited for implementation at the Melbourne city and Bundoora East campuses of the RMIT University

Bachelor of Engineering in:

- Aerospace Engineering 1980  
  (formerly Aeronautical Engineering)
- Automotive Engineering 2001
- Biomedical Engineering 2008 – 2009
- Chemical Engineering 1980
- Civil and Infrastructure Engineering 2004  
  (formerly Civil Engineering) 1980 – 2003
- Electronic and Communication Engineering 2010  
- Computer and Network Engineering 2010  
- Electrical Engineering 1980
- Environmental Engineering 1995
  (formerly Manufacturing Systems Engineering)
- Mechanical Engineering 1980
- Software Systems Engineering 1999 – 2009
- Geological Engineering 1987 – 2005
- Metallurgical Engineering 1988 – 2004
- Polymer Engineering 1999 – 2004
And dual degrees,

Aerospace Engineering – with Business
Chemical Engineering – with Arts, with Business and with Science
Civil and Infrastructure Engineering – with Arts and with Business
Computer and Network Engineering – with Business, with Science and with Computer Science
Electrical Engineering – with Business and with Commerce
Electronic and Communication Engineering – with Computer Science and with Science (Physics)
Mechanical Engineering – with Business

For accredited programs at the level of Engineering Officer:

RMIT University (next general review 2014)

The following programs are accredited for implementation at the Melbourne city campus of the RMIT University

Associate Degree in Engineering Technology in:

- Advanced Manufacturing 2006 (P)
- Civil Engineering 2009 (P)
- Electrical/Electronics 2006 (P)
- Mechanical 2006 (P)
  (formally Design and Development)
- Network Engineering 2008 (P)
4 GENERAL INFORMATION

4.1 The educational institution

Name of Institution
RMIT University

Name of School or Responsible Entity within the Institution
College of Science, Engineering and Health

Institution Awarding the degrees
RMIT University

4.2 Key dates

Date of submission of request for accreditation
2008

Date of receipt of initial documentation
June, 2009

Panel pre-visit teleconference
23 July, 2009

Panel pre-visit planning meeting
17 August, 2009

Panel campus visit
18-19 August, 2009

4.3 Programs submitted for accreditation

4.3.1 Bachelor of Engineering programs

Accreditation/continuing accreditation is sought for the following four year (full time) Bachelor degree programs delivered at the RMIT University Melbourne city and Bundoora East campuses such that graduates of these programs will be adjudged as adequately prepared for entry to the profession and for admission to Engineers Australia in the grade of Graduate Professional Engineer.

<table>
<thead>
<tr>
<th>Title of Program</th>
<th>Full title of degree(s) to be awarded on completion of program</th>
<th>Abbreviation of degree(s) title</th>
<th>Program duration - full time basis</th>
<th>Current accred’n status</th>
<th>Level of accred’n sought</th>
<th>EA First Accr’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Manufacturing and Mechatronics</td>
<td>Bachelor of Engineering (Advanced Manufacturing and Mechatronics)</td>
<td>B Eng (Adv Manu &amp; Mechatronics)</td>
<td>8 sem 4 years</td>
<td>Full</td>
<td>Full</td>
<td>1985</td>
</tr>
<tr>
<td>Aerospace Engineering</td>
<td>Bachelor of Engineering (Aerospace Engineering)</td>
<td>B Eng (Aerospace Engineering)</td>
<td>8 sem 4 years</td>
<td>Full</td>
<td>Full</td>
<td>1980</td>
</tr>
</tbody>
</table>

1 Change in title implemented in 2009; formerly Bachelor of Engineering (Manufacturing and Engineering Management).
<table>
<thead>
<tr>
<th>Programme</th>
<th>Degree Title</th>
<th>Duration</th>
<th>Full Accreditation</th>
<th>Accreditation Status</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Engineering</td>
<td>Bachelor of Engineering (Automotive Engineering)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>2001</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Bachelor of Engineering (Chemical Engineering)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>1980</td>
</tr>
<tr>
<td>Civil and Infrastructure</td>
<td>Bachelor of Engineering (Civil and Infrastructure)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>2004</td>
</tr>
<tr>
<td>Computer and Network Engineering</td>
<td>Bachelor of Engineering (Computer and Network Engineering)</td>
<td>8 sem</td>
<td>Not Accred.</td>
<td>Full</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Bachelor of Engineering (Electrical Engineering)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>1980</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>Bachelor of Engineering (Electrical and Electronic Engineering)</td>
<td>8 sem</td>
<td>Not Accred.</td>
<td>Provisional</td>
<td></td>
</tr>
<tr>
<td>Electronic and Communication Engineering</td>
<td>Bachelor of Engineering (Electronic and Communication Engineering)</td>
<td>8 sem</td>
<td>Not Accred.</td>
<td>Full</td>
<td></td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>Bachelor of Engineering (Environmental Engineering)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>1995</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Bachelor of Engineering (Mechanical Engineering)</td>
<td>8 sem</td>
<td>Full</td>
<td>Full</td>
<td>1980</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Bachelor of Engineering (Biomedical Engineering)</td>
<td>8 sem</td>
<td>Provisional</td>
<td>Full</td>
<td>2008</td>
</tr>
<tr>
<td>Network Engineering</td>
<td>Bachelor of Engineering (Network Engineering)</td>
<td>8 sem</td>
<td>Provisional</td>
<td>Full</td>
<td>2008</td>
</tr>
</tbody>
</table>

2 Formerly the separate degrees of Bachelor of Engineering (Computer Systems Engineering) and Bachelor of Engineering (Network Engineering).

3 New program to be offered by SECE from 2010. Second year students in 2009 will be able to select this program in 2010, commencing at third year, because of the common first two years of all Bachelor of Engineering programs in SECE.

4 Formerly the separate degrees of Bachelor of Engineering (Electronic Engineering) and Bachelor of Engineering (Communication Engineering); see table on page 4.

5 Program discontinued from 2010, but needs to be considered for transition from provisional to full accreditation.

6 Program discontinued from 2010, but needs to be considered for transition from provisional to full accreditation.
4.3.2 Combined degrees

Accreditation is sought for combined degrees such that graduates of these programs will be adjudged as adequately prepared for entry to the profession and for admission to Engineers Australia in the grade of Graduate Professional Engineer. The following combined degrees require five years or more of full time study and dual testamurs are awarded. Combined degrees of this nature allow certain Bachelor of Engineering programs to be combined with the Bachelor of Arts, Bachelor of Business, Bachelor of Science, Bachelor of Computer Science and Bachelor of Commerce. The following combined degree combinations are permitted.

