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R&D BUILDING THE Perfect Lab

Renovated Special Mention Award 2002 Lab Of The Year

Old is New Again

It's the "new wine in old bottles" theory—but raised to another order of magnitude.

Turning an old warehouse into a facility that houses one of the most sophisticated scientific instruments in the world is a formidable achievement. Yet it was done with imagination, with controlled yet flexible planning, and represents an enormously innovative use of available space.

Sandia National Laboratories, Albuquerque, N.M., converted and expanded a warehouse to accommodate Z-Beamlet, the third largest pulsed laser on earth. Ultimately, the team of scientists, architects, and engineers fit Beamlet into a building of nearly 1,084 m² and on two levels. The complete renovation included construction of a second floor mezzanine.

The course of the laser beam requires that it exit the Beamlet facility and penetrate the tee wall precisely in order to enter the Z-Accelerator facility.

"Once you consider how they threaded the components up and around and through," says Victoria David, competition judge and architect at RNL Design, Denver, "you think that too often we don't give constructors enough credit for the unique, clever, and often ingenious ways they devise for shoehorning new construction into existing space."

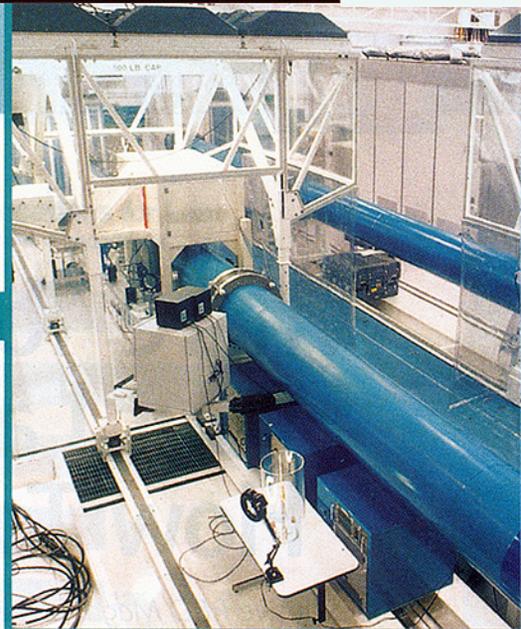
The structure that became the Z-Beamlet facility was a 25-year-old warehouse that had been used as a laboratory staging area. It was constructed of precast concrete tee walls and roof with one advantage: a position next to the Z-Accelerator housing. Ultimately, the renovation created an environment that permitted research potential to be fully realized. In addition, Sandia saved taxpayers tens of millions of dollars over the cost of new construction.

The accelerator itself was disassembled, packed into 25 semi-trailers, and transported from Lawrence Livermore (Calif.) National Laboratory to Sandia, a project of great delicacy, given the precise tolerances and operating conditions involved.

By bringing all elements into place, Beamlet could be connected to Sandia's Z-Accelerator, an extremely powerful device that would then be used to produce x-ray images of infinitesimally small explosions resembling fusion reactions.

"One of the most amazing things about this facility," says judge Howard Wertheimer, an architect from Lord

Aeck & Sargent, Atlanta, "is that the technology associated with the laser's light must travel more than 75 m, through two buildings and a connector bridge, which crosses over a roadway, to a target no bigger than the diameter of a human hair. In addition to these precise alignments, the environment is cleanroom quality."



▲ In the Hi Bay interior, the trench in the lower left corner carries high-voltage cables to the laser amplifier units. (Photo: M. Hurst, Sandia National Laboratories)

Economical cleanrooms

Everything from support equipment to building fixtures and supports were planned around the requirements of the laser. Many surveying instruments were used to locate the components and keep the lines of sight straight.

Several judges commented on the remarkable achievement involving cleanroom design that permitted Class 100 cleanroom conditions to be brought to different points on the laser line—a far more economical arrangement than bringing the entire facility to Class 100 standards.

Because of the tight project schedule, assembly of the laser began while construction was still going on. This situation required constant interaction among the project management and the contractor teams. Work on the capacitor bank occurred first so that that it would be ready when the laser was. The control room was completed so that it could be occupied while the Hi Bay was under construction.

"I like the fact that they even reused a liquid nitrogen storage tank from the failed superconducting super collider project in Texas," says Richard Rietz, a competition judge and consultant for laboratory architecture and design.

—Iris Poliski

Vitals Stats

Project: Z-Beamlet Facility, Sandia National Laboratories, Albuquerque, N.M.
Size: 1,084 m²
Budget: \$12.875 million
Architects/engineers: SMPC Architects PA (design architect); Bridges & Paxton Consulting Engineers Inc. and Chavez-Grievies Consulting Engineers Inc. (engineers); Henderson Construction Inc. (construction); and Forstbauer Surveying Co. LLC (survey services), all of Albuquerque, N.M.
Completion date: June 2001