Professional Engineering Graduates by Branch of Engineering

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As members know, the national statistics that are based on field of education (ASCED) codes collected and published by the Department of Education, Skills and Employment cannot provide reliable figures for graduations by their branch of engineering, or data on the intended professional purpose of the degrees.

This report aggregates data provided by all 36 ACED members (35 universities) for the numbers of graduates from each of their degree programs accredited at the level of professional engineer, for years 2016 - 2020. These numbers represent nearly all such Australian domestic graduates. (Two private providers that graduate small numbers of international on-shore students are not included.)

The 'year' is the year in which the academic program is completed. Some universities could not provide data for 2020 graduations at the time of collection: accordingly the data presented is for 2016 to 2019.

Thirteen engineering branch groups are identified, as in the following Table. The classification of programs is based primarily by degree title. Except for 'Electrical and Electronic', degree titles of the form ('xx and yy') are assigned to the more specialised branch. For example, 'Civil and Environmental' degrees are classified with Environmental Engineering and 'Civil and Mining' is classified under Mining.

Classification of Engineering Branch Groups

ID	Engineering branches covered	ID	Engineering branches covered
1	Civil, Structural, Construction, Infrastructure	8	Biomedical
2	Environmental, Civil and Environmental	9	Mechanical, Manufacturing, Industrial, Prod'n
3	Chemical, Materials	10	Aeronautical, Aerospace
4	Mining, Petroleum, Metallurgy	11	Mechatronics, Robotics
5	Electrical, Electrical and Electronic, Energy	12	Naval Architecture, Maritime
6	Electronics, Computer Systems, Telecomms	13	Geospatial, Surveying
7	Software, IoT	14	Other

The numbers of graduates from the accredited Bachelor (Honours) and entry-to-practice Masters degrees graduations in each of the 13 branches (plus an 'other' category) are provided in the Appendix for 2016 to 2019. On-shore and off-shore international graduate totals are shown separately. There are no off-shore entry-to-practice Masters degrees. Figure 1 shows the total graduates from each of these cohorts.

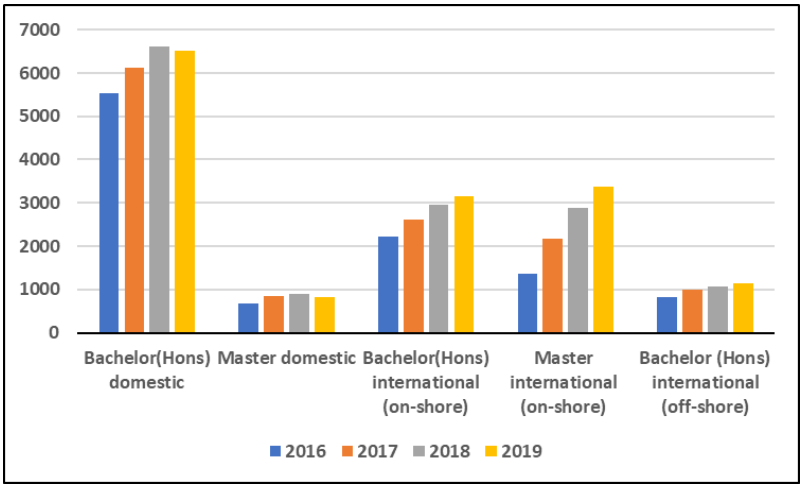

Figure 1 Total numbers of professional engineering graduates, 2016-2019

In 2018 and 2019, more than 7,000 domestic students graduated from degrees accredited to meet the national standard set by Engineers Australia for professional engineers and thereby recognised by the Washington Accord. Most are from Bachelor (Hons) degrees. Two Australian universities offer only Masters level degrees at this level. However, more than 20 universities are now offering entry-to-practice Masters degrees to support the considerable growth of on-shore international students.

Figure 2 shows these numbers broken down by the engineering branch group.

