



INSPECTION AND MAINTENANCE SERVICES

DEDICATED TO DELIVERING WORLD-CLASS, INNOVATIVE INSPECTION, MAINTENANCE AND TECHNICAL SERVICES.



ONTARIOPOWER
GENERATION

Who We Are

Ontario Power Generation (OPG) produces almost half of the electricity that Ontario homes, schools, hospitals and businesses rely on each day.

We are committed to ensuring our energy production is reliable, safe and environmentally sustainable for Ontarians today and for the future. We are currently undergoing the largest infrastructure project in Canada by refurbishing our clean energy powerhouse, the Darlington Nuclear Generating Station.

As of Dec. 31, 2016, OPG's generating portfolio had an in-service capacity of 16,177 megawatts. We own and operate:

- ☼ 2 nuclear stations
- ☼ 66 hydroelectric stations on 24 river systems
- 🌲 2 biomass stations
- 🔥 1 thermal station
- 🌀 1 wind turbine

OPG owns two other nuclear stations, which are leased to Bruce Power L.P. We also co-own but do not operate the Portlands Energy Centre in Toronto and the Brighton Beach gas-fired generating station in Windsor.

Inspections and Maintenance Services

Inspection and Maintenance Services (IMS) is a division of OPG that provides inspection and maintenance services for the energy sector across the world.

For over 40 years, we have performed inspections using safe, reliable and state-of-the-art robotic tooling systems. Our clients include nuclear, hydroelectric and thermal/geothermal electric utilities.

We are a team of over 350 experienced, innovative and industry-leading energy professionals, specializing in end-to-end solutions in the following areas:

- Engineering and technology development
- Project management
- Operations and site delivery
- Regulatory experience
- Business development

OPG is interested in collaborating within the innovation community to support technology development. We look forward to working with entrepreneurs, innovators and start-ups to drive improvements to safety, efficiency and the effectiveness of inspections and maintenance in the energy sector worldwide.

Experienced. Innovative. Responsive.

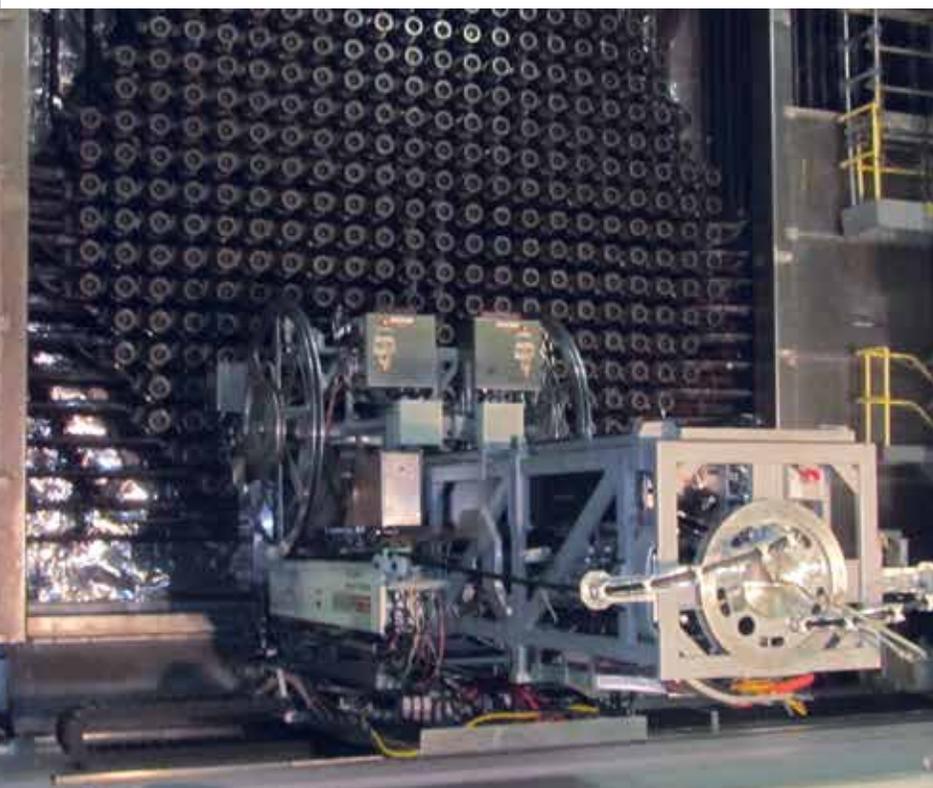
Technologies

Power generating stations require detailed inspections and thorough maintenance to ensure safe and reliable operation. For over 40 years, IMS has successfully designed, engineered, built and operated non-destructive tooling to help our customers maintain and extend the operational life of their stations.

