

# Think Thermally®

March 2002

Practical news for practicing thermographers

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## Thermal Solutions® 2002

"You seem to have provided for our every need as thermographers and as professionals," was the way one person described Thermal Solutions® 2002. Another of the nearly 200 people attending exclaimed, "I'm just so glad I was here!"

Clearly the draw was more than the perfect Orlando weather, although that was certainly a bonus for many Northerners. Given the large number of enthusiastic conversations that seemed to sprout up everywhere during the week, having a chance to talk to other thermographers seemed high on the list of reasons to attend.

**Many stated without hesitation that this was the best conference they'd ever attended.**

Another good indicator of the popularity of the conference was the fact that attendance at all of the nearly three dozen presentations was strong right up to the last one on Thursday afternoon.

For those who arrived at the conference early (on Sunday), Thermal Solutions® got off to a quick start with a golf tournament. Although the \$50,000 hole-in-one grand prize, Bahamas cruise or the Scotland golf trip were not claimed, a great deal of fun was had by one and all. Two "closest-to-the-hole" prizes of \$100 each were awarded in lieu of the unclaimed grand prize. Tourney judge, Jim Fritz, assured all golfers a similar grand prize will be available again at next year's event.

On Monday more than a hundred thermographers took part in one or more of



the six short courses. Designed to provide focussed training on specialty topics, these three-hour, intensive offerings have become perennial favorites; offerings included, among others, *Maintenance Optimization*, *Furnace Inspection* and *Nondestructive Testing of Materials*. The *Roof Moisture Inspections*, *Reporting Software* and *Mechanical Inspections* short courses were especially popular. One attendee stated, "Van's mechanical class was superb—it was very educational and I learned a lot."

Between short courses many also attended the trade show in which over a dozen vendors of infrared and maintenance-related products exhibited their wares. Three camera manufacturers showed brand new products, which were well received by participants.



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Thermal Solutions®, continued from first page



The conference officially kicked off with the opening banquet on Monday evening, attended by over 200 people. The chefs of the Radisson Barcelo served up a spectacular feast that left no one unsatisfied. John Snell thanked the authors and keynote speakers for their efforts to present information of the highest quality at the conference. He also acknowledged members of the Steering Committee for their continued work in helping to shape and maintain the professional tone of the conference.

Dr. Austin Richards of Indigo Systems bedazzled the group with an overview presentation of his recent book, *Alien Vision*, in which he views life through all parts of the electromagnetic spectrum. The book, available at [www.snellinfrared.com](http://www.snellinfrared.com) provides, with humor and scientific rigor, even more detail in his effort to find new ways to look at the world we live in.



The Tuesday morning keynote address, given by Dr. Roderick Thomas (Swansea University in Wales, UK), detailed the type of work that is being done in the UK with thermography. Dr. Thomas has extensive experience with industrial, R&D, and medical uses for the technology. Atlanta firefighter and SAFE-IR instructor Steve Woodworth delivered the keynote address on Wednesday morning; the Thursday keynote was delivered by Special Agent Bob Darnell, President of the Law Enforcement Thermographers' Association. Both Steve and Bob told how thermography has saved the lives of



not only the firefighters and law enforcement personnel but also the general public they serve. Each urged thermographers to do whatever they can to help their local fire and police departments acquire and use the technology.

For the first time in its four-year history Thermal Solutions® ran two tracks of presentations, one for Condition Monitoring (CM) and the other for Nondestructive Testing of Materials (NDT). Ten papers were presented in the NDT track, which was co-sponsored by Thermal Wave Imaging (TWI). In addition, a TWI User Group meeting on Tuesday afternoon was attended by more than two dozen people.

Twenty-four papers were presented in the CM track by experienced thermographers traveling from all over the world. Traveling the farthest of anyone, Tony Rolland of Australia spoke of the importance of communications. Other presentations covered a wide variety of technical topics including, among others, T&D line inspection, motors, buildings, and maintenance.

