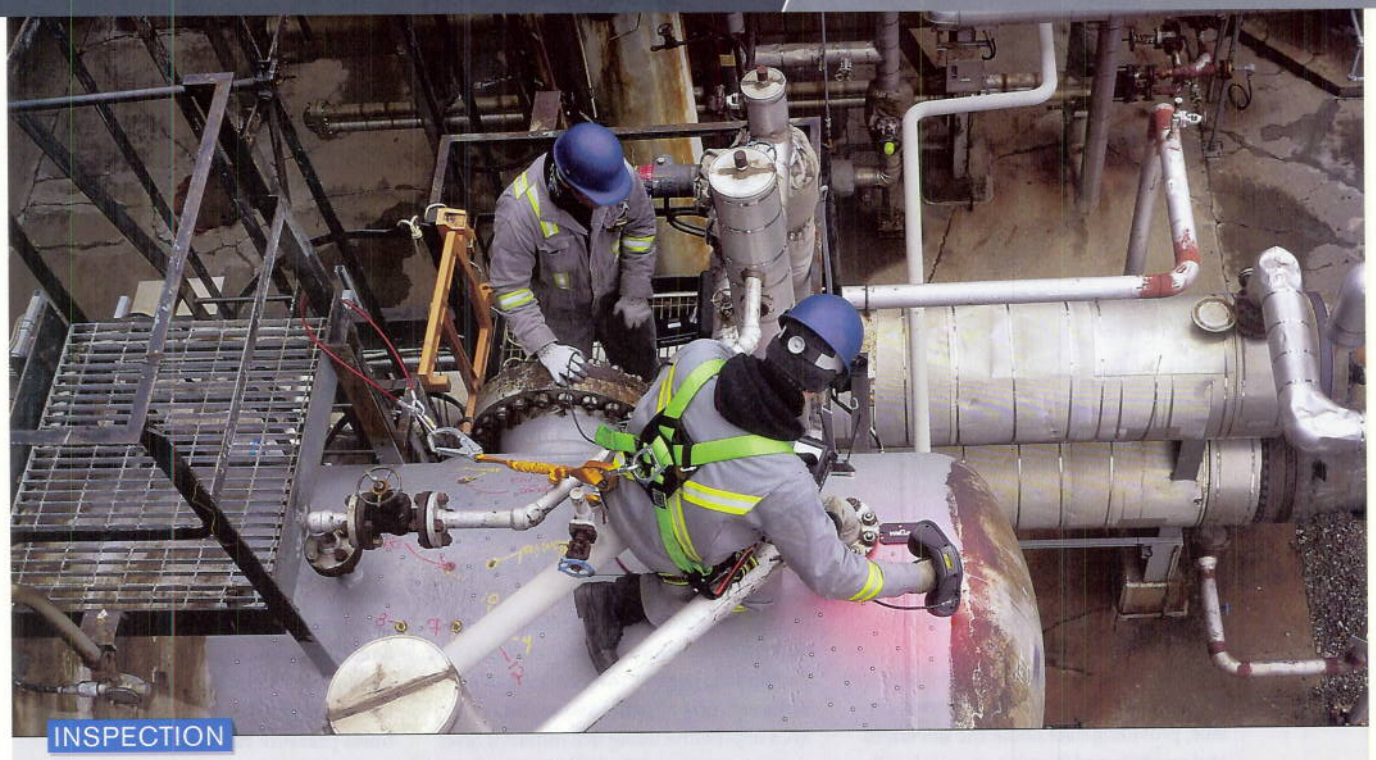


PHOTO: CREAFORM INC.

INSPECTION

Better Safe Than Sorry

Laser scanners and specialized software allow for faster, more effective testing of pipelines

Even before recent high-profile crude oil pipeline ruptures in the United States, North America's pipeline carriers had good reason to adopt the latest in pipeline-testing technologies.

Today, with sharply increased scrutiny from regulators like the National Energy Board, and the negative fallout from the Michigan and Arkansas incidents, the industry has all the more reason to search out the most effective methods for testing the integrity of oil and gas pipelines.

