

# Think Thermally®

August 2001

Practical news for practicing thermographers

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**Reply today!!**

## A Solution for You in 2002 Thermal Solutions®

Mark your calendar for January 21–24, 2002 and join us in Orlando for Thermal Solutions® 2002. You will not find a more exciting and practical professional infrared conference anywhere! And, thanks to the cooperative efforts of Thermal Wave Imaging, this year's conference will include an entire track devoted to NDT.

Six pre-conference short courses are scheduled for Monday beginning at 9:00 AM. The short courses this year include:

- Conducting Effective Roof Surveys
- Mechanical Applications for Infrared
- Maintenance Optimization in Electric Utilities
- Inspecting Heaters, Furnaces and Boilers Inside and Out
- Nondestructive Testing Using Active Thermography
- IR Software Overview and Report Writing Workshop

The conference officially kicks off Monday evening, January 21<sup>st</sup> with a fun-filled reception to include the Thermal Image Gallery and an exhilarating keynote address.

## ...this year's conference will include an entire track devoted to NDT.

Each of the next three days opens with a keynote address followed by a variety of presentations. There will be a full day of NDT paper presentations on Tuesday, along with a separate Condition Monitoring/PdM track.

Vendors will display the latest equipment from Monday noon through mid-morning Tuesday. Take "The Thermal Challenge" at the Snell Infrared booth!

## It's Only 2 Degrees!

A few months ago, Roy Huff of Snell Thermal Inspections was working in a substation. They requested a couple pieces of equipment be examined. Roy was looking around with his camera while waiting for the equipment to be opened up (the mark of a good thermographer), when something on a nearby transformer caught his eye. Because of the angle, it was difficult to see exactly what

## ...never base repair decisions solely on temperature.

he wanted to. He crawled under the bushings coming out of the side of the transformer (See image 1) and used the automatic span/level feature on the camera with the resulting image being displayed (see image 2). Can you see any problems? Look REAL closely!

*continued on page 4*



Thermal Solutions® 2001



Image 1

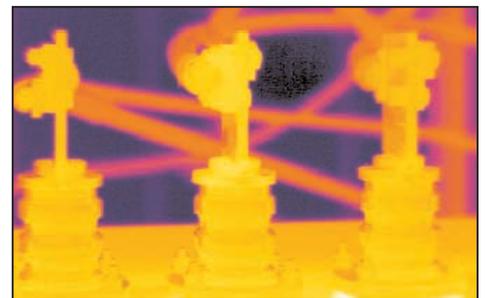


Image 2

*continued on page 5*

## I Scream...For Ice Cream

Summer, even our brief one here in Vermont, would not be complete without a dish (or two!) of ice cream. Vermont is the home of Ben & Jerry's and their notable flavors such as Cherry Garcia and Chubby Hubby <www.benjerry.com>, so of course, we are biased. Thermographers who come to Vermont for our training course often include a trip to the Ben & Jerry's plant, which is a beautiful thirty-minute drive away. The original gas station in Burlington, where Ben Cohen and Jerry Greenfield got their start making their ultra-premium ice cream in a hand-cranked mixer, was torn down in recent years.

It is a widely held belief that ice cream was first made in China as long ago as the 1300s. By the mid-1800s it was commonly made in many homes using fresh cream and fruit. The job of cranking the mixer often fell to the children in the family; they had the most

enthusiasm for the job of turning the crank. A mix of ice and salt assured temperatures were cold enough to freeze the mix.

Why the mixture of salt and ice? The salt causes the ice to melt and remain a liquid at temperatures below 32°F/0°C. The right mix of ice and salt will easily result in temperatures as low as -40°F/-40°C. Using plain ice would mean the ice cream mix would never freeze or, if it did, only after an impossible amount of cranking.

When we make ice cream now, we buy a bag of ice from the corner store. In the old days, ice was cut from lakes and rivers in the winter and stored in the icehouse. These structures, typically double walled and filled with sawdust, were a part of every farm or village. Whole boatloads and boxcars of ice headed south every winter. Some of it surely found its way into a batch or two of peach ice cream.



Kevin Fritz, son of Jim and Kelli Fritz of Snell Infrared, enjoys an ice cream cone at Ben & Jerry's Scoop Shop in Montpelier, Vermont.

No matter what kind of summer you are having, we are certain a little ice cream will make it better. If you have some hot fudge sauce and an infrared camera, you might just see an interesting thermogram—if you work quickly!

