On the Laser's Edge

When Rod Saunders arrived at the Laboratory with an associate of arts degree in electronics, he looked forward to a career in the same field. "I thought my job would be all electronics." Instead, Saunders was quickly recruited to join Livermore's laser effort to build increasingly powerful lasers composed of thousands of optical components. "A series of doors opened up for me," he says, "many of them unexpected."

Some 34 years later, Saunders is lead operator for the National Ignition Facility (NIF), the most powerful laser in the world. He also has become one of the Laboratory's best resources for building and testing optical diagnostics and orchestrating a NIF shot.

Saunders has worked on several generations of Livermore lasers, including Argus, Shiva, Novette, Nova, and finally NIF. On Shiva, he learned to align laser beams and minuscule targets. For Novette and the 10-beam Nova laser, he built many electro-optical sensors, which are used to characterize the laser beam. Saunders eventually joined the Nova shot operations staff and became shot director, a position he held for 14 years.

During the NIF construction in the late 1990s and early 2000s, he built some of the first sensors for the giant laser. With his extensive experience as a shot operator, he was chosen as one of four shot operators for NIF and then was named lead operator. In this role, he participated in the NIF Early Light campaign, a series of experiments designed to test NIF components using beams from the first four completed lasers. By the end of the campaign, in October 2004, more than 400 shots had been performed, and NIF had demonstrated its capability to deliver high-quality laser beams to the target chamber.

Saunders usually can be found in the NIF control room, which is modeled after the National Aeronautics and Space Administration's mission control room in Houston, Texas. NIF control room operators, most of them technicians, access data through a hierarchy of on-screen graphics menus. The data shown correspond to thousands of control points for electronic, optical, and mechanical devices, such as motorized mirrors and lenses, energy and power sensors, video cameras, laser amplifiers, and diagnostic instruments. Operators can also view videos of key hardware from cameras located throughout the complex.

Saunders is part of a team that is diagnosing laser light from the first bundle of eight NIF laser beams. These so-called laser science shots examine laser beam quality, shape, and energy. For the tests, the laser light terminates in calorimeters instead of targets in the NIF target chambers.

"Conducting shots on NIF is a real team effort," Saunders says. As lead shot operator, he works with the NIF shot director, usually a Ph.D. physicist with a laser science background. He is in radio contact with other technicians in the control room and at stations throughout the facility. He typically works from 3 p.m. to 1 a.m.; shots are run only on swing shift.

In the control room, his main task is coordinating all 14 NIF subsystems as part of a three-and-a-half-hour shot countdown for the laser science shots. Shots involving the target chamber require even longer setup times. The countdown checklist has moved from a manual process to a nearly automated one. Saunders also serves as chair for the committee that reviews proposed changes to the checklist. (See S&TR, July/August 2005, Orchestrating the World's Most Powerful Laser.)

As lead operator for the National Ignition Facility, Rod Saunders is expert in orchestrating a laser shot

The combination of overseeing thousands of laser shots and building hundreds of sensors has given Saunders an intimate knowledge of many NIF subsystems and the possible pitfalls of designing and executing a laser shot. "To have a successful shot, we have to understand what all the subsystems do and how they all have to work together," he says.

From Science & Technology March 2006 Article, ***These People Make Things Happen***, *Rarely in the limelight, technicians at Lawrence Livermore are essential to successful research projects.*
UCRL-52000-06-3, March 1, 2006 — http://www.llnl.gov/str/March06/Aufderheide.html