



**Pressure Tube Inspections – CIGAR & ANDE**

The concept and functionality of the ANDE (Advanced NDE), a primary CANDU reactor pressure tube inspection system, is founded on proven designs used in the CIGAR inspection head and supplemented by additional or upgraded components as required.

This practical, flexible approach has been taken in order to expand, and take advantage of, the significant body of knowledge that already exists for in-reactor operation of CIGAR equipment.

The ANDE tool has been successfully deployed for inspections during numerous CANDU outages.

**The TRUSTIE™ Inspection System  
An Industry Standard**



The **TRUSTIE™ (Tiny Rotating Ultrasonic Tube Inspection Equipment) System** was developed for the ultrasonic inspection of thin-walled, small diameter tubing and has long been established as industry standard equipment.

The accurate flaw sizing provided by TRUSTIE™ can be used to efficiently monitor growth rates of low-level pit and fret indications for units remaining in service. Accurate circumferential crack depth profiling has been demonstrated in laboratory and field inspections. Kinectrics has done extensive performance demonstrations on determining indications due to fretting damage.

New leading-edge advances in TRUSTIE™ data analysis capabilities and other innovative system enhancements are currently in development at Kinectrics.



**Top to Bottom  
Reliable Concrete  
Rehabilitation for  
Nuclear**

**Kinectrics' CAR Group**

A team from Kinectrics' Concrete Assessment and Repair (CAR) group led by Department Manager Ron Cullen has recently completed a major concrete repair project on the vacuum building of an Ontario nuclear station.

The vacuum building floor slab was repaired through epoxy injection, installation of joint sealant and the application of an elastomeric coating. This project required specific repair techniques that could be undertaken while the structure remained on-power. It was also critical that the materials used would provide optimal long-term performance in a nuclear environment for a containment structure. Only proven technologies, for example, qualified elastomeric coatings are used by Kinectrics in nuclear concrete rehabilitation projects.

The project was successful and Kinectrics was recently awarded a contract for additional rehabilitation work on the vacuum building's roof.

The Kinectrics CAR group offers long-term experience in the rehabilitation of nuclear station concrete structures. "We do nuclear inspections and repairs all the time and Kinectrics can provide the specialized expertise needed to perform this type of work successfully", states Cullen.

**NOW AVAILABLE!**



**TRUSTIE™  
System &  
Parts  
Catalogue**

For general information about Kinectrics, contact:  
**Cheryl Tasker-Shaw**  
416.207.6000 ext. 5970  
cheryl.tasker-shaw@kinectrics.com

For nuclear and technical-related inquiries, contact:  
**John Krasznoi, Sr. Director  
Business Development (Canada)**  
416.207.6000 ext. 6260  
john.krasznoi@kinectrics.com

**Hank Werksma, Sr. Director,  
Business Development (USA)**  
616.846.0642  
hank.werksma@kinectrics.com

**Kinectrics Inc.**  
800 Kipling Avenue  
Toronto, ON M8Z 6C4  
Phone: 416.207.6000  
Fax: 416.207.6532  
E-mail: info@kinectrics.com



Volume 4 Issue 1 May 2008

In this issue

COVER STORY

**The Right Tools**

PAGE 2

**Designed to Deliver -  
Inspection & Maintenance  
Systems Tools for Nuclear**

PAGE 3

**Nuclear Toolbox -  
Options for Inspection that  
Get the Job Done**

PAGE 4

**TRUSTIE™ Inspection  
System**

[www.kinectrics.com](http://www.kinectrics.com)