## You're ready for Level II!

You've already taken Level I training and have three to twelve months experience using thermography. What's next? Consider a Level II course. If thermography is your primary job, Level II is essential. If you are a curious professional, your appetite for more will be satisfied. Level II training helps you put all the pieces together, showing you the "big picture" of what's happening thermally.

### *What you can expect*

You can count on a thorough, fast-paced and fun-filled session of heat transfer theory. From that vantage point the influences on surface temperature become clear, allowing you to make better radiometric measurements and understand the thermal dynamics of the components you are inspecting.

Roll up your sleeves, because you'll work together during our hands-on exercises to fully understand the applications and the limitations of the technology. As you found in our Level I course, we skillfully blend lectures with numerous examples, demonstrations and hands-on teamwork using imaging systems.

### *Answers to important and timely questions*

You probably noticed after Level I training that thermography is not as simple as it seemed at first. You may secretly wonder if all your data is accurate or your interpretations correct. Don't worry! Your previous training and work experience have taken you this

far; you're simply starting to have new questions about important issues. You might be thinking, "how is wind affecting this?" or "if I use a mirror to get under this coupling, how do I correct my measurement?" That's why we have a seat for you in a Level II training course—just in time to answer all your questions.

### *Confidence*

Can you recall how great it felt to find your intuition was "right on the money" and you figured out something very cool all on your own? Remember the confidence you felt after you taught a co-worker something you mastered in your Level I training (maybe emissivity)? During Level II you can expect to validate a great deal of knowledge and skill that supports you in your day-to-day work. You'll see how far you've come.

### *New infrared-related tools*

During our course you'll begin forging your questions with Level II concepts. This creates new working tools for you. You'll develop a greater appreciation of what it takes to get more accurate temperature measurements; this, will allow you to expand the results you are getting at work. For instance, you'll never forget what your camera's working IFOV is after you've been through Level II, nor will you be fooled by measurements on low-emissivity materials. Back on the job you'll quickly be conducting inspections more effectively and producing clearer, more powerful reports.

*continued on page 4*

## Novovoronezh

Roy Huff of our Kansas City office and Ray Pugh of Battelle/Pacific Northwest National Laboratory have traveled several times to Soviet-built RBMK nuclear reactors and have trained people from numerous stations including: Chernobyl, Smolensk, Kursk, Leningrad, and Armenia. Roy has extensive experience with thermography in nuclear power stations and is one of the few qualified trainers in the world to hold an ASNT IR/T Level III certificate.

In June, Roy and Ray traveled to work with the Novovoronezh Nuclear Power Plant (NNPP) personnel. The NNPP is located outside of Voronezh, which is about 300 miles south of Moscow. Travel logistics make the trip from Moscow to Voronezh a twelve-hour train ride.



Inspecting the power station; problems found at switchyard. (insert)

The Level I training included theory and applications and extensive work with the camera and reporting software. There were field trips to the switchyard (see left) and other places in the plant. Even on a hot and sunny day,

problems were found in the switchyard (see insert).

NNPP, which is a pressurized water reactor, has been in operation at this site for almost forty years. Over this period they have produced more than 300 billion kW hours of power for the region. There are five reactors at the site: two have been decommissioned and three are still operational. There were twelve participants from NNPP and one that traveled from the Bilibino NPP, which is located above the Arctic Circle.

As with the previous visits, Roy said the people are wonderful to work with. They are eager to learn new methodologies to maintain their critical equipment. They are also very warm and friendly. They welcomed the instructors with open arms and at the end of the week they reluctantly bid farewell at a party (see above) that included traditional Russian food and drink and lasted into the early morning hours.

Snell Infrared is proud to continue to support this significant project.



Farewell dinner for Ray and Roy

## The Snell Infrared September Clothing Sale!

Snell Infrared is offering a 30% discount on all clothing products during the month of September. Here are just a few of the clothing items available during the sale:

- The **Oxford sports shirt**, with its button down collar and long sleeves, gives you a professional look and enables you to stay comfortable all day long. These shirts have a good look, casual comfort and are available in four fabulous colors. The Think Thermally® logo adds to its appeal.



- Our **Classic denim shirt** is always in fashion! This long-sleeved durable shirt is prewashed for a soft feel and comes with the Think Thermally® logo just over the single chest pocket. This shirt will have you looking and feeling great.



