

Advanced Videoprobes Locate Defects Deep Inside Pipes, Tubing

Conam Inspection, Inc., a Glendale Heights, IL-based inspection and testing service, uses advanced visual-inspection instruments called "videoprobes" for plant applications. The company depends on the probes to complete its nationwide quality-control service, which provides nondestructive testing, mechanical testing, and metallurgical- and chemical-analysis services

Figure 1: A Conam inspector uses a View-A-Pipe videoprobe to inspect the welds inside a stainless steel heat exchanger used in the glassmaking industry.

for a wide range of industries.

One of the videoprobes Conam uses is called the View-A-Pipe, developed by Lenox Instrument Co., Inc., Treviso, PA. The instrument views otherwise-inaccessible areas through a TV chip on the end of a long flexible cable which can be snaked deep inside heat exchanger or boiler tubes, turbines, pressure vessels, holding tanks, pumps, compressors, and other plant equipment. It can twist around corners when necessary. Color video images of the area appear on a portable TV monitor which the operator observes during the inspection, spotting such problems as contaminants, corrosion and blockages.

"We save the customer money every time we use the videoprobe," says Rod Reinholdt, general manager of Conam's Nondestructive Testing (NDT) and Inspection Group at the company's Glendale Heights headquarters.

"Reaching the probe into an otherwise-inaccessible area is a lot less expensive than cutting through a pipe or tube to physically find the problem. When the camera shows corrosion, we know its exact location, and our customer can replace or repair that area rather than undertaking a more widespread and expensive replacement. Without the probe, we don't know exactly where the problem is."

Conam's videoprobe inspections help customers make informed, cost-saving decisions on how long to keep equipment. "We can inspect the ID (interior diameter) wall of a piping system or a heat exchanger and confirm how much wall loss has occurred," says Reinholdt. "This gives customers a good idea of how much longer the system will last. They can replace at exactly the right time, avoiding the possibility of a system failure."

How it works

View-A-Pipe uses an advanced charged couple device (CCD) chip at the end of a 45-ft.-long flexible stainless steel-braid probe impregnated with a protective resin. The sealed waterproof probe has an outside diameter of 0.433 inches and a bending radius of 150mm. The system includes a fiberoptic light source and a 5-in. color monitor that displays high-resolution images that can be videotaped or enlarged. The portable instrument is available with remote focus that can be manually adjusted from zero to infinity. The probe also offers four-way articulation for maximum control. Besides a direct-view (55-degree) viewing head, a variety of interchangeable viewing heads, including direct wide, direct telephoto and right angle, can be used.

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Conam uses View-A-Pipes for a wide range of field-service applications at customer sites throughout the U.S., from viewing plugged condenser tubes to detecting contamination in a piping system. According to the company, they've saved money for customers in the petrochemical and refining, utility (both nuclear and fossil-fueled), pharmaceutical, chemical, aviation, steel, general manufacturing and many other industries.

"The Lenox probes are our primary visual inspection tool because they're more portable, easier to use, and more economical than other, more expensive videoprobes," says Randy Sweet, vice president of the NDT Group at Glendale Heights. "They are also extremely field-worthy. They can go into very nasty environments and keep on ticking."

Conam says the TV probe is a valuable complement to its numerous other NDT services, which include ultrasonic, x-ray, eddy current, magnetic-particle and liquid-penetrant. Conam employs the probe to corroborate the conclusions of these other approaches. It can verify, for instance, the results of eddy current inspections.

"X-ray tests may show that pendant platens at the bottom of a 2-in.-diameter tubing loop in a boiler is clogged with debris like calcium deposits," says David Thigden, regional manager at Conam's Houston, TX, field office. "We will cut a portal in the tube, drop in the videoprobe, and view the problem from close up. We will also look for such problems as grooves, bulges, cracks and deformities. We use the View-A-Pipe on all major utility outages and on jobs calling for a variety of inspection methods. We have used it to successfully spot mussels and other marine growth which could close off inlet pipes that supply cooling water to utility boilers."

Company technicians also frequently inspect nuclear plants, where the flexible probes examine piping systems for corrosion, check the condition of valves and verify weld quality.

On a special inspection, Conam technicians were asked to check a Boeing jet aircraft. They inserted the probe inside the plane's fuel tanks, looking for exfoliation (flaking), corrosion, or damage from condensate, and checking whether sections of the tanks needed to be replaced.

In petrochemical plants, field technicians push the flexible cable into transfer lines for raw products or reactants looking for blockages. In polypropylene production plants, the videoprobe can show rough edges on the walls of lines which can snag and shred pellets of raw material.

The videoprobes sometimes view the interiors of steam turbines, checking blades and making sure nuts and other components are not missing. They are also helpful in finding tools that have been dropped inside machinery. "We receive quite a few calls to look inside machines for things like lost hammers, loose bolts, and damaged valves or lost pieces inside machines," says Steve Fay, lab manager at Glendale Heights. Fay adds that the Lenox probe "has performed quite nicely; the optics are fine, the recording quality is excellent, and it's easy to set up, operate and take apart." The company's Lenox systems, he says, have never needed repair.

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