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**The History and Impact of Australian Engineering**

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**Acknowledgement**

Mr John Gibson is a highly regarded educator and engineer. John taught Industrial Arts at a number of high schools before taking a position at Sydney Teachers’ College, then University of Sydney. He had an engineering education consultancy and has extensive experiencing working with NESA on Engineering Studies syllabus development and the HSC examination committee. The STEM Industry School Partnerships (SISP) Program asked John for his responses to the iTeachSTEM topic discussion questions. SISP is grateful to John for submitting these example discussion responses.

History

# Name significant Australian engineering achievements in the past 30 years.

List 1.1 November 2015 Engineers Australia

* 1. **Water & Waste**

* major Australian dams: providing water supply, electricity and irrigation
* water on tap: finding and delivering clean water to our cities is a continuing challenge for engineers
* Lock Bar Pipe: before electric welding, this was a leading technology for manufacturing large steel pipes
	1. **Energy**
* Interconnected Electricity Grid: one of the longest AC transmission systems in the world
* Basslink: completed in 2005 across Bass Strait, it was the longest high voltage DC undersea cable in the world
* White Cliffs Solar Power: world’s first commercial solar power station has demonstrated two different technologies
* Duck Reach Power Scheme: first commercial hydro-electric scheme to be built in Australia
	1. **Structures**

* Sydney Olympics Site: largest land remediation site in the southern hemisphere
	1. **Sea & Air**

* Black Box Flight Recorder: adopted world-wide, has saved countless lives
* Australia II and the Winged Keel: innovative engineering helped win the America’s Cup
* high speed catamarans: Australian designed and built, these ferries greatly reduced travel times around the globe
* Australia Airline Engineering: continuous improvement has achieved world-leading results
* Interscan Microwave Aircraft Landing System: invented in Australia, this technology helps lands aircraft safely
	1. **Communications**
* CSIRO Wi Fi: this ubiquitous technology is an Australian invention
* Australia Radio Australia Transmitting Stations: powerful short wave transmitters
* Bass Strait Telegraph Cable: first and longest undersea cable in Australia
	1. **Manufacturing**
* Variable Ratio Power Steering: originally for aircraft, this invention is now used in motor vehicles world-wide

	1. **Defence**
* Jindalee Over-the-Horizon Radar: Seeing beyond the horizon was done first by Australian engineers and scientists
* Collins Class Submarines: the world’s most capable non-nuclear submarines
* Active Phased Array Radar: Australia is a leader in this technology which makes for more capable warships
	1. **Technology**
* Cochlear Hearing Implant: enabling the profoundly deaf to hear
* Michell Thrust Bearing: this Australian invention is a vital component in every propeller-driven ship
* CSIRAC Computer: this large valve-type computer had a long working life in Australia
* HIFAR Reactor, Lucas Heights: Australia’s first nuclear reactor operated safely and reliable for nearly 50 years
* Radio Telescope, Parkes: one of the first large movable dish telescopes continues to collect data from the stars
* Australian Space Tracking Stations: brought to Earth the first images of man walking on the Moon
* Mt Stromlo Observatory: the oldest active observatory in Australia once housed the largest optical telescope in the Southern Hemisphere
* Woomera Rocket Range: the largest land-based rocket and weapons test facility in the western world launched the first Australian-made satellite
* Julius Automatic Totalisator: an ingenious mechanical device, capable of real-time calculations, adopted throughout the world
1. **Discuss examples of the change in materials and manufacturing techniques over time.**
* the use of polymers in most engineered objects – injection moulding of cheap and disposable eating utensils
1. **Discuss examples of technology now used in the designing of products.**
* Finite Element Analysis
* CAD
1. **Discuss developments in the technical communication of designs.**
* CAD drawing has allowed transmission of designs electronically between team members
* advantages of CAD: editing, library’s, transmission/sharing, manufacturing production -CAD CAM, laser/3D printing, 3D viewing, AR and VR
1. **Detail particular materials applied in a current product that would not have been available to the engineer 30 years ago.**
* high temperature alloys
* Smart materials
1. **Nominate technologies in modern products that were not present 30 years ago.**
* Internet
* Bluetooth
* WiFi
* GPS

Impacts

1. **List significant technological developments in engineering, and provide key points that demonstrate the impact of that development on society.**
* motor car
* aircraft
* space travel
* satellite communication
* landing on the moon
1. **List significant impacts on people’s lives achieved in Australia by engineering projects in areas such as:**
* transport East/West railway line Supersonic flight
* electricity supply Snowy Mountain Hydro Scheme Electromagnetism
* water supply Bore Drilling Dam mechanics
* production methods Mass produced vehicles CNC Machining
* structures Sydney Harbour Bridge
* health Bionic ear
1. **Discuss the effect that engineering has had on:**
* communication
* cultural Awareness
* technology
* safety
* health
* the Environment