

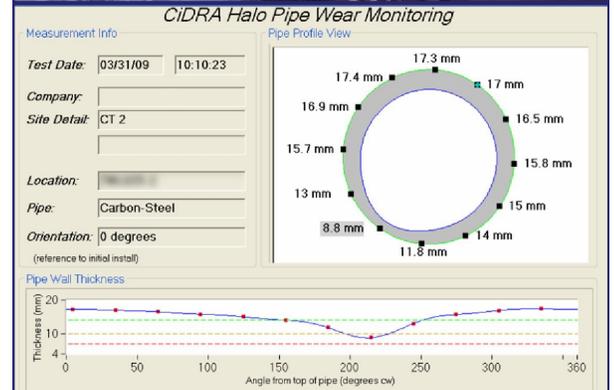
Pipeline Reliability and Integrity

The Solution.....

CiDRA's slim profile HALO® SMARTring® pipe wear measurement system provides on-demand, permanent, fixed pipe wear measurements. The HALO system has been commercial for over six years delivering accurate, timely and consistent measurements even under the most extreme climates and conditions.

Customers have realized year-over-year sustainable benefits in terms of uptime through the elimination of pipe ruptures; the reduction of maintenance costs through the extension of pipe life, and an increase in operating efficiencies through enhanced scheduling. The HALO SMARTring measurement system has also contributed to the enhancement of process safety.

CiDRA customers are leveraging HALO SMARTring information to further understand the complex modes of wear degradation, including effects of erosion/corrosion, sliding and stationary sand beds. HALO SMARTring's "on-demand" measurement system has enabled our customers to move from a condition of "swimming in data" to transforming data to information that can be acted upon with confidence.



CiDRA
50 Barnes Park North
Wallingford, CT 06492
+1.203.265.0035
www.cidra.com

Pipeline Reliability and Integrity

Why HALO® SMARTring® Systems?

The HALO *SMARTring* pipe wear measurement system was developed based on customer desires to eliminate the high costs associated with manual wear measurements in mineable oil sands complex slurry flows and harsh environments. The features inherent in the HALO *SMARTring* measurement tool and software, were inspired through close collaboration with our customers' Inspections, Reliability, Maintenance, Planning and Operations teams.

The key features are as follows:

Measurement Accuracy

- Proprietary sensor design provides excellent coupling to the pipe
- Patented, robust SONAR signal processing and algorithms

Calibration:

- Calibration and accuracy of the *SMARTring* measurements are maintained throughout the life of the sensor band by way of an integrated known Reference Block, which is interrogated every time a set of readings is taken on each band. Band temperature is measured with every reading to provide further correction

Slim Profile:

- Installs up against the flange where wear is most likely to occur
- No protruding hardware – less worry about damage due to pipe rotations and handling
- Number of sensors around the circumference of the *SMARTring* is configurable to 12 measurement points on larger pipe diameters

Rotation Sensing:

- Lets you know that the pipe was rotated at the angle orientation that it was rotated to. Provides a quality check to ensure that the pipe crew rotated the pipe at the angle requested
- Maintains a history of rotations and rotation angle

On-Demand Measurements:

- No 'swimming in data'. Measurements are made at a frequency required to ensure visibility, prevention and predictability on aggressive and non-aggressive lines
- Measurements can be made daily, weekly, bi-weekly, bi-monthly, quarterly, etc. depending on the situation



CiDRA
50 Barnes Park North
Wallingford, CT 06492
+1.203.265.0035
www.cidra.com

Pipeline Reliability and Integrity

HALO® SMARTring® Features

Dual Connector Boxes:

- SMARTring systems can remain on the pipe during rotations – no need to remove and re-install. Helps to maintain registration and repeatability
- Ensures access to all measurement points around the pipe, even after the pipe has been rotated
- Mitigates the needs for hydro-evacuation and /or steam cleaning the pipe to make a measurement

Long Connector Cables from HALO Data Acquisition to Junction Box:

- Measurements are acquired from walkways or ground level. No need to maintain scaffolding to make measurements above ground level
- Enhances safety. Measurements can be made from a distance from hazardous or hard to reach locations; e.g., high locations, culverts, pumps

HALO SMARTring Pipeline Integrity Assurance:

- Proven superior over other methods of pipe wear measurement
- Over six years of best-in-class performance and quantifiable value delivery
- Excellent measurement delivery and visual reports



CiDRA
50 Barnes Park North
Wallingford, CT 06492
+1.203.265.0035
www.cidra.com

Pipeline Reliability and Integrity

HALO[®] SMARTring[®] Benefits

HALO SMARTring Delivers Proven Results Year after Year:

- Typical return: 4-6 times on investment
- Enables you to get to the next turnaround without an unscheduled shutdown - no surprises
- Prevents pipeline hole-outs and ruptures
- Extends pipe life of up to and over 100%
- Helps to optimize turnaround efficiencies and the management of pipeline supply chain and inventories
- Enhances pipeline safety
- Mitigates uncertainty – know where and how much pipe is wearing. No worrying about catastrophic failure because pipe wear can't be measured due to inaccessibility
- Enhances predictive modeling
- Optimizes turnaround planning – take advantage of scheduling benefits with service providers and leverage

About CiDRA

CiDRA has been a service and technology provider to the Mining and Mineable Oilsands industries for over eleven years, providing industry-specific solutions aimed at increasing safety, reliability, recovery and efficiency. CiDRA has built award-winning local teams of service professionals throughout the world.

SONARtrac[®] non-contact flow and entrained air measurement systems have fast become the standard for aggressive and difficult to measure slurry flows and have helped enable step-change increases in reliability and uptime for slurry transport pipeline systems. The passive sonar architecture has been extended to provide insight into the fluid dynamics of a slurry line used to detect the presence of stationary sand-beds, partially filled pipes, and other conditions that impact operations.

CiDRA's slim profile HALO *SMARTring* tools and services provide on-demand, permanent, fixed pipe wear measurements. HALO has been commercial for over six years, delivering accurate, timely and consistent measurements even under conditions when a pipe is covered with sand or snow.

CiDRA technologies, combining the unique measurements of *SONARtrac* velocity, entrained air, and sand bed detection with the HALO *SMARTring* measurements, are leveraging information for operators to further understand the complex modes of wear degradation, including effects of erosion/corrosion, sliding and stationary sand beds. HALO systems have enabled the move from time-based to condition-based monitoring.



CiDRA
50 Barnes Park North
Wallingford, CT 06492
+1.203.265.0035
www.cidra.com