<table>
<thead>
<tr>
<th>BA</th>
<th>BBus</th>
<th>BSc</th>
<th>BCompSc</th>
<th>BCom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Engineering (Aerospace Engineering)</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Chemical Engineering)</td>
<td>✔ ✔</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Civil and Infrastructure)</td>
<td>✔ ✔</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Computer and Network Engineering)</td>
<td></td>
<td>✔</td>
<td>✔ ✔</td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Electrical Engineering)</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Bachelor of Engineering (Electronic and Communication Engineering)</td>
<td></td>
<td></td>
<td>✔ ✔</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Bachelor of Engineering (Environmental Engineering)</td>
<td>✔</td>
<td></td>
<td>✔ ✔</td>
<td></td>
</tr>
<tr>
<td>Bachelor of Engineering (Mechanical Engineering)</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3.3 Programs at the level of Engineering Officer

Accreditation is sought for the following two year (full time) Associate Degree programs such that graduates of these programs will be adjudged as adequately prepared for entry to the profession and for admission to Engineers Australia in the grade of Engineering Officer.
<table>
<thead>
<tr>
<th>Program</th>
<th>Full title of degree(s) to be awarded on completion of program</th>
<th>Abbreviation of degree(s) title</th>
<th>Program duration - full time basis</th>
<th>Current accred’n status</th>
<th>Level of accred’n sought</th>
<th>EA First Accred’d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Manufacturing</td>
<td>Associate Degree in Engineering Technology (Advanced Manufacturing)</td>
<td>AssDeg EngTech (Adv Manufactu)</td>
<td>4 sem 2 years</td>
<td>Provisional</td>
<td>Provisional</td>
<td>2006</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Associate Degree in Engineering Technology (Civil Engineering)</td>
<td>AssDeg EngTech (Civil Eng)</td>
<td>4 sem 2 years</td>
<td>None</td>
<td>Provisional</td>
<td></td>
</tr>
<tr>
<td>Electrical/Electronics</td>
<td>Associate Degree in Engineering Technology (Electrical/Electronics)</td>
<td>AssDeg EngTech (Electrical/El)</td>
<td>4 sem 2 years</td>
<td>Provisional</td>
<td>Full</td>
<td>2006</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Associate Degree in Engineering Technology (Mechanical)</td>
<td>AssDeg EngTech (Mechanical)</td>
<td>4 sem 2 years</td>
<td>Provisional</td>
<td>Full</td>
<td>2006</td>
</tr>
<tr>
<td>Network Engineering</td>
<td>Associate Degree in Engineering Technology (Network Engineering)</td>
<td>AssDeg EngTech (Network Eng)</td>
<td>4 sem 2 years</td>
<td>Provisional</td>
<td>Full</td>
<td>2008</td>
</tr>
</tbody>
</table>

7 Formerly Associate Degree in Engineering Technology (Design and Development)
5 BACKGROUND

RMIT University has a rich history of teaching engineering from the trade level to the degree level. Currently engineering is taught within the College of Science, Engineering and Health led by the Pro-Vice Chancellor – Professor Peter Coloe, a microbiologist with a research interest in understanding, detection and control of infectious diseases in humans and animals. From the point of view of the teaching programs the PVC is assisted by the Associate PVC Learning and Teaching - Professor Julianne Reid, affiliated with the School of Medical Sciences and a researcher in metabolic disorders and the Associate Dean (Program Quality) – Professor Mark Shortis who has a dual role of Professor of Measurement Science in the School of Mathematical and Geospatial Sciences.

The College of Science, Engineering and Health is comprised of 10 schools:

- Aerospace, Mechanical and Manufacturing Engineering
- Applied Sciences
- Civil, Environmental and Chemical Engineering
- Computer Science and IT
- Electrical and Computer Engineering
- Engineering (TAFE)
- Health Sciences
- Life and Physical Sciences
- Mathematical and Geospatial Sciences
- Medical Sciences

Engineering programs are delivered through the following schools within the College, with Heads of School designated:

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>HEAD OF SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace, Mechanical and Manufacturing</td>
<td>Professor Aleks Subic</td>
</tr>
<tr>
<td>Engineering (SAMME)</td>
<td></td>
</tr>
<tr>
<td>Civil, Environmental and Chemical</td>
<td>Professor John Buckeridge</td>
</tr>
<tr>
<td>Engineering (SCECE)</td>
<td></td>
</tr>
<tr>
<td>Electrical and Computer Engineering</td>
<td>Professor Ian Burnett</td>
</tr>
<tr>
<td>Engineering (SECE)</td>
<td></td>
</tr>
<tr>
<td>Engineering (TAFE)</td>
<td>Mr Peter Ryan</td>
</tr>
<tr>
<td>Engineering (SoET)</td>
<td></td>
</tr>
</tbody>
</table>


The School of Engineering (TAFE) (commonly referred to in the documentation by the acronym SoET) offers over 50 TAFE qualifications as well as the 5 Associate Degree programs designated as higher education programs. In those Schools exclusively delivering higher education programs (SAMME, SCECE, SECE), academic leadership is provided at the School level by the Head and the Deputy Head (Learning and Teaching). Each of these Schools is further divided into Disciplines led by a Discipline Head. Overlaying this structure there are the teaching programs, each with a Program Director.

There appears to be some overlap in responsibilities with some of these positions. The position description for Program Directors supplied during the panel visit shows that the position reports directly to the Head of School and is responsible for, among other things, –

“The leadership, strategic planning, policy development, management and quality of undergraduate programs, and management and oversight of the administration related to undergraduate programs (but not for the detailed administrative activities within these areas)”. 

Discipline Heads also report to the Head of School and are responsible for the provision of personnel and resources for teaching and research. Deputy Heads (Teaching and Learning), also report to the Head of School and are responsible for the quality and implementation of all programs offered within the School, and ensure that all academic administration is conducted in accordance with RMIT policy and procedures. Coordination of the various roles appears to occur in each School’s Teaching and Learning Management Committee.

<table>
<thead>
<tr>
<th>Title of Program</th>
<th>Program Director</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Manufacturing and Mechatronics</td>
<td>Dr Alexandra Kootsookos</td>
</tr>
<tr>
<td>Aerospace Engineering</td>
<td>Assoc Prof Hadi Winarto</td>
</tr>
<tr>
<td>Automotive Engineering</td>
<td>Not named</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Dr Raj Parthasarathy</td>
</tr>
<tr>
<td>Civil and Infrastructure</td>
<td>Dr Rebecca Gravina</td>
</tr>
<tr>
<td>Computer and Network Engineering</td>
<td>Dr Jidong Wang (Computer Systems Engineering) and Dr Mark Gregory (Network Engineering)</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Dr Selva Moorthy</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering</td>
<td>Dr Selva Moorthy (Electrical Engineering) and Dr Chi Wong (Electronic Engineering)</td>
</tr>
<tr>
<td>Electronic and Communication Engineering</td>
<td>Dr Chi Wong (Electronic Engineering) and Mr Michael Manh (Communication Engineering)</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>Assoc Prof Sujeeta Setunge</td>
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<tr>
<td>Mechanical Engineering</td>
<td>Mr Christopher Dixon</td>
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<td>Biomedical Engineering</td>
<td>Dr John Fang</td>
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<td>Network Engineering</td>
<td>Dr Mark Gregory</td>
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<tr>
<td>Year 1 (all SECE programs)</td>
<td>Dr Wayne Rowe</td>
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<tr>
<td>Year 2 (all SECE programs)</td>
<td>Mr Tom Berg</td>
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Of note is that there is no single Program Director for a number of programs offered in the School of Electrical and Computer Engineering. In fact there are 4 Program Directors involved in each of the degree programs. See for example [http://www.rmit.edu.au/programs/ad002](http://www.rmit.edu.au/programs/ad002) (accessed 26.8.09)
programs in Electronic and Communication Engineering, Electrical and Electronic Engineering and Computer and Network Engineering. The panel had difficulty in seeing how the responsibilities assigned to Program Directors could be discharged under this arrangement.