Clearly, the pipeline sector is getting the message. Outside the sector, if anyone can see a silver lining to the increased scrutiny the sector is under, it's likely the tech companies that are marketing improved testing tools and methods for finding and assessing damage, including corrosion, to pipelines.

In a sense, the case for using the best testing technologies available has been made largely in the public arena. Whenever there's a pipeline leak or rupture, the public has made clear its sympathies rarely lie with the pipeline carrier. Under pressure to meet higher pipeline integrity and public safety standards than ever before, today's carriers know they will be held accountable for any failure to do so.

On a purely practical level, adopting the most effective testing technology could mean much more for carriers than just having a ready answer when regulators come calling. Indeed, for some carriers, taking the right steps to improve public safety now could mean the difference between surviving and not surviving, in the long run.

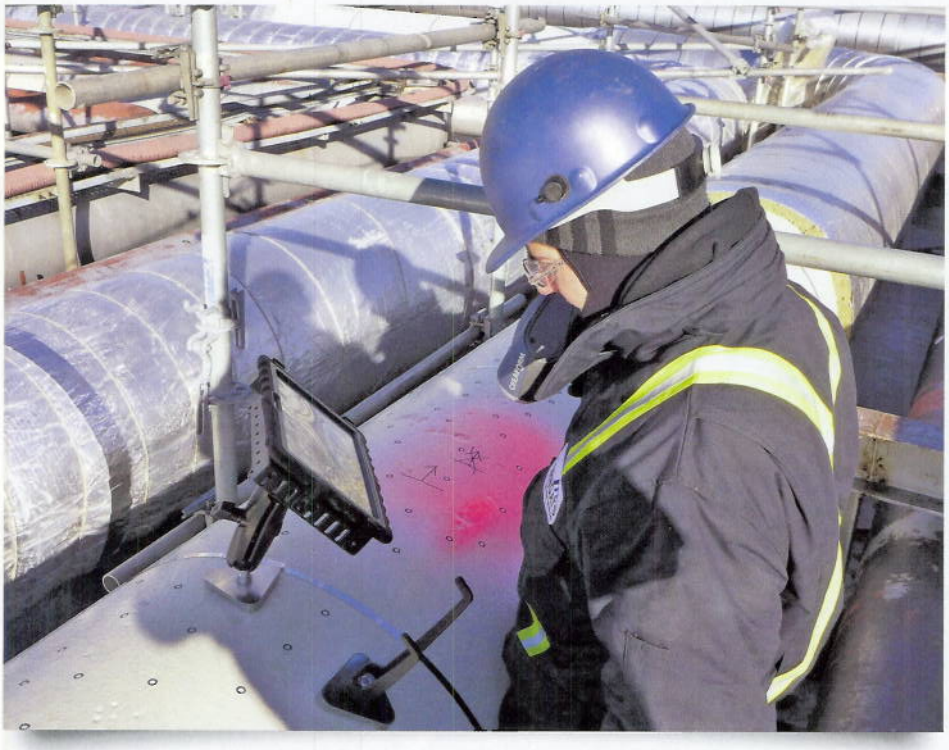
It's into this regulated, well-scrutinized environment that manufacturers of pipeline-testing tools venture, knowing the stage has been set by regulators, environmentalists and an often-skeptical public. One such manufacturer is Quebec's Creaform Inc., which offers laser scanning technology to the pipeline industry through a range of products.

Among these is a handheld scanner and dedicated software that tests pipelines and pressure vessels for mechanical damage and corrosion. According to Creaform, the company's Handyscan 3D laser scanner and its Pipecheck software together make up a third option for pipeline carriers that use non-destructive testing (NDT) to gauge the physical condition of their oil and gas pipelines.

TRADITIONAL ASSESSMENT METHODS

Two factors that threaten the physical integrity of pipelines and pressure vessels are corrosion—or rust—and physical or mechanical damage. As for tools used to assess these factors, laser scanning is not the only one. In the pipeline sector, two other common methods of NDT testing are >

LASER ACCURACY
Creaform's Handyscan 3D portable laser scanning technology for surface inspection of pipelines and pressure vessels uses triangulation and binocular vision to self-position itself to a unique dynamic referencing system on the pipeline, ensuring high measurement repeatability and accuracy.



