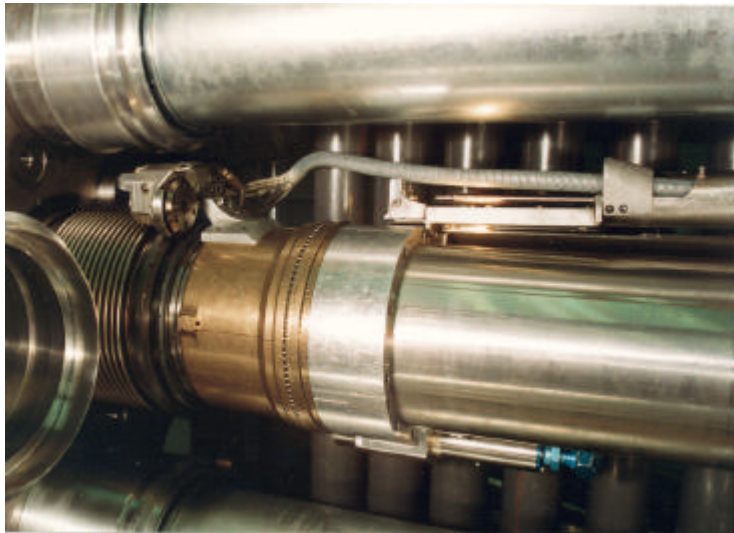


# Nuclear Capability

**ODIM Spectrum - Nuclear (previously known as Spectrum Engineering) has earned a reputation for arriving at creative and uncomplicated solutions to challenging requirements. The company makes cost-effective use of state-of-the-art technologies throughout its operations. Services provided to clients range from project management and engineering analyses through to design, development, and prototype testing, as well as the supply of automated systems, custom tooling, robotic end effectors, radiation monitoring systems and unique detection equipment.**



## **ODIM Spectrum's experience and capability includes the following:**

- CSA Z299.1 Certificate with QA Program successfully Audited by OPG
- CSA N286.2-00 Compliant
- Remotely operated cutting, cleaning, inspection and welding systems for fuel channel maintenance
- Probabilistic safety assessment and reliability analysis
- Failure modes and effects analysis
- Environmental qualification and configuration management
- Isotope separation systems
- Radiation monitoring instrumentation
- Delayed neutron failed fuel location systems
- Safety and process systems design
- Radiation surveys and radioactive source leak testing

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## Selection of nuclear industry projects performed by ODIM Spectrum.

### Remotely Operated Equipment

- Design, development and supply of cut, weld and shifting tools for repositioning of reactor pressure tubes
- Equipment design & supply to service the Universal Delivery Machine for CANDU reactors (GE, OPG)
- *Design services for Terminal Solid Solubility (TSS) equipment for reactor pressure tube inspection*
- *Development of low torque single channel tooling for reactor maintenance (Darlington and Pickering)*
- Design and development of special purpose tooling for multi channel and for large scale fuel channel replacement (Bruce "A" NGS, Bruce Power)
- Design and development of wire brush cleaning tools for Pickering "A" retube project
- Design of special purpose tooling for reactor maintenance (CANDU-3, AECL)
- Spent fuel packaging project for NPD decommissioning (AECL)



**Low Torque Tooling Operator's Control Panel**

### Safety Reliability and Licensing

- Technical Justification document for Terminal Solid Solubility (TSS)
- Inspection system for reactor pressure tubes (OPG)
- Pilot Environmental Qualification studies for High Pressure Emergency Coolant Injection system (Bruce "A" NGS) and for Shutdown System 1 (Pickering "A" NGS)
- Safety and reliability analysis for Shutdown Systems 1 and 2 as well as for ECC and containment systems (Gentilly-2)
- Safety and reliability analysis for Shutdown Systems 1 and 2 as well as for ECC and Containment systems (Point Lepreau NGS)
- Monitoring of site operations and safety system testing and preparation of quarterly reports to the CNSC (Point Lepreau NGS)
- Reliability, maintainability and safety analysis training course (Wolsong 1)
- Safety and reliability analysis, Probabilistic Safety Analysis (Wolsong 2,3,4)
- Reliability and safety analysis of Safety System 1, Safety System 2 and Reactor Regulating System (Maple-X10 Reactor, AECL-CRL)