The School of Engineering (SoET) is structured differently. It was established in July 2008 to bring together all the TAFE programs in engineering. As previously noted, it now provides 50 TAFE qualifications as well as the 5 Associate Degrees in Engineering Technology. In contrast to the other Schools discussed above, leadership is provided by the Head of School assisted by four Industry Managers covering the following industry groups: Aerospace and Manufacturing, Electrotechnology and Communications, Building Services and Innovations and Projects. In this School (SoET), the role of Program Director in the other engineering schools is performed by the Team Leader for Associate Degrees, Mr Nagendra Rao. As stated in the RMIT submission - "This role has responsibility for the management and coordination of the Associate Degrees, including quality of the learning and teaching. The Associate Degrees Team Leader is a member of the School Learning and Teaching Committee and regularly consults with the Industry Managers to ensure that the Associate Degree programs are satisfactorily resourced."

5.1 Previous review visits - Outcomes

The last general review took place in 2004. Since then there have been supplementary reviews, one to consider new Bachelor of Engineering programs in the School of Electrical and Computer Engineering (April 2008) and one to consider the Associate Degrees in Engineering Technology (April 2008). RMIT University has included responses to issues and recommendations raised in those visit reports in their current submission. Overall these responses report significant changes that have been made to address the issues raised in these earlier reviews, but several require further comment, included below.

5.1.1 General Review 2004

R2 of 2004 General Review

Strengthen the program leadership function, particularly in SECE, but in the other schools also, through a clearer role definition, defined level of accountability and through appropriate training opportunities.

The key leadership position at the program level has been recognised with the establishment of the Program Director role. However the role definition and level of accountability for this position are not clearly differentiated from those of the Head of Discipline or the Deputy Head (Learning and Teaching). Furthermore there are up to 4 Program Directors involved with a number of the programs offered in SECE. It is not clear to the panel how all 4 can have the same responsibility for the program. Also of concern was the appointment of relatively junior academic staff (academic level B) to this important leadership position.

R3 of 2004 General Review

Strengthen the identity and coordination of engineering activities at RMIT - to monitor and address any divergence in processes and approach, differences in the adequacy of physical resources and variations in performance between the schools as well as providing a driving force to promulgate best practice in engineering education.

Substantial improvements are reported in the academic management and governance processes across the College to address these issues. Nevertheless, during the present accreditation visit the panel noted that there was still divergence in processes and approach between and within Schools. This was very apparent in the different treatment given the capstone final year project in the Bachelor of Engineering programs, the duplication of curriculum content in different Schools and even in different Programs taught within the same School, and the lack of engagement at the curriculum level between the programs in chemical engineering and environmental engineering.
5.1.2 Review of Associate Degrees in Engineering Technology 2008

R 1 of the 2008 Review

_Incorporated as a condition of Provisional Accreditation being granted, the university is informed that: “A condition for each accreditation is that prior to the 2009 scheduled general review visit, the Associate Degree programs be revised such that their curricula explicitly demonstrate the incorporation of integrating engineering application and professional development experiences, including the development of an awareness and commitment to ethics, sustainability and environmental issues. These attributes will be expected to be identifiable in program and course learning outcomes, as well as being present in specified assessment methods”. This requirement should underpin a systematic re-evaluation of targeted graduate capabilities, curriculum design and more rigorous mapping of learning experiences and assessment measures to track delivery of outcomes._

It is the current panel’s view that the response of RMIT University to this recommendation is inadequate. In particular, evidence is lacking of curriculum revision that “…..explicitly demonstrate the incorporation of integrated engineering application……..identifiable in program and course learning outcomes….”

R 4 of the 2008 Review

_That the university establish processes for productive benchmarking of the Associate Degree programs against comparative recognised programs which may exist in either the Higher Education or TAFE sectors. The forming of partnerships with like minded providers, both nationally and internationally is suggested._

No action has been taken on this recommendation

Other remaining issues in need of on-going attention have been raised in the analysis undertaken in Section 10 below.

5.2 Pre-visit teleconference

Initial documentation for the 2009 general review visit was received from the University some 7-weeks prior to the visit and distributed to panel members. A subset of the evaluation panel met via tele-conference on 23rd July, 2009 to consider the initial documentation submitted by the RMIT University.

Participants in the tele-conference were:
  - Professor Chris Cook, (Panel Chair)
  - Mr Tim Macoun
  - Mr Paul Mitchell
  - Dr Philip Schneider
  - Mr Michael Flood
  - Mr John Page
  - Mr Solomon Dent
  - Emeritus Professor Neil Page,
  - Emeritus Professor Alan Bradley, and
  - Ms Jill Kiley.

The tele-conference provided an opportunity for panel members to share their initial findings and to highlight any matters of concern. Panel members were very pleased with the structural layout, quality and comprehensiveness of the submitted documentation. The documentation was found to systematically address almost every aspect of the accreditation criteria.

Following analysis of the submitted materials the panel was able to compile a list of issues for further investigation during the visit. Both contextual issues and program specific matters were raised.
This list of issues was provided to the RMIT University shortly after the teleconference.

The panel also asked that the College supply, prior to the visit, a full set of course guides, a budget model for the College of Science, Engineering and Health and a table of teaching duty allocations for 2009. These additional items were made available for the panel’s pre-visit meeting on the afternoon of 17th August, 2009. Again the panel was most grateful for the timely response to this request.

In addition, the panel very much appreciated the supplementary materials and information that was provided during the visit.
6 OVERALL IMPRESSIONS

The panel was impressed with the overall standard of engineering education being offered at the RMIT University. It is one of the relatively few universities in Australia that offers engineering from TAFE through to professional degree levels. This aspect is seen by senior management as a major distinguishing factor and natural advantage in positioning the university in the engineering education sector. The Vice-Chancellor strongly supports engineering and articulated a clear vision for its future. At all levels there is good engagement with industry. This shows up largely in terms of sessional teaching, Program Advisory Committees and industrially sponsored research.

Key attributes are referenced in the Commendations – Section 7.

6.1 Bachelor of Engineering programs

In recent years there has been restructuring of the College and Schools teaching engineering courses. Clearly important advances have been made in recent times in better managing learning and teaching activities through the appointment of Program Directors for each program and Deputy Heads, Learning and Teaching, in each school, but there is some confusion in roles between these positions and also with that of the Discipline Heads. Despite these management developments there are still noticeable differences in policies between Schools and even between different programs within the same School.

Detailed comments are given about each program later in this report, but considered overall, the panel rated the programs in chemical, civil and infrastructure, and environmental engineering as being very good. The programs in aerospace, automotive and mechanical engineering were also good, but some curriculum review has been recommended. The computer and network engineering, electrical, electrical and electronic, electronic and communication programs were generally good, but there was concern about the achievement and tracking of key learning outcomes in the capstone final year project.

The panel had serious concerns about the program in advanced manufacturing and mechatronics. It was considered too deficient in the key areas of programming and mechatronics for it to justify a title including “mechatronics”, and as such, could not be supported for provisional accreditation at this time.

Further background to the points raised here is contained in the detailed analysis in Section 9 of this report.

