

German Digitalization Technology Helping Protect the Great Barrier Reef – in an Australian first

- Advanced German technology used to help protect a global asset and one of the seven wonders of the world – the Great Barrier Reef
- Over 344,000 square kms coastline simulated in the \$35 million Townsville based SeaSim that is half the size of a football field
- Siemens' Simatic PCS 7 deployments include some of the largest desalination plants, multiple water and wastewater treatment plants in Australia

Australian scientists and researchers are using leading German digitalization and automation technology from Siemens innovatively to simulate, monitor and assess the impact of climate change, ocean acidification and water quality on marine life at the Great Barrier Reef. Believed to be the most advanced facility of its type in the world, the technology at the Australian Institute of Marine Science's \$35 million National Sea Simulator (SeaSim) in Townsville has enabled researchers to do things previously not possible.

“SeaSim gives us a capability we have never had before in terms of the complexity of experiments we can carry out. Siemens technology underpins all the monitoring systems here within SeaSim. We are able to look at multiple environmental parameters that affect marine organisms, and this is the first time we have been able to do that,” said Dr. David Souter, AIMS research director.

Jeff Connolly, CEO of Siemens Australia and New Zealand congratulated the researchers and Australian government for employing the most advanced technologies to protect reef for future generations. “The Great Barrier Reef is a global asset. It belongs to the people of the world, and it's great to see that our

technology can support the fine work and ingenuity of Australian scientists and researchers,” said Mr. Connolly.

The main focus of SeaSim is to provide a complete plant/process automation system to run high-quality marine research in an aquarium setting. The initial automation solution was developed by SAGE Automation, one of Australia’s leading independent automation and control systems integration services providers and a Siemens Solution Partner. Siemens’ Simatic PCS 7, a system proven for its high availability, reliability and scalability, is used at the facility to conduct multiple experiments running simultaneously over longer periods of time.

SeaSim's Precinct Operations Manager Craig Humphrey appreciates the features that SeaSim’s advanced control system provides. “Over 70 individual experiments have been conducted in the SeaSim to date, ranging from experiments run over days to weeks to others which will take years to be completed.”

The complexity of the research required an extremely reliable and scalable control system capable of high accuracy measurement and control of critical process variables, as well as long term data logging and reporting involving big volumes of data. The plant automation system is based on a Simatic PCS 7 system with dual-redundant OS Server and several OS Clients for local operation. PCS 7 also integrates a number of package units for individual experiments that are automated with Simatic S7-1200/1500 controllers via an Industrial Ethernet communications backbone.

According to Adrian Fahey, CEO of SAGE Automation, “The project is a great example of industrial technology being applied successfully in a non-traditional industrial application. The solution was driven by high-precision data collection and reporting.”

In addition, Siemens supplied Sinamics variable-speed drives that are linked via Profibus to the control system. To ensure long-term data availability and provide the research teams with data logging and archiving features, the solution also contains Simatic Process Historian / Information Server. Having multiple Siemens

components in one package paid off as engineering time was significantly reduced and information availability was greatly increased in the PCS 7 control system.

Why the research is so important for Australia

The reef is one of the seven wonders of the natural world and the only living organism that can be seen from the moon, but according to Mark Read, Manager of Operations Support at the Great Barrier Reef Marine Park Authority, the economic value the Great Barrier Reef brings to Australia is about AUD 5.6 billion a year.

“Also, the reef provides just under 70,000 jobs,” he said, “about 64,000 of those directly involved with tourism. However, including the natural value the reef brings means it’s very, very difficult to put a dollar figure on the entire area. It’s big.”

At the SeaSim, Siemens technology is helping bring clarity on the impacts of climate change, coral bleaching, pest management, sediment and pollution, and seawater technologies; all vitally important – not just to protect the natural conditions or marine ecosystems but to also maintain a sustainable economy and livelihood of people dependent on the reef.

“German technology is helping Australia herald in the Fourth Industrial Revolution (Industry 4.0) through innovative applications by some of the brightest minds in the country. The SeaSim is a spectacular infrastructure development that not only helps in the research of marine life, but also the protection of the nation’s assets,” said Jeff Connolly, CEO of Siemens Australia and New Zealand.

“PCS 7 provides for core processes to remain stable with high availability, ensuring no single point of failure of the control system can affect the experiment primary controls. Sequencing these primary systems is achieved effectively via the DCS system. In addition to this it allows us to design and implement affordable custom controls in three IEC 61131-3 programming languages for the PLCs. With PCS 7 and TIA, we can create industry leading advanced controls for the specific purpose of seawater organism scientific research,” said Craig Humphrey.

SeaSim is just one example of Siemens process automation technology being deployed across Australia. Estimated at more than \$30 billion of critical assets, Siemens technology deployments include some of the largest desalination plants in

Australia, oil and gas production sites including Woodside, the last remaining Australian owned brewery (Coopers), chemical and metallurgical plants, critical pharmaceutical plants (GSK and CSL), and even the traffic lane change controls on Sydney Harbour Bridge.

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