



KINETRICS

Small Modular and Advanced Reactors

Supporting the development, testing, qualification,
demonstration, and deployment of new nuclear technologies



Why Kinectrics?

- * Actively involved in SMRs with in-depth understanding of the associated technical & political landscapes with Canada
- * Kinectrics wide range of capabilities and experience offers a one-stop shop to support SMR development activities including materials, testing and qualification services, licensing, safety analysis, and project and site services
- * Having decades of nuclear experience, Kinectrics is well positioned to support SMR technology developers as an advisor to ensure that relevant Canadian requirements are met and reliable Canadian partners are selected, where required
- * The only organization to perform an Owner's Engineer role for a new nuclear power plant in Canada



Benefits to SMR/AR

Kinectrics has:

- A full-scale testing facility ready to accommodate specific test requirements coupled with thermal hydraulics expertise to analyze heat-sink performance;
- Comprehensive material characterization services in our corrosion and material testing facilities to assess material science and qualify materials for specific applications and regulatory compliance;
- Instrumentation and control expertise on the implementation of new set-points, modifying trip logic and implementing new trip parameters for special safety systems;
- Knowledge of the Canadian regulatory regime and what is required to advance successfully through the VDR and licensing process;
- Development of high-level SMR licensing strategies in Canada; and
- Centre of Excellence for the provision of specialized safety analysis services for Ontario Nuclear Power Plants

Management of Nuclear New Build



Turnkey

- Reduced time to operation
- Lowest resource demands
- Consolidated cost
- Liability transferred to supplier



Owner's Engineer

- Balanced approach to time, costs, and resources
- Expedited issue resolution
- Liability shared



Design & Build

- Lower up-front costs
- High resource demands
- Full scope, schedule and cost control by owner
- Liability held by owner

Not typically used in nuclear

Modern approach to nuclear

Historical approach to nuclear

Demonstrated capability for niche nuclear facilities: Cernavoda Tritium Removal Facility OE, Teeswater Laundry Facility, Isotope Delivery Systems, etc.

SMR Capabilities

Materials, Testing and Qualification Services

Full-Scale Testing Facilities

Analysis Methods

- Equipment Failure Analysis
- Failure Modes and Effects Analysis
- Stress Analysis

Material Testing

- Metallurgical and non-metallurgical
- Elastomeric
- Materials qualification
- Simulated environmental/in-service conditions

Component Testing

- Pressure boundary program
- Equipment Qualification (LOCA/HE, Seismic, RFI/EMI, Chemical, Submergence, etc.)
- Commercial Grade Dedication

Safety Analysis

Kinectrics performs the majority of specialized safety analysis services for Ontario NPPs and has experience supporting SMR/AR

- Deterministic, Probabilistic, Hazard Analysis, Computer Code Development, Verification & Validation

Human Factors

- HFE Program Management
- OPEX Review
- Function Analysis & Allocation
- Task Analysis
- Human System Interface
- Staffing & Qualifications
- Treatment of Important Human Actions
- HF V&V
- Design Implementation
- HU Monitoring

Licensing and Pre-Licensing

Largest and most experienced nuclear licensing team in Canada, with the following:

- Regulatory strategy
- Compliance assessments
- Licence application development
- Regulatory engagement plans
- VDR
- Environmental and Impact Assessment

Quality Assurance

Kinectrics meets quality standards to develop new nuclear design for SMRs

- Audited by customers and industry groups such as CANPAC, NUPIC & NIAC
- CSA B51 & CSA N285, ISO 17025 Accreditation, ISO 9001 Certification

Nuclear Security

- Threat and Risk Assessments
- Robustness Assessments
- Cyber Security
- Blast Analysis
- Physical Security Design

Decommissioning, Radioactive Materials & Chemistry Services

- Full suite of decommissioning services
- Nuclear waste management & disposal solutions
- Radioactive facilities
- Analytical chemistry laboratory
- Decommissioning planning for new builds

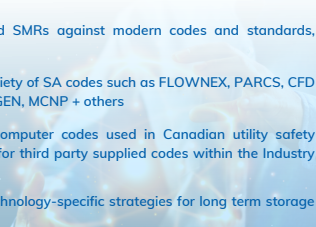
Design Engineering & Site Services

- Fire Protection
- Environmental Assessment
- Mechanical and Civil Engineering
- Electrical and Instrumentation & Controls Engineering
- Systems Engineering
- Client On-Site Support
- Project Management and Controls
- Site Prep

Experience

We have significant experience supporting a multitude of SMR vendors relating to over millions of dollars of work.

Highlights include:

- Kinectrics was the Owner's Engineer (OE) for the Darlington New Nuclear Project (DNNP)
 - Supported OPG throughout the EA process and Joint Review Panel (JRP) proceedings
 - Performed and provided oversight of much of the DNNP site preparation and readiness work
 - Continue to support OPG in licence renewal, technology reviews, and other related work
 - Developed and executed work programs to ensure that computer codes meet the requirements of CSA N286.7, "Quality Assurance of Analytical, Scientific, and Design Computer Programs for Nuclear Power Plants"
 - Performed Probabilistic Safety Assessments (PSAs) for a number of reactor designs, including support for risk-informed technical specification development. Our core PSA team has a proud 35-year history of risk assessment services to nuclear utilities.
 - Performed the SA documented in Ontario nuclear plants Safety Reports, including defining work programs to address CNSC expectations for Deterministic Safety Analysis (DSA)
 - Comparison of existing plants and SMRs against modern codes and standards, including CNSC requirements
 - Kinectrics has experience with a variety of SA codes such as FLOWNEX, PARCS, CFD including STAR-CCM+, SCALE, ORIGEN, MCNP + others
 - Created analytical methods and computer codes used in Canadian utility safety analyses and act as the custodian for third party supplied codes within the Industry Standard Toolset
 - Experience with development of technology-specific strategies for long term storage of used SMR fuel
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