6.2 Associate Degree in Engineering Technology programs

Two aims have been given for the introduction of the Associate Degree programs: (a) to provide another pathway into the professional Bachelor of Engineering programs for those not meeting the direct entry criteria and (b) to produce graduates that would meet the Stage 1 competency standard for the Engineering Associate level. The Associate Degree programs have been designed to guarantee 2 years advanced standing in the Bachelor of Engineering programs. It is the panel’s view that this requirement has severely constrained the development of curriculum that would produce graduates at the Engineering Associate level. It is on this basis that the panel has recommended that these programs be only accorded limited extension of provisional accreditation pending review of the curriculum along the lines recommended by the 2008 panel.
7 COMMENDATIONS

The panel wishes to specifically congratulate the University, College and Schools on the following aspects of the undergraduate engineering programs.

- The vision and strategic direction being provided for engineering at the University Executive level.
- The team spirit and collegiality among all staff – academic, technical and administrative.
- Staff engagement with industry.
- The “Trade Fair” concept as a show - case for student work, developed in electrical engineering.
- Impressive laboratory facilities, particularly for the Associate Degree programs.
- Excellent feedback from students about the access they have to staff at all levels.
8 ACCOUNT OF VISIT PROCEEDINGS

A record of the visit schedule and the program of discussions held with the graduates, external stakeholders, the senior leadership team, academic staff and students is provided in Appendix 1. Appendix 2 contains additional notes on the separate meetings with staff and students. Issues raised in these discussions are largely incorporated within the analysis to follow and specific recommendations for the University are provided in Section 10.

The Panel would like to thank the Vice Chancellor – Professor Margaret Gardner, the Pro-Vice Chancellor Science, Engineering and Health – Professor Peter Coloe, the Associate Dean (Program Quality) - Professor Mark Shortis, the Heads of School and other members of the Senior Leadership Group, as well as the Undergraduate Program Directors, academic, technical and administrative staff and students for the warm hospitality and climate of cooperation that characterised the visit.

The panel very much appreciated the quality and attention to detail in the submitted documentation as well as the displayed supporting materials and samples of student work during the visit. The range and depth of evidence provided in these displayed materials was sufficient to formulate the final recommendations of the panel. The willingness of staff and students to engage in free and open discussion and the opportunity for in-depth dialogue with graduates and external stakeholders helped very much in the assessment process.
9 ANALYSIS OF PERFORMANCE AGAINST ACCREDITATION CRITERIA

Observations and findings of the panel, referenced to the accreditation criteria, are presented in ‘dot point form’ below. Only selected matters have been discussed here, with specific attention to comments raised by individual panel experts.

Key suggestions for improvement are summarised in the associated recommendations of Section 10.

9.1 The Operating Environment

• Considerable effort has been put into a committee structure to oversee the learning and teaching activities within each program. However, the leadership function for each program was not clear. As discussed in Section 5 of this report, the key person identified to provide leadership at the program level is the Program Director. Others with some responsibility in this area are the Discipline Leaders and Deputy Heads (Learning and Teaching). In the position descriptions for all 3 positions there is some overlap in the key responsibilities. This lack of clarity has led to differences in interpretation within and between some Schools. Importantly no single Program Director is identified for the Bachelor of Engineering programs in the automotive, computer and network, electrical and electronic, electronic and communication specialisations. In the absence of this leadership position, it was unclear to the panel who has responsibility for the overall content and balance of these programs. In another program, Advanced Manufacturing and Mechatronics, a level B academic had been appointed to this key leadership role.

• Feedback from academic staff suggests that there is very limited staff development leave available. While short leave breaks of days or weeks are available, for example to attend a conference, staff development leave of semester length was unknown. This was of particular concern to the panel in those disciplines with little staff turnover – in chemical engineering there has been no new staff in 12 years.

• Dependence on sessional staff for teaching was being reduced by involving more research appointments in teaching.

• There is some evidence emerging that students articulating from the Associate Degree programs were having mixed success in the Bachelor of Engineering programs. Staff commented that students articulating into the aerospace program were not as successful as those in some others. Staff members were also critical of the university policy of allowing some students to transfer from the Associate Degree programs to the Bachelor of Engineering programs at the end of their first year. The staff view expressed was that they were ill prepared for the BE program.

• There is a good range of technical and administrative staff to support all programs.

9.2 The academic programs in general

• The panel commends SCECE on its use of national and international benchmarking. This has been used to good effect, especially in the revision of the civil and infrastructure and environmental programs. It encourages the wider adoption of this approach across the College.

• Program objectives were not always clear. This was true for some of the Bachelor of Engineering programs, as well as the Associate Degree programs. This observation is of special significance for the SECE suite of programs. The panel recommends that the School give further consideration to the type of graduate they wish to deliver, the skills needed and the balance of courses under the new revised program titles.
• As discussed earlier in this report, the design of programs for the Associate Degree in Engineering Technology is compromised by the dual goals for these programs: (a) as an alternative pathway into the Bachelor of Engineering programs for students who don’t meet the normal entry requirements for the BE programs and (b) preparation of graduates to achieve stage 1 competencies at the Engineering Associate level. Accreditation was sought on the basis of (b). The review panel of 2008 recommended significant review of the curriculum to achieve this, but in the present panel’s view, this has yet to occur.

• There is very little exposure if any to basic forms of programming in some BE programs – students in the advanced manufacturing and mechatronics program in particular were critical of the omission of C++ or V basic in their program of study.

9.3 Quality Systems

• The setting and mapping of the learning outcomes and their assessment has been done to a commendably high standard in SAMME and SCECE. In contrast SECE needs to further develop a comprehensive statement of targeted graduate capabilities linked to stage 1 competencies for professional engineers. It should then map learning outcome contributions and assessment to the same standard as SAMME and SCECE.

• RMIT University should be commended for the Program Advisory Committees that have been established to provide program specific advice, largely from the external constituency. However, the minutes of meetings provided to the panel indicated that these were largely of an information sharing nature in which RMIT University reported on planned changes. The University is encouraged to use these forums to involve external members more in the setting and assessment of desirable graduate outcomes.

• Opportunities for student feedback and consultation were good and the students the panel met seemed happy with their access to staff and the response to their concerns.

• The proportion of honours graduates was very high. The panel recommends that benchmarking be carried out across the College and with external programs to ensure some consistency in standard.

• University policy determines that grades used for student work are: pass (50-59%), credit (60-69%), distinction (70-79%) and high distinction (80-100%). These divisions have lower break points than commonly used in the tertiary engineering education sector and may contribute to the relatively high proportion of honours graduates.

• The panel was concerned about the lower English language requirement for international students entering the AD programs compared with the BE programs (IELTS 6 vs 6.5). It was argued that the small class teaching used in the AD programs provided more help to students with the development of language skills. However, the panel was concerned to read in the Program Annual Reviews for the Associate Degree in Engineering Technology (Design and Development) in 2008 that “Being (a) HE (higher education) program, attendance is not compulsory for students and the class participation is poor”.

• Course outlines provided to the panel prior to the visit, and available in the public domain on the RMIT University web site, were poor. The set was not complete and those provided lacked detail about content and assessment. More detailed information was available in hard copy form during the site visit which provided the necessary detail. The panel would encourage RMIT University to bring the standard of the public domain course details to the level of those available in hard copy.

