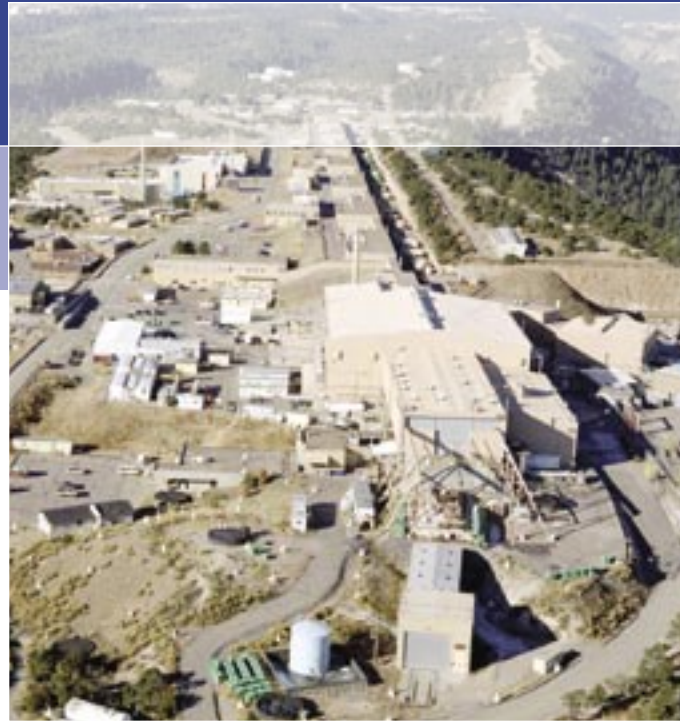


## Los Alamos researchers keep proton beam on target with Foxboro mini-DCS




### CUSTOMER BENEFITS VERSUS A PLC

- ▶ Easier configuration
- ▶ Greater programming flexibility
- ▶ Reduced programming time
- ▶ Better multi-processor functionality
- ▶ More efficient updating of redundant processors

#### ABOUT LOS ALAMOS NEUTRON SCIENCE CENTER

LANSCE is located in Los Alamos, New Mexico, U.S.A. The site houses equipment which produces intense sources of pulsed protons and spallation neutrons. Its purpose is to provide the United States scientific community with the capability to perform experiments in support of national security and civilian research. LANSCE facilities include a high-powered 800-MeV proton linear accelerator, a Proton storage ring (PSR), neutron production targets, and a variety of associated experimental areas and spectrometers.

### CUSTOMER CHALLENGE

Using linear accelerators to produce radioactive isotopes for medical research requires precision control of both the position and the temperature of targets.

“Part of our assignment was to control the movement of targets, getting them into position and holding them there at a controlled tension while they are bombarded with protons for the precise duration and intensity necessary to produce the desired isotope,” said Darryl Case, systems integrator and president of Cali-tech, the full-service instrumentation/automation/controls company that designed the control system for Los Alamos researchers.

During isotope production, target samples are placed into tubes that are lowered through a completely shielded tunnel to chambers some 40 feet beneath the earth’s surface. There, a linear accelerator bombards the target with a proton beam, converting its atomic structure to a different isotope of itself. This variation serves as a tag which enables easier tracking and monitoring of the substance during medical research applications.

The system must maintain control through several modes of operation. In addition to the actual production mode during which the target is bombarded, there are also on/off, maintenance, and standby modes, plus a purification mode wherein ions are removed from the water as the target goes through the container.

“We also had to control cooling of the target, which is surrounded by flowing water and must be monitored constantly for temperature, water tank level, flow, and pressure,” Case added.

### THE FOXBORO SOLUTION

Because of the relatively small scale of such applications, systems using programmable logic controllers (PLCs) are often specified. But because of the complexity of application, the isotope production facility at Los Alamos Neutron Science Center (LANSCE) has gone forward instead with a solution based on a Foxboro A<sup>2</sup>™ mini-DCS (distributed control system) that the center’s control engineers look to for robust control — faster, more economically, and with greater flexibil-

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— Darryl Case, President of Cali-tech (LANSCE systems integrator)



ity than a conventional PLC solution. The controller used is a Foxboro A<sup>2</sup> automation system from Invensys. It has a redundant processor and an object-oriented, drag-and-drop configuration tool that provides a single point of configuration.

“The control problem was somewhat complex, involving many variables. We could have programmed a PLC with ladder logic, but once you go that route, you are pretty much stuck with ladder logic. Adding to the complexity was the fact that we were using two processors. We’ve implemented PLCs in redundant configurations before, and had to write additional software to monitor the second or third PLCs and keep each one updated,” Case said.

## RESULTS

“With the Foxboro A<sup>2</sup> system, we saved some programming time and also had more flexibility to implement changes. Also, if there is any failure, the system will change processors seamlessly, automatically downloading a secondary or standby controller and keeping it constantly up to date,” said Case.

All control is configured in one cabinet, located above ground in the control room, along with three PC monitors and the I/O, which is wired to the target location in the tunnel.

The Foxboro A<sup>2</sup> automation system from Invensys is furnishing hundreds of customers in myriad industries worldwide with the right answer for their small-to-medium control applications. At Los Alamos, this powerful mini-DCS has provided both Case and his customer LANSCE with the robust, economical PLC alternative they sought.



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