soundprint®

# SmartBall™

(Pat. Pending)

## *Autonomous In-line Leak Detection and Condition Assessment System*

**SoundPrint® SmartBall** is an innovative leak detection technology from **Pure Technologies**. It is a free-swimming, non-tethered foam ball with an instrumented aluminum core capable of detecting the acoustic activity associated with leaks and pockets of trapped gas in pressurized pipelines. SmartBall is inserted into a pipeline and travels with the water flow for up to twelve hours, collecting information about leaks and pockets of trapped gas for a long pipeline with a single deployment.

www.puretechnologiesltd.com

## *An Innovative Product from a Leader in Acoustics*

Soundprint SmartBall is one of the latest innovations from Pure Technologies, a leader in acoustic data acquisition and interpretation. Pure is the developer and sole provider of long-term acoustic health monitoring solutions for pipelines, bridges, buildings and other critical infrastructure. Using proprietary technology and advanced software functionality, we have added a new dimension to the management of physical infrastructure. We have now applied our research and development capabilities to the problem of leak detection in larger diameter piping systems, resulting in the introduction of a cost-effective, versatile and industry-leading solution to this critical issue.

### Building a Condition Assessment Program

Most pressurized pipe in the water and wastewater industry have not been inspected or assessed since they were installed, many of which are several decades old. Leak detection plays an important role in a condition assessment project. Identifying leaks on pressurized pipe provides valuable information on whether or not a pipe is meeting its basic function of transmitting pressurized water without leakage. Pure Technologies' SmartBall provides a solution to proactive asset managers that will help identify leaks before they develop into catastrophic failures.


*For more information on SmartBall and how to build a comprehensive condition assessment program, refer to our website at:*
**www.puretechnologiesltd.com**
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***Pure Technologies has offices located throughout Canada, United States, Mexico, Europe, Africa and the Middle East.***

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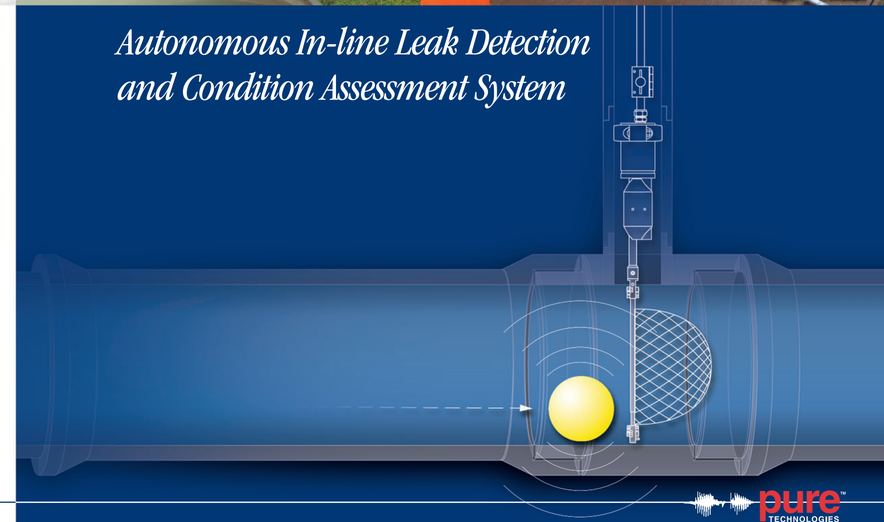
## *Autonomous In-line Leak Detection and Condition Assessment System*



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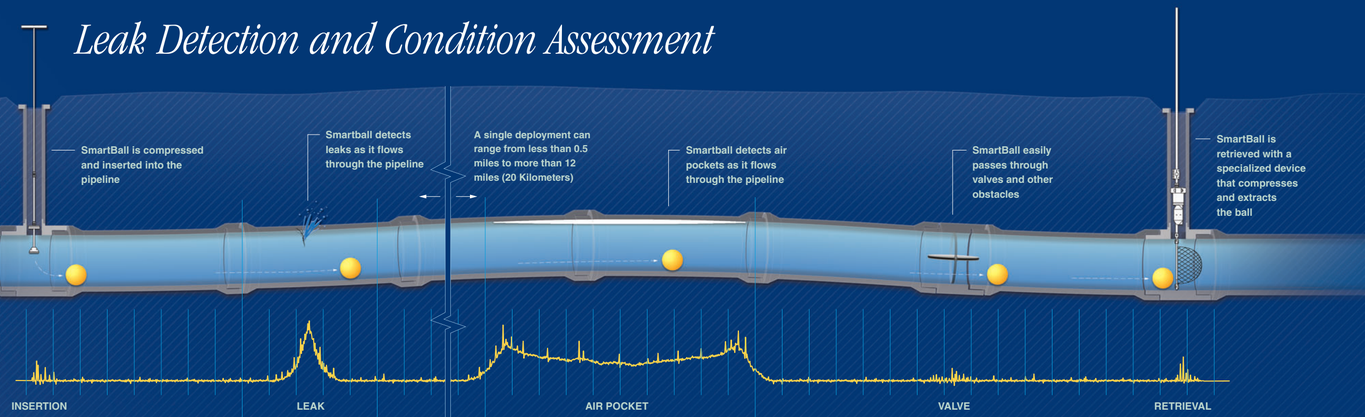
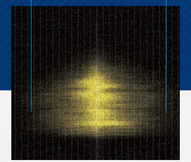
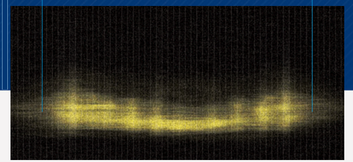
## Leak Detection and Condition Assessment