INSTANTANEOUS ASSESSMENT
Creaform's Pipecheck software platform addresses both external corrosion and mechanical damage assessment of pipelines, generating instant on-site results.

ultrasonic and pit gauge testing. The latter also measures the depth of corrosion or damage—often, dents—in a pipeline or pressure vessel.

Ultrasonic testing uses high-frequency sound waves to penetrate the tested surface, providing data about the thickness and condition of the pipe or vessel wall being tested. One challenge of ultrasonic testing, according to experts, is the need for skilled technicians to operate the assessment tools.

According to Creaform officials, if traditional methods, whether pit gauge or ultrasonic probe, are used in assessments, different technicians may produce different results. "The pit gauge is a very accurate device when used correctly," says Jérôme-Alexandre Lavoie, the company's technology integration and new applications manager.

"The major uncertainty associated with [it] comes from the operator. An inexperienced operator will give you results that a different operator would not give you."

The range of products Creaform makes includes the Handyscan 3D portable laser scanner, used to assess pipelines and pressure vessels for damage or corrosion. According to Lavoie, laser scanners largely overcome the problems inexperienced operators can create when using traditional assessment methods.

The same point was made by an executive with Edmonton-based Acuren, which uses Creaform tools to test pipelines and pressure vessels in the oil and gas sector, among others.

The laser scanner "is operator-agnostic," says Tom Taylor, Acuren's laser product manager. "You can have five different [technicians] assess the same area of pipeline using five different laser scanners, and you'd get the exact same results. Whereas, if we did that with five different [technicians] using a pit gauge or ultrasonic probe, you're almost certain to get a different result from each of them. There are always variables."

The set-up for using a pit gauge is not especially time-consuming, according to Taylor, noting the process involves sandblasting and painting a grid on the surface of the pipeline or vessel being assessed. Often, spray paint and a template are used to ensure a standard grid pattern. Similar preparation also usually precedes ultrasonic testing, so in that sense they are on roughly equal footing.

With the pit gauge method, however, more time is spent actually making the measurements, square by square, on each part of the grid. The finer the grid, the more measurements are needed. As the deepest point of each square is measured, the results are recorded, often manually by a second technician, consuming additional time, he says. It's also during this stage of the process that errors can arise, often through mistakes in measuring or noting figures, Taylor says.

For most pipeline carriers time is of the essence, since digging up pipelines for testing or repair is a costly business, one that pipeline engineers are keen to see completed promptly. Thus, there's more pressure than ever to test pipelines quickly and efficiently, something older testing methods don't always accomplish.

On that score, laser scanning might have the edge, says Lavoie. "The main advantage is speed of acquisition, and you get a lot more detail with the laser scanner than with the manual pit gauge or ultrasonic probe. With the laser scanner, you really capture all the details," he says, noting technicians often use data gained from the tests to calculate burst pressures on pipelines.

The laser scanner "scans damaged areas in three dimensions while Pipecheck, Creaform's pipeline integrity assessment software, automatically creates a grid at a resolution the operator chooses. The resolution affects accuracy, and the finer the resolution, the more accurate your burst-pressure calculation will be."

Available in two versions, the Handyscan laser scanner best suited to oil and gas pipelines and pressure vessels may be the EXAscan. The EXAscan uses a high-definition camera to produce multi-resolution scans through a single acquisition session. This allows operators to increase the scanning resolution (by four times) on damaged areas to capture more details while increasing scanning speed on non-damaged areas. It is often used with Pipecheck, allowing fuller use of the scanner's abilities.

For those doing the actual testing, Pipecheck makes the creation of post-assessment reports easier, since these can be generated on site automatically and instantly in Microsoft's Excel format. As the technician scans the pipe surface, the scanner is connected to a laptop that's part of a fully rugged mobile workstation set up on site. During scanning, the technician uses EXAscan and a wireless tablet to monitor data as it is being acquired.

■ *James Mahony*

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