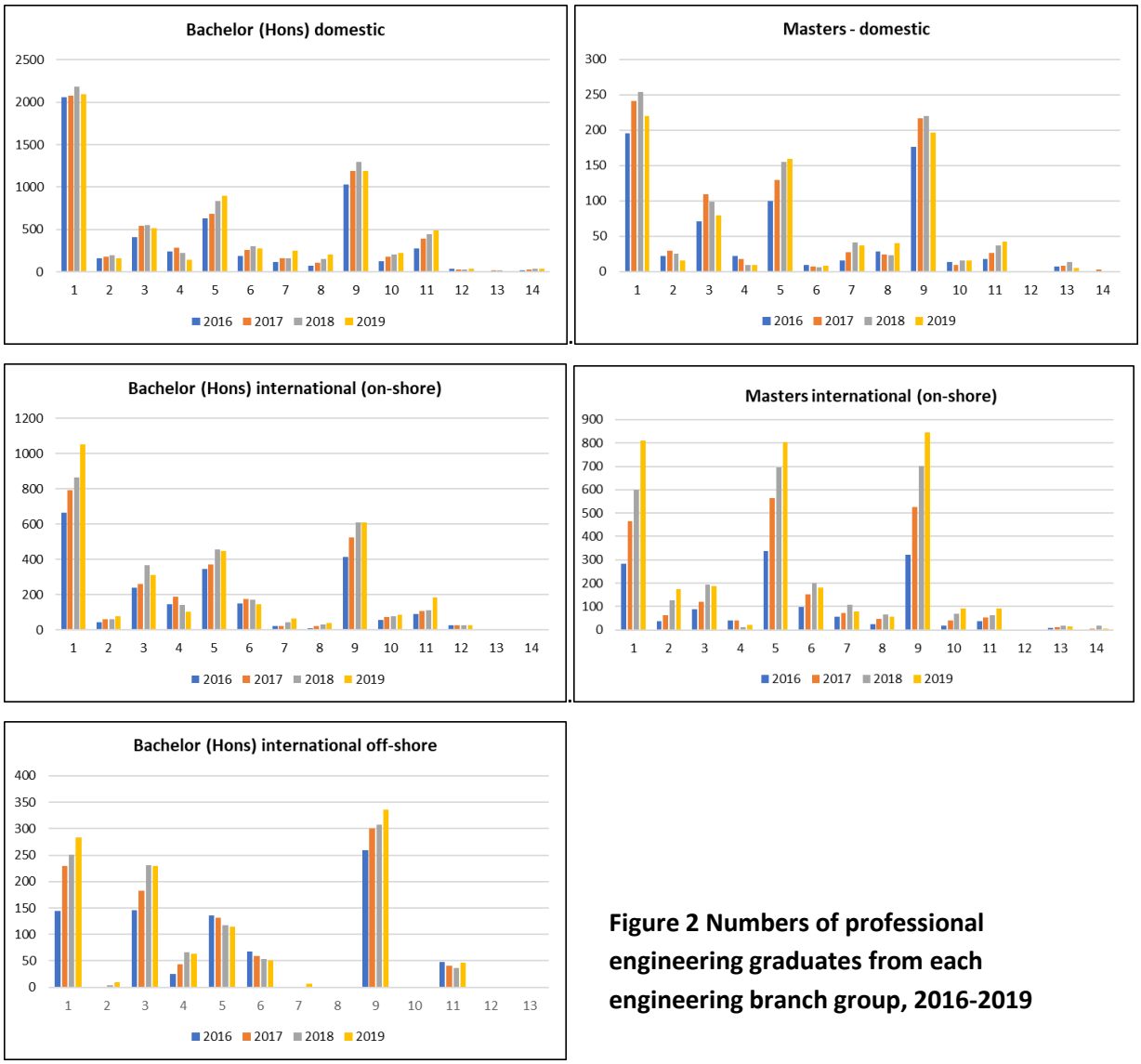

Figure 2 Numbers of professional engineering graduates from each engineering branch group, 2016-2019

For domestic graduations, the Civil Engineering branch group (1) has the highest numbers, followed by Mechanical (9), Electrical (5) and Chemical (3) groups. There was growth in the numbers of graduates from Electrical (5), Software (7), Biomedical (8) and Mechatronics (11) branch groups. The Mining group (4) is clearly in decline.

The majorities of the international (on-shore) graduations from both BEng(Hons) and Master degrees are spread more evenly between the Civil (1), Electrical (5) and Mechanical (9) branch groups, but in Figure 2 the detailed distributions and trends are masked by the large (approx. 50%) annual growth of numbers.

The international (off-shore) graduations from BEng(Hons) degrees are led by the Mechanical (9), Civil (1) and Chemical (3) branch groups, with the Electrical (5) and Electronics groups (6) showing declines over the four years of data. The off-shore programs recorded are operated by only six Australian universities,

in six countries. The branches covered and graduation trends reflect the providers' relationships and local needs, and cannot be interpreted further.

