

# ELECTRICAL & ELECTRONICS



Almost everything powered uses electricity and electronics in some form, from high-speed trains to miniature microphones. This is a rapidly developing, hi-tech sector spanning occupations in the electrical, sustainable energy, electronic, communications and information technology fields. New fields, such as data communication, home automation, intelligent systems for industrial and facilities management, and more sophisticated fire and security systems, are constantly emerging.

Qualifications in Electrical or Electronic areas could see you involved in a wide variety of vital products and systems. You have the opportunity to manufacture and maintain lifts, escalators, refrigeration, air conditioning, computer systems, fire protection, security alarms, navigation equipment, entertainment equipment, wireless technology, solar energy equipment or robotics systems.

There are jobs available in Electrical Engineering, Design, Electronics Engineering, Electrical Fitting, Mechatronics and Instrumentation. The skills you gain could also see you moving into related industries such as Information Technology and Communications, Aerospace, Transport and Distribution or Power Generation.



**Louie Pipicella**

"Because I am in management, one of the biggest challenges is getting people to work together. There's a need to inspire people and get them to understand that there's a common goal that we're all striving for.

The best advice I can give to anyone leaving school today would be to get a certificate under your belt. I found that without that foundation it's very difficult to move forward, but the good news is that 3 or 4 years of study can lead to a lifetime of rewards..."

Production Manager @ Soletron Aust



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# ELECTRICAL & ELECTRONICS

# ELECTRICAL ENGINEERING



Electrical Engineers design systems and equipment that transmit, measure and control the generation and supply of electricity. They supervise the manufacture, installation, operation and maintenance of equipment, machines and systems.

You could work in areas such as power plants, generators, metal refining, rolling mills, motor and transformer manufacture, or conduct research into new applications of technology and production machinery.

You will be involved in the planning, design, construction, operation and maintenance of electrical facilities, power plants, parts, equipment and distribution centres.

With the challenges of environmental management associated with greenhouse gasses produced by fossil fuels, you could find yourself working toward more



The GreenStreet street light...

- is manufactured by Australian company Pierlite
- won an Australian Electrical & Electronic Manufacturers Association Excellence in Energy Efficiency Award;
- and took 5 years and \$500K to develop.

If GreenStreets replaced just 10% of Australian street lights, it is estimated there would be an annual saving of 8,000 tonnes of coal and 19,000 tonnes of CO<sup>2</sup> emissions...

**GREEN LIGHT**

efficient and 'green' solutions to power generation. From solar and hydro-electric, to wind generation and tidal power sources – there are plenty of areas to research and explore as an Electrical Engineer.

Relevant qualifications that could lead to a job in this area are to be found in the Metal and Engineering Training Package ([see the Qualifications InfoSheet](#)).



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# ELECTRICAL & ELECTRONICS ELECTRONICS ENGINEERING



The development of electronics over the last 50 years has been extraordinary. Today you have the option of working with electronics in computing, telecommunications, aviation, robotics or the security and defence industries. Or you might like to develop sophisticated medical equipment, electrical consumer goods, or explore the science of most efficiently moving electrons around circuit boards!

Working as a Computer Hardware Engineer you can design and develop physical devices that process information, anything from computer components to telephones. You could specialise in areas such as data networks, mobile and satellite communications, signal processing, image processing, data coding, optical fibres and communication, photonics and micro-electronic devices.

A career as a Software Engineer will see you designing and producing cost effective,



Solar Systems Pty Ltd engineered the \$7 million Solar Dish Concentrator Project in three remote Northern Territory communities.

It is comprised of 30 dishes each 14 metres wide and concentrates the sunlight 500 times. This is saving 420,000 litres of diesel and 1550 tonnes of Greenhouse emissions annually.

The project won the 2005 Engineering Excellence Award and the Peoples Choice Award and the John Wellard Sustainability Award.

**HOT**

reliable software systems. This could include working with artificial intelligence, computer science, graphics, CAD (computer aided design), human computer interaction, information systems, computer interfacing, networks, software development, software systems and systems design.

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## ELECTRICAL & ELECTRONICS

# ELECTRICAL / ELECTRONIC MANUFACTURE



Many companies manufacture electric and electronic products such as circuit boards, electrical hardware, computer components, telephones, mobile phones, photocopiers, cameras and ATM machines.

As a production employee, you'll be responsible for the production and assembly of electrical and electronic appliances. As a tradesperson, you will be engaged in installation, repair and maintenance work and the dismantling and replacement of engineering components.

You might work with diagnostic tools, generators, switchboards, programmable logic controllers, instruments, navigational and sonar devices, telecommunications, computers or even satellite communication systems.