• While the course outlines provided in hard copy at the time of the visit did map the development graduate attributes, it was frequently not clear how this was being explicitly assessed.
9.4 Specific comments related to individual programs from individual panel specialists

Sub-Panel 1: Dr Philip Schneider

BE Chemical Engineering

Program Structure and Content
- Program objectives are clearly articulated and reflected in discussions held with leadership team, academic staff and students.
- Stage 1 competencies were mapped against the each unit offered in the Chemical Engineering program. All competencies have been adequately covered by this program.
- There is a strong commitment by the Discipline leadership team, the staff and the students to chemical engineering at RMIT. Students strongly identify with their program and are engaged in the process of their education.
- Students are exposed to chemical engineering design throughout their program, culminating in the 4th year capstone project. This approach is highly commendable.
- Problem Based Learning (PBL) features strongly and effectively in the program. 25% of the course is taught using a PBL approach, which has been embraced by students.
- The program adequately prepares students with skills in the area of business and project management.
- Ethics and sustainability are adequately covered, although further work could be done to make explicit issues of sustainability in later year units.
- The teaching laboratories are adequate. There is a reasonable level of practical experience for students studying the chemical engineering program.
- There is adequate exposure to design software (Hysis).

Exposure to Professional Engineering Practice
- The third year “Week in Industry” program is commendable. Students enjoy this experience and have used it as a springboard for Vacation Practice opportunities and further employment.
- E-portfolios are not currently in use. It would be worth exploring their use in the future.
- A number of field trips are offered to students, although not all are mandatory. Students felt more encouraged to learn after exposure to these visits. Guest presenters have also been used in the course and currently the Hysis instruction is being delivered by a sessional staff member from industry.

Educational Culture - Academic Staff Team
- Staff numbers appear to be deficient against the recent increase in student load, which has been attributed to the recently offered dual degree programs. The Discipline leadership team suggested that two appointments would be made in the near future, one to replace a retiring member of staff and another new appointment.
- The academic staff appear to share a common vision and are aligned with group goals. This was evidenced in the combined effort of staff in the development and acceptance of Problem Based Learning, which accounts for 25% of subjects in the program.

Standards of Student Work, including Capstone Project
- Final year work was of a reasonable standard, including design and thesis components.
- Some concerns related to whether theses were being second graded or simply moderated were called into question, with variable answers from staff.
- The quality of presented work was of professional standard.
Vacation employment reports were of an acceptable standard, although there appeared to be some issues with the way in which these were handled. It was stated that only 6 of the 12 weeks of vacation employment needed to be in the area of chemical engineering, which was of some concern to panellists. Also, the procedures in place for assessing vacation reports and involving employers could be made more rigorous, so that vacation practice supervisors are in the quality loop.

- Review of course review data indicates staff are actively involved with tracking and improvement of the course.
- The proportion of Honours I graduates is excessive, approaching a level of 50%. Benchmarking should be carried out across the College and with external programs. Given this very high percentage of Honours I and the fact that equal weighting is used across all year levels to determine overall GPA, it is likely that assessment of unit (subject) results should be more stringent and moderation processes employed to steer GPAs to a more appropriate level.

Industry Advisory Mechanisms and Benchmarking
- Limited evidence of formal input by industry to the development of the ‘big picture’, although some tangential inputs can be seen via the “Week in Industry” program and industry visits for example, which give the course a better industry context.
- There are adequate mechanisms in place to drive industry relevance into the program, but these could perhaps be better utilised.

Laboratory Facilities
- Laboratories are of a suitable standard and equipment is available to ensure appropriate practical understanding of engineering concepts.
- IT support, though centralised, appears to be adequate. This is partly due to the initiative and know-how of the laboratory technicians. Access to specialised software does not seem to be uniform across all computers that students utilise, due to licensing issues. Students thought that perhaps security issues prevented 24-hour access to the Chemical Engineering area. Perhaps this matter could be explored to enhance access to software.
- Students were for the most part happy with the level of learning support available to them. They indicated that the staff was generally helpful and committed to their education. Some student feedback suggested that not all timetabled hours were utilised for lectures/tutorials and felt that this let them down somewhat, although this was not a serious issue.
- Technical support staff appears to be sufficient to ensure that the goals and objectives of the program are met.

Sub-Panel 2: Mr John Page, Prof Tony Lucey, Mr Solomon Dent, Prof Neil Page

BE Aerospace

Program Structure and Content
- Program objectives and targeted graduate outcomes are good. The program seems to correlate well with Stage 1 Competency Standard.
- The basic education design is fine but it is seen as a work in progress and should further improve based on staff initiative.
- Articulation pathways - The only concern in this area is the associate degree which does not seem to match the aerospace studies in the degree program.
- The final year thesis which acts as the capstone has the depth and span one would expect.
- Design skills development is rather weak currently with new design technologies not well used and the structure of the design projects in the final years being poorly structured. However, when these concerns were raised with the appropriate staff they had already identified these weaknesses and were in the process of taking appropriate remedial actions.
- The graduates appear to be well prepared to address complex problem solving.
- Aerospace design in the final years should provide hands-on management of a modern goal oriented team. While the theory taught is fine, this practical component is underdeveloped.
- The emphasis on sustainability in other areas of the School should be better reflected in aerospace. Professional Engineering ethics seems to be handled adequately. No indication was given as to how student ethics were handled which is vital in a program with a high level of project work.
- Mathematics seemed to meet the requirements but computing was inadequate.
- Laboratory for first two years very good due to resources shared with TAFE activities. In the final two years students only seemed to get good exposure to their area of thesis.

**Exposure to Professional Engineering Practice**
- There appears to be a realistic commitment to industrial exposure. International initiative particularly exciting.
- All these issues seem to be well addressed though most of the sessional staff appear to be PGs from the school rather than practicing engineers. More industrial exposure for the teaching staff through consultancy and study leave would also be of value.
- The students seem keen to gain exposure to practice as part of their development and are aware of its significance.

**Educational Culture - Academic Staff Team**
- There appears to be a generational change taking place which should bode well for the school’s future. There appears to be only a limited opportunity for study leave which must effect staff expertise development.
- The team appeared to have a good constructive relationship. Particularly impressive was the way they were prepared to demonstrate differences of emphasis in our presence which was very healthy.
- Most of the staff had a good grasp of the “big-picture” for learning outcomes
- All the staff/student interactions within the school seemed to work quite well. The relationship between senior students and staff outside their thesis area seemed a little limited. Many of the staff would benefit from exposure to practising engineering in a commercial environment

**Standards of Student Work, including Capstone Project**
- Assessment seems vary varied with no clear policy on how to deal with collaboration between students on joint projects. While project type learning is very valuable it requires a rigorous assessment methodology.
- In general the use of computer graphics (e.g. CATIA) was poor.

**Industry Advisory Mechanisms and Benchmarking**
- The industrial attendees met during the visit had a high regard for the graduates. In particular the aerospace representatives claimed the students had a good understanding of industrial requirements. The material provided from the formal meetings with industry was less encouraging as it seemed to lack in-depth review.
- Much of the research is aligned with research establishments which is of course valuable but more direct research with industry would be good.

**Laboratory Facilities**
- The synergy with TAFE means that the available equipment for the first two years of the degrees is outstanding. The laboratories utilised later in the course seem much more mixed.
Some facilities seem exclusively research driven while others are very basic. The establishment of the industry supported labs should be encouraged and commended.

