

INFRARED-MAN: SEES TALL BUILDINGS WITH A SINGLE LENS!

By William Flannery of the
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Gary J. Weil shares an unusual skill with Superman: Both can see through solid objects.

Weil is president of EnTech Engineering Inc., which specializes in testing buildings, roads, bridges and buried pipes without damaging them.

Using infrared still and video cameras and ground radar, Weil and his crews can detect internal gaps, voids, cracks, leaks and trapped water that are invisible on the outside.

"When I started 17 years ago, the purpose of the company was to find ways to test our infrastructure without having to destroy it," Weil said. "Back then if you needed to find if a bridge was failing, you had to take a jack hammer out and bust it all to hell. And no matter what you found, you still had to repair it."

By using infrared cameras, Weil can save time and money.

"We don't have to cut any holes; we don't have to stop any traffic," Weil said. "It used to take a month to test a bridge. We can inspect it in two hours."

Weil calls his patented testing technique Infrared Thermography.

Infrared rays, also called heat rays, are similar to normal light rays but cannot be detected by the human eye. Objects give off infrared rays that vary with the object's temperatures.

Pointing to the multicolor infrared image on the television monitor, Weil said, "Thousands of people will look at this image and say, 'Wow, look at all the nice colors.' But when we look at it we ask, 'Why are there different levels of temperature?'"

Weil then turns the infrared camera on a reporter's white shirt. Hues of reds, greens, yellows and blues fill the monitor.

"Where the shirt is directly in contact with your body, those are the green colors," he said. "Where there is an air gap, you have the darker blues. The air gaps act like an insulator, kind of like a Thermopane window."

Weil looks for the blue cracks and blotches.

Using infrared cameras, Weil and his employees literally can see through walls, bridge decks, earth and even machinery in operation.

"We have used infrared to inspect . . . printing presses," Weil said. "We would simply

walk alongside the running press, and the infrared image will show which bearings are running hot and need to be replaced."

Bridge inspections are done by mounting the camera on a boom on the front of a truck. "We then drive across the bridge at 10 mph so we won't stop traffic," Weil said. "We generally inspect one lane at a time, but we can do three lanes at once."

Weil's company has inspected nearly every bridge in the metro area. "We've done the Poplar Street bridges three times," Weil said. "The last time, we did it in one night."

Most inspections are done at night, said Weil, in order to avoid shadows giving false readings.

The infrared camera can inspect from inside or outside, at ground level - even for the tallest office buildings - or from above by plane or helicopter. The camera can even spot deeply buried objects.

Weil's workers have detected objects 38 feet below the Earth's surface, Weil said. Once the problem site has been located, Weil uses ground-penetrating radar, which can read objects up to 20 feet underground.

"The infrared can tell you where the problems are," Weil said. "The radar can confirm what the infrared has told us, and it can give us the depth."

In the past 17 years, EnTech has done more than 1,500 inspection jobs in 30 states and overseas in Europe and Asia. Weil has licensed his Infrared Thermography technique to the Italian government for bridge inspections and finding water-system leaks.

Weil estimates about 50 percent of his business is underground pipes, 30 percent bridges and 20 percent buildings.

One of his largest jobs was inspecting 350,000 square feet of concrete during the rehabbing of the Seattle Kingdome.

"When we got there, we started looking at the floor, but the engineer said, 'No, that's not it,' as he pointed up at the ceiling 300 feet above," Weil said.

Just then, one of the cranes inside the stadium collapsed, killing three workers.

"In order not to interfere with the accident investigation, we had to stay within a 20-foot radius of the center of the floor near second base," Weil said.

Weil took more than 300 infrared images of the 20-year-old roof and finished in four days, ahead of the accident investigation.

Nondestructive testing has several key advantages, Weil said. Many problems, like leaky roofs, can be detected months before they become visible on the inside.

"Another advantage is saving money," Weil said, citing a job EnTech did for Neihaus Construction and the federal Department of Housing and Urban Development.

"It involved a HUD-owned nursing home," Weil said. "HUD had budgeted \$2.5 million for repairs, and it would require moving 100 elderly tenants out during the remodeling."

Using the infrared inspection method, the EnTech crew found and marked only those parts of the walls and water pipes that needed repair. The inspection took one day.

Instead of \$2.5 million in repairs, HUD spent only \$250,000 - 10 percent of the original estimate, Weil said. "And they didn't have to move the tenants out."

Weil said he believes the company is about four years ahead of its competition, none of whom use both infrared and radar inspection. "We keep investing in ourselves - new equipment, new software, new techniques," he said.

Weil also sees other uses for his Infrared Thermography system, such as finding buried land mines.

"What do all land mines have in common, be they made out of metal, plastic or wood?" Weil asked. "The dirt on top is never tamped down - there is always a little space."