Electro Scan Inc. unveiled its patent pending low voltage conductivity technology at WEFTEC in Chicago, representing the water industry’s first tool to estimate gallons per minute leakage rates. Previously winning the coveted Innovation Award for Electro Scan’s ES-620, Electro Scan can deliver much needed insight into pipe conditions by providing unparalleled data intelligence for gravity sewer mains, and now pressurized water mains.

Elector Scan’s latest product, a 4-in-1 probe for pressurized water mains, once again, proves to be a highly anticipated, worthwhile, and needed product for the water sector. By combining its patent pending (1) low voltage conductivity, (2) pressure sensor, (3) high resolution CCTV camera, and (4) acoustical hydrophone to compare old v. new technologies, Electro Scan provides unprecedented insight into the condition of an agency’s water infrastructure.

Electro Scan technology is filling a gap in the water leak detection market by providing the industry’s first reliable, repeatable, and measurable tool to find potable water losses. With its comprehensive 4-in-1 probe, Electro Scan looks forward to helping your agency or water company implement this new technology when evaluating water and other pressurized pipes.

Electro Scan is simple geophysics – if electrical current can pass through the wall of a pipe, water will too. Except with Electro Scan, not only can we locate every leak in a pipe, but we can estimate its defect flow in either gallons per minute or liters per second. Every leak... for every pipe...every time.

To put things in perspective, an 8% water loss from leakage is equivalent to losing a one month supply of water, with most utilities experiencing from 10% to 30% in water losses [apparent and real losses] each year.

Entering into its fourth year of severe drought, California is ready for serious water leak detection.

“Given new California legislation to be signed by Gov. Brown, new translates affecting 450 of the state’s largest utilities are requiring annual water audits and water loss control training programs,” states Chuck Hansen, Chairman, Electro Scan Inc.
Next Generation Multi-Sensor Water Leak Detection Technology

Automatically Locate and Measure Leaks in Pressurized & Gravity Water Mains.

Electro Scan’s Proprietary 4-in-1 Probe Includes:
- Low Voltage Conductivity
- High Definition CCTV
- Pressure Sensor
- Acoustic Hydrophone

Low Voltage Conductivity Leak Detection is Here!
The water industry’s first reliable & repeatable tool to locate & measure water leaks in pressurized water distribution & transmission mains.

Key Highlights
- No reliance on third party data interpretation.
- Locate all cracks, holes, defective joints & service connections, and other defects where water leaves the pipe.
- Automatically measure each defect’s flow in estimated gallons per minute (gpm) or liters per second (lps).
- Rate each water main on its Total Defect Flow.
- Find all anomalies not found by acoustic sensors, gas tracers, electro-magnetic sensors, and high resolution CCTV.
- Automatically generate cloud-based reports in 10 minutes after scan completion.
- Offered as a service exclusively to North American water utilities.
- 2,000 ft length using in-pipe tethered probe.
- Entry through hydrants, valves, and large meters.
- Pressurized and gravity mains.
- Closed pipes and open water channels or ditches.

Available as a professional service using its fleet of Water Leak Detection Vans, Electro Scan is overhauling how leading water utilities find and measure water losses.

Learn how Electro Scan can partner with your water utility to easily introduce its game changing technology to locate and measure water losses.

U.S. and International Patent Pending

ASTM F2550-13 Compliant
Reliable, Repeatable, & Measurable Technology Finds Water Losses

### Pipe Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature Range</td>
<td>-5°C to 45°C (23°F to 113°F)</td>
</tr>
<tr>
<td>Operating Pressure Range</td>
<td>0–90 PSI</td>
</tr>
<tr>
<td>Location Accuracy</td>
<td>0.4 inches (1cm)</td>
</tr>
<tr>
<td>Conveyance Type</td>
<td>Pressurized or gravity mains</td>
</tr>
<tr>
<td>Insertion Tube Launch</td>
<td>Fire Hydrants, Air Valves, Gate Valves, Flow Meters, Hot Taps, Pressure Fittings.</td>
</tr>
<tr>
<td>Required Flow</td>
<td>1 ft (305mm) per second (fps)</td>
</tr>
<tr>
<td>Transport</td>
<td>Parachute</td>
</tr>
<tr>
<td>Pipe Materials</td>
<td>Asbestos Cement (AC), Cement-Mortar Lined and Coated Steel Pipe (CMSIP), Cured In-Place Pipe (CIPP), Fiberglass Reinforced Pipe (FRP), High-Density Polyethylene Pipe (HDPE), Prestressed Concrete Cylinder Pipe (PCCP), Polyethylene Pipe (PE), Polyvinyl Chloride (PVC), and Reinforced Concrete Pipe (RCP).</td>
</tr>
</tbody>
</table>

### Multi-Sensor Probe

- **Probe Length**: 6.25 inches (158.75mm).
- **Rigid Length**: 10 inches (254mm).
- **Cable**: Neutrally buoyant.
- **Cable Type**: Fiber optic and copper.
- **Single Point Access Range**: 1,000ft (305m) range or 2,000ft (610m) range from a single point of access.

### Low Voltage Conductivity

**Next Generation Defect Location & Measurement (gpm or lps).**
- **Voltage**: 11 volts, AC, RMS.
- **Current (max)**: 40 mA.
- **Defect Flow Calculation**: Gallons per minute (gpm) or Liters per second (lps).
- **ASTM F2550-13**: Yes. Able to automatically locate all cracks, fissures, broken joints, and leaking service connections, by measuring the change in electrical current able to pass through the wall of a pipe.