BE Mechanical

Program Structure and Content
- Good rational design leading to desired graduate attributes, with some emphasis on computational methods using standard packages
- No explicit teaching of programming – this is seen as a weakness at the professional degree level and limits the potential of electives in mechatronics.
- Strong laboratory program, both physical and computational.

Exposure to Professional Engineering Practice
- Excellent industry interaction typified by the Green Housing project, as well as a series of units developing professional practice skills.
- Graduates seem very suited to industry needs.

Educational Culture - Academic Staff Team
- Good collegiality and adequate opportunity for discussion and reflection.
- Nice balance of staff – young/experienced, teaching/research mix.
- Good organisational structure and leadership of the School.
- Good interaction with students, industry, local community and research agencies.

Standards of Student Work, including Capstone Project
- Generally the capstone project reports are satisfactory to good. The standard of English is marginal with some international students, but the technical content is sound but often shallow.
- Standard of assessment is satisfactory, but there is weak discrimination between standards with most students getting a credit grade or better.

Industry Advisory Mechanisms and Benchmarking
- Reporting suggests industry just “rubber stamps” course developments.
- Little evidence of formal benchmarking but the external activities of staff members ensures the Discipline is aware of external developments.

Laboratory Facilities and Student Support
- Excellent, with plenty of evidence of continuous re-generation.
- Well served in IT tools and software packages.
- Student clinics provide good support.

BE Automotive

This program is closely aligned with the BE Mechanical degree and many of the comments above apply to both programs.

Program Structure and Content
- Strong mechanical program with solid well structured automotive specific courses.
- Formula SAE is a strong benefit for the development of design, team and leadership skills
- High level of software package learning
- Computer programming poorly developed
- Systems engineering not covered well (Aerospace have a good course)
- Should consider increasing use of complex networked embedded computer systems

Exposure to Professional Engineering Practice
- Strongly reliant on placements and projects which appear to work very well and received positive reviews from the students.

Laboratory Facilities
- Laboratories extensive and of high quality
- Student concerns about the number of software licences for packages they use (CATIA mentioned).

BE Advanced Manufacturing and Mechatronics

Program Structure and Content
- Mechatronics content minimal (1 core course) – title of degree not accurate
- Little programming – a little taught in mechatronics course.
- Sustainability a strength
- Could do with more content on Materials

Laboratory Facilities
- Good laboratory access

AD Advanced Manufacturing, Design and Development

Program Structure and Content
- Little evidence of its design as a self contained engineering program that produces engineering associate level graduates
- Limited exposure to industry
- Almost no manufacturing content in AM program
- Some concerns about supporting laboratory work – e.g. no labs in Thermo-fluids 1
- Generic skill development is in the program, but some concerns about group assessment
- Mapping of targeted graduate outcomes is largely absent
- No capstone or integrating activity that demonstrates student achievement in planning, conducting and documenting an engineering project

Sub-Panel 3: Mr Tim Macoun, Mr Paul Mitchell

BE Civil and Infrastructure, Environmental, AD Civil

BE Civil and Infrastructure

Program Structure and Content
- Engineering design and complex problem solving are well developed
- Capstone project experience watered down by multiple discrete reports
- Good spread of skills development, good range and depth of technical competence
- Sustainability well embedded
- Ethics covered, but more theoretical than practical
- Project teams well used but students had some concerns that “peer review” weighting depends on which lecturer is involved.
Exposure to Professional Engineering Practice
- Significant industry liaison by RMIT provides opportunities for students but no evidence of outcomes being assessed.
- Student involvement with Engineers Without Borders is innovative and beneficial and is to be commended

Educational Culture - Academic Staff Team
- Rapid increase in students numbers means heavy staff loads - extra staff are being sought.
- Unclear to panel that level of accountability for continuous improvement are robust.
- Good rapport with students and industry.

Standards of Student Work, including Capstone Project
- Capstone project reports are satisfactory and are appropriately assessed.
- Students want greater involvement of academic staff during project work.

Industry Advisory Mechanisms and Benchmarking
- Good interaction with industry and use of benchmarking

Laboratory Facilities
- Very good across all areas with sound forward planning for improvement.

BE Environmental

Program Structure and Content
- Substantial improvements have been made since the 2004 accreditation, now comfortably meets accreditation criteria.
- Very supportive student opinion of program

Exposure to Professional Engineering Practice
- Good

Standards of Student Work, including Capstone Project
- Good

Industry Advisory Mechanisms and Benchmarking
- Need improvement, insufficient examples of responses to IAC and PAC inputs

Laboratory Facilities
- Excellent and getting better

AD Civil

Program Structure and Content
- New program in 2009
- Sound program content but range of learning experiences not completed by any “capstone” project
- Articulation path well embedded but this at expense of capstone project
- Student awareness and understanding of para-professional status not well understood
- Laboratory learning of very high standard
- Ethics and sustainability covered
- Monitoring and tracking of graduate outcomes proposed but not fully evident to panel
Sub-Panel 4: Prof Alan Bradley, Prof Chris Cook, Mr Michael Flood

BE Electrical, Computer and Network, Electronic and Communication

AD Electrical/Electronics, Network

BE Electrical, Computer and Network, Electronic and Communication

Program Structure and Content
- Common 1st year across these programs is seen as a strength
- 4 year engineering design sequence is seen as a strength
- Concern about capstone project in final year – limited evidence of full project experience, limited evidence of student achievement and learning outcomes.
- Enterprise engineering in 1st year provides good foundation in professional development
- “Big picture” understanding by students is weak. This School needs to urgently address the big picture at curriculum, student and staff levels.
- No evidence of reflective practices, tracking professional development against a specification of targeted graduate outcomes.
- Weakness in signals and systems courses in the Electrical and Electronics program
- Need to develop a graduate outcome specification for each program reflecting what they are trying to achieve. Staff need ownership of this – lacking. Perhaps training needed for Program Director role.
- Information literacy skills need regular development, perhaps in engineering design/enterprise engineering at each year level.
- E portfolio needs to be encouraged further as a useful vehicle for student development.
- Control, signals, systems and digital signal processing should be given more treatment in all programs except that for electrical.

Exposure to Professional Engineering Practice
- Work Integrated Learning initiatives are to be applauded, however work experience opportunities are very limited, especially for international students. Students would like to see more RMIT facilitation of work experience.
- Exposure to practice through guest lecturing schemes is a highlight.
- While happy with the level of industry exposure students wanted more site visits.

Educational Culture - Academic Staff Team
- At interview, few of the staff present contributed to the discussions (unresponsive). Their engagement with the “big picture” outcomes was weak.
- The sub-panel members were impressed with the plans by the new Head of School to bring about positive change.

Standards of Student Work, including Capstone Project
- Panel had serious concerns about the quality evident from displayed material for the capstone project. The current final year capstone project is entirely inadequate – there needs to be full scale projects with the work of individuals identifiable.

Industry Advisory Mechanisms and Benchmarking
- Only one IAC serves the School and Program Directors do not attend the meetings. This is seen as a serious weakness given that the Program Directors have the academic leadership role for the programs they are assigned to.
AD Electrical/Electronics, Network

Program Structure and Content
- These programs are constrained by a common 1st year (apart from Network). This inhibits inclusion of a capstone integrating experience of the kind sought by the 2008 review panel. Inclusion of such a capstone experience could be accommodated quite easily, perhaps as part of the WIL initiative proposed to start in 2010.
- Otherwise the facilities, resources and technical content of these programs is impressive.