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**Nuclear Ventilation and Process Systems**

- Design of Primary Heat Transport drying system. (Bruce "A" NGS)
  - Upgrade of HVAC system and operating manual (Bruce "A" NGS)
  - Waste handling system for bitumenized nuclear waste (AECL-CRL)
  - Redesign of NRU reactor stack duct (AECL-CRL)
  - Detailed design and specification for emergency coolant injection system (Douglas Point)
  - Pool liner and penetration design and installation specification (Maple-X10 Reactor, AECL-CRL)
  - Primary cooling system including piping stress analysis (Maple-X10 Reactor, AECL-CRL)
  - Purification and skimming systems - design and specification (Maple-X10 Reactor, AECL-CRL)
  - In-Pool material review (Maple-X10 Reactor AECL-CRL)
  - Controlled ventilation scheme (Tritium Technology Facility, AECL-CRL)
  - Heat recovery system (Tritium Technology Facility, AECL-CRL)
  - Conceptual design review of Silicon-30 Irradiation Facility and costing (MNR Pool Reactor, McMaster U)
  - Preliminary engineering of the primary cooling system and building heating, ventilation, air conditioning and nuclear exhaust filtration systems (MNR - Maple Project, McMaster University)
  - Development of functional requirements for HVAC systems and services during construction and facility operation (Kanata Radioisotope Processing Facility, Nordion International Inc.)
  - Design of nuclear exhaust filtration systems (Kanata Radioisotope Processing Facility, Nordion Int.)
  - Design of cooling system for cobalt storage pools complete with control scheme and cobalt building ventilation exhaust filtration (Kanata Radioisotope Processing Facility, Nordion International Inc.)
  - Design of nuclear exhaust filtration system, (Triump Facility, Nordion International Inc.)
  - Cost estimates for reactor cooling and HVAC systems (Fusion Fuels Technology Project)
  - Design of pressure swing absorption system for isotope separation (Fusion Fuels Technology Project)
  - Detailed design and fabrication of Advanced Gas Chromatograph (Fusion Fuels Technology Project)

**Radiation Monitoring, Instrumentation and Safety System Design**

- Design and supply of Stack Emissions Monitor Pump and Flow Control Panel (Darlington NGS)
- Design, procurement and commissioning of containment isolation radiation monitoring system (Bruce "A" NGS and Bruce "B" NGS)
- Design and development of on-line liquid effluent radiation monitor (Bruce "A" NGS)
- Design of button up containment system monitors (Pickering "B" NGS)
- Design of delayed neutron system for location of failed fuel (CANDU-600)
- Design of containment button-up system monitors (CANDU-600)
- Design enhancement of hydraulic and neutron measurement loops for delayed neutron system for location of failed fuel (Point Lepreau NGS)
- Design review, design modification and testing of Iodine-125 rig (MNR Pool Reactor, McMaster U)
- Design of area, stack and contamination radiation monitoring systems (Kanata Radioisotope Processing Facility, Nordion International Inc.)
- Design and development of laser spectrometer for measurement of small concentrations of heavy water in light water (Ontario Hydro International)
- Design and development of prototype on-line in-reactor temperature probe (Ontario Hydro Tech.)



**Stack Emissions Monitor Pump and Flow Control Panel**

**Modelling and Data Analysis**

- Acoustic signal analysis and processing (Darlington "A" NGS)
- Modeling of fluid/structure acoustics and dynamics (Darlington "A" NGS)
- Development of test program for measurement of pressure & vibration data on Unit 3 (Darlington "A")
- Development of a database for statistical analysis of fuel damage (Darlington "A" and Bruce "B" NGS)
- Seismic qualification of structures (Pickering "A" NGS)
- Stress analysis of fuelling machines (Pickering "A" NGS)
- Stress analysis of spent fuel racks (Pickering "A" NGS)
- Seismic qualification of structure (Tritium Technology Facility, AECL-CRL)
- Preliminary building seismic qualification (MNR - Maple Project, McMaster University)
- Thermal hydraulic design, stress and heat transfer analysis for breeder in tube concepts for ITER
- In vessel conceptual design for pilot reactor, including stress and heat transfer analysis, and cost estimates (Fusion Fuels Technology Project)
- Evaluation of compact toroidal gun for space usage (Fusion Fuels Technology Project)

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