**The  
Right  
Tools**

Equipment that  
delivers for Nuclear  
Inspection and  
Maintenance



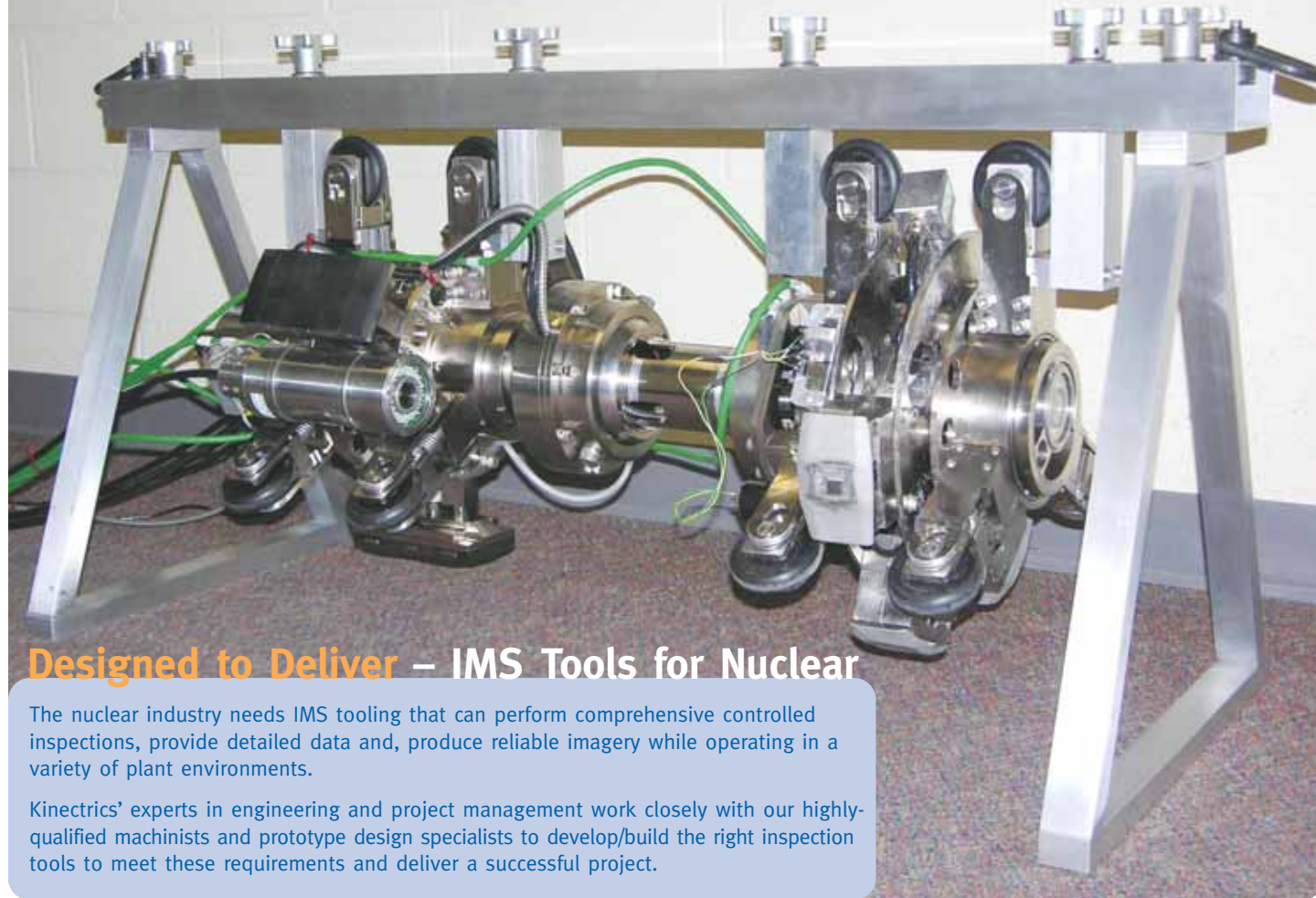
**Editorial**

Having the right tools for the job is important to the success of any project, and even more critical in the successful performance of complex tasks related to nuclear Inspection and Maintenance Systems (IMS).

Kinectrics has been building on superior expertise in IMS, tooling and similar services for over 30 years. We are internationally recognized for technical excellence throughout the industry for our experience and capabilities in this area.

Recently, Kinectrics was pleased to announce a significant expansion of our inspection and maintenance services for nuclear through the acquisition of Axiom NDT. Now a Kinectrics Company, Axiom NDT adds its advanced Phased Array technology to expand Kinectrics own comprehensive range of Non Destructive Evaluation (NDE) capabilities. These services include support for many specialized NDE tools throughout the nuclear industry, including the unique TRUSTIE™ system. [New TRUSTIE™ catalogue now available —see page 4.]

This issue of GPT ON—the first in a bright, redesigned graphic format—presents a selection of innovative, custom-built inspection tooling systems from Kinectrics that are being employed industry-wide to help nuclear utilities maximize equipment performance and maintain safe, cost-effective operations.



### Designed to Deliver – IMS Tools for Nuclear

The nuclear industry needs IMS tooling that can perform comprehensive controlled inspections, provide detailed data and, produce reliable imagery while operating in a variety of plant environments.

Kinectrics' experts in engineering and project management work closely with our highly-qualified machinists and prototype design specialists to develop/build the right inspection tools to meet these requirements and deliver a successful project.

#### The MORDIE Tool

Kinectrics recently completed the design and manufacture of a custom tool to be used for CANDU Moderator Relief Duct (MRD) inspections. This project evolved from related inspection work done at a Canadian nuclear station in 2005.

The new device, known as MORDIE (Moderator Relief Duct Inspection Equipment) was designed and built specifically to provide advanced NDE inspections as part of a client initiative based on the earlier project.

