

Think Thermally[®]

March 2004

Practical news for practicing thermographers

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Thermal Solutions[®] 2004

Thermal Solutions[®] 2004 was a success by all accounts. John Snell recalls looking out on a ballroom of nearly 200 people during the opening night dinner and thinking, "This is what the infrared community is about. This conference is a success when I see a room full of thermographers fully engaged with each other and exchanging information."

Participants heard over two dozen presentations by fellow professionals. Papers that received high accolades included Kelly Paffel's discussion of steam trap inspection, Daryl Moore's presentation on hysteresis and John Moreno's presentation on "outside-the-box" IR applications. All papers from the conference are available now, both as hard copy and on CD-ROM.

Three keynote speakers built a strong foundation for the rest of the conference to stand on. Keith Brantley, an Olympic runner, spoke dramatically of his first-hand experiences with heat management in athletics. Cliff Warren, former CEO of Raytek and AGA, offered his unique and informed perspective on where the industry has been and where it is headed. Meteorologist Bruce Schwoegler's presentation "Weatherwise and Otherwhys," brought an overwhelmingly enthusiastic response from attendees with a

fresh perspective on thermal influences in weather. The Wednesday morning Panel Discussion found four experts answering a variety of questions about cost savings that lasted nearly two hours.

Nearly all participants took one or more of the optional six short courses that were offered prior to the conference. Topics included mechanical, electrical, building and medical applications plus information on how to establish an ASNT-based certification program.

All the major infrared camera manufacturers were among the eighteen vendors exhibiting at Thermal Solutions[®] 2004. "We know that thermographers want and deserve factual, unbiased information about products," said Susan McDowell, Snell Infrared's Inside Sales Manager and the person in charge of organizing the exhibition. "We are by far the largest independent IR conference, which means everyone who comes here has a great opportunity to see all the products in one place at one time."

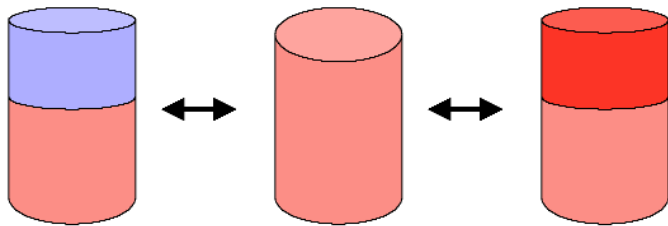
Statistics alone cannot fully measure the success of the conference. There were plenty of opportunities for participants to simply enjoy the event and be part of a growing community of infrared professionals. Carl Schultz, PdM Manager at Westar Energy and one of the presenters, said "The information exchange was absolutely great. I can think of no other forum where I have gained more in such a short period of time. I always feel like a sponge when I get back!"

Jim Fritz, General Manager of the Snell Companies, said of the event "I'm very proud to be the sponsor of this conference for the sixth time and am already looking forward to an even bigger and better gathering next year." For more information on Thermal Solutions 2005, stay tuned to the conference web site at www.thermalsolutions.org during the coming weeks.



Locating Levels in Tanks Using Infrared Thermography

Instrumentation for locating levels in tanks and silos is often unreliable. The need for precise information about levels remains necessary, or even critical, in many instances. Sometimes existing instrumentation simply cannot determine levels, especially when foams and waxes are present. Safety issues can be involved as well.



As it transitions from night to day a simple liquid/gas interface influenced by the out-of-doors ends up all the same temperature twice. In large tanks the liquid does not change temperature greatly, but the gas typically does.

A thermographer working in a petrochemical plant relayed a story about a contractor hired to clean out a large tank. When the manway door was opened, sludge, which had settled to a depth high above the door, oozed forth creating a dangerous and environmentally damaging situation.

There are numerous instances where infrared could have been used to provide or verify information about the condition inside the tank or silo. Level location or verification of instrumentation continues to be an important need in industry.

Most of the time the materials in a tank or silo—whether solids, liquids or gases—behave differently when subjected to a thermal transition. Gases typically change temperature much more easily than liquids. Water, for instance, has a thermal capacity that is 3500 times greater than air. One Btu of energy added to a cubic foot of water will raise its temperature 0.016°F while the same energy added to the same volume of air results in a 55°F increase!

Key to determining levels is to observe the tank or silo during a thermal transition. If viewed while at steady state with their surroundings, no differences will be seen. In fact, tanks and silos that are full or empty often appear identical, i.e. no indication of a level. Interestingly, it is difficult to find tanks or silos that are not in transition. Outdoors, the day/night cycle often provides enough driving force to create detectable differences. Even indoors, variations in air temperature are often much more significant than might be appreciated.