Laboratory Facilities
- Impressive, industry standard equipment and facilities.
- Laboratory learning is a significant part of the overall learning experience.
- Students reported difficulties in gaining access to computing facilities
- Students reported that PLC facilities were inadequate
10 SUMMARY OF RECOMMENDATIONS TO COLLEGE AND SCHOOLS

The following recommendations to the College are intended to assist with the processes of continuing quality improvement and to summarise the outcomes arising from the above discussion.

R1 The value of staff development leave is widely recognised as providing academic (and other) staff with opportunities to develop new skills and networks to strengthen their professional abilities. RMIT University and the College should consider extending their staff development programs to include the opportunity for staff to take leave of up to a semester’s duration for defined development purposes to refresh and strengthen their teaching and/or research.

R2 The panel was encouraged by the evidence of growing collaboration between the Disciplines and recommends that this process continue within and across School boundaries. The need for further collaboration was typified by (a) the widely varying approach to the capstone project in final year - there should be a common approach to the marking and moderation of this milestone for learning outcomes and demonstration of graduate attributes that have been developed, and more generally (b) the lack of recognition and adoption of best practice in the mapping of graduate outcomes across Disciplines and Schools.

R3 Further to the previous recommendation, the panel recommends a review of the capstone project in the electrical suite of programs (electrical, computer and network, electrical and electronic, electronic and communication). The outcomes from this project should provide auditable evidence of the graduate attribute development claimed for this course.

R4 As identified to the panel, academic leadership for each BE degree program is provided by the Program Director for that program. The responsibilities specified for this position to a degree overlap those of the respective Discipline Head and the Deputy Head (Learning and Teaching). The panel recommends that the College clarify the positions of academic leadership in the various engineering program areas. Of additional concern was the appointment of multiple Program Directors for a number of BE degree programs offered through the School of Electrical and Computer Engineering. The panel recommends that the College review this arrangement so as to better demonstrate how the academic leadership of these programs takes a holistic approach leading to a balanced program producing graduates with demonstrated capabilities in a recognised specialisation.

R5 The panel was concerned about the high proportion of honours being awarded in the Bachelor of Engineering degrees and encourages the College to develop guidelines as to the qualities expected for each level of grade in courses used to calculate the GPA, the basis of honours determination.

R6 National and international benchmarking of program content has been used to good effect in the Civil and Infrastructure and Environmental programs. The panel recommends that this process be widely adopted across the engineering programs as part of the College’s commitment to continuous review and improvement.

R7 The panel recommends review of Advanced Manufacturing and Mechatronics program to bring the degree title and program content into alignment.

R8 The panel recommends the addition of course material on programming into the Advanced Manufacturing and Mechatronics, Automotive and Mechanical programs to provide better underpinning skills to support following applications courses such as mechatronics and control.

R9 The panel shared staff concerns about the practice of allowing some students to transfer from the Associate Degree programs to the Bachelor of Engineering programs at the end of their first year.
Given the heterogeneous nature of the student intake into the AD programs, the panel recommends that this practice be reconsidered; at the very least there should be specific tracking of the subsequent success of the students involved.

R10 The Associate Degree programs need further revision to accommodate the recommendations of the 2008 review panel and demonstrate the delivery of stage 1 competencies at the Engineering Associate level.

END REPORT

Appendices 1 & 2 to Follow
# APPENDIX 1 - SCHEDULE OF ACTIVITIES

<table>
<thead>
<tr>
<th>TIME</th>
<th>IChemE Panel</th>
<th>Engineers Australia Panel</th>
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</thead>
<tbody>
<tr>
<td>0900-0930</td>
<td>Prof Keith King (Chair) Prof Moses Tade Prof Colin Webb Mr Paul Taranto</td>
<td>Dr Phillip Schneider Mr John Page Prof Tony Lucey Mr Solomon Dent Prof Neil Page Mr Tim Macoun Mr Paul Mitchell Prof Alan Bradley Prof Chris Cook Mr Michael Flood</td>
</tr>
<tr>
<td>0930-1030</td>
<td><strong>OPENING SESSION WITH SENIOR LEADERSHIP TEAM</strong> - Joint Panel meeting</td>
<td>Venue: Research Lounge 28.5 - (includes light morning tea)</td>
</tr>
<tr>
<td>1030-1130</td>
<td><strong>MEETING WITH PROGRAM LEADER/S</strong> - Joint Panel meeting with the Program Leaders for Chemical Engineering Discipline</td>
<td>Venue: Research Lounge 28.5</td>
</tr>
<tr>
<td>1130-1230</td>
<td>Meeting with Design Project staff - Discipline of Chemical Engineering (JH, SB, LA)</td>
<td>MEETING WITH HE and TAFE PROGRAM LEADER/S - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical), AD (Advanced Manufacturing), AD (Design and Development)</td>
</tr>
<tr>
<td>1230-1330</td>
<td>Working lunch with Chemical Engineering Academic staff</td>
<td>PANEL PRIVATE SESSION with access to displayed materials</td>
</tr>
<tr>
<td>1330-1430</td>
<td>Panel Private Session with access to displayed materials</td>
<td>MEETING WITH HE and TAFE PROGRAM LEADER/S - BE (Civil and Infrastructure), BE (Environmental), AD (Civil)</td>
</tr>
<tr>
<td>1430-1530</td>
<td>Tour of Chemical Engineering facilities</td>
<td>MEETING WITH HE and TAFE PROGRAM LEADER/S - BE (Electrical), BE (Computer and Network), BE (Electronic and Communication), BE (Network), BE (Biomedical), AD (Electrical/Electronics), AD (Network)</td>
</tr>
<tr>
<td>1530-1630</td>
<td>Meeting with Technical and Professional Staff (until 16:00)</td>
<td>PANEL PRIVATE SESSION with access to displayed materials</td>
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<tr>
<td>1630-1730</td>
<td>Review of Day 1 and Planning of Day 2 with Program Leaders from 16:00 (MJ, RP)</td>
<td>SUB-PANEL 2 - MEETING WITH ACADEMIC/TEACHING STAFF</td>
</tr>
<tr>
<td>1745-1845</td>
<td>Joint Panel informal meeting with external constituencies</td>
<td>SUB-PANEL 3 - MEETING WITH ACADEMIC/TEACHING STAFF</td>
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<tr>
<td></td>
<td>External Advisory Board members, employers and graduates as well as selected members of the Senior Leadership Team</td>
<td>SUB-PANEL 4 - MEETING WITH MEETING WITH ACADEMIC/TEACHING STAFF</td>
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<td></td>
<td>Venue: Storey Hall Foyer</td>
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<tr>
<td>TIME</td>
<td>IChemE Panel</td>
<td>Engineers Australia Panel</td>
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<tr>
<td>0715-0830</td>
<td>LIBRARY PRESENTATION by University Librarian/Reference Librarian</td>
<td>SUB-PANEL 2 - TRAVELS TO BUNDOORA EAST CAMPUS</td>
</tr>
<tr>
<td>0830-0900</td>
<td>IChemE Panel Private Session with access to displayed materials</td>
<td>LIBRARY PRESENTATION by University Librarian/Reference Librarian - Venue: 14.12 Main Conference Room</td>
</tr>
<tr>
<td>0900-0930</td>
<td>Design projects - follow up discussion with Design Project staff (JH, RP) - Venue: 7.4.11</td>
<td>SUB-PANEL 2 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>0930-1000</td>
<td>IChemE Panel Private Session with access to displayed materials - Venue: 7.4.11 - (includes light morning tea)</td>
<td>SUB-PANEL 3 - TOUR OF FACILITIES - Be(Civil and Infrastructure), BE(Environmental), AD</td>
</tr>
<tr>
<td>1000-1030</td>
<td>IChemE Panel Private Session with access to displayed materials - Venue: 7.4.11</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1030-1100</td>
<td>IChemE Panel Private Session with access to displayed materials - Venue: 7.4.11</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1100-1130</td>
<td>IChemE Meeting with Students - BE (Chemical) - Venue 7.2.42</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1130-1145</td>
<td>IChemE Meeting with Students - BE (Chemical) - Venue 7.2.42</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1200-1230</td>
<td>SUB-PANEL 2 - MEETING WITH TECHNICAL STAFF - Venue TBA 251.3 Meeting Room 2 - (includes light morning tea)</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1230-1300</td>
<td>IChemE Panel Private Session to develop findings and recommendations</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - BE (Advanced Manufacturing and Mechatronics), BE (Aerospace), BE (Automotive), BE (Mechanical)</td>
</tr>
<tr>
<td>1300-1330</td>
<td>IChemE Lunch and Report Back - Venue: 7.2 staff room</td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - AD (Civil) - Venue: 10.12.30</td>
</tr>
<tr>
<td>1330-1400</td>
<td></td>
<td>SUB-PANEL 3 - MEETING WITH STUDENTS - AD (Electrical/Electronics), AD(Network) - Venue: 10.7.27</td>
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<tr>
<td>1400</td>
<td></td>
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<tr>
<td>1515-1530</td>
<td></td>
<td>EXIT INTERVIEW (MEETING) - with Senior Leadership Team - Venue: 14.12 Main Conference Room (Engineers Australia Panel departs 15.30 sharp)</td>
</tr>
</tbody>
</table>