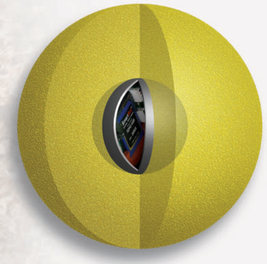
*Ideal for water, wastewater, force mains, reclaimed water, raw water, plastic pipe, concrete pipe, metallic pipe and any pressurized pipe.*











**Lightweight foam perimeter will absorb water and flow freely with the water. Aluminum core contains the instrumentation.**

### SmartBall Configuration

SmartBall consists of two primary components: an aluminum alloy core and a foam over shell. The core is 2.5-inches in diameter and houses an acoustic sensor, tracking equipment, circuitry, and batteries. The core is placed into a foam shell that can vary in diameter depending on the size, operation, and configuration of pipeline to be surveyed. Each SmartBall is tested and can withstand 500 psi or higher pressures. During a survey, the foam structure fills with water to allow acoustic activity to easily penetrate the foam to be recorded by the core. During the standard applications, the entire assembly has a negative buoyancy in water. The ball settles to the bottom of the pipe and traverses the pipe by rolling with the water flow.

## Overview of a Typical SmartBall Survey

**SmartBall surveys are performed through a seven step process:**

1. **Site review:** Drawings, flow characteristics and pipeline configurations are reviewed.
2. **Install SmartBall Tracking Sensors:** SmartBall tracking sensors are mounted to appurtenances to track the position of SmartBall as it rolls through the pipe.
3. **Install Extraction Net:** An extraction net is inserted into the flow to capture SmartBall. For water mains, a minimum four-inch outlet is required. In sewer force mains, SmartBall is usually captured at a point of discharge.
4. **Insert SmartBall:** In most applications, SmartBall is compressed and inserted into an operational pipeline through a minimum 4-inch outlet.
5. **SmartBall Traverses the Pipe:** Once inside the pipe, SmartBall rolls with the flow in the pipeline and obtains a high quality recording of the acoustic activity in the pipe. The device also sends out ultrasonic pulses, so technicians can track the position of the ball during the survey.
6. **Capture SmartBall:** Once the SmartBall rolls into the extraction net, the ball is compressed and pulled up through the outlet.
7. **Analyze and Report Data:** Proprietary SmartBall software is used to evaluate the data and provide a report that lists the size and location of leaks and pockets of trapped gas.

## Tools for Identifying Real Water Losses

Identifying and reducing real water losses provides water utilities immediate savings and an increased capacity to meet their water demands. Water utilities now have multiple technologies available to identify real water loss- it is just a matter of identifying which tool best meets their needs. Leak detection tools are divided into two groups: those that can be used for small diameter pipe and those suitable for large diameter pipe.

### Leak Detection Technology for Small Diameter Pipe:

**Acoustic Correlators**

These devices are acoustic sensors attached to pipeline appurtenances. If they are able to detect acoustic activity from a leak occurring between the sensors, the leak can be located. The ability of the sensors to detect the leak is dependent on the acoustic energy of the leak, and the pipe material. Correlators are effective in small-diameter cast-iron, steel or ductile iron pipelines; however, they are less effective in larger diameter pipelines and in concrete, PVC and GRP pipelines. The correlators have to be moved frequently to survey long lengths of pipeline.

**Acoustic Data Loggers**

These devices are similar to correlators; however, they are attached to pipeline appurtenances for a period of hours, usually overnight, when demand is low and traffic activity is at a minimum. The data loggers can acquire acoustic information about leaks, but cannot locate the leaks. Otherwise, they have the same limitations as correlators.

### Leak Detection Technology for Large Diameter Pipe:

The acoustic characteristics of large diameter pipe require that a sensor be placed inside the pipe to successfully identify leaks. Inline systems are able to discriminate between multiple leaks in a single reach of pipeline whereas other devices require additional inspections after each leak is repaired. There are two types of “in-line” systems that can identify leaks:

**Tethered Systems**

Tethered systems work by inserting a hydrophone attached to a cable into a pipeline and using a parachute and the water flow in the pipe to deploy the hydrophone along the line. Once a leak is detected, the location of the hydrophone can be determined by traversing back and forth until an accurate location is pinpointed. The location information is transferred to the surface using a manned surface tracker. Because the sensor passes directly over the leak location, the sensitivity of the system is far greater than correlators or data loggers. However, the survey length is limited by the “drag” on the cable, bends, and inline appurtenances (e.g. butterfly valve). Typically the system has a maximum range of approximately 1 mile, although this can be reduced significantly depending on pipeline configuration.

**Autonomous In-line Devices**

SmartBall combines the best features of the above techniques and has several logistical advantages. Since the device is free-swimming, the sensors travel directly past leaks and air pockets which provide high sensitivity and the ability to survey noisy pipes. In addition, the size of the ball allows it to pass through valves, around 90-degree bends and through other constrictions. SmartBall is also able to discriminate between multiple leaks in a single reach of pipeline whereas other devices are limited. Furthermore, the long battery life and large memory capacity allows the device to operate for up to twelve hours, thereby permitting very long lengths of pipeline to be surveyed with a single deployment. For example given a flow rate of 1.5 ft/s (0.5 m/s), SmartBall can be used to survey 12 miles (20 km) of pipe in a single deployment!