- The **Snell Infrared sweatshirt** is heavyweight and made to last. The reinforced stitching makes it very durable and the Think Thermally® message makes it just plain "cool" to wear on cool days.



- A favorite of all thermographers is the **Heavy Mesh Polo**. This shirt will have you looking good throughout your hectic day. The accent on the collar and short sleeves makes this the nicest looking polo you can find. Great for work or play. The Think Thermally® logo makes this a one of a kind polo that you'll love to wear.



So, go ahead and show the world you "Think Thermally®" in a stylish and practical manner.

To view these items and more, visit our webstore at [www.snellinfrared.com/\\_store](http://www.snellinfrared.com/_store). Place your order on-line, or call Lisa at 800-636-9820.

Don't miss this time-limited opportunity... it's hot stuff!

**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>**

2 Degrees, continued from first page

Roy knows not to view only the image generated by the camera's automatic feature. He narrowed the span to the minimum allowed to accentuate the problem (see image 3). The temperature difference of the B phase conductor was only 2.35° F over the reference temperature. Should a 2° temperature difference be written up in the report? Roy noted the entire conductor heating up, not just the connection. A pattern like this means a problem could lie deep inside the transformer. He wrote up the 2° anomaly and suggested dissolved gas oil testing (see *Think Thermally*®, August 1998 "Transformers: the Heart of the System" and November, 1998 "Letters to the Editor" for additional information on transformers and gas testing).

When the utility ran the dissolved gas analysis, in accordance with ASTM D 3612, one pertinent comment from the report read, "Partial discharge present in oil. Condition is severe." While this image (image 4) is not of the transformer discussed, it shows what type of damage

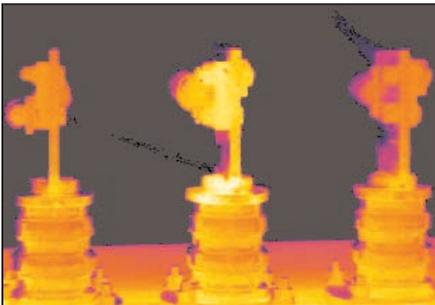


Image 3

can occur when dealing with internal problems.

There are several lessons to be learned from this story. First, good thermographers will not immediately accept the image the camera displays automatically. An intuitive thermographer will always tweak the image to assure they find all the problems and are able to pinpoint where the real problem lies. Secondly, never base repair decisions solely on temperature. As many of our students know, temperature-based priority systems by themselves DO NOT work! This example shows again how a measly 2°F temperature rise was an indication of a problem just beginning to show severe consequences.

To learn even more about prioritization of electrical problems, see the July, 1996 edition of *Think Thermally*® ("Repair prioritization based on real factors") or to obtain the reprint "Improving temperature measurements for electrical inspections" you can email us at [thinkthermally@snellinfrared.com](mailto:thinkthermally@snellinfrared.com).



Image 4

Level II, continued from page 2

A new resource manual

Is your Level I manual dog-eared, worn and well-used? You'll leave Level II with a new manual packed full of notes, information, and materials to carry you into your next level of professional development. And we'll support you after the course, just as we always have, by phone, fax or email with any situations where you need it.

More connections to other thermographers

Obviously, thermographers know more about thermography than anyone! A room overflowing with experience and

learning awaits you in your Level II course. You know that problem you've been seeing in #5 disconnects? Probably someone in your class has the same disconnect, the same troubles, and maybe even an answer. We know that you'll learn as much from your fellow professionals as you do from the instructor (and that's saying a lot)! Maybe you'll run into some old friends from Level I.

Now you know you're ready for Level II. We have several courses remaining in 2001 and more coming in 2002. Level II is your next step.

## Keep It Steady

Binoculars are essential for substation and distribution work. They are used inside where equipment may be mounted under the ceiling and to check building exteriors, regardless of size. If you don't yet own a pair, consider



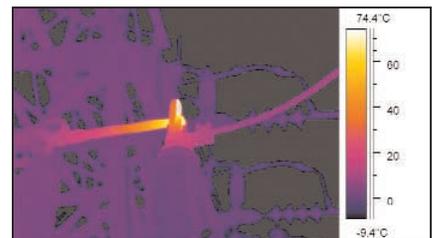
John Froehle of Cinergy shows two high-tech tools that help him inspect substations, The 10x30 IS binoculars and the Kestrel® 3000 Weather Station.\*

adding some of the new image stabilized (IS) binoculars to your tool kit.

