framatome

GALILEO

Advanced Fuel Rod Performance Code

Framatome's GALILEO, a best-estimate code that evaluates and predicts fuel rod performance, helps increase operational flexibility through statistical application methodology, allowing you to maximize your performance while positioning you for advanced fuel management.

Challenge

Evolving market needs present new challenges in fuel rod design, core design, safety analysis and core monitoring. The availability of a robust tool with supporting methodology to accurately predict fuel behavior in all conditions is crucial to safe and economic fuel usage.

Solution

GALILEO is a best-estimate fuel rod performance code that predicts the thermal-mechanical behavior of a pressurized water reactor (PWR) fuel rod. This code integrates the best models existing in current U.S. and European Framatome fuel performance codes while also supporting advanced fuel management and high burnup extensions.

GALILEO predicting capability is supported by an extensive fuel rod database representing a wide variety of fuel rod designs and operating conditions (low and high duty) obtained from commercial and experimental reactors around the world. This dense database firmly supports the associated statistical application methodology using GALILEO that evaluates fuel rod behavior under normal operation and transient conditions. This evaluation quantifies design margins relative to design criteria in a best-estimate (little or no bias on average) manner. These best-estimate predictions effectively reduce over-conservatism while maximizing performance margins for demanding operating conditions across the U.S. PWR fleet.

Customer benefits

- Maximized operational margin and increased operation flexibility as a product of greater accuracy resulting from the statistical application methodology coupled with GALILEO best-estimate predictions
- GALILEO qualification has demonstrated the code is excellent at predicting fuel rod performance for different cladding types, urania and gadolinia-bearing fuels, and a wide range of PWR operating conditions
- GALILEO and the associated statistical methodology are NRC approved to a burnup greater than 62 GWd/mtU and can accommodate advanced fuel management, high burnup applications, and other emerging challenges

Your performance
is **our** everyday **commitment**

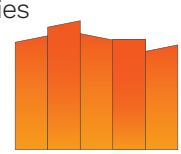
Technical Information

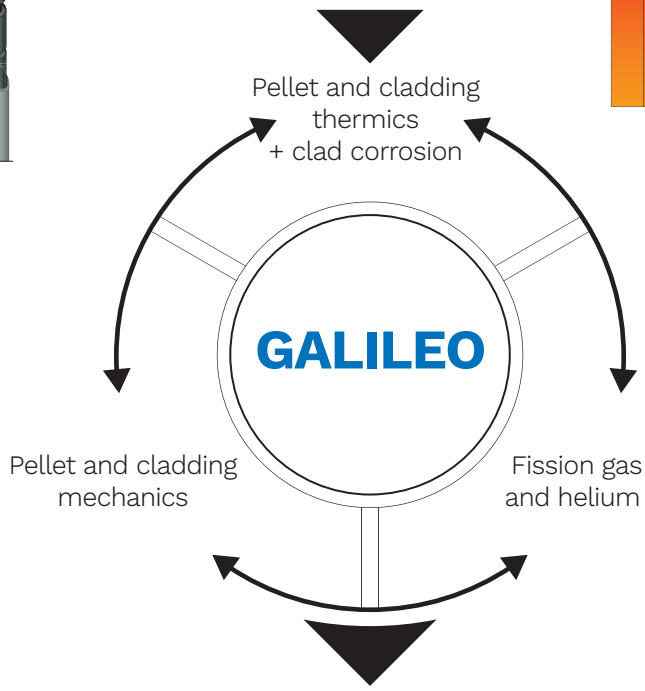
- Data for more than 2000 fuel rods ranging from 0 to 100+ GWd/mtU burnup were available for GALILEO development
- Vast fuel rod database includes measurements of temperature, fission gas release, dimensional changes and many other parameters for a large assortment of fuel rod designs and conditions
- GALILEO incorporates state-of-the-art models (many physically based) to adequately simulate high burnup and multi-dimensional effects of both fuel and cladding
- Statistical methodology considers power, manufacturing and code model uncertainties and reflects those uncertainties within the design analysis results
- In addition to thermal-mechanical applications, GALILEO can also be used to provide data for other discipline analyses such as neutronics, thermal-hydraulics, transient/accident and radiation analyses.

Input data

- Rod characteristics
- Pellet and cladding geometry
- Material

- Irradiation conditions
- Thermal-hydraulic conditions
- Power histories





Output results

- Fuel and clad temperatures
- Fuel and clad stresses and strains
- Outer zirconia thickness and hydrogen content
- Fission gas release and rod internal pressure

Scan to learn more or visit
http://www.framatome.com

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