Neutron beam instruments - Delivering solutions

Neutrons are used to see the internal structure of many classes of materials, helping scientists understand why materials have the properties that they do, and helping tailor future new materials, devices and systems.

Every year thousands of local and international industry and researcher partners access ANSTO’s neutron beam instruments to solve complex problems.

Combating influenza
Tens of thousands of Australians suffer from influenza (flu) every year with many cases serious enough to result in hospitalisation. The development of new devices for its rapid diagnosis and treatment are essential to reducing its duration and severity. ANSTO scientists, collaborating with the University of Newcastle upon Tyne and Orla Protein Technologies Ltd in the United Kingdom, are using neutron reflectometry to aid the design and manufacture of new molecular-based devices. These provide rapid electronic read-outs with results that are less influenced by patient variability compared to existing devices.

Improving power turbine blades
The structural integrity of turbine blades used in power stations is being examined by neutron imaging and strain analysis by ANSTO scientists and their research partners.

Neutron techniques are providing information about stresses that may be critical for failure analysis of turbines, bridges, pipes and aircraft engines. Such information ensures the safety of people using these components, enables companies to maximise the efficiency of their assets, and informs the choice of materials and processes in future manufacturing regimes.

Helping prevent bowel cancer
Working with Perten Instruments, Australian researchers developed a new technique to examine food manufacturing processes in real situations and real time. The neutron Rapid Visco Analyser allows manufacturers to determine the best way to cook and process the starches present in foods such as rice, pasta and cereals. This discovery could see manufacturers making food more efficiently, with lower energy input. It also gives manufacturers the ability to create starches with known health benefits, similar to those that have been proven to help counter bowel cancer.

Keeping our railways safe
Australia’s rail and minerals industries are benefiting from nuclear techniques, which are used to solve the problem of fatigue (squats) or cracks in rails. While typically starting as minor abnormalities, rail squats can quickly turn into dangerous vertical cracks.

The facilities at ANSTO allow researchers to examine full-scale components. Such studies help railway engineers better understand how residual stresses evolve, and then to develop rails with longer service lives, and determine the most appropriate rail maintenance schedules for safe and economic operation of the rail infrastructure serving the minerals industry.