### High Definition CCTV

**In-Pipe Navigation & Documentation of Location of Low Voltage Defects.**
- **Resolution**: 1920 x 1080, 30 fps, H.264 compressed stream.
- **Minimum Illumination**: 6 Lux at F2.8.
- **Output Compressed Video Formats**: Digital (AVI and MP4); High-sensitivity complementary metal-oxide-semiconductor (CMOS) image sensor combined with an advanced image processor superior video and still image quality.
- **Focus**: Fixed position, autofocus, auto white balance, and image stabilization.
- **Focal Length**: 5.3mm.
- **Video Streams**: Two simultaneous video streams, including a high quality stream for archiving and a low quality stream for live viewing on mobile devices, each with independently configurable resolution & bit rate streaming that can be output to specific network addresses.
- **Text Overlay**: Built-in overlay generators allow up to 160 text characters to be positioned anywhere in the video frame.
- **Snapshot**: Capture and store hi-res jpg 4096 x 3096.
- **Lighting**: 8 LEDs, 4500 Lumens.

### Pressure Sensor

**In-Pipe PSI to Help Calculate Defect Flow Rate at Specific Leak Locations.**
- **Type**: Media compatible piezoresistive silicon pressure sensor.
- **Digital Output**: 24-bit ΔΣ ADC pressure sensor.
- **Temperature Monitoring**: Integrated for accurate pressure calculation compensation.

### Acoustic Hydrophone

**Legacy Method to Assess Metallic Fittings & Benchmarking Old v. New Standards.**
- **Frequency Range**: 1Hz to 170 kHz, omnidirectional.
Finding Defects in Water Mains in Arizona

Sometimes having high desert sources of water coming into a water treatment plant are more pure than some urbanized treatment plants.

As a result, it is important to ensure some of its most difficult to access water mains are inspected to determine current levels of water loss.

Using Electro Scan’s push rod version of its leak detection low voltage technology, Electro Scan’s field operations conducted a leak detection survey in less than time it took to arrive at the job site from the main road.

Individual defect locations, shown in the table to the right, correspond to the first 42ft of the pipe, measures the height of its defect grade (i.e. Small, Medium, Large), Defect Start (ft), Defect End (ft), Defect Length, and GPM Flow.

As shown in prior USEPA studies, consulting engineers and water utility professionals should not necessarily focus on the defect height or grade, but instead, focus on the area ‘under the curve’ determining the Total Gallons Per Minute (GPM) of defect flow.

While a leak may generate a steep spike as the Electro Scan defect current seeks to return to its grounded source, it is not uncommon to have a Small or Medium Grade represent a Medium or Large defect flow.

New Level of Accuracy Arrives to Find and Measure Water Loss in Water Distribution Mains

Pinpointing water losses using acoustic sensors may be coming to an end as Electro Scan introduces its international patent-pending low voltage tri-electrode technology.

Since the early days, water crews have been challenged to hear leaks in water mains.

Years later, the ability to measure sound vibrations to accurately locate and measure defect flows remains a challenge, especially from:

- Ambient noise
- Water table heights
- Pipe materials, especially non-metallic
- Pipe diameter
- Leak size
- False Positive anomalies
- Inability to quantify defect flows
- Changes in backfill materials
- Lengthy data processing & reporting times
- Lack of repeatability, by crew, by equipment
- Inexperienced field crews
- Need for third-party data interpretation
- Silent or undetected leaks

The inaccurate or incorrect condition assessment of our nation’s water mains represents a key risk for most water utilities.

Whether prioritizing existing water mains needed to determine criticality and ranking of worst-to-best pipes or certifying CIPP rehabilitation, repair, and renewal projects to assure a zero-leak rating as a condition of acceptance — water utilities must use the best possible solution to allocate and deploy its scarce capital.

Representing a bottom-up approach to assess pipe-by-pipe defect flow ratings — a first in the water business — privately managed and publicly operated water utilities can now find all openings in its pressurized network to improve the accuracy of assessing its critical water mains.

Designed specifically to assess ACP, CCP, CFSP, CIPP, CMLC, CMUL, FRP, HDPE, RCP, PC-PCCP, PE, PVC, and others, Electro Scan’s international patent-pending 4-in-1 tethered probe combines its core low voltage conductivity technology with an acoustic sensor, high resolution CCTV, and pressure sensor, to assess your system.
Drought Changes Economics for Finding & Fixing Water Losses Before Reaching a Customer’s Meter

New Normal In H2O Economics: Dramatically Lower Revenues For Water Utilities, Cutbacks in O&M and Capex to Service Bond Payments

If only we had fixed our leaking water mains before the drought hit! Shoulda... Coulda... Shoulda... Woulda...

We all understand that conservation and more efficient use of water allows us to extend our existing resource base. Better monitoring and metering of water consumption helps us become more efficient, while increasing our reuse of effluent becomes more acceptable and common place.

As the water industry has applauded Governors and CEOs’ vision of building California’s 38 million residents to conserve water, local and community water utilities understand the pressure. Our mandate, to conserve water utilities, is more difficult to perform with the disruption of travel, e.g., CCTV vans.

But our dilapidated and crumbling infrastructure cries for more attention and investment dollars now.

The conventional estimate is that 80 percent of the water used in California flows into the state’s multi-billion dollar agricultural sector. The 20 percent left for urban use is split between homes, businesses, and government.

About 6 percent of the state’s water is consumed by industries, commercial operations, and governments. About 14 percent is poured into bathtubs, toilets, and washing machines or sprayed over residential lawns.

By now, the whole nation is aware that its fruit and vegetable basket, California, is in the fourth year of an unprecedented drought. One NASA scientist recently projected that the state may only have water losses before reaching a customer’s meter

Low Voltage Conductivity Confirms Engineer’s Suspicions

Continued From Page 1

PROBLEM: A 27-in gravity-fed raw water concrete irrigation main was thought to be leaking. After years of suspicion, including CCTV of the dewatered pipe, Electro Scan was invited to evaluate the pipe to pinpoint any leaks.

