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News Flash
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A Cold Answer to a Hot Problem

Elizabeth Budzakoska conducting an experiment on a section of power station piping

Elizabeth Budzakoska, a Wollongong University student based at ANSTO, has been researching an alternative welding technique that could have a significant impact on the reliability, safety and cost-effectiveness of repairing power station components.

Power stations contain kilometres of piping that must endure steam at high temperature and pressure. If a component fails it can result in death and injury, as shown in two cases in the United States in the 1980s.

Elizabeth's work – which is sponsored by the Cooperative Research Centre for Welded Structures – looks at the conventional welding technique, the costly option of replacing the component and how these choices compare to her research on the alternative known as 'cold-weld' repair.

"Weld repairs in these components are often difficult and costly but the price of replacement is even greater," Elizabeth said. "Conventional welding uses post weld heat treatment (PWHT) to reduce residual stresses and improve mechanical properties, but this takes time, needs bulky equipment and results in downtime at a price of nearly $200,000 per day for the power station.

"For the past two years my research looked at a new alternative – cold-weld repair, a technique that avoids PWHT by careful control of the welding process and is currently considered to be a short-term cure until a replacement part is available.

"My research was made viable because I was fortunate enough to get the unique opportunity to study a cold-weld repair made on a thick-walled pressure vessel from Ireland. It failed prematurely after 107,000 hours and, following a cold-weld repair, continued to operate for a further 5,000 hours.

"Because of the time scale of this type of failure, material which has been operating for this long after having a cold-weld repair is rare as the conditions of a power station cannot be simulated in a laboratory in a reasonable time.

"If we are able to find out more about cold-welds it could change the way we do repairs, saving time and money. I hope my studies may be the beginnings of more research that focuses on validating the technique so it's used more widely," Elizabeth said.

Elizabeth's fundamental research which is carried out in the Materials Assessment Laboratories at ANSTO may not only help increase the safety and life of components in power stations, but also benefit other industries that use high temperature processes.

Pacific Island Research Key to Environment Protection

For the first time, the roles ancient settlers and climate change played in the degradation of the Pacific Islands will be investigated, courtesy of a grant from the Australian Research Council for a joint project between ANSTO and the Australian National University.

ANSTO's Dr Henk Heijnis and his team will gather archaeological evidence from the Galapagos, Cocos, Deventuradas and Juan Fernandez Islands to determine whether they acted as stepping stones for the transfer of Amerindian culture into the Pacific.

"Firstly, our team will determine when humans originally came to the four main Pacific island groups," Henk explained. "We can then help manage our current environment by accumulating knowledge about events from past centuries that contributed to the deterioration of the islands' environment.

"Mankind is always wondering how we will cope with climate change," Henk continued. "From the information we collect we will be able to see how these people reacted and what effect they had on the environment.

"This historical evidence will help us determine how we need to look at managing resources to avoid further environmental damage; whether we focus on humans or climate change."

More Information

ANSTO has published its 50th Anniversary Booklet featuring stories and images about our past and current work. If you would like a copy of the booklet please contact Susan Cooper on (02) 9717 3626.

If you would like to receive online updates about ANSTO's science and technology please email enquiries@ansto.gov.au or call (02) 9717 3111.

New Pool for Replacement Research Reactor

The reactor pool being lowered into position

Curious spectators gathered at the site of Australia's new world-class research reactor on the 23rd January to watch as one of its most significant components, the reactor pool, was lowered into position.

Shane Harrison, construction co-ordinator for the project, said the installation of the pool enables ANSTO's contractor to progress to the next stage of construction, and ultimately completion.

"We are making sure that the highest standards of quality are achieved in the construction of the replacement research reactor," said Shane. "High degrees of accuracy and precision are being achieved".

The stainless steel pool weighs over thirty tonnes and required two cranes (one capable of carrying 300 tonnes) to lift it into position. The pool is required to be positioned at an orientation, height, and tilt to within an accuracy of 1mm, so the reactor will be able to function as planned.

The pool is 14 metres deep and holds a volume of over 200 m^3 of pure water that provides cooling and shielding. The small reactor core, which is slightly larger than an average computer monitor, will be submerged in water at the bottom of the pool.

The replacement facility will replace HIFAR (High Flux Australian Reactor), which has been operating safely since 1958. The new facility will operate using low enriched uranium fuel.

When completed, the new reactor will offer opportunities for greater knowledge associated with biotechnology and human health, sustainability, engineering, materials, nanoscience and environmental science.