Think Thermally®

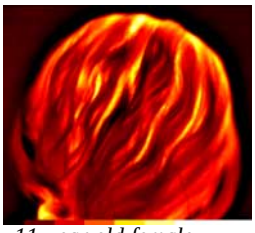
Practical news for practicing thermographers

September 2002

See inside:

Interviews with Thermographers:
Dr. Jeffrey Carmen

Think Thermally® recently interviewed Dr. Jeffrey Carmen of Manlius, New York. Dr. Carmen is a Psychologist who has specialized in the treatment of migraine headaches for the last ten years. Four years ago, he developed a method of treatment that involves using infrared imaging for biofeedback. For clients whose migraines are not driven by chronic infection or chronic disease, Dr. Carmen claims that about 85% will be able to significantly improve their migraines. This improvement usually happens within the first four to six sessions; sometimes "fine tuning" may require more sessions.



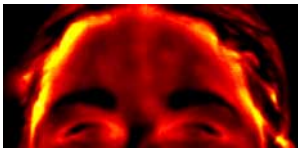
11-year-old female, migraine, occipital region

Dr. Carmen does not suffer from migraines, but is fascinated with the phenomenon. He explained with barely contained excitement how the headache is the second stage of a migraine: The first stage lasts anywhere from a few minutes to several weeks. In the first stage, the brain has somehow gone "on tilt" and the person with the migraine could suffer any number of symptoms. These symptoms may sometimes include paralysis, loss of vision, loss of language or hallucinations. When this first stage ends, the headache begins.

12-year-old female, left temporal migraine

Although migraine research is still unable to clearly define the cause of the head pain, there is general agreement that the pain is associated with blood vessels that become dilated or excessively stretched open. There are pain receptors that activate when this happens, which also account for the transient increase in pain every time the heart beats. There is a slight increase in stretching with each heartbeat that produces a pounding pain in the head of the migraine sufferer, in which the pounding is synchronized with the pulse.

Originally, Dr. Carmen was looking for a way to use infrared to provide biofeedback. He wanted to create an image outside the patient that would show what was happening inside and would help people learn how to constrict their blood vessels. He humbly admits that he "stumbled upon" this method of treatment when the original concept did not work. People could not learn to directly constrict their blood vessels.



19-year-old female, right temporal migraine

What did work was a bit of a surprise. By increasing brain activity and blood flow in the prefrontal cortex, excessive blood vessel dilation in other parts of the brain was reduced. The mechanism involved is probably associated with the fact that the prefrontal cortex is intimately associated with inhibition of the rest of the brain. It is, in fact, the "executive control system" for the brain, so this area can shut down a migraine. The patient needs simply to learn a technique. They need to learn how to create

(continued on next page)

(Interviews, *continued from front page}*

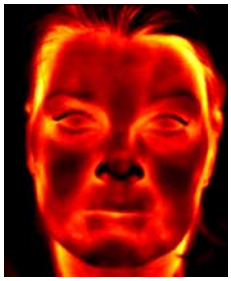
the state of high intensity concentration with no emotional stress. For most people, the learning curve for the technique is 30-60 seconds.

The prefrontal cortex is in the front of your head. With infrared, an increase in blood flow to the prefrontal cortex can be detected. The method, then, involves learning to increase this blood flow.

EEG sensor assembly on forehead

Infrared, by showing an increase in temperature on the face, is a superior tool for providing this feedback. This process has also been attempted, with some success, by monitoring and training brainwaves in the front of the brain. The problem with monitoring brainwaves (EEG) is that every time the eyes move they produce a surge of electrical activity that interferes with the recording of the brainwaves. Because the infrared system records a thermal, rather than electrical, signal there is no electrical interference.

An infrared image of the forehead is captured before and after each session. Often, the headache itself can be imaged as a high heat area that roughly corresponds to the area of the headache. During the session, a smaller sensor also displays temperature data on a digital display. The patient concentrates on raising the numbers on the display, which correspond to progressive increases in prefrontal cortical activity. When the subject has begun to use mostly the prefrontal cortex and the display crosses a preset threshold, a VCR turns on and a favorite movie starts to play. The movie is likely to induce a change again in the brain. As the person watching becomes involved in the movie and has experiences with emotions, memories and concepts, blood flow will increase to these other parts of the brain, decrease from the prefrontal cortex, and the movie will shut off.