### Ampcontrol

- is one of Australia's largest privately owned electrical and electronic manufacturing, design and service companies
- have increased employees from 150 to 500 in four years including 80 trainee positions
- have increased turnover from \$20M to \$100M and have grown profits from \$1M to \$12M in just 10 years

Ampcontrol attributes its success to its technology development, but more importantly its workers and their skills and career development.

**HIGH VOLTAGE**

You could also work in a more technical or supervisory role, working as a team leader, quality assurance officer or being responsible for production scheduling. You might also assist with the research, design and manufacture of electronic equipment. Finally, you might be involved with product testing and evaluation using measuring and diagnostics devices to repair, test or adjust equipment.

Relevant qualifications that could lead to a job in this area are to be found in the Metal and Engineering Training Package ([see the Qualifications InfoSheet](#)).



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# ELECTRICAL & ELECTRONICS

## ELECTRICAL FITTERS & ELECTRICIANS



Electrical Fitters make and repair electrical equipment, motors, instruments and appliances. Fitters differ from electricians where they also make and recondition equipment.

As an Electrical Fitter, you will install electrical control systems and assemble electrical components and appliances. You could also maintain electrical motors, switching gear and heating equipment, or service automated production processes. You may also program the electronic equipment that controls machinery.

An Electrician installs, maintains and repairs wiring, and associated equipment, lighting systems, control systems and process instrumentation. Electricians are responsible for the safe installation and operation of equipment that is 'live'. Electricians also diagnose faults in equipment and will repair them, or call in a specialist to effect the repairs.



Northern Territory apprentice Nathan Heinrich...

- works for PowerWater
- has completed a New Apprenticeship in Distribution, specialising in Cablejoining
- has dual trades in Cablejoining and Systems Electrician
- won 2005 Group Training NT Apprentice of the Year;
- and was runner up 2005 DEST New Apprentice of the Year Training Awards.

Go Nathan!

**POWERFUL STUFF**

As an electrician, with experience and possibly some business training, you may specialise as an electrical contractor, who orders materials and organises projects to meet customer needs. These skills will benefit you if you eventually run your own business.

Relevant qualifications that could lead to a job in this area are to be found in the Metal and Engineering Training Package ([see the Qualifications InfoSheet](#)).



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# ELECTRICAL & ELECTRONICS MECHATRONICS



Mechatronics is a very exciting field involving the design of 'intelligent' machines using electronic and computer control systems.

Mechatronic applications range from household appliances, such as washing machines, fax machines and DVD players and recorders, to industrial equipment such as mining machinery, automated manufacturing machinery and robots. They also include aircraft, motor vehicles, cameras and power generators.

As a Mechatronics Engineer you will be involved in the application of new technology, combining mechanical, electronics and computer knowledge. You might work in a laboratory, processing plant or in an engineering office. You could specialise in designing high-tech engineering systems to automate production lines, or in the development of automated solutions for moving components and finished goods.



Timothy Driver works for Central West Group Apprentices and won his regional competition and represented his region at 2002 World Skills National Finals.

Gregory Harris works for Country Energy and won a Vocational Excellence Award, Dubbo TAFE Apprentice of the Year and received a Ministerial Scholarship in 2004.

Together, Timothy and Greg were awarded a Certificate at the 38<sup>th</sup> International World Skills Competition in Helsinki, and are now rated in the top 20 Mechatronics Engineers in the World.

**TEAMWORK**

You could even work on the production of smart consumer goods or even develop new processes in underwater exploration, mining or forestry, where employing human labour may be dangerous.

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## ELECTRICAL & ELECTRONICS

# INSTRUMENTATION



Instrumentation involves assembling, calibrating, installing and certifying precise instruments that measure, indicate, transmit, record and control. It includes the areas of Precision and Electronics Instrumentation, and Instrument Fitting.

Instrument Fitters work in areas such as, aviation, mining, refining, medicine, power generation, water reticulation and science. Experienced instrument fitters may work with professionals designing, manufacturing or modifying equipment.

You will be involved in commissioning control systems and their ongoing maintenance. You will examine and test faulty electronic instruments in order to diagnose faults. You may work on the installation of instrumentation wiring, and hydraulic or pneumatic instrumentation tubing. You may also repair, maintain and service industrial instruments.



The Australian Antarctic Divisions Electronics Laboratory produces electronic instrumentation systems that may have to operate unattended for 10 years in temperatures as low as  $-80$  degrees Celsius.

Their Instrument Workshop products include:

- moving mirrors for the LIDAR system (light detection & ranging instrument) accurate to billionths of a metre
- drills capable of drilling samples a kilometre under the ice surface

100%

Instruments must read correctly. Whatever the job, you can be sure that your attention to detail will ensure that this precision work is carried out to the high standards required by this demanding but rewarding field.

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