

Fatigue and Fracture Laboratory

BWXT Nuclear Energy, Inc. (BWXT) Fatigue and Fracture Laboratory (F&FL) routinely performs a wide variety of mechanical test methods on metallic samples. The F&FL is staffed with experienced engineers and technicians and is directly supported by the Hot Machine Shop to ensure accurate and reproducible test results. Standard or non-standard specimens are designed by engineers, machined, and then tested in the F&FL.

Experience

The F&FL has handled more than 40 Reactor Vessel Surveillance Program (RVSP) capsules. RVSP capsules are usually irradiated in reactors for various periods of time and then withdrawn from the reactors for testing. The F&FL has also been instrumental in several projects where highly irradiated components such as vessel internals were removed from a reactor for mechanical testing.



Testing a variety of specimens, including RVSP capsules



Three-point bend testing

Equipment

Equipment in the F&FL includes two MTS 220 kN servohydraulic test machines and a Satec 240 ft-lb Charpy impact tester. These machines are surrounded by 2 to 4 in. of lead to provide shielding for operators. Charpy impact, tension and compact tension fracture toughness tests are regularly performed in this laboratory in accordance with the appropriate ASTM standards. Remote handling tools and automatic specimen loading devices are available for transferring and loading of specimens. The F&FL is designed to handle specimens out of cell with radiation levels as follows (beta + gamma, single specimen):

- Charpy specimen - 2000 mrem/hr at 30cm
- Tension specimen - 2000 mrem/hr at 30cm
- Compact tension specimen - 7000 mrem/hr at 30 cm

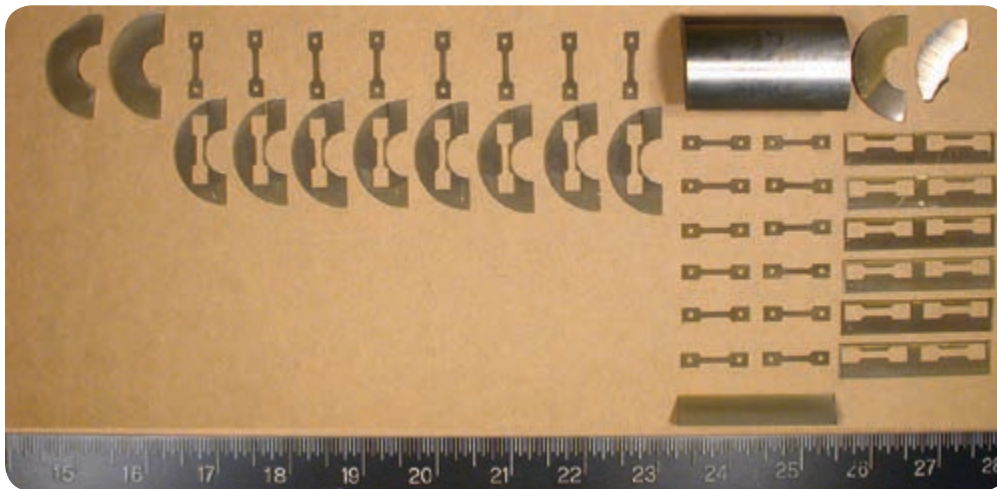
However, specimens with higher radiation levels can be handled if additional shielding is erected around the MTS test machine or the Charpy tester. An example of this was a project involving highly irradiated bend test specimens. These specimens had been irradiated to high fluences in a test reactor at high fluxes and had radiation levels up to 30 R/hr at 30 cm. The testing of these specimens was successfully completed in the F&FL with satisfactory results. Mechanical tests are performed in accordance with the appropriate ASTM standards.



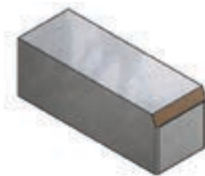
Elevated temperature tensile testing

Services

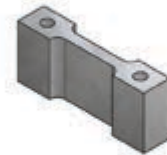
- Charpy impact testing (ASTM E23 and A370)
- Tension testing (ASTM E8 and E21)
- Fracture toughness testing (ASTM E1820)
- Low cycle fatigue testing (ASTM E606)
- High cycle fatigue testing (ASTM E466)
- Fatigue crack growth rate testing (ASTM E647)
- Transition region fracture toughness testing (ASTM E1921)
- Vickers and Knoop microhardness testing
- Miniature specimen machining and testing



Twenty (20) sub-site tensile specimens produced from a small section of nozzle material



Typical charpy half



Tensile outline blank



Tensile sliced to thickness

NUCLEAR ENERGY

GOVERNMENT SERVICES

ADVANCED TECHNOLOGIES

Headquartered in Lynchburg, Va., BWX Technologies, Inc. (BWXT) is a leading supplier of nuclear components and fuel to the U.S. government; provides technical, management and site services to support governments in the operation of complex facilities and environmental remediation activities; and supplies precision manufactured components and services for the commercial nuclear power industry. BWXT has more than 5100 employees and significant operations in Lynchburg, Va.; Erwin, Tenn.; Mount Vernon, Ind.; Euclid, Ohio; Barberton, Ohio; and Cambridge, Ontario, as well as more than a dozen U.S. Department of Energy sites around the country. Follow us on Twitter @BWXTech and learn more at www.bwxt.com.

The information contained herein is provided for general information purposes only and is not intended nor to be construed as a warranty, an offer, or any representation of contractual or other legal responsibility.

Products and services herein described are provided by BWXT Nuclear Energy, Inc., a BWXT subsidiary.

© 2015 BWXT Nuclear Energy, Inc. All rights reserved.



BWXT Nuclear Energy, Inc.

2016 Mt. Athos Road
Lynchburg, VA 24504-5447 USA
t: + 434.522.5165
f: + 434.522.6860

www.bwxt.com

