



Laser Dimensioning

Located at the Chalk River Laboratories, CNL's Laser Dimensioning (LD) capability enables the development of predictive equations for the maintenance and design of CANDU® reactor fuel channel components. The purpose of CNL's LD capability is to perform high-precision (i.e., micron level) dimensional measurements on un-irradiated and irradiated small-scale material specimens. The facility supports deformation and creep studies on various reactor materials, such as zirconium and inconnel alloys. CNL's LD capability utilizes three laser-based profiling systems of the Beta-Laser Mike (formerly Zygo) brand.

There are several complementary facilities and branches at CRL which work in conjunction with CNL's LD capability. These include:

- The Laser Welding Facility
- The irradiation facilities within the NRU reactor, including the U1 and U2 loops, and Fast Neutron rods
- The Shielded Facilities
- The Analytical Chemistry Branch
- The Electron Microscopy Facilities (SEM, TEM, and X-ray)

Since 1988, CNL has utilized its LD capability in irradiation experiments designed to support current and future CANDU reactor designs by testing fuel channel materials over a wide range of conditions ranging from 0 to 250 MPa applied stress, 25°C to 360°C testing end-of-tube ($\sim 1e16$ n/m²/sec) and body-of-tube ($\sim 2e17$ n/m²/sec) fast-neutron fluxes.

CNL's LD capability group would like to continue to establish partnerships with universities and industry, leveraging this capability to increase CNL's understanding of the in-reactor effects on the deformation of nuclear materials.





The Laser Dimensioning staff are able to:

- Set up and monitor in-reactor or out-reactor experiments designed to maintain test samples at a specified temperature, pressure and/or neutron flux and generate key data for developing predictive deformation models, particularly for nuclear reactor components
- Perform measurements on the test samples using the laser measuring system
- Analyze data
- Handle irradiated test samples in shielded facilities
- Perform laboratory testing of pressurized capsules and tensile specimens using creep-testing equipment for irradiated and non-irradiated materials
- Perform basic metallurgical characterization of test materials
- Interpret mechanical drawings and electrical schematics
- Design, maintain, build, and install test rigs that operate in a nuclear environment – requires applying knowledge of materials QA for nuclear applications