Using technology found in many of today's camcorders, IS binoculars offer a huge advantage over conventional ones by virtually eliminating the wiggles associated with conventional high power binoculars. The electronic system powered by a couple of AA batteries, produces remarkable results.

Students in a recent on-site class conducted at a Midwest utility used them to view a 4160V disconnect switch found with infrared. The magnified and stabilized image clearly showed that the disconnect blade was not properly seated. This detail was not visible with conventional binoculars.

IS binoculars are not inexpensive, but we have found the Canon 10x30 IS model\* to be more than adequate and an excellent value at \$400. You won't regret spending the money, once you try them. In fact, we bet you'll never go back to using regular binoculars...unless someone borrows your new pair!



A visual inspection of this disconnect switch using the Canon 10x30 IS binoculars helped determine the exact cause of heating.

\*Both items are available at the Snell Infrared webstore: [www.snellinfrared.com/\\_store/](http://www.snellinfrared.com/_store/)

*Thermal Solutions, continued from first page*

Two field trips are scheduled for Wednesday afternoon. Past field trips have included Kennedy Space Center, DisneyWorld's backstage Utilidor adventure, the Indy 500 racetrack and museum and United Airlines heavy maintenance facility. This is a great way for attendees to have a fascinating adventure.



You'll experience more infrared presentations



Thursday morning and, after closing remarks, will be on your way home by noon.

Snell Infrared staff will be administering eye exams that comply with the standards of the American Society for Nondestructive Testing (ASNT) SNT-TC-1A. We will issue a certificate for your personnel folder that verifies the results of two eye tests. Similar exams, if taken privately, could cost \$100 or more! This is just one more good reason to attend Thermal Solutions®.

All of this is happening at the Radisson Barcelo Hotel, 8444 International Drive in Orlando, Florida. Make your reservations early (room availability is limited) and have your

choice of standard accommodations at \$89 or deluxe at \$109. When you register for the conference, your name will be entered into a drawing to win three free nights at the Radisson. Located on world famous International Drive, this hotel is only four miles from Disney World and only two miles from SeaWorld, Universal Studios and Wet-N-Wild Waterpark. Go to [www.radisson-orlando.com](http://www.radisson-orlando.com) for more information. Call 407-345-0505 for reservations and mention you'll be attending Snell Infrared's Thermal Solutions® conference to acquire the special rate. Check out the conference web site <[www.thermal-solutions.org](http://www.thermal-solutions.org)> for frequent updates! Register on-line or call 800-636-9820.

**Final Notice**

## Don't delay...reply today!

We are changing the way we distribute *Think Thermally*®. Due to rising postage costs, we will be sending an electronic version of the newsletter by attachment to e-mail. There will be no charge to receive the electronic version, but there will be a subscription price for those who wish to continue to receive a written copy. Most of our subscribers have responded to these notices, but we haven't heard from everyone. To guarantee uninterrupted delivery of the highly-acclaimed *Think Thermally*® newsletter, please take a minute to complete the form below and mail or fax it to us today.

**Mail** completed form to:  
Snell Infrared  
P.O. Box 6  
Montpelier, VT 05601-0006

**Or fax** it to us at  
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The type of infrared camera(s) I use: \_\_\_\_\_

# Snell Infrared Remaining 2001 Course Schedule

## Level I

September 10–14, Kansas City, MO  
September 24–28, Montpelier, VT  
October 15–19, Cincinnati, OH  
October 22–26, Toronto, Canada  
November 5–9, Dallas, TX  
December 3–7, Montpelier, VT

## Level I Review Course with Certification Exam

August 21–23, Montpelier, VT

## Level II

September 24–28, Nashville, TN  
November 5–9, Dallas, TX

## Level II Review Course with Certification Exam

August 28–30, Montpelier, VT

## Level III, Best Practices

September 18–20, Montpelier, VT

## Nondestructive Evaluation of Materials

### Level I

October 15–19, Detroit, MI

## Research, Development & Testing

October 30–November 2, Phoenix, AZ

**Thermal Solutions® Conference**  
**Orlando, Florida**  
**January 21–24, 2002**

*The 2002 course schedule is now available!  
Call 800-636-9820 for dates and locations!*

FAX 802.223.0460

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