

Platform Scale Testing Center

Purpose

The Platform Scale Testing Center at ORNL enables researchers to investigate monitoring scenarios involving scales representative of those used in facilities that transfer UF₆ into and out of cylinders – UF₆ production, enrichment, and fuel fabrication. The Center provides a means to evaluate the static and dynamic responses of a wide variety of weighing systems.

System Specifications

The Center contains two platform scales that were calibrated using nationally traceable reference standards:

- A 10,000 lb (4,536 kg) capacity scale with four weight modules with stacked load cells (one weight module at each corner of the platform)
- A 8,000 lb (3,629 kg) capacity scale with four shear-beam load cells (one load cell at each corner of the platform)

Three tanks are present that can contain enough water to represent the weight of UF₆ stored in model 30B and 48Y cylinders:

- Two 735 gallon tanks sized to hold 5,020 lb of water (approximate weight of a full 30B UF₆ cylinder)
- One 3,750 gallon tank sized to hold 27,560 lb of water (approximate weight of a full 48Y UF₆ cylinder)

Water can be transferred among the three tanks at the range of rates found in UF₆ handling facilities (e.g., the weight equivalent of a full 30B can be transferred in as little as a day or at a much slower continuous rate taking more than 100 days).



One platform scale uses stacked load cells at each corner (left). Another scale uses a single shear-beam load cell at each corner (center).

Scale Performance Testing

The Center was commissioned in October 2013. Performance tests were performed on each scale to (1) ensure that the scales were functioning properly, (2) determine each scale's general accuracy, (3) evaluate the scale's hysteresis and nonlinearity, and (4) address concerns that uneven load distribution could cause erroneous readings.

These commissioning tests demonstrated that the scales performed best when calibrated using a standard span calibration method, in general were robust against uneven load distribution, and did not exhibit significant hysteresis or nonlinearity.



A weigh module protects load cells from damage and ensures force is directed vertically for accurate weight readings. A weigh module with a single load cell (left) and a weigh module with stacked load cells (right) are shown.

Safeguards Applicability

Two fundamental IAEA safeguards objectives are detecting diversion of declared materials and excess production using undeclared materials. The Platform Scale Testing Center allows ORNL to simulate and share with international collaborators data that represent full weight profiles associated with potential diversion and misuse scenarios.

- The stacked load cells could allow two parties (e.g., the operator and IAEA) to each independently monitor process weights.
- The system enables researchers to transfer water between the tanks to create weight profiles similar to the withdrawal of UF₆ product into 30B cylinders.

The ability to continuously monitor the responses of load cells in feed and withdrawal (F/W) stations would be most helpful to international inspectorates who monitor plant operations.



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