Our staff and analysts are trained to the highest standards and use this tooling to reliably and repeatably detect flaws in plant components. We complete these inspections safely and efficiently, using well-established procedures and training.

OPG's IMS division is capable of completing a variety of repairs, replacements, and modifications to plant components as requested. Our philosophy is to continuously improve our program through the pursuit of enhanced technology that allows us to be more adaptive and responsive to the unique demands of our customers.

OPG also continues to invest in the research and development of further advancements in the area of inspection and maintenance such as unmanned aerial vehicles, remote delivery systems and robotic pipe crawlers to achieve faster, cheaper and safer inspections.



FACT:

In 2015, hydroelectric and nuclear power provided approximately 80 per cent of the **power in Canada**. IMS has been instrumental in contributing to this increase in generation through technology development.



Land

Ground-breaking technology. Non-destructive, of course.

The bulk of work completed by IMS is conducted through remote operation of specialized tooling within hydroelectric and nuclear stations.

The equipment and components within electricity-producing facilities are designed to withstand unique conditions, which can include anything from high-pressure steam and fast-moving water to high levels of radiation. These conditions make it difficult to inspect and maintain the components.

How do we inspect?

In order to maintain and inspect this equipment without damaging it, we use equipment similar to that of a doctor who examines a person using Ultrasonics or X-Rays. In the inspection industry, this technology is referred to as Non-Destructive Testing.

As in any fast-paced growing industry, there have been several challenges with accessibility, speed and data quality. Our innovation team has been one of the first to automate this non-destructive technology and propel the industry to high levels of safety, quality and efficiency.

What equipment do we use?

We use a wide range of non-destructive technology in the inspection and maintenance of boilers, turbines, fuel channels, piping systems, civil structures and other critical plant equipment. We deploy remotely operated vehicles, robotic tooling and laser measurement systems to safely and successfully complete inspection campaigns.



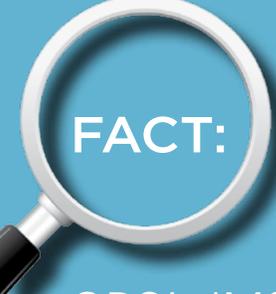
Areas of Expertise

- **Ultrasonic testing** uses high-frequency sound energy and ultrasonic waves, which can help identify tube-wall thickness, detect fractures or corrosion in the material, and measure the flow rate of the water running inside a pipe.
- **Eddy-Current testing** uses specialized probes to detect defects such as erosion, cracking or even loose parts.
- **Laser technology** is used to map the profile of complex structures, such as the reactor face, to accurately predict operating lifespan.

Air

The sky's the limit.

OPG's IMS Team's capabilities include diverse inspections of hard-to-reach locations using Unmanned Aerial Vehicles (UAVs) with reliable high-resolution visual, infrared and mapping applications. The use of drone technology provides significant safety and cost benefits by simplifying inspections in locations that would be difficult for humans to reach.



FACT:

OPG's IMS Team maintains a fleet of advanced drones featuring capabilities such as high-definition video, thermal imaging and protective enclosures to allow inspections of indoor environments.

Sea

Underneath it all.

Our Diving Operations Team provides safe, secure, high-quality, and low-cost underwater maintenance and inspection services to power generating stations. We have an excellent safety record and have been recognized by the Ministry of Labour for increasing safety standards for divers in Ontario.

We carry out our underwater diving inspections using video technology, vacuum systems, remote operated underwater vehicles, and hydraulically driven tools similar to those employed by astronauts.

Over the years, IMS has focused on continuous improvement through the use of innovative equipment to enhance safety, production and service capabilities.



FACT:

OPG is one of the first to invest in emissions-free electric boats for our water operations.

THE ADVANTAGES TO WORKING WITH IMS

- Operational excellence working to the highest safety standards
- Highly trained and specialized work force
- Proven track record of developing inspection tools and processes
- Customized end-to-end services
- Expertise in navigating regulatory requirements

Inspection and Maintenance Services

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