The Conference Proceedings, including papers from both tracks, was distributed to all attendees in hardcopy and CD-ROM format. The proceedings is available at the Snell Infrared webstore, too: [http://www.snellinfrared.com/\\_store/index.asp](http://www.snellinfrared.com/_store/index.asp).

Wednesday afternoon, more than 150 attendees boarded buses for field trips to Kennedy Space Center and Daytona USA Speedway. Both afforded excellent opportunities to see how thermography is being used, as well as a chance to see two very exciting attractions.



Perhaps the most telling indication of the success of the conference was the fact that during each break groups of thermographers continued to learn from and share with each other in an almost nonstop fashion. Many stated without hesitation that this was the best conference they'd ever attended.

Plans are well underway for Thermal Solutions® 2003, January 27-30 in Tampa, Florida. For details give us a call or visit the conference web site at <http://www.thermal-solutions.org>. The Call for Papers will be available shortly and all thermographers are invited to consider submitting an abstract.



## New ASNT Thermal/Infrared Committee Leadership

You don't forget meeting Al Ohliger; he is not afraid to walk right up to you and offer his hand. You'll also notice his warm greeting bears a strong Gulf Coast twang, not surprising for a guy steeped in the oil industry. Al juggles more jobs for Chevron Texaco than any three people should, and he recently added a new one as Chair of the Thermal/Infrared (T/IR) committee of the American Society for Nondestructive Testing (ASNT).

Al's involvement with ASNT was necessitated by his long tenure in the petrochemical and petroleum refinery industries. Both industries have heavily relied on extensive safety and acceptance testing using NDT methods performed by technicians certified to ASNT standards. Al, in fact, holds an ASNT Level III Certificate in the TIR test method.

Al set an ambitious agenda for his term. His first order of business is to re-energize the committee. Key to his plans is a comprehensive review of the existing ASNT Level III exam and an update of the Body of Knowledge and all references for questions. He wants to see a Study Guide published to assist people in taking the exam (editor's note: as we go to press, the Study Guide has been scheduled for publication by ASNT). If the committee will support the effort, Central Certification exams for thermographers at Level I and II is a long-term goal. Al also believes the advent of the new PDM Level III exam holds promise for many thermographers who have shied away from the traditional NDT exam.

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You can reach **Think Thermally®** at:

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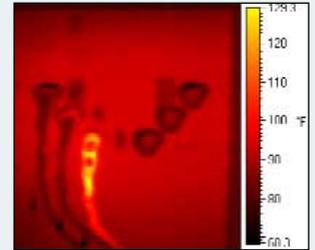
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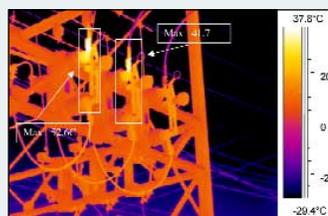
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## ✓ Checklist for Accurate Radiometric Temperature Measurements

- ❑ Don't trust what you are seeing on low emissivity components! Things will almost always be hotter than they appear and some problems you will miss entirely.
- ❑ Be conservative when you don't have a direct view of the component. One example is enclosed, overhead bus ducts. Even small temperature rises can mean serious problems. Even when you have a direct view of a connector you are still not seeing the point inside, which is where heat is being generated.
- ❑ If loads are light and will increase later, note any hot spots you find as potentially serious. As load increases, the temperature of the hot spot might increase dramatically.
- ❑ You cannot always set an emissivity value and expect to get good temperature readings. If you don't understand temperature measurement, don't rely on it. Stick to high-emissivity spots, such as insulation of wires and the bodies of fuses. Measurements will usually be more accurate.
- ❑ If you are working in windy conditions, remember that the hot spot will be cooled, perhaps significantly. This can also be true inside if you are in the influence of an air current. If you see a hot spot in these conditions, know that it will almost always become hotter when the wind or air current stops.
- ❑ Once you have found a problem, you may be able to develop a "temperature trend" suggesting when a failure might occur. Beware, however that many, complex variables are involved and such predictions are often inaccurate.
- ❑ Hot spots may be too far away or too small to accurately measure. Understand the limits of resolution and use the right lens.
- ❑ The temperature of a hot spot can be a poor indicator of how serious a problem is. When prioritizing problems for repair, consider all of the relevant factors involved. These include safety, criticality, history, availability for repair, future load conditions and other factors.
- ❑ Always follow up. Make sure the repair actually fixed the problem.
- ❑ Some maintenance personnel may have a spot radiometer and try to compare their temperature readings with those you measured using your camera. Both work in similar ways, and both are subject to wide variations in accuracy. If the readings are different, can you explain why?