SOLUTION: Electro Scan technology accurately locates and measures leaks without operator intervention using a probe that emits a low voltage high, frequency electric current to assess the pipe wall. Traveling at 45-606 per minute and taking readings every 14 milliseconds, the Electro Scan Probe collects 10-20,000 data points (every 300Hz) with data processed on its CriticalHD cloud application estimating defect flows, streamline per foot (gpm) for each leak and total pipe segment. The water probe utilizes the existing cable and reel solution, can magically look inside our water mains and automatically identify all service connections, leaks, and automatically tell you how much and where leaks are occurring, it will be difficult to perform a routine water audit.

That is, until the right tool comes along.

Electro Scan continues to support the top-down analysis and assessment of our water networks, but when the right technology comes along that can compete, and all the holes in our pipes, it’s just Indiana Jones has just found the Holy Grail to show how spuriously real losses, linked to specific mains.

Off-the-shelf algorithms of age, diameter, material, length, and installation, can now be overlaid with actual water loss leakage rates on in-house GIS systems to re-rank and re-prioritize VIP programs to get the biggest bang from our customer’s (and bondholder’s) bucks.

Identifying and Measuring Water Loss in GPM Linked to Specific Water Mains! Its Like Finding The Holy Grail of the Water Business

General Managers and Board Members have all heard the familiar complaint from citizens action groups that “its easy to lower water loss, simply increase estimates of unlined metal and unmetered consumption.”

Let’s face it, without available tools that can magically look inside our main pipes and automatically tell us how much and which leaks are occurring, it will be difficult to perform a routine water audit.

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Acoustic Sensor Included in 4-in-1 Probe To Assess Metallic Connections & Highlight Superiority of Low Voltage Conductivity
Electro Scan’s Low Voltage Conductivity Finds Defects Missed By Acoustic (Sound), Helium Tracers (Smell), Visual Detection (Sight)

Limitations in ‘Listening’ for Leaks

The pipe material and diameter have a significant effect on the attenuation of leak signals in the pipe. For example, leak signals travel faster in metal pipes and are attenuated greatly in plastic ones.

The larger the diameter of the pipe, the greater the attenuation, and the further it is to detect the leak. The pipe material and diameter also affect the predominant frequencies of leak signals — the larger the diameter and the less rigid the pipe material, the lower the predominant frequencies.

The pipe material and diameter have limitations in ‘listening’ for leaks. The larger the diameter of the pipe, the more leak signals at the ground surface is influenced significantly by the soil type and the water table level.

- High signal attenuation, low frequency content, and the pronounced effect of fittings on the wave propagation.
- Significant variation in the sensitivity, frequency range, and signal-conditioning and processing features of different acoustic leak-detection devices. The more sensitive the device, the larger the signal-to-noise ratio of the equipment, the smaller the leaks that can be detected.
- Modern acoustic equipment incorporates signal-conditioning components such as filters and amplifiers to make leak signals stand out. Filters remove interfering noise occurring outside the predominant frequency range of leak signals. Amplifiers improve the signal-to-noise ratio and make weak leak signals audible.

**SOUND**

Varying pipe materials, size, time-of-day water pressure, diameter, and utilised noises limit the use of acoustic sensors.

**SIGHT**

The majority of leaks are undetected, limiting the use of aboveground visual inspections. CCTV cameras inside water mains can expect to have even poorer results.

**SMELL**

While helium released in water mains may escape through leaks into the surrounding bedding, traces may surface many feet from actual leak location.

- **Leak Detections**
  - Significant variation in the sensitivity, frequency range, and signal-conditioning and processing features of different acoustic leak-detection devices. The more sensitive the device, the larger the signal-to-noise ratio of the equipment, the smaller the leaks that can be detected.
  - Modern acoustic equipment incorporates signal-conditioning components such as filters and amplifiers to make leak signals stand out. Filters remove interfering noise occurring outside the predominant frequency range of leak signals. Amplifiers improve the signal-to-noise ratio and make weak leak signals audible.

- **Helium Tracers**
  - Helium travels through the ground but lighter than air, permeates through loose ground, and then, being insoluble and lighter-than-air gas, such as helium or hydrogen, is injected into a segment of a water pipe. The gas escapes at a leak opening and, then, being lighter than air, permeates to the surface through the soil and pavement. The leak is located by tracing the ground surface ‘directly above’ the pipe with a highly sensitive gas detector.

- **Visual Detection**
  - The technology uses helium gas as a tracer to locate leaks. As documented in AWWA’s Manual of Water Supply Practices M36: Water Audits and Loss Control Programs, helium gas is injected into live water mains, with its need to isolate a zone, depressurize, or shut the water system down. The helium mixes with flowing water and travels throughout the pipe network to the desired area(s) to survey for leaks. When the helium-marked water leaves the pipe network through leaks in the pipe wall — through loose connections of at service fixtures, meters, or valves — the helium separates from the water. Helium travels through the surface where it can be measured aboveground with specialized monitoring equipment. Elevated levels of helium detected above a leaking pipeline indicate a leak is nearby.

- **Electro Scan News**
  - Founded over 40 years ago, American Leak Detection operates networks in four countries, on the continents. We are looking forward to meeting its highest achieving franchisees.

**Ranked #1 in Entrepreneur® magazine in the ‘Maintenance Products and Services’ franchise sector for the last five years, American Leak Detection is the world leader in the industry they created — the accurate, non-destructive detection of hidden leaks (water, sewer, and gas).**

Electro Scan Inc. is delighted to be invited to attend its first American Leak Detection Annual Convention & Expo, November 4-8, 2015, held at the Palmer House Hilton, Chicago, IL. A Gold Sponsor at this year’s Convention, Electro Scan understands the speed of light that commercial businesses move in comparison to their government counterparts. “I’ll never forget when Jimmy Carter wandered up to one of our inspection trucks during a project at Baby Beach in Dana Point, California,” stated Mark Grabowski, VP and General Manager, Electro Scan Inc. “We weren’t quite sure how they knew about the project — assessing California’s most polluted beach — but were glad to get a telephone call a few months later asking if we would be interested in attending their annual meeting in Chicago.”

