

X-Ray Vision Engineering Firm Succeeds By Finding Flaws Beneath Surface

**By Robert Sanford
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In the early 1980s St. Louis experienced a rash of street cave-ins due to under-the-surface erosion from old sewers and water conduits.

A fledgling engineering firm, EnTech Engineering Inc., was asked if it could detect sites where collapses might occur. That was right down EnTech's alley, so to speak. Non-destructive testing with an infrared sensing system was its specialty.

Since then EnTech has done sensor surveys of numerous streets in St. Louis and other cities. Now it is negotiating for similar work in Italy, a project

that could start in five cities and grow from there.

"Imagine. They have water pipes in Italy that are 1,000 years old," said Gary Weil, EnTech's founder. "It seems likely that there are a number of leaks and voids to be found."

The inspection of a street or structure involves looking at it with an infrared camera hooked to a computer. The system is portable and can be carried in a harness by a man.

It can analyze the view that the camera sees. Objects in the view are differentiated according to differences in the amount of heat encountered at the surface. A patch of street pavement with a cave under it shows a different surface temperature from pavement resting solidly on stone or dirt. So an underground void would be apparent to the system.

The system can be very precise and the computer

assists it in recognizing tiny differences in heat. Such a system costs about \$125,000, Weil said.

With the Italian project in mind, EnTech recently trained three Italian engineers here in how to use the system and how to evaluate its findings. If the project expands it will involve training more people and adding to the eight-member staff at EnTech. The business is growing, Weil said, because the services offered are cost effective.

In the past, he said, when a business suspected a water leak or a void beneath a surface it would bring in a backhoe and dig a hole. But the hole might be in the wrong place. So the thing to do was dig another hole. Trouble was, it might be in the wrong place, too. And so forth.

EnTech is able to locate voids or irregularities under

ground as deep as 40 feet, Weil said.

The company is not limited to sensing subsurface objects. It uses its heat-sensitive capabilities to survey a number of things. A look at an electrical circuit can locate a hot spot caused by a loose connection. A scan of a machine in operation can reveal a bearing that is worn and about to cause trouble.

A roof scan can show the location of leaks and the size of damp areas caused by the leaks. A scan of the exterior of a building can show whether the building is losing energy at particular places and locate the places. Also, energy losses from steam and hot water systems inside a building can be located by the infrared scan.

On the hot side, the company does scan tests of ladle cars carrying molten iron at a steel mill. The scan tells

whether the brick insulation system in the car is in satisfactory condition.

A sizable part of EnTech's business is scanning bridge decks. It just finished doing 60 bridges in Illinois, including some in Chicago that carry high traffic loads. It can do the scanning at a speed of about 10 miles an hour with the equipment mounted on a van. That eliminates the need to close traffic lanes or stop traffic.

With the equipment mounted on a helicopter, a scan can be made of large areas. The company recently scanned a large group of office buildings in St. Louis County from an altitude of 2,000 feet. The results showed the location of underground steam lines and positions of apparent energy loss. It also showed roof areas and pinpointed some places where leaks had allowed

moisture to accumulate unseen under the surface.

The above-ground point of view allows scanning and leak detection of pipelines, whether they contain oil, chemicals, water, steam, gas or sewage. Large areas can be covered or the scan can be focused down to particular points.

Weil said the non-destructive scanning technique is timely in the sense that some pipelines have been built with a planned life of 20 to 25 years and are beginning to show signs of impending failure. The new technique is a valuable tool in successful planned maintenance that can extend the life of the lines, he said.

Weil began the company in 1980. "If you asked people whether they would like to run their own company I would guess that 90 percent would say yes," he said.

"Well, I started this company because I got fired from a job. If I hadn't been fired I probably wouldn't have started the company. So, it turns out, getting fired may have been the best thing to happen to me.

"I was a vice president of May Department Stores, in charge of maintenance for 2,000 stores in 38 states. At a board meeting at which the topic of discussion was women's dresses I managed to go to sleep. I was let go.

"When I worked at May I had tried to hire someone to do non-destructive scanning of roofs. I couldn't find anyone with the right equipment. So when I found myself unemployed I decided to open my own business and emphasize having the best equipment and the best training."

To date, he said, EnTech has scanned roofs totaling about 30

million square feet of surface and has advised clients about the location of leak areas needing repair. Rarely are complete replacements needed, he said, a fact that makes the service cost-effective for clients.

Weil's wife, Georgiana, is president, being more attuned to running a business than he is, he said. He works more as an idea man. His efforts at increasing the effectiveness of different testing techniques won him an award as Missouri Inventor of the Year this year.

Revenues of the business have increased through the years, Georgiana Weil said. They amounted to about \$500,000 last year and may come close to doubling that this year.

The cost of the services to clients varies with the size of the job, the equipment required and the number of technicians needed to complete

the work. Weil said the old-fashioned approach of digging and looking might cost \$20 to \$85 a square foot, whereas a scan test on a large area might cost a penny a square foot.

EnTech adds new techniques as they develop. Using ground-penetrating radar, technicians can determine the size and depth of a void underground and can estimate how much material will be needed to fill it.

Monsanto Co. was EnTech's first customer and continues to hire it, Weil said. Among numerous other clients, 90 percent continue to use the firm, he said.

New clients pop up. Recently there was a scan job of streets and bridges in Los Angeles. The high-tech scan contrasts with old methods of finding voids beneath roads, one of which involves dragging heavy chains along the surface and listening to the sounds that result. The new scan is a

hundred times faster and far more accurate, he said.

Another recent job was at an airport in New Hampshire. A landing gear of a wide-body jetliner poked through a taxiway surface, causing some \$500,000 damage to the plane. When the plane was removed it was determined that a 40-year-old drainage pipe under the surface had leaked and eroded away the supporting ground. EnTech scanned 2 million square feet of pavement and found 12 subsurface voids that could have caused major damage to planes if the pavement had collapsed.