*Radiometric measurements of high emissivity components, like this bushing plug, can be very accurate and repeatable.*

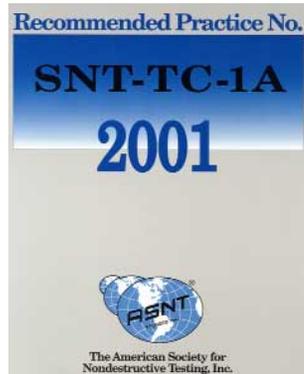


*Area measurements—in this case with maximum temperature displayed—offer a great way to find out what the hottest spot is on a component.*

The primary benefit of thermography is finding problems. If conditions are right and you understand what you are doing, you will find them. If you don't, you won't. Measuring temperatures can sometimes be done reliably and may be useful. A minimum of two weeks training and one-year experience is recommended to qualify thermographers to measure temperatures accurately. It is not as easy as it looks! Know your limits and work within them.

## Changes in SNT-TC-1A, 2001

Since thermography was adopted by the American Society for Nondestructive Testing (ASNT) in 1992, hundreds of thermographers have used their qualification and certification standard (SNT-TC-1A) as a guide for assuring the qualifications of personnel conducting inspections. The process is straightforward. Certification in compliance with ASNT standards is based on training, work experience and testing. Snell Infrared training fully complies with the standards of ASNT, as does our certification testing program.



Last year several changes were made to SNT-TC-1A which may impact thermographers, perhaps significantly. Both the training and work experience requirements have been reduced from previous requirements, as can be seen in the table below.

### Previous versions

	Previous versions	2001 version
Work experience, Level I	3 months	210 hours
Work experience, Level II	18 months	1260 hours
Training hours, Level I*	40/36 hours	30/32 hours
Training hours, Level II*	40/35 hours	32/34 hours

\*Hours are based on educational experience: high school graduate/at least 2 years of post high school technical education.

Changes to the work experience requirement are essential to a number of companies struggling with qualifying thermographers to Level II and keeping them long enough to recoup their investment. Also, the reduction in training hours at both levels means that thermographers no longer need to complete "Directed Study" projects that Snell Infrared formerly used to partially fulfill the training hours. In addition, training related to basic temperature measurement was added to the Level I curriculum—a recognition of the power of today's entry-level cameras and the tasks new thermographers will be attempting to accomplish.

Companies can choose to continue operating under earlier versions of SNT-TC-1A and comply with more stringent requirements. We anticipate many companies will modify their Written Practices to comply with the 2001 version without sacrificing the quality of the inspections being provided. Copies of SNT-TC-1A are available from ASNT by calling 800-222-ASNT or by visiting their website at <http://www.asnt.org>.

If you have any questions about your certification program and how it is impacted by these changes, give us a call; for the different definitions of certification, ask for the certification article authored by John Snell. No program yet? Establishing one is easy—let us help you get started. An effective certification program based on ASNT standards assures effective results for your company and your customers.

## HELP WANTED

Snell Thermal Inspections is looking for several dynamic technical specialists to join its team that provides quality plant condition monitoring services to its clients. We currently have positions available in nine areas:

Texas	Minnesota	Indiana
Michigan	Louisiana	Illinois
Tennessee	Iowa	Southeast U.S.