From concealed plumbing systems to swimming pool cracks, to municipal water utility projects, American Leak Detection has been a ‘go to’ solution provider using the most advanced, sophisticated electronics devices — without bashing holes in walls or digging up a backyard deck or yard. American Leak Detection sets the standard for non-invasive leak detection and repair with proprietary methods and technology.

Founded over 40 years ago, American Leak Detection operates networks in four countries, on the continents. We are looking forward to meeting its highest achieving franchisees.
What happens in Vegas, stays in Vegas?

We hope not because demand is already exceeding supply of Electro Scan’s new fleet of Leak Detection Vans. Las Vegas will be the next stop for Electro Scan’s Low Voltage Leak Detection Van after its attendance at the 88th Annual Water Environment Federation Technical Exhibition and Conference (WEFTEC), held Sept 26-30, 2015, McCormick Place, Chicago, IL.

Largest of all AWWA sections, the CA-NV section is a leader in many aspects of water operations and management, and already receptive to Electro Scan’s next generation technologies to locate and measure water loss.

“My first AWWA CA-NV attendance was in 1986 at Lake Tahoe,” states Chuck Hansen, Chairman, Electro Scan Inc. and former Chairman, CEO & Founder of Hansen Information Technologies, a leading provider of water & sewer asset management applications sold to Infor, the leading provider of water & sewer asset management applications sold to Infor Global in 2007. “Like our upcoming attendance at the AWWA CA-NV Section Annual Meeting at the Tropicana Hotel in Las Vegas, nobody had ever heard of Computerized Maintenance Management Systems (CMMS) to track work orders for customer service requests, water main breaks, hydrant flow testing, valve exercising, and activity-based costing.”

Back for his second act, Hansen is now spearheading a new breed of water leak location technology with his new patent-pending low voltage conductivity technology.

“We spent a lot of time at HANSEN looking at emerging technologies and their potentially new data dictionaries that might need to be added to our SOL relational database,” said Hansen. “I had been watching the Electro Scan technology for almost ten years, before starting due diligence and deciding to acquire the available technology.”

“We are delighted with the initial response to our advanced leak detection tools and feel we are in the right place, at the right time, with the right technologies,” states Hansen. “We are also quite happy that many leading water utilities include legal language in the contracts that allow for more innovative solutions to be substituted for existing solutions, especially in case a current vendor’s solutions are deemed technologically obsolete. I hope to see you stop by our van in Vegas, and learn about the future of water.”

Electro Scan Inc’s Northern California Headquarters ‘Best Positioned’ To Help Utilities Address the Drought

“With manufacturing facilities located in Woodland, Calif., Electro Scan is proud to be a “Made in California” high technology service provider.

Helping Farmers and Irrigation Districts Find Water Losses Using Electro Scan’s Low Voltage Conductivity Leak Location Technology

The California State Water Project, commonly known as the SWP, is a state water management project under the supervision of the California Department of Water Resources. The SWP is one of the largest publicly built and operated, water and power development, and conveyance systems in the world, providing drinking water for more than 23 million people and generating an average of 6500 GWh of hydroelectricity annually. However, as it is one of the largest single consumer of power in the state itself, it has a net usage of 5100 GWh.

The SWP collects water from rivers in Northern California and redistributes it to the water-scarce, but historically rich and fertile Sacramento–San Joaquin Delta. The Delta serves as a reservoir for the SWP’s water delivery capacity while finding solutions for the environmental impacts of water diversion.

To reach Southern California, the water must be pumped 2,000 feet (610 m) over the Tehachapi Mountains – the highest single water lift in the world.

The SWP shares many facilities with the federal Central Valley Project (CVP), which primarily serves agricultural users. Water can be interchanged between SWP and CVP facilities as needed to meet peak requirements for project commitments, providing an estimated 660 billion cubic feet of water annually, as compared to total entitlements of 4.23 trillion cubic feet (123,500 km³) from SWP’s water delivery capacity.

Since its inception in 1960, the SWP has required the construction of 21 dams and more than 700 miles (1,100 km) of canals, pipelines and tunnels, although these constitute only a fraction of the facilities originally proposed.

As a result, the project has only delivered an average of 2.4 million acre feet (60.9 km³) annually, as compared to total entitlements of 4.23 trillion cubic feet (123,500 km³). The SWP’s water delivery capacity while finding solutions for the environmental impacts of water diversion.

To date, few if any commercially available products have been able to provide consistent assessment of open channel and cementlined ditches.

Today, Electro Scan is leading the industry in providing precise survey technologies that can locate and measure debris flows in gaining...
New Technology Rewrites PCCP Condition Assessment; Revamps Prioritization of Water Main Replacement

Detecting degraded Prestressed Concrete Cylinder Pipe (PCCP) in water mains has been hit or miss, at best.

Used by 90 out of the 100 largest water utilities in the United States especially in water mains 24” and above, the inability to consistently locate micro-cracking with acoustic sensors, electromagnetic sensors, or high resolution digital cameras or measure an estimated defect flow in gallons per minute or liters per second, has spurred development and use of low voltage conductivity technologies that overcome drawbacks of legacy inspection devices.

What was lacking was the ability to systematically provide an unbiased evaluation of the pipe wall, without the need for third-party data interpretation.

How PCCP Fails

In the past, many believed that the only indicator of impending PCCP failure occurred when longitudinal cracks were visually detected during the later stages of a progression to pipe failure usually resulting from undetectable micro-cracking or misinterpreting false-positive readings.

PCCP consists of a concrete core, a thin steel cylinder, high tensile prestressing wires, and a mortar coating. The concrete core is the main structural load-bearing component with the steel cylinder acting as a water barrier between concrete layers, the prestressing wires produce a uniform compressive pressure in the core that offsets tensile stresses in the pipe, and the mortar coating protects the prestressing wires from physical damage and external corrosion.