#### Project Background



During a 2005 Unit Outage, initial inspection work using Phased Array technology was carried out by Axiom NDT on stainless steel moderator relief duct cover gas lines in the client's station. Replicated samples were made of the inner

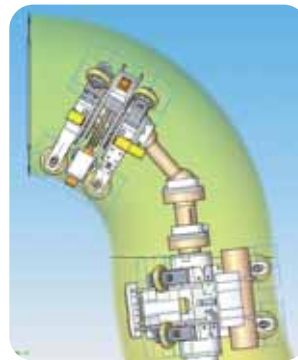
pipe wall, which were then analyzed by Kinectrics' Materials and Components Group.

On conclusion of the 2005 project, Kinectrics was contracted to design and build a new tool (MORDIE) to perform additional inspection work.

#### A Practical Design

The new Kinectrics MORDIE tool was designed to traverse and inspect, using on-board NDE technology, the interior walls of the larger (18") sections of the client's MRD piping system.

Prior to commencement of the specified work, Axiom NDT again used Phased Array technology to inspect the outside of the pipe as it had for the 2005 project work.



#### Rigorous Qualification

Before commencement of the 2007 inspections, extensive testing of the MORDIE tool itself was carried out both in Kinectrics' 15,000 sq. ft. Mechanical Lab and at the client's site. Initial tests were performed on a full-size MRD mock-up set up in Kinectrics mechanical laboratory.

On-site testing of the MORDIE at the client's nuclear station comprised 3 weeks and involved multiple contractors, including Axiom NDT and Kinectrics, as well as client engineers and other technical staff. Two MRD mock-up units were required for the demonstrations.

For the preliminary work, Kinectrics supported the MORDIE tool and hardware operations, while Axiom NDT directed the actual inspection and data collection using the Phased Array and Eddy Current technologies integrated into the device. In addition, Kinectrics personnel provided extensive support and training related to the operation of the MORDIE for the client's engineering team and other contractors.

On completion of rigorous preparation and testing, the device was moved into the reactor

## Nuclear Toolbox - Options for Inspection that Get the Job Done

Kinectrics has developed, tested and proven a number of advanced innovative inspection tools for the nuclear industry.

### B-VIR – The Bellows Visual Inspection Recorder



The **B-VIR** tool was developed by Kinectrics to meet a client's requirements for regular inspection of Primary Heat Transport (PHT) Pump containment seal bellows.

Historically, these inspections had been performed outside containment—involving a laborious and time-consuming removal of the pump motor assembly.

Kinectrics developed the **B-VIR** tool for the client to visually inspect the bellows from inside containment, thereby conserving valuable resources. **B-VIR** consists of a commercially-articulating video scope as part of a long probe capable of navigating the bellows circumference. The device allows video recording of convolutions anywhere from top to bottom.

A prototype **B-VIR** tool was developed in 2006 / 07 and used during a unit outage in 2007 and again in 2008. Additional modifications were made based on this field experience and the **B-VIR** has already delivered excellent pictures of the most critical bellows areas.

### Feeder Inspection Tools – Ultrasonic Thickness Measurement



In 2006 Kinectrics was approached by a group of clients to develop reliable hand tools to measure feeder thickness in the area of the Grayloc weld. Kinectrics collaborated closely with this client to create 2 specialized tool designs. This project included a **6-Pack tool** available for 2" feeders and 2.5" feeders, and a hand-held **Grayloc Area Inspection Tool (GAIT)** that can be adapted to fit either 2" or 2.5" feeders.

### The Feeder Internal Delivery System (FIDS)



The Kinectrics' **FIDS** program involved the development of a Prototype Feeder Internal Delivery System and fixed plug equipment. The **FIDS** is a "pipe crawler" device used to deploy feeder plugs (called Fixed Plugs) to upper feeder nozzles from inside the outlet headers. The method of access used is through the PHT piping, from the steam generator primary head to the outlet headers.



vault area, where it was operated by computer control. On delivery into the pipe, the MORDIE tool successfully inspected portions of several 18" Moderator Relief Duct MRD pipes.

### Multiple Technologies - Superior Data

Phased Array (PA) technology was employed in order to provide the client with more extensive data than if the Eddy Current method alone were used. Together, the two technologies served to confirm the mutual results.

This high quality data acquired by Kinectrics MORDIE tool was invaluable to the client, and the device will also facilitate inspections in other systems scheduled for assessment during future outages. The compiled data will also be used to effectively support future maintenance programs designed to extend the life of station systems.

A second project to design a smaller tool to inspect 2" sections of the client's moderator relief duct system is currently in the early stages of development at Kinectrics.

Introducing



The recent acquisition of Axiom N.D.T. Corporation of Cambridge has enabled Kinectrics to significantly expand its IMS capabilities. Axiom's Advanced Ultrasonic Inspection services include Phased Array, Creeping Wave and Time-of-Flight Diffraction (TOFD) inspection methods.

A Kinectrics Company

For more information contact:

Tom Thomson

Phone: 519.496.9185

E-mail: tthomson@axiomndt.com

www.axiomndt.com