

Westinghouse Mechanical Testing

Background

The Westinghouse engineers, technicians and staff who specialize in evaluations through laboratory testing of irradiated and non-irradiated materials provide experimental evidence to support materials and processing solutions for its customers while supporting industry technical initiatives.

The materials group performs laboratory evaluations in Churchill, Pennsylvania (USA), for a wide range of customers, supporting all of the Westinghouse product lines and specializing in material evaluations and testing that include hot cell capabilities, microstructural characterization and chemical processing.

In addition to the Westinghouse product lines, the materials group supports utilities worldwide, the Electric Power Research Institute, the U.S. Department of Energy (predominantly through the U.S. National Laboratories), the Pressurized Water Reactor Owners Group, and other commercial and non-commercial organizations worldwide.

Description

The materials group performs mechanical testing and micro-structural characterization of:

- Reactor vessels and heads
- Fuel grid assemblies/skeletons
- Reactor internals
- Steam generators

Typical mechanical testing capabilities include:

- Remote machining of highly precise test specimens from previously irradiated materials
- Testing of specimens in a variety of environments such as air, simulated pressurized water reactor/boiling water reactor water or inert gas
- Testing of specimens at a range of temperatures (generally room temperature to approximately 650 F [343 C])

Materials testing and evaluation capabilities include:

- Four main turbine system MTS test frames (three servo hydraulic frames and one electromechanical frame), with load capacities ranging from 6,750 to 100,000 lb
- Two Instron® test frames (one servo hydraulic and one electromechanical), with load capacities ranging from 25,000 to 50,000 lb
- 2013 MTS SilentFlo™ hydraulic power unit (for all hydraulic frames)

- Hardness and micro hardness
- Tensile
- Slow strain rate
- Compression
- Burst
- Fracture toughness
- Creep (in environment)
- Charpy
- Residual stress
- Crack initiation and crack growth rate
- Stress corrosion cracking initiation testing
- Helium leak testing
- Density
- Wear

Benefits

Mechanical testing of Charpy V-notch, tensile/ slow strain-rate tensile, fracture toughness and crack growth specimens is accomplished by:

- In-cell tensile testing at room temperature and high temperatures
- In-cell fracture mechanics testing at both pre-cracking and load-crack opening testing (J-R curve development)
- In-cell Charpy testing from -200 F to 550 F (-129 C to 288 C)
- In-cell hardness testing
- A complete suite of out-of-cell mechanical testing support

These testing capabilities provide data to more thoroughly assess the effects of irradiation on material toughness.



Mechanical test frames ranging from 6,750 to 100,000 lb load capacity

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Instron is a registered trademark of Illinois Tool Works Inc. (ITW).