Relying on highly tensioned steel wire to hold concrete in compression, generally 24” and above, PCCP was generally known to have a high shock resistance, was fast to install, had good antisepic properties, and was relatively easy to maintain – until it failed.

But, when water seeps through the cement mortar encapsulated in the pipe, the steel wire can be corroded and eventually cause a rupture.

In fact, due to the basic properties of concrete, water seepage into inner surfaces of the pipe – and ultimately its wire layers – actually occurs much sooner.

Since there is only a short period of time of detectability of telltale longitudinal cracking and failure, the discovery of major cracks or acoustic anomalies, may be only hours, weeks or perhaps several months before a sudden explosive burst occurs.

While pipes made of High Density Polyethylene (HDPE) represents a read-available substitute for PCCP, water utilities must still plan sustainable long-term replacement and renewal programs to limit water delivery disruptions.

In addition to broken prestressing wires due to corrosion or poor material quality, other factors contributing to pipe failures and leakage have included joint leaks, poor bedding, excessive external loading, hydrogen sulfide (i.e. for wastewater applications), poor quality of mortar lining, corrosive soil, and improper installation or construction damage.

Low voltage conductivity testing detects micro-cracking not visible using high resolution cameras or acoustic sensors, as well as visible macro-cracking, automatically indicating a defect’s location and estimated gallon per minute (or liters per second) defect flow rate. Since initial micro-cracking occurs years before failure, the use of low voltage conductivity detection represents the first reliable technology that can identify critical pipes and develop comprehensive risk management strategies.

Sustainable PCCP Management

It is also important to note that additional factors, beyond wire breaks, acknowledging additional condition factors, limitations of wire break assessment, and to consider other rehabilitation approaches. There may be a more sustainable PCCP management approach (or combination of approaches) that should be consistently investigated.

History of Prestressed Concrete Cylinder Pipe

First manufactured in 1942 as lined cylinder pipe, prestressing wire lined cylinder pipe was directly wrapped around a steel cylinder.

In 1952, a concrete encasement of the steel cylinder was used on both sides of the pipe. Known as embedded cylinder pipe, it differed from lined cylinder pipe by the encapsulation of a steel cylinder in a concrete core, wrapping prestressing wire around a concrete core rather than the steel cylinder as in lined cylinder pipe.

Electro Scan Inc. Announces Entry into Potable Water Market, Joins Water Associations Across US
Limitations of Acoustic Sensors, Data Loggers, & Correlators Favor Electro Scan To Find Defects in PVC, PE, HDPE

Continued from Page 1

Plastic Pipe Limits Travel of Sound & Vibration Preventing Acoustic Sensors from ‘Hearing’ Leaks

The effectiveness of acoustic leak detection techniques has always depended on several factors:

Pipe size and depth, soil type and water table level, leak type and size, system pressure, interfering noise, and sensitivity and frequency range of the equipment, are just some of the conditions that often result in false-positive readings and undetected leaks.

Further complications have involved field set-up, calibrating equipment measurement devices, lack of repeatability of results – either taken multiple times during a single day, using different crews with the same equipment, or using different equipment to diagnose the same pipe.

Finally, precise knowledge of the pipe specification data required to correlate leaks with traditional acoustic leak detection technologies has also been a challenge.

No bigger limitation exists for acoustic pipe than the pipe type or pipe material, with the most dramatic fall-off of consistency about the effectiveness of acoustic leak detection equipment – a serious problem in view of the increasing use of plastic pipes in water distribution systems worldwide.

What’s down there?

<table>
<thead>
<tr>
<th>Pipe characteristics</th>
<th>PVC (measured)</th>
<th>HDPE (measured)</th>
<th>PVC (measured)</th>
<th>HDPE (measured)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe diameter (inches)</td>
<td>3/4</td>
<td>3/4</td>
<td>2</td>
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</tr>
<tr>
<td>Pipe wall thickness</td>
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<td>0.15</td>
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<tr>
<td>Test pressure (psi)</td>
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</tr>
<tr>
<td>Pressure loss (%)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Interference level

- PVC: 12%
- HDPE: 22%

Pipe: 3/4 inch PVC, HDPE

Locating nonmetallic pipe leaks is extremely difficult, because the sound energy attenuates rapidly on these materials.

But most long-time users and experts agree that acoustic sensors, data loggers, and correlators, have never been useful in assessing leaks in plastic pipes, including PVC, PE, and HDPE pipes.

Characteristics of leak signals in plastic pipes differ significantly to metallic pipes. First, plastic pipes are much “quieter” and do not transmit sound or vibration as efficiently as metallic ones. Interfering traffic signals, attenuation of leak signals along the pipe, and underground noise in plastic pipes, render acoustic sensors, data loggers, and correlators, ineffective or useless to finding leaks.

Consequently, most operators are skeptical about the effectiveness of acoustic leak detection equipment – a serious problem in view of the increasing use of plastic pipes in water distribution systems worldwide.

Electro Scan Partners with Industry Leader ULC Robotics Inc., For Customizable Pressurized Water Main Entry

Hauppauge, NY – Electro Scan has announced an exclusive partnership with ULC Robotics, Inc. a leading robotics, energy services, and research and development company focused on the energy and utility industries. The partnership will focus on the development of a highly customizable entry access solution for pressurized water mains.

“Electro Scan is delighted to team with a great partner like ULC,” states Mark Grabowski, VP and General Manager, Electro Scan. “While they are most well-known for defining the future of gas utility maintenance tools, ULC’s capabilities extend far beyond natural gas.”

ULC Robotics range of products and services in gas utilities confront the increasing need to repair and maintain gas pipeline infrastructure while causing less disruption to the public, reducing methane escape and eliminating leaks by developing and deploying innovative gas utility repair systems and advanced camera inspection systems.