The starting dates will vary, but all will begin within the next four months. Some positions will have regional responsibility for various plants, while others will be full-time at a specific plant.

Responsibilities include:

- Infrared thermography data collection, analysis and reporting
- MCE data collection, analysis and reporting (online and offline testing)
- Ultrasonic data collection, analysis and reporting
- Assisting in the development and implementation of the customers condition monitoring and reliability program

### Qualifications:

The candidate should have a working knowledge of a wide range of industrial equipment. The candidate must have good organizational skills and strong analytical and interpersonal skills and be able to work in a team environment. Excellent communication skills, both verbal and written, are a must. The candidate should also possess general computer applications knowledge, and the specific technology software skills.

The successful candidate will have training and experience in infrared thermography and at least general familiarity with motor circuit evaluation and ultrasonics. Real world experience in the technologies is a must. Prefer Level II, but would consider a very experienced Level I. Applicants should be physically fit enough to be able to work in a plant maintenance environment and be able to collect the needed data for analysis.

Snell Thermal Inspections is a growing thermography service provider and a leader in the infrared service field. The salary offered is commensurate with the applicant's skills and experience. We also offer a competitive benefits package including health, long-term and short-term disability, dental and vision insurance, along with a Simple IRA program and continuing education program.

Please e-mail your resume to [rhuff@snellinfrared.com](mailto:rhuff@snellinfrared.com).

## New Wind Chill Isn't as Chilly

Temperatures in Vermont have fallen and the wind will pick up. As we eat hot cereal before going to work, we hear the weatherman talk about "wind chill." The wind chill index, which tells you how cold the wind makes the temperature feel, is based on a combination of wind speed and air temperature. Your body is always producing and losing heat; heat loss is accelerated by wind. Remember your Level I/II training class? Wind thins the boundary layer by sweeping away a layer of still air next to your skin. The evaporation of moisture from the exposed skin also increases the cooling.

Wind chill was originally conceived in the 1940s. Paul Siple and Charles Passel conducted experiments by freezing water in plastic containers in the Antarctic. How long it took the water to freeze depended on the original temperature of the water, the temperature outside and the wind speed. Determining wind chill has been based on these experiments, but there have been discussions in scientific communities suggesting the original numbers may be unrealistic.

Both the Meteorological Services of Canada and the U.S. National Weather Service began using a different formula to determine wind chill last fall. Since the 1940s, additional experiments have suggested different conclusions. Computer modeling and clinical tests validate the new approach.

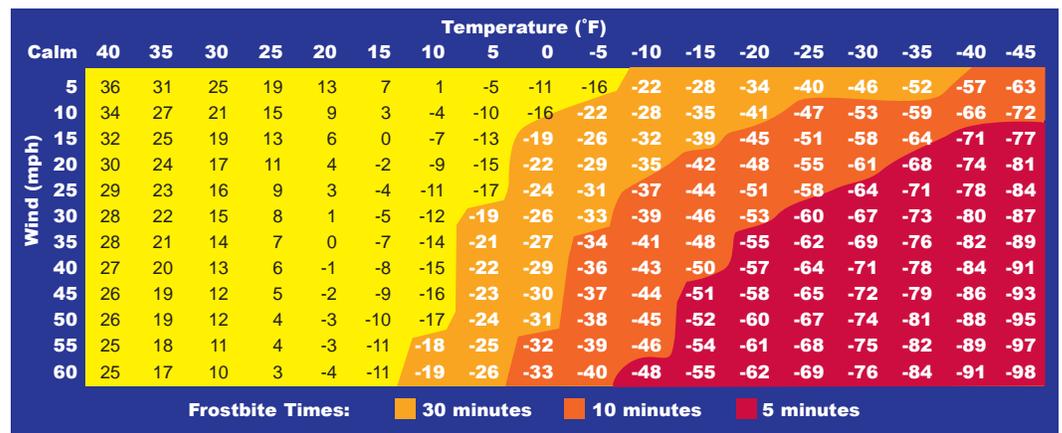
The Joint Action Group for Temperature Indices developed the bulk of the new data. Researchers believe the new numbers more accurately portray what actually occurs in the real world. The original tests were done at 33 feet above the ground—the typical height of an anemometer. New numbers

