

What Happens If We Run Out of Engineers?

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I have had the opportunity to work as an engineer through more than two generations, and it is interesting to reflect on the changes I have seen.

I worked initially for the South Australian government railway system as an electrical engineer and had many colleagues in the major infrastructure government departments of roads, water, electricity, and communications. All these agencies trained more engineers than they needed, and on graduation many moved into the private sector.

These departments now have very few engineers, and the work is done through large, private-sector organizations or through contractors. There used to be a small number of disciplines, but now universities offer courses in over 30 disciplines. There are now only a few jobs that don't involve interdisciplinary and inter-professional teams. My projects were local, and now most engineers are involved in global projects.

All countries need a flexible and competitive workforce to meet international challenges. As the world moves further toward a global economy, the importance of technology and innovation, as drivers of sustainable economic growth, cannot be overstated. Innovation leads to increased competitiveness, which in turn leads to employment generation and wealth creation.

There is a strong link among technology, economic growth, and competitiveness. Technological change plays a greater role than capital investment in economic growth. Technological change, in turn, depends on the engineers who develop and apply new technologies. Engineering is crucial to underpin growth in the knowledge-based goods and services that now contribute over half the gross domestic product of countries in the Organization for Economic Co-operation and Development.

Engineering provides a bridge between science and technology, and between technology and commerce. It plays an essen-

tial part in meeting the material needs of society and in the generation of wealth. It is engineering that translates research into resources and products.

In Australia, enrollment in engineering is declining. This has led to fewer engineers in the Australian workforce than are needed for it to be truly competitive in a global environment. One reason for this is a lack of understanding by the community and governments about engineering and its importance to Australia's future.

Role of Schools

We will not succeed in growing the engineering skill base in Australia without changes in the education system.

Primary school students cannot study math and science if there are not enough math and science teachers. At the secondary school level, students will not see engi-

neering as a possible career path if parents, teachers, and careers advisors know nothing about engineering. If universities do not give credit or adequate weighting to engineering studies at the secondary level, students will not be interested.

What About the Missing Resource?

Engineers Australia acknowledges the valuable and significant contribution women make across all engineering disciplines. It is vital that we take serious action to attract and retain more women to engineering. More women in engineering will have benefits to the profession and the wider community as diversity results in better use of talent, increased workplace understanding, enhanced breadth of understanding in leadership positions, enhanced creativity, and increased quality of team problem solving.

An Issue of Flexibility

Mobility is also important. In practice, an idea for a structure, project, or product may be conceived by an engineer in one

country, designed in one or more countries, constructed or produced with components from many countries, operated and maintained where used, and disposed of with international support.

In this era of extensive use of the Internet and the availability of many internationally recognized engineering software packages, the concept of an engineer belonging to a country is challenged. It is, however, important for all engineering associations (and governments) to have confidence in the abilities, standards, and experience of engineers working across international boundaries.

Hundreds of bilateral international agreements and memoranda of understanding have brought confidence between countries. In the last 20 years there has been a growing interest in multilateral agreements for engineering graduates, criteria for working independently, and the

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recognition of experienced engineers.

Engineering companies are getting around the problem of shortages by shifting work to where the engineers live rather than shifting the engineers.

Complementary to the interests and activities of the engineering societies who are active in international standards is the expansion of government-sponsored bilateral and multinational free trade agreements between Australia and other countries.

We are aware that 40% of Australian engineers are working internationally whether they leave their desks or not. So "Mobility of Engineers" is paramount.

So what are your plans to source engineers in the next generation?

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