Trend shifts between the branches are presented in Figure 3 as proportional distributions.

For domestic graduations of both Bachelor (Hons) and entry-to-practice Masters degrees, there have been declines in the proportions of Civil (1), Mining (4) and Mechanical (9) groups, and increases in Electrical (5), Mechatronics (11), Software (7), Aeronautical (10) and Biomedical (8) groups. The Chemical group (3) is slightly stronger amongst Masters students. From low bases, Software (7) and Biomedical (8) are showing strong growth, 35% and 64% per annum respectively for the Bachelor (Hons) programs.

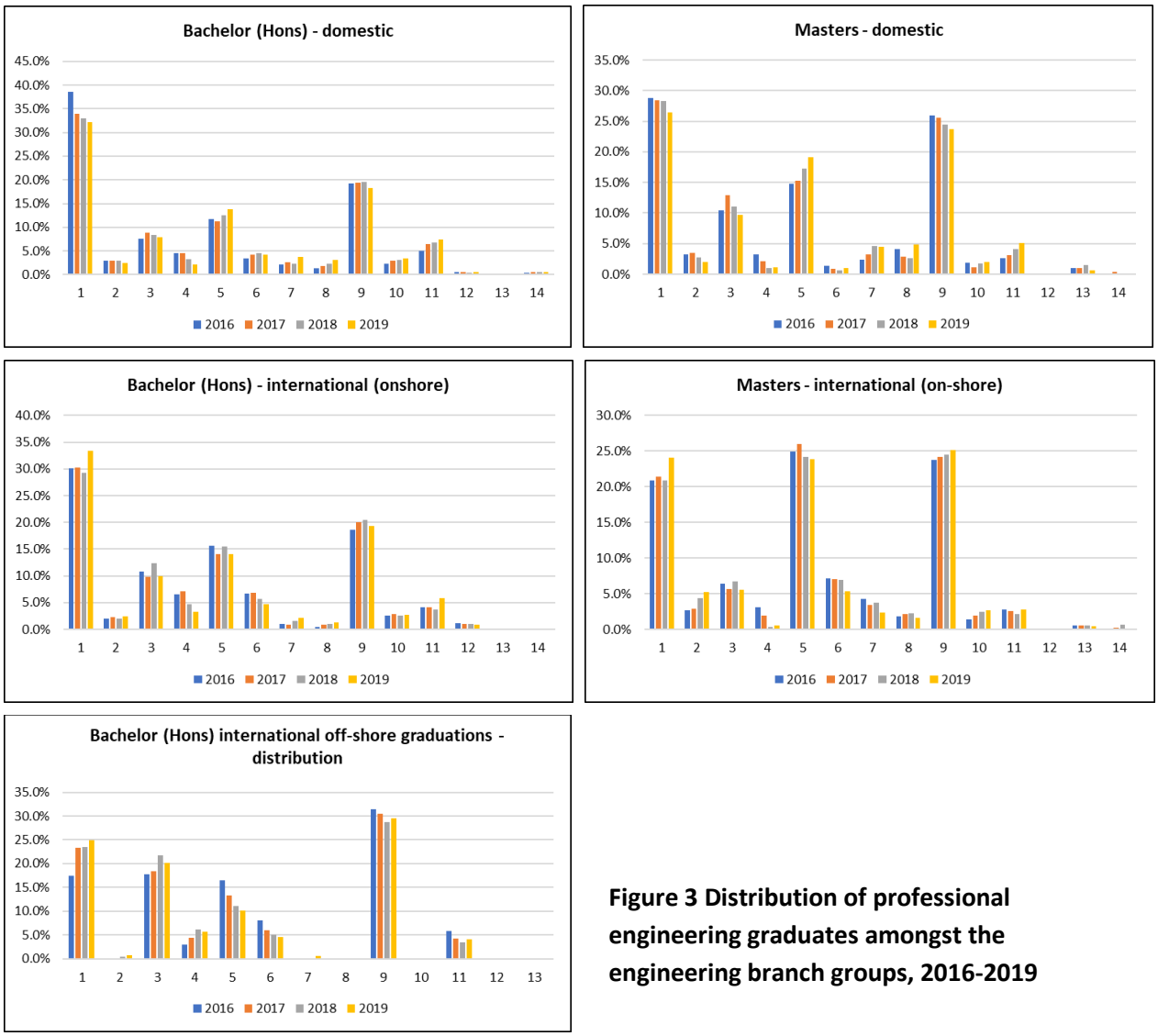

Figure 3 Distribution of professional engineering graduates amongst the engineering branch groups, 2016-2019

For the international (on-shore) cohorts, amongst Bachelor (Hons) degrees, the Civil (1) and Mechanical (9) groups lead, with the Electrical (5) and Electronics (6) groups trending down. In contrast, the latter combination leads the distribution of entry-to-practice Masters graduates. The proportions in other branch groups are stable, but Environmental (2) has increased, while Software (7) has declined.