Environmental conditions can influence detectability positively or adversely. Wind, precipitation, ambient air temperature and solar loading can all, separately or together, create or negate differences on the surface.

Some tanks are covered in cladding, often unpainted aluminum or stainless steel. Detecting the kind of fine temperature differences necessary to reveal levels on surfaces such as these—ones having low emissivity and high reflectivity—is nearly impossible. The problem, however, is most often easily rectified by applying a high emissivity target vertically such as a painted stripe or a piece of tape on the tank.

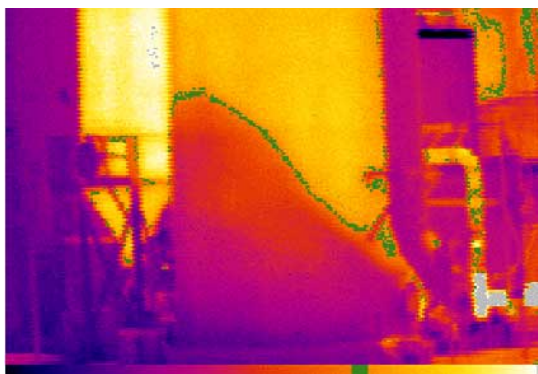
Tanks which are insulated can also prove challenging. Thankfully, insulation levels are typically not great enough that they preclude seeing levels, but they can make it much more difficult.

An industrial hot air gun can be used to heat the surface of small to medium sized tanks. Cooling can be provided simply by wetting the surface with water. As evaporation takes place, cooling drives transient heat flow and reveals or enhances the levels.

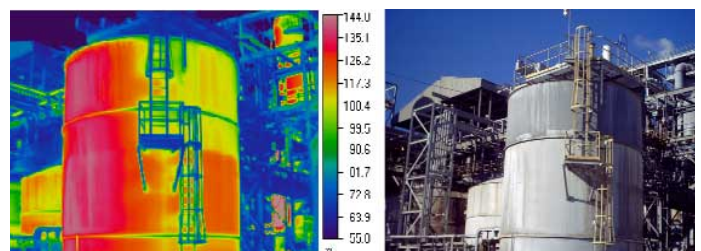
Although solar loading can enhance a pattern, more often it can cause subtle thermal patterns in a tank or silo to be obliterated. It may be possible to view the device on the shady side, but sometimes it may be necessary to return when the sun's affect is lessened.

Spheroid tanks offer another type of challenge. When viewed from one point, their reflectance varies widely over their curved surface. It is not unusual to find the tops of such tanks appearing cooler while the bottom appears warmer; all too often both patterns are related more to reflectance than emission.

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Sludge buildup in this tank is substantial, approximately 20' deep, a condition that had not been well understood. The outflow is pumped on the right side.

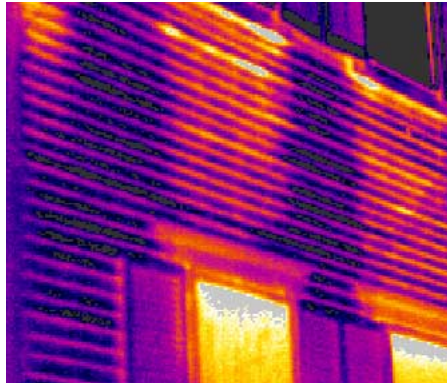


The impact of solar heating is evident on the left side of the tank, although it does not fully obliterate the level. Note the level is clearly displayed on the shady side.

Courses for Building Professionals

With infrared cameras becoming easier to use and more affordable, they are now seen as a viable tool in building diagnostics. Professionals in this field know they cannot afford to make mistakes when applying the technology. Basic understandings about thermal imaging and heat theory are “must-haves,” as is the knowledge of the actual application when utilizing thermography to scan buildings.

A Snell Infrared Level I course has always contained the fundamental knowledge every thermographer needs, however, building professionals often found that the mechanical and electrical applications simply did not apply. To accommodate these thermographers, we have added some information to Level I



and have changed the order in which material is presented.

For this new Level I course camera use, heat theory, building inspections and roof applications are now all contained in the

first part of the class. Those who wish to participate only in this special buildings section can do so by attending the Monday, Tuesday and Wednesday sessions (two and a half days) for a reduced rate of \$1,095 per person.

