

# Post Irradiation Examination Systems

## Real-Time Fuel Performance Data

AREVA's Post Irradiation Examination (PIE) systems offer real-time, accurate methods of collecting fuel performance data during refueling outages or after fuel discharge. With measurement of fuel performance characteristics critical to both nuclear fuel suppliers and the user, our PIE systems provide distinct advantages. For example, using poolside PIE costs less than hot-cell examinations of discharged fuel. And PIE data are available immediately — not several months or years after fuel fabrication or discharge.

## Accurate, Portable Three-Axis Manipulator

Part of the PIE system is based on a portable, three-axis manipulator positioned on the spent fuel pool storage racks. It is an accurate, computer-controlled delivery system for a variety of fuel-measurement devices. Mounted on the rear of the manipulator is a high-resolution camera with zoom lens, which along with the measurement heads are all remotely removable. This feature allows convenient, quick servicing or change-out. Equipment setup typically requires two shifts. Plus, the fuel rod oxide layer and diameter measurement heads can be used simultaneously, reducing inspection time nearly by half.

## Dependable, Stand-Alone Measurements

AREVA can perform fuel rod oxide thickness and diameter measurements, eddy current and visuals on single rods removed during fuel assembly reconstitution campaigns. These measurements can be performed with the Individual Rod Inspection Station (IRIS) or Advance Lone Fuel Rod Examination Device (ALFRED). The individual rod inspection systems are easily set up and provide full-length scans, including rod sections normally inaccessible to scanning because of the spacer grids.

## Designed for Safety

The PIE system is designed for fuel and plant safety. That's why we limit the contact force of probes and measurement heads. Guide wheels prevent over-travel by causing oxide and diameter probes on the fuel rod to retract before reaching a spacer grid.

AREVA also realizes the importance of personnel and plant systems safety during all examinations. The operator views all operations using remote and redundant camera systems. Our teams fully refurbish and qualify these systems prior to each deployment.

## Continuously Improving Technology

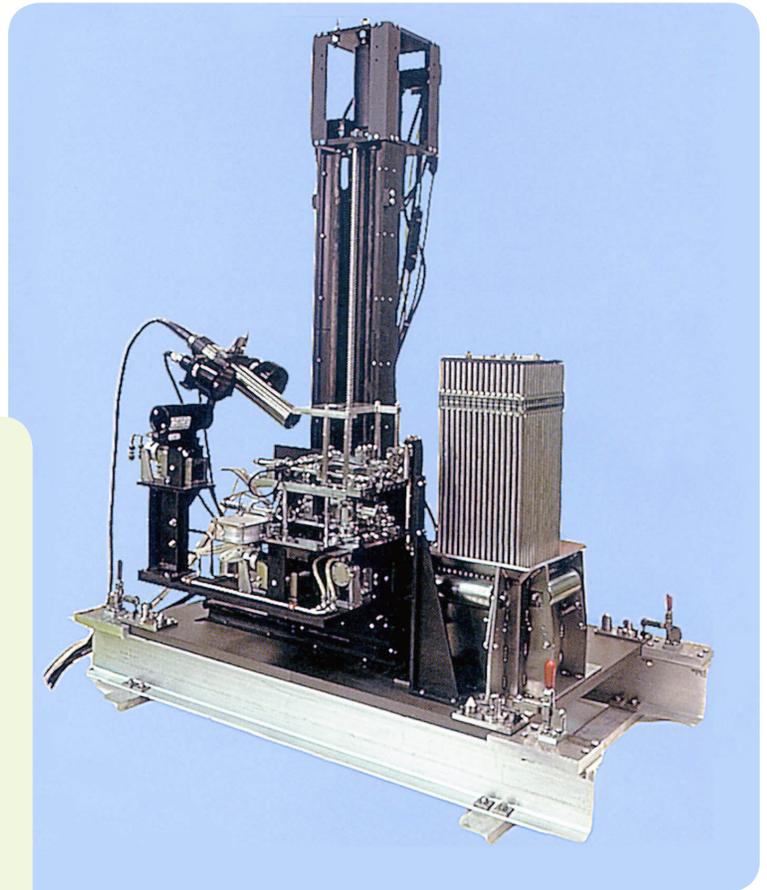
We are continuously upgrading PIE systems to enhance equipment reliability and decrease site intervention times.

## Features and Benefits

- Collects fuel performance data in real time
- Accurate, computer-controlled delivery system
- Allows convenient, quick servicing or change-out
- IRIS or ALFRED provide full-length scans of individual fuel rods
- Cuts inspection time nearly in half

### Primary Measurements Performed

- Oxide Measurement
  - Fuel rod
  - Guide tube
  - Grid
- Fuel Rod Diameter
- Length Measurements
  - Fuel rod
  - Guide tube
  - Fuel assembly
  - Shoulder gap
  - Holddown spring height
  - Grid space
- Bow Measurements
  - Guide tube
  - Fuel assembly
  - Fuel rod by water channel measurement
- Visual Inspections
  - High-definition zoom imaging
- Gamma Scan
- Fuel Rod Eddy Current



PIE System

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