With a comprehensive portfolio of advanced robotic tools and cameras, ULC Robotics systems are designed and developed to enter live pressurized gas mains to perform internal inspection and repair. ULC will use their extensive knowledge of the gas industry to work closely with Electro Scan and develop a pioneering launch tube assembly that aims to dramatically improve the way Electro Scan deploys their unique technology into live, pressurized water mains.

The Research and Development team at ULC Robotics has a variety of experience working in other sectors of the energy industry including nuclear and electrical. The team has also developed products beyond the energy industry, which is why Electro Scan is excited to collaborate with ULC and revolutionize the way we work with our water utilities.

“Well known in the gas industry, Greg Penza actually got his start working for his Dad in the sewer business,” states Chuck Hansen, Electro Scan’s Chairman. “We were just lucky that Greg hadn’t started new solutions in the water business and had interest in helping us tackle technical issues using their toolbox of patents and know-how.”

Engineered to work within water utilities, Electro Scan’s CISBOT Field Supervisor, drives the robot through a gas main in Edinburgh, Scotland.

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The Next Generation in Pipe Condition Assessment

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Water ElectroScan YouTube Channel Surpasses 130,000 Views & Growing...

Electro Scan’s YouTube Water Channel has been experiencing unprecedented traction for its recently posted videos, already surpassing +130,000 views since posting its first video on Earth Day – April 22, 2015. Uploaded as a teaser to let the industry know what was coming, Electro Scan launched its Water Leak Detection product in full swing September 10, 2015, posting it first in a series of videos detailing our new Water Leak Detection product.

The result: Electro Scan has accumulated YouTube views faster than any new product introduced for the water business. Check out our Water Channel as the excitement builds.

Electro Scan News

Plastic Pipe Limits Travel of Sound & Vibration Preventing Acoustic Sensors from ‘Hearing’ Leaks

The effectiveness of acoustic leak detection techniques has always depended on several factors:

Pipe size and depth, soil type and water table level, leak type and size, system pressure, interfering noise, and sensitivity and frequency range of the equipment, are just some of the conditions that often result in false-positive readings and undetected leaks.

Further complications have involved field set-up, calibrating equipment measurement devices, lack of repeatability of results – either taken multiple times during a single day, using different crews with the same equipment, or using different equipment to diagnose the same pipe.

Finally, precise knowledge of the pipe specification data required to correlate leaks with traditional acoustic leak detection technologies has also been a challenge.

No bigger limitation exists for acoustic pipe than the pipe type or pipe material, with the most dramatic fall-off of consistency about the effectiveness of acoustic leak detection equipment – a serious problem in view of the increasing use of plastic pipes in water distribution systems worldwide.

What’s down there?

<table>
<thead>
<tr>
<th>Pipe characteristics</th>
<th>PVC (measured)</th>
<th>HDPE (measured)</th>
<th>PVC (measured)</th>
<th>HDPE (measured)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe diameter (inches)</td>
<td>3/4</td>
<td>3/4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pipe wall thickness</td>
<td>0.07</td>
<td>0.07</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Test pressure (psi)</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Pressure loss (%)</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Interference level

- PVC: 12%
- HDPE: 22%

Pipe: 3/4 inch PVC, HDPE

Locating nonmetallic pipe leaks is extremely difficult, because the sound energy attenuates rapidly on these materials.

But most long-time users and experts agree that acoustic sensors, data loggers, and correlators, have never been useful in assessing leaks in plastic pipes, including PVC, PE, and HDPE pipes.

Characteristics of leak signals in plastic pipes differ significantly to metallic pipes. First, plastic pipes are much “quieter” and do not transmit sound or vibration as efficiently as metallic ones. Interfering traffic signals, attenuation of leak signals along the pipe, and underground noise in plastic pipes, render acoustic sensors, data loggers, and correlators, ineffective or useless to finding leaks.

Consequently, most operators are skeptical about the effectiveness of acoustic leak detection equipment – a serious problem in view of the increasing use of plastic pipes in water distribution systems worldwide.

Electro Scan Partners with Industry Leader ULC Robotics Inc., For Customizable Pressurized Water Main Entry

Hauppauge, NY – Electro Scan has announced an exclusive partnership with ULC Robotics, Inc. a leading robotics, energy services, and research and development company focused on the energy and utility industries. The partnership will focus on the development of a highly customizable entry access solution for pressurized water mains.

“Electro Scan is delighted to team with a great partner like ULC,” states Mark Grabowski, VP and General Manager, Electro Scan. “While they are most well-known for defining the future of gas utility maintenance tools, ULC’s capabilities extend far beyond natural gas.”

ULC Robotics range of products and services in gas utilities confront the increasing need to repair and maintain gas pipeline infrastructure while causing less disruption to the public, reducing methane escape and eliminating leaks by developing and deploying innovative gas utility repair systems and advanced camera inspection systems.

With a comprehensive portfolio of advanced robotic tools and cameras, ULC Robotics systems are designed and developed to enter live pressurized gas mains to perform internal inspection and repair. ULC will use their extensive knowledge of the gas industry to work closely with Electro Scan and develop a pioneering launch tube assembly that aims to dramatically improve the way Electro Scan deploys their unique technology into live, pressurized water mains.

The Research and Development team at ULC Robotics has a variety of experience working in other sectors of the energy industry including nuclear and electrical. The team has also developed products beyond the energy industry, which is why Electro Scan is excited to collaborate with ULC and revolutionize the way we work with our water utilities.

“Well known in the gas industry, Greg Penza actually got his start working for his Dad in the sewer business,” states Chuck Hansen, Electro Scan’s Chairman. “We were just lucky that Greg hadn’t started new solutions in the water business and had interest in helping us tackle technical issues using their toolbox of patents and know-how.”

