



Innovation Corner: Artificial Intelligence and Machine Learning at Kinectrics



Artificial Intelligence (AI) is changing the way we live and work. Machine Learning (ML), a subset of Artificial Intelligence, uses computers to find patterns from experience to:

- Automate tasks
- Provide recommendations
- Find anomalies, and
- Gain new insights.

At Kinectrics, we have the capability to use AI and ML tools to efficiently analyze large volumes of data, using processes that are not possible with traditional data analysis algorithms. Kinectrics can also use these tools to help you teach a machine to learn from the history of human responses given a set of conditions, enabling the capture of human expertise to automate manually intensive and error prone processes, while allowing for better utilization of your workforce.

Why trust Kinectrics with your Artificial Intelligence and Machine Learning needs?

- With technical expertise in the Nuclear industry we are intimately familiar with station components/processes, allowing us to leverage our engineering experience to influence the Machine Learning models. This increases confidence in model performance and accuracy.
- With many years' experience in data analytics, and as an industry leader in AI/ML, our understanding of the first principles behind the methodologies allows us to tailor and modify our models to the specific needs of our customers.

Kinectrics is currently undertaking several Computer Vision projects to help stations perform inspections and analysis more efficiently.

[Learn more.](#)

Kinectrics' Virtual World – Analytical Chemistry Lab



Kinectrics' Analytical Chemistry Laboratory is licensed by the Canadian Nuclear Safety Commission (CNSC) and is accredited to ISO 17025 by The Standards Council of Canada for many tests, including radiochemical tests. Our lab offers a wide range of specialized equipment to deal with routine as well as complex samples. Kinectrics' Analytical Chemistry lab personnel are highly qualified scientists and technicians, many with post-graduate degrees.

Take a self-guided tour of this lab [here](#) today!

Featured Insight: End-to-End Decommissioning and Waste Management Services



We work with our clients to deliver safe and cost effective solutions across the Decommissioning & Waste Management project life cycle, from concept to site end-state, drawing on the integrated capability and experience of our people, process, technology, nuclear licensed laboratories and large scale facilities.

Our key competencies of strategic planning, safety analysis, regulatory support, engineering design, decontamination, waste treatment, dosimetry, active laboratories, licensed facilities and site operations have been demonstrated on operational, refurbishment, and decommissioning nuclear projects.

The combination of Kinectrics' operational experience and our team of subject matter experts, uniquely enables us to develop innovative solutions that meet the changing needs our of clients.

Want to learn more? Take a look at our brochure [here](#).

Project Highlight: Using Machine Learning to Make Deuterium Uptake Inspection Scope Recommendations



The amount of Deuterium in CANDU pressure tubes affects their service life. The empirical models built to forecast the Deuterium concentration are constantly updated using the data obtained from periodic in-service inspections. Since the cost to perform these inspections are very high, the objective of this project was to provide recommendations for inspection locations in an upcoming campaign that consider what locations would have the highest impact on the evolution of the empirical models.

The overall strategy was to evaluate how sets of hypothetical inspection results from different candidate inspection locations will affect the Kinectrics' in-house subject matter expert's (SME) opinion on the Deuterium uptake that is expressed through the empirical models. Normally, the SME may take days to manually evaluate the effect one set of inspection results will have on the empirical model. Given there are many combinations of inspection locations, it may take weeks of evaluations to obtain the scope recommendations. To facilitate this analysis, a novel Kinectrics proprietary machine learning algorithm was developed to mimic the SME's empirical modelling preferences, as well as incorporate the state-of-the-art of Deuterium uptake, and apply it to automate the numerous evaluations.

The algorithm that was developed reduced the evaluation time by about 85% and produced inspection recommendations that the SME and the client agreed with. This demonstrated how the Kinectrics proprietary machine learning algorithm:

1. Automated a highly manual evaluation process,
2. Captured the Kinectrics' in-house SME's expertise in empirical modelling,
3. Incorporated the state-of-the-art understanding into the evaluation and ultimately the recommendations.

The client further requested that the novel algorithm be used to produce inspection recommendations for an upcoming Deuterium concentration inspection campaign and assist in the development of the empirical model that will be incorporated in future safety assessments.

Read the full case study [here](#).