

Action	Outcome
Engineers Australia continues to lead debate on "green" issues including the introduction of limits on the emission of greenhouse gases into the atmosphere.	The Australian government announces its ongoing commitment to creating a prosperous low-pollution economy in which Australia's environment is protected, and continues work on "green" issues including the Carbon Pollution Reduction Scheme and a variety of other climate change adaptation programs.
Engineers Australia calls on the federal government to ensure that any student wanting to study engineering at an Australian university has access to a Commonwealth-supported university place.	The federal government announces an investment of \$491 million over four years to "uncap" the number of public university places from 2012.
Engineers Australia works consistently to increase the visibility of engineering in the Australian media.	From 2008 Engineers Australia sponsored the annual National Press Club of Australia's Engineers Australia Journalism Award. "Engineers Australia" and/or "Engineering" are mentioned more than 60-80 times per month in the Australian media – radio, press, internet and television. Engineers Australia's National Office issues more than 25 media releases in 2009.
Engineers Australia works to ensure engineers are represented on key government boards, councils, roundtable meetings and conferences.	Representatives from Engineers Australia including the chief executive, and current and past national presidents attended and presented at more than 15 conferences in 2009. Engineers are represented broadly in government activities throughout 2009. For example as part of the Prime Minister's Science, Engineering Innovation Council, the Future Manufacturing Industry Innovation Council, Liability Reform Steering Group and the Australian Council of Built Environment Design Professions.

This is the last column of our "Patently successful" series of articles presenting a selection of patented Australian engineering inventions that conquered the world but whose Australian origins are not widely known.

PATENTLY SUCCESSFUL

Variable ratio steering for vehicles

by Edward Genocchio

This last column is devoted to the work of one of Australia's most inspiring engineers. Arthur Bishop's inventions and the company he founded based on those inventions, Bishop Technology Group, are models of engineering excellence. Bishop successfully used the patenting system to build a world-renowned engineering design business providing engineers with the flexibility to experiment and drive technology forward.

Bishop started working as an aircraft engineer in the 1940s designing power steered undercarriages for military aircraft. After World War II he applied his skills to developing power steering systems for the automotive industry. In the 1970s he turned to automotive rack-and-pinion systems and started patenting his concepts. One of his most important patents is Australian Patent No. 462,162.

The patent describes a variable ratio steering system mechanism for a vehicle having a rack meshing with a helical pinion, the rack having a group of teeth at its centre of varying form and varying inclinations with respect to the axis of the rack, the teeth of the rack thereby meshing with the teeth of the pinion at varying effective pitch radii in a predetermined manner.

Back in 1971 variable ratio racks meshing with straight-cut (spur) pinions were known, but it was thought that a variable ratio rack meshing with a helical pinion was an impossible geometry. The use of a helical pinion enabled conjugate tooth meshing action to be achieved for up to a 50% ratio change in the rack and pinion steering gear.

Bishop, as can be attested by the number of articles written about him, is an inspiration to young engineers and an example of how thinking outside the square in engineering can drive change. His rack-and-pinion steering systems are now used in many vehicles internationally, including a wide range of Mercedes-Benz vehicles and the locally manufactured Ford Falcon. Bishop Technology Group has filed hundreds of patents for various steering-rated technologies and employs engineers in Australia, the United States, and Germany.

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