Engineered to work within water utilities, Electro Scan’s CISBOT Field Supervisor, drives the robot through a gas main in Edinburgh, Scotland.

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Managing the Decay & Corrosion of Asbestos Cement Water Pipes Using Electro Scan Leak Detection Services

Electro Scan provides the first advanced tool to allow water utilities the ability to assess the degradation of Asbestos Cement (AC) pipe, estimated to be as high as 12 to 15% of all potable water mains. AC pipe was first introduced in North America in the late 1920s and became a common choice for potable water systems from the 1940s to the 1970s.

The use of AC pipe was largely discontinued in North America in the early 1980s, but AC pipe is still a significant portion of the water distribution systems in many North American cities. Health concerns associated with the installation, removal, and disposal of asbestos products ended the phase-out of AC pipe.

Today, little if any work has been completed on assessing the deterioration of AC pipe. Instead, the water industry acknowledges a variety of factors, including working environment and operational conditions, and eventually, when stresses exceed their strength, they fail. There is a substantial variability in the deterioration rate of AC pipes, and therefore also in their condition. Since total replacement is economically not feasible for many utilities, there is a great need to develop effective renewal strategies, like those emerging using Electro Scan.

Limited degradation models have been developed by academia, which is dependent on pipe age, water quality, and soil pore water pH; however, relatively low coefficients of determination in the various regression analyses warrant caution in the application of the results.

Contact Electro Scan to find out how its low voltage conductivity condition assessment can readily diagnose corrosion levels to help prioritize and plan replacement and rehabilitation.

Hansen Announces $25,000 Donation for Water Loss Leak Detection Center of Excellence

Sacramento, Calif. – In September 2015, CriticalH2O, Inc., a non-profit 501(c)(3) organization, announced the donation of $25,000 matching fund by software entrepreneur and public works veteran, Chuck Hansen.

Representing California’s leading Center of Excellence for Water Loss Leak Detection, CriticalH2O, Inc. was launched to consolidate, organize, and disseminate academic, commercial, and public sector advancements in solving key aspects of pipeline and irrigation water losses suffered by California water utilities, special service districts, and irrigation agencies.

“A new breed of internal pipe inspection tools are providing unprecedented information that is changing how water utilities decide how and when to repair & replace their crumbling infrastructure,” states Chuck Hansen, Chairman of Hansen Investments LLC. “Procurement cycles no longer allow public entities to readily adopt and benefit from new technologies, so if private funds can be harnessed to provide needed oversight, we need to help.”

CriticalH2O, Inc. expects to assess emerging high tech solutions for finding and quantifying water losses, in addition to helping establish new visual standards for using high resolution CCTV for water main condition assessment.

North American Water Loss Conference December 8 & 9 Introduces ES Water Leak Detection Services in Atlanta, GA

Atlanta, GA – Electro Scan Water Services is pleased to announce its attendance at the North American Water Loss Conference, held at the Atlanta Peachtree Marriott, December 8 & 9, 2015.

Field Service and Consultants will be available to discuss requirements and specifications for planning your next leak detection project.

Moving from older legacy inspection technologies to more advanced solutions often delivers a force magnitude of actionable management information and asset intelligence, not previously available.

Plan on attending this important event and learn how global water utilities are adopting low voltage conductivity assessment tools to replace existing condition assessment practices. Scheduled to attend is Chuck Hansen, former Chairman of Hansen Information Technologies, now owned by Alpharetta, GA-based, Infor Global.

Got Water?

California is home to over 100 bottled water facilities and the City of San Francisco Has Banned the Sale of Water Bottles?

It is estimated that each year, Nestlé is just one example of how corporations reap the benefits of our domestic water supplies. Nestlé is building on a global movement to phase out the sale of plastic water bottles, a move that is building on a global movement to reduce the huge amount of waste from the billion-dollar plastic bottle industry.

In a bold move toward pollution control, San Francisco has just become the first city in America to ban the sale of plastic water bottles, a move that is building on a global movement to reduce the huge amount of waste from the billion-dollar plastic bottle industry.

Over the next four years, the ban will phase out the sales of plastic water bottles that hold 21 ounces or less in public places with waivers permissible if an adequate alternative water source is not available.

While Food & Water Watch has always opposed bottled water, depleting groundwater in an already depleted area is highly questionable.

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App Orchid & Electro Scan Announce Water Strategic Alliance to Offer Enterprise Search Engine

SACRAMENTO, Calif. – Electro Scan Inc., a leading provider of leak detection instrumentation and cloud applications for the water, sewer, and gas pipeline industries, announced a Strategic Alliance with App Orchid Inc., makers of advanced cognitive-based solutions that capture, calibrate, and disseminate collective workforce wisdom across enterprises that can be presented in adaptive, intuitive, gamified applications.

Just like Google has evolved from being a keyword search engine to allowing users to ask simple yet powerful questions, App Orchid allows users across a business enterprise to ask questions and get answers about their operations and critical assets.

Electro Scan’s partnership with App Orchid was announced in conjunction with the AWWA Annual Conference & Exposition, Uniting the World of Water, and the launch of Electro Scan’s next generation low-voltage water leak detection and CriticalH2O cloud application.

“The identification of critical resources can no longer rely on rigid hyper-optimized data models,” explained Krishna Kumar, CEO and founder of App Orchid Inc. “Grass root tribal knowledge must be combined with traditional systems and ERP solutions using next generation heuristic tools to assess and address critical business resources. Big Data models and their analytics are only as strong as their weakest data source. That’s why subject matter experts, like Chuck Hansen, and more accurate diagnostic tools, like ElectroScan, are an integral part of Smart Cities.”

Prior to founding Electro Scan, Chuck Hansen was founder, Chairman and CEO of Hansen Information Technologies, a leading provider of asset management solutions for water and sewer utilities acquired by Infor Global in 2007.