were gathered with data at 5 feet—the typical height of an adult human face. Winds are generally less at the lower height. Instead of plastic containers, the new experiments focused on exposed skin. Clinical trials in wind tunnels exposed participants' faces to various wind and temperature combinations. Wind does not cool inanimate objects below ambient air temperature unless evaporation also occurs. So, wind chill only affects living tissue. If your car's radiator is  $-5^{\circ}\text{F}$  and the wind chill index is  $-23^{\circ}\text{F}$ , the car's radiator will not drop lower than  $-5^{\circ}\text{F}$ .

The old formulas are said to overstate the effect of wind chill. For example, when the air temperature is  $10^{\circ}\text{F}$  and the wind is 10 MPH, the old wind chill chart reads  $-9^{\circ}\text{F}$ ; the new one reads  $0^{\circ}\text{F}$ . At the same temperature with 30 MPH winds, the new wind chill temperature is  $-23^{\circ}\text{F}$ , the old chart reads  $-33^{\circ}\text{F}$ .

The changes are a relief to us. While we write this article, it is  $10^{\circ}\text{F}$  outside with 40 MPH winds. It is no longer a  $-37^{\circ}\text{F}$  wind chill; it's only  $-29^{\circ}\text{F}$ ! The new wind chill really isn't as chilly as it once was!

Wind Chill Chart



ASNT Leadership, *continued from page 3*

Al is convinced thermographers can benefit greatly from establishing certification programs that comply with ASNT Guidelines. Like many in the business, he is pleased that SNT-TC-1A (2001) was recently revised to require fewer training hours (30–32 hours) and less experience at Level II (1,260 hours over a 9–27 month period). He is confident these changes will set the stage for even greater use of the Guidelines by companies throughout the world.

If you have participated in the ASNT committee process in the past, consider renewing your commitment and joining us again under Al's leadership. The process is open to anyone willing to

work. It is a consensus-based committee governed by Robert's Rules. Negative comments on action items must be addressed and resolved. The Committee meets two times each year, once with a working meeting at the Fall ASNT Conference and again with a shorter meeting at Thermosense. Most of the work is done by phone, mail and email between meetings. Attendance at meetings, while encouraged, is not mandated.

To learn more about the work of the committee, email Al Ohliger <[ohlighaa@chevrontexaco.com](mailto:ohlighaa@chevrontexaco.com)> or John Snell <[jsnell@snellinfrared.com](mailto:jsnell@snellinfrared.com)>

# Snell Infrared Remaining 2002 Course Schedule

## Level I

April 15–19, Indianapolis, IN  
April 22–26, Toronto, Canada  
May 13–17, Charlotte, NC  
June 10–14, Montpelier, VT  
July 15–19, Minneapolis, MN  
August 12–16, San Diego, CA  
September 9–13, Montpelier, VT  
October 7–11, Cincinnati, OH  
October 21–25, Toronto, Canada  
November 4–8, Dallas, TX  
December 2–6, Montpelier, VT

## Level I Review Course with Certification Exam

August 13–15, Montpelier, VT

## Level II

April 8–12, Charlotte, NC  
June 3–7, Montpelier, VT  
September 16–20, Indianapolis, IN  
October 28– November 1, Toronto, Canada  
November 4–8, Dallas, TX

## Level II Review Course with Certification Exam

August 20–22, Montpelier, VT

## Level III, Best Practices

September 24–26, Montpelier, VT

## Specialty Courses

*Toronto, Canada:*

May 22–23, Analyzing Products & Processes  
September 25–26, Electrical Applications  
November 13–14, Building Applications

*Detroit, Michigan:*

April 17–18, Electrical Applications  
October 9–10, Mechanical Applications

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