Thermographers may also want to consider our two-day Buildings Specialty Course. This class is for those who have already had training and experience with the technology. It is an in-depth exploration of infrared in building diagnostics and roof moisture surveys. The abbreviated Level I course provides the stable foundation; the Specialty Course builds upon that.

For more information about any of our courses, please call 800-636-9820 or visit our website at www.snellinfrared.com.

Call for Papers

Snell Infrared is delighted to announce the return of Thermal Solutions® to Clearwater Beach, Florida, **January 24-27, 2005**. Thermal Solutions® is a professional conference and independent community of infrared thermographers and is open to everyone regardless of equipment preference, previous training or company affiliation. For those who are interested in presenting a paper, please write a brief abstract (100-200 words) and submit it for review by June 1, 2004. Please send abstracts to: Thermal Solutions®, P.O. Box 6, Montpelier, VT 05601-0006 or via e-mail at abstracts@thermalsolutions.org

A Winning Combination

Snell Infrared's two-day Specialty Courses are designed for people who have already had training, but are looking to further their infrared education on specific applications. Course topics include Building, Electrical or Mechanical Applications and offer thermographers a chance to specialize their training within a particular field.

Two upcoming dates include an Electrical Applications course, Tuesday and Wednesday, April 20-21 with a Mechanical Applications course that follows Thursday and Friday, April 22 and 23 in Charlotte, NC. This back-to-back scheduling gives thermographers the opportunity to participate in both classes and strengthen their infrared knowledge with two highly-demanded applications.

For you race fans: NASCAR's Advance Auto Parts 500 is scheduled in Martinsville, VA, just north of Charlotte on Sunday, April 18. The Martinsville Speedway is a long, thin oval track shaped much like a paper clip. At only .526 miles, this track is the shortest loop on the Nextel Cup circuit. Its demanding layout always guarantees an action-packed race and is known to be one of the most beautiful and modern racing facilities around. For a winning combination, consider attending all of these events.

Locating Levels, *continued from page 2*

Many industries have a critical need to determine levels in tanks or silos or to validate the already existing level-indication instrumentation. In many instances, infrared thermography provides a simple, cost-effective means of doing both. Conditions often allow for levels to be seen at almost any time of the night or day and throughout the year. While levels are not always immediately obvious, persistence, careful imaging and simple enhancement techniques can often produce remarkable results.

You can reach *Think Thermally*® at:

Snell Infrared
P.O. Box 6
Montpelier, VT 05601-0006

Phone: 800-636-9820
Fax: 802-223-0460

E-mail:
thinkthermally@snellinfrared.com

Web Site:
<http://www.snellinfrared.com>

Snell Infrared 2004 Course Schedule

Level I (\$1,495)

Tampa, FL	March 15–19
Indianapolis, IN	May 3–7
Toronto, ON Canada	May 10–14
Minneapolis, MN	June 21–25
Montpelier, VT	August 9–13
Portland, OR	September 13–17
Edmonton, AB Canada	September 13–17
Charlotte, NC	October 4–8
Dallas, TX	November 8–12
Toronto, ON Canada	November 22–26
Montpelier, VT	December 6–10

Level II (\$1,495)

Tampa, FL	March 29–April 2
Edmonton, AB Canada	May 31–June 4
Minneapolis, MN	June 21–25
Montpelier, VT	September 13–17
Dallas, TX	November 8–12
Toronto, ON Canada	Nov. 29–Dec. 3

Level III, Best Practices (\$995)

Toronto, ON Canada	June 7–9
Indianapolis, IN	October 19–21

Specialty Courses (\$750)*

Mechanical Applications:

Toronto, ON Canada	March 22–23
Charlotte, NC	April 22–23
Phoenix, AZ	Sept. 30–Oct. 1
Edmonton, AB Canada	October 19–20

Electrical Applications:

Charlotte, NC	April 20–21
Toronto, ON Canada	May 18–19
Phoenix, AZ	September 28–29
Edmonton, AB Canada	October 21–22

Building Applications:

Minneapolis, MN	March 30–31
Toronto, ON Canada	December 7–8

* Level I or extensive thermographic experience is a recommended pre-requisite for these two-day Specialty Courses.

Need a course in Materials Evaluation, Process Monitoring or R&D?

Just ask!

*Custom courses, or any of the courses listed here,
can be provided at your facility.*



Training, Certification and Support for Thermographers

P.O. BOX 6
MONTPELIER,
VERMONT

05601-0006

1.800.636.9820

FAX 802.223.0460