Report of Accreditation Visit
RMIT University 2009 Visit
Draft 1 to panel – 9 September, 2009
Draft 2 to Accreditation Board – 17 September, 2009
Draft 3 to University – 5 November, 2009
Final report to University 22 2009

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A1.1 Meeting with External Constituents: Attendance

The panel met with external constituents in the evening of 18th August. This meeting was attended by members of the Program Advisory Committees, other members from industry, graduates and members of the academic staff. The business cards made available to the panel are shown below.
APPENDIX 2 - ADDITIONAL NOTES FROM MEETINGS WITH TEACHING STAFF AND STUDENTS

Many of the comments and much of the feedback received from staff members has been incorporated in sections of the discussion above. Any further issues or comments have been listed in dot-point form below to complete the record of discussion.

A2.1 Issues raised in discussions with teaching staff

SAMME

- University vision for engineering – no staff response. Power to influence limited to program design.
- Mechanisms exist for cross-discipline discussions by staff
- School vision – sustainability, with industry links
- Regular links with industry
- Possible resource issues in terms of design group sizes
- Moderation of final year project marks – work in progress
- Some differences in policies across the School – now progressing to whole-of-school approach
- Project students capped at 10 per staff member
- Workplan – a cooperative workload distribution model, staff seem happy with how it works
- 25 AD graduates just articulated to BE program. No knowledge of those who might have gone directly into industry.
- Strong feeling that university policy allowing AD students with a GPA of 2 to articulate into the BE programs after 1 year is wrong – students unable to cope.
- Sustainability concept widely embraced
- Need to identify special characteristics of an RMIT SAMME graduate
- Overall a cohesive team and positive about their work

SECE

- Course outlines still to pick up graduate attribute mapping
- New version of 3rd year design running this year using WIKI’s and blogs to facilitate group interaction - groups are deliberately formed to create compositions with diverse backgrounds – a very commendable approach
- Curriculum and course development shifting from discipline based to program based (Program Director leading)
- Curriculum creep – doesn’t appear to be any monitoring or control
- Teaching enhanced by research – examples: DSTO links for more than 20 years, BAE
- Difference between Assoc Diplomas and Assoc Degrees – no clear answer
A2.2 Issues raised in discussions with students:

Sub panels had the opportunity of meeting with undergraduate student groups from all programs within various schools. Student representatives had been arranged from various year levels. The sub-panels were impressed with the eagerness and ability of students to articulate their views and to offer mature reflection on their learning experiences, clearly a resource that can contribute significantly to the processes of continuing quality improvement and the educational design and review tasks of the academic teaching teams.

Many of the views expressed have been integrated with the discussion sections above. Other salient points are recorded below in dot point form.

**Students of the School of Electrical and Computer Engineering**

- 9 students – like program and staff
- Difficulties with vacation employment
- PLC lab not large enough (not many courses offer PLC training)
- Adequate technical staff support
- 3rd year group project of 8, cross disciplinary, taught to work in groups, reinforces concepts of design process- peer review of contribution (Wiki, website note), can accept varying contribution
- Aware of grievance procedures
- All 4th year present project at “Trade Fair” – good
- Good communication with staff, responsive to feedback

**AD (Electrical/Electronics, Network)**

- 9 students - all want to articulate to BE
- Happy with program – supportive of staff and accessibility
- Some idea of para-professional role
- Workload OK
- Resources good – latest technology, adequately staffed
- Staff very accessible
- Good exposure to broader skills, ethics, communication in management course
- Electrical design subject is individual project based
- Good IT and software support, but access to computers can be a challenge

**Students of the School of Aerospace, Mechanical and Manufacturing Engineering**

- 11 students present, 3 international and 8 domestic covering all 4 years of BE programs. Students were courteous and articulate.
- 2 campus arrangement not ideal but manageable
• Liked applications linked to class room learning
• Formula SAE very positive for personal development
• Big picture? Knowledge developing
• Some knowledge of graduate attributes and the accreditation requirements
• 4th year aero – not much access to lab (wind tunnels), insufficient number of licences for some software
• Complaints about insufficient programming (e.g. C++) and software training
• Auto- a lot crammed into program – superficial
• Some lab designed to compare physical measurements with computational predictions (agreement wasn’t very good)
• Workload high (esp. 3rd year) but worthwhile
• Contact with sessional staff outside class hours was good
• Student feedback is taken seriously
• Insufficient mechatronics in manufacturing program

AD (Design and Development) Students

• About 60 students in AD (Des & Dev) – present were 7 students, 5 international, 2 domestic (sat separately). Some international students walked in and out during the session without comment or apology, others were checking or texting on their mobile phones.
• Standard of spoken English from several of the international students was mediocre.
• Attracted by design focus. Reason for entry was articulation – no student present started with the intention of exiting after the AD
• Small group teaching (about 25 students) in subjects like mathematics – students liked this
• International students seek local student involvement in their group activities
• Mix of teaching – TAFE staff very directed cf HE more student based learning
• Some class attendance problems (about 70-80% attendance). Class register taken
• Group activities – no assessment of team working
• Overall workload fine
• Some support mechanisms for international students