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ANSTO uses Galil Controllers in Neutron Beam Instrumentation for Scientific Research

42 eight-axis Galil controllers help maneuver eight neutron beam instruments for scientific research.

Galil's Ethernet motion controllers were selected by the Australian Nuclear Science and Technology Organization (ANSTO) for Australia's Neutron Beam Instrumentation Project (NBIP). Designed to investigate the atomic structure of new materials, understand the kinetics of chemical reactions and peer into living organisms to understand their biological process, the NBIP is located at the new $350 million Open Pool Australian Lightwater (OPAL) nuclear reactor.

Dr. Frank Darmann, electrical project engineer for ANSTO, says the success of ANSTO to facilitate great scientific research hinges on its reputation for providing flawless accuracy and instrument reliability. As a result, only the most precise motion control technology could be specified.

With that uncompromising criterion, Dr. Darmann undertook an extensive six-month search to select and integrate the right motion control solution to maneuver the eight non-invasive neutron scattering instruments that currently comprise the NBIP. Precision, support, simplicity of integration, ease-of-use and reliability were critical. In the end, Dr. Darmann and his staff selected Motion Solutions Australia to provide the necessary components, which includes a combination of forty-two Galil DMC-2280 and DMC-2183 eight-axis Ethernet motion controllers as well as over 200 stepper drives and amplifiers.

One of the reasons for using Galil controllers is that the neutron scattering instruments provide feedback via a 1 MHz synchro-serial interface (SSI), a standard motion encoder data format. "The Galil controller accepts this signal format as a standard option, so all that is required is to do the configuration in the controller's program and it works. We have completed this on 168 axes so far with zero problems," Dr. Darmann added.

Each of the neutron scattering instruments has 24 to 32 axes, with each axis of motion encoded with precision absolute encoders. Additionally, each is designed to run around the clock throughout the year, are sized at about 137.76 sq. ft., weigh approximately 1,540 lbs., and move around on precision polished granite floors.

"We needed a system that was reliable, maintainable and upgradeable. The specifications on neutron scattering instruments rarely stay constant; scientists always push the boundaries of what's possible. The Galil controller and the integrated system around it allow that to occur relatively easily," said Dr. Darmann.

In addition to the low cost and ability of the Galil controller to meet their stringent requirements for precision, ANSTO also values the support provided by Motion Solutions Australia and the responsiveness of the Galil team. Dr. Darmann refers to a specific instance where they needed 32-bit feedback to the Galil controller. "Galil's Engineering team wrote new firmware for us and we had it in place within eight weeks. We wouldn't have got that elsewhere.

"We also had to decide whether to use absolute encoders or incremental encoders across the 200 axes. Incremental encoders lose their position when the system is turned off or fails. That means upon initialization or recovery, each axis must be 'tared off' or 'homed' to some fixed point and then moved back to where it was. This is time consuming and can be inaccurate. Absolute encoders can remember their last location. By employing an absolute encoding technique, we have eliminated one more risk of instrument downtime during operations—an important one, given there are over 200 encoders in the project." ■

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