The Mechanical branch group (9) leads the international (off-shore) cohort, and Chemical (3) has nearly as strong a proportion as the Civil group (1). The Electrical (5) and Electronics (6) groups are trending down. These distributions and trends, taken as they are from six universities' specific program provision in six countries, are not open to deep interpretation.

Appendix

Bachelor (Hons) on-shore

Engineering branches covered		2019		2018		2017		2016	
		dom	int	dom	int	dom	int	dom	int
1	Civil, Structural, Construction, Infrastructure	2,094	1,053	2,186	867	2,075	792	2,060	667
2	Environmental, Civil and Environmental	159	77	195	61	182	60	158	44
3	Chemical, Materials	516	313	552	367	538	259	407	239
4	Mining, Petroleum, Metallurgy	141	103	220	140	283	186	244	146
5	Electrical, Electrical and Electronic, Energy	896	446	831	458	687	370	630	347
6	Electronics, Computer Systems, Telecomms	278	147	299	170	255	177	187	149
7	Software, IOT	245	66	156	45	159	21	119	23
8	Biomedical	207	39	149	31	110	23	71	10
9	Mechanical, Manufacturing, Industrial, Prod'n	1,186	608	1,296	609	1,188	523	1,027	414
10	Aeronautical, Aerospace	220	87	204	77	179	74	125	58
11	Mechatronics, Robotics	485	183	447	110	391	107	272	92
12	Naval Architecture, Maritime	33	26	31	28	31	26	32	27
13	Geospatial, Surveying	13	4	15	2	15	1	3	1
14	Other	40	2	38	4	31	1	19	1
	TOTAL	**6,513**	**3,154**	**6,619**	**2,969**	**6,124**	**2,620**	**5,354**	**2,218**

Masters - on-shore

Engineering branches covered		2019		2018		2017		2016	
		dom	int	dom	int	dom	int	dom	int
1	Civil, Structural, Construction, Infrastructure	220	810	254	601	241	465	195	282
2	Environmental, Civil and Environmental	16	176	25	127	29	63	22	36
3	Chemical, Materials	80	188	99	194	109	122	71	87
4	Mining, Petroleum, Metallurgy	9	20	9	11	18	41	22	42
5	Electrical, Electrical and Electronic, Energy	159	803	155	696	130	565	100	337
6	Electronics, Computer Systems, Telecomms	8	180	6	200	7	154	9	97
7	Software, IOT	37	79	41	107	27	74	16	58
8	Biomedical	40	56	23	65	24	46	28	25
9	Mechanical, Manufacturing, Industrial, Prod'n	197	845	220	703	217	526	176	321
10	Aeronautical, Aerospace	16	92	16	70	9	42	13	19
11	Mechatronics, Robotics	42	93	37	63	26	55	18	37
12	Naval Architecture, Maritime	1	2	0	1	0	1	0	0
13	Geospatial, Surveying	5	14	13	17	8	11	7	8
14	Other	1	5	1	19	3	5	1	1
	TOTAL	**831**	**3,363**	**899**	**2,874**	**848**	**2,170**	**678**	**1,350**

Bachelor (Hons) off-shore

Engineering branches covered		2019	2018	2017	2016
		int	int	int	int
1	Civil, Structural, Construction, Infrastructure	283	251	230	144
2	Environmental, Civil and Environmental	9	4	0	0
3	Chemical, Materials	229	231	182	146
4	Mining, Petroleum, Metallurgy	64	66	43	25
5	Electrical, Electrical and Electronic, Energy	115	118	131	136
6	Electronics, Computer Systems, Telecomms	51	54	59	67
7	Software	6	0	0	0
9	Mechanical, Manufacturing, Industrial, Prod'n	336	307	301	259
11	Mechatronics, Robotics	46	36	41	48
	TOTAL	**1,139**	**1,067**	**987**	**825**