Prior to founding App Orchid, Krishna Kumar was founder, CEO and CTO of Space-Time Insight, a leading provider of geospatial situational intelligence applications. His current venture, App Orchid, is gaining momentum. At a recent SAP Annual Sapphire conference, App Orchid was selected as “SAP HANA Innovation Awards 2015” winner.

Water utilities can now have Electro Scan Water Services conduct assessments of 10-15% of their network and recommend long-term CIP programs by Age, Pipe Type, Diameter, Length, DMU, including integration of corporate databases like CRM, ERP, and Billing, in addition to Email, Social Media, and other internal documentation.
Electro Scan Inc. selected its first public demonstration of its patent-pending 4-in-1 leak detection probe to be at the 22nd Annual Urban Water Institute Conference, held August 26-28, 2013 at the Hilton San Diego Resort.

“Electro Scan represents the cutting edge of technology that will enable water and wastewater agencies to accurately determine the condition of their aging pipelines,” states Liz Ohlund, Chair, Urban Water Institute. “This is just the type of technology that the policy makers and senior management staff that comprise our Urban Water Institute membership need as they decide where to spend their limited funds.”

The Institute is governed by a volunteer board of 40 directors drawn from hands-on policy makers, elected officials, and industry leaders who are active in the water resources industry.

A Patron Member of the Urban Water Institute, Electro Scan was the Platinum Sponsor of the Institute’s Annual Water Conference where it demonstrated its 4-in-1 Water Leak Detection Probe.

“Like a Scene from HBO’s Hit Show Game of Thrones, Electro Scan is Prepared to Defend Its “Iron Throne”

Electro Scan Achieves New ISO Certification: OHSAS 18001

What is OHSAS 18001?

The OHSAS 18001 standard is internationally accepted as a method of assessing and auditing occupational health and safety management systems. Developed by leading trade and international standards bodies, it provides a framework for organizations to instigate proper and effective management of health & safety in the workplace.

By having a clearly defined management system in place to identify and control health and safety risks, organizations are able to minimize risks to their workforce and visitors or external contractors on its premises or while in the field. The standard will allow Electro Scan and its subsidiaries processes for continually reviewing and improving its occupational health and safety standards.

Key areas assessed, include:

• Management systems in place
• Planning and risk assessment
• Staff training and awareness
• Communication of safety management
• Response to emergency situations
• Monitoring and continual improvement

Once again, congratulations to Electro Scan’s VP of Administration, Janine Mullinix, for overseeing the process, coordinating with outside consultants, and educating staff. Now, Electro Scan is certified for ISO 9001, ISO 14001, and ISO OHSAS 18001, an achievement few leak detection suppliers and/or service companies have earned.

Electro Scan’s Chuck Hansen and Matt Campos explain the advantages of low voltage conductivity.

Not only were patents filed for its basic technology, but also includes its defect detection data processing method and integration to video pipe inspection. While other acoustic vendors have integrated video into their products, Electro Scan is the only company with rights combining FELL or LVC with integrated video into their products, Electro Scan’s all-in-one probe includes its proprietary low voltage conductivity sensor, acoustic sensor, pressure sensor, and high resolution CCTV camera, in a single in-pipe tethered probe providing unparalleled condition assessment data, finding locations and measurements of defect flows, not previously available from legacy inspection devices.

Conference attendees were able to see the technology in action, discuss budget requirements, and arrange follow-up meetings with their consulting engineers and Board of Directors.

“Winter may be coming, but you will not be seeing many competitors offering low voltage conductivity solutions in the foreseeable future – especially given the “fire-breathing dragons and unbreachable moat” Electro Scan has been constructing since its founding in 2011 to protect its next generation leak detection technology.

“Knowledge is a weapon. Arm yourself well before you ride forth to battle.”

Maester Aemon Game of Thrones

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“Electro Scan technology leapfrogged existing techniques, like acoustic sensors, high resolution CCTV cameras, helium tracers, and electro-magnetic sensors.”

Also known as Focused Electrode Leak Location (FELL) or Low Voltage Conductivity (LVC), Electro Scan began its quest early to consolidate all available intellectual property related to the technology.

First, Electro Scan Inc. was founded October 31, 2011 in the State of Delaware, and within a month, acquired the intellectual property, including, but not limited to algorithms, conceptual designs, documentation, drawings, formulas, plans, reporting tools, software (in both object code and source code form), works in process related to the business and other assets and liabilities from Leak Busters, Inc. and Nevada-based PDQ Scan, Inc., filing its first patents in February 2012.

“We recognized early on that the Electro Scan technology leapfrogged existing techniques, like acoustic sensors, high resolution CCTV cameras, helium tracers, and electro-magnetic sensors.”

William Buffett has said, “In business, I look for economic castles protected by unbreachable moats. After all, without a competitive advantage, how can investors expect their current investment to be around years into the future, let alone appreciate in value?”

Chuck Hansen, Electro Scan’s lead inventor and founder, believes the same thing and has taken steps to go to war, if necessary, in order to protect Electro Scan’s “iron throne.” But what is Electro Scan’s defense and how did everything come together?

“Larger companies or patent trolls are less likely to challenge up and coming companies, if they know they’re protected by policies that would cost several million dollars.”

Not only were patents filed for its basic technology, but also includes its defect detection data processing method and integration to video pipe inspection. While other acoustic vendors have integrated video into their products, Electro Scan is the only company with rights combining FELL or LVC with CCTV.

International patent applications followed soon after U.S. patent applications, filed in accordance with the Patent Cooperation Treaty (PCT).

“It’s one thing for a nimble high tech company to file patents, but another to take out large insurance policies to defend and aggressively pursue any copies or misappropriation of its intellectual property,” states Hansen.

“Electro Scan Inc. Attends 22nd Annual Urban Water Institute Conference as Platinum Sponsor

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