28-year-old female, bilateral temporal migraine

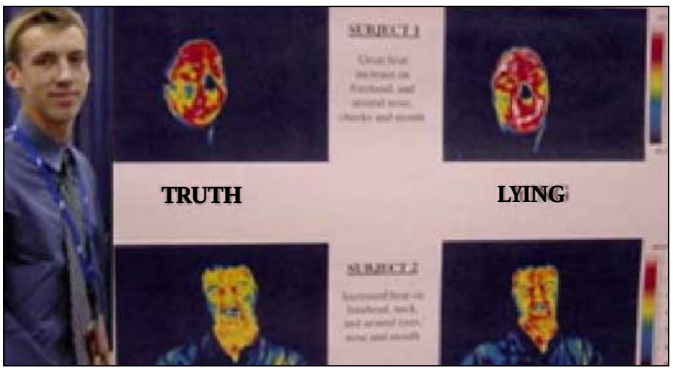
The purpose is to learn how to increase activity in this front part of the brain. After this has been learned, the treatment involves exercising this control. Just as a weightlifter strengthens muscles with repetition, the migraine sufferer strengthens their ability to change blood flow with repetition. So this technique can then be applied when the migraine begins and the headache can be averted.

Also, over time, the technique becomes prophylactic in the sense that the migraines are less intense, happen less frequently, or sometimes not at all.

Think Thermally® is grateful to Dr. Carmen for showing us yet another application for infrared. We are more than happy to send him some Vermont maple syrup, which will delight all areas of his brain via the taste buds!

Liar, liar…

We ran two images in the May, 2002 issue of *Think Thermally*® that demonstrated the thermal changes to a face when someone tells a lie. A high school student did this work, with support from thermographers at NASA Goddard Space Flight Center, as a science fair project. Since then, we have learned that Scott Newman the young man who conceived of the fascinating project has been heaped with praise, recognition and awards for his work.



Scott competed in several science fairs, ending with the Intel International Science and Engineering Fair in Louisville, KY in May. He came away from that with a full-ride scholarship to Drexel University in Philadelphia. Other awards Scott won include a $1,000 first place award from Kodak Company, a $3,000 savings bond for first place award from the U.S. Army, an Honorable Mention Award from the American Psychological Society and a $1,000 third place Grand Award. Scott was also a guest on Good Morning America (unfortunately there were no politicians or corporate CEOs on the show to act as subjects for his study).

Haven't yet visited your local school classroom with your infrared camera? Now is a great time to plan for the next school year. We can provide you with an outline that we have used successfully in middle school settings. Be a part of helping another bright, young student like Scott do a great bit of work!

Has your mailing or email address changed recently?

If so, please let us know so that we can continue to send **Think Thermally**® *your way!*

You can reach us at:

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Where there's smoke, there's…infrared!

Few people face greater dangers in the workplace than a firefighter inside a burning building. Smoke makes it impossible to see further than a few inches. The source of the fire is often hidden from view, biding its time until it flashes over and engulfs the whole building in an inferno. When firefighters do enter the building, they must slowly feel their way along to minimize the risk of getting lost or falling through a burnt floor or missing stairway. Finding a person trapped inside is a race against time with the odds stacked against life.

"People who are familiar with the power of industrial infrared inspections can play an important role in helping local fire departments realize the benefits of investing in the technology."

— John Snell, Snell Infrared

Infrared thermography is helping more and more fire departments tip the odds back in their favor. Using specially designed cameras adapted to their extreme needs, firefighters are able to see through the smoke. The advantages of using thermal imaging systems are so considerable that few who have used these remarkable new tools wonder how they did their jobs without them.

Courtesy Bullard

Modern infrared systems for firefighters are especially designed for their needs.

Courtesy MSA

Visible light cannot penetrate smoke, but longer wavelengths of infrared radiation can. The difference is stunning. In fact, one grave danger for firefighters using infrared cameras is relying too much on the technology. If their batteries run down or the camera otherwise fails, they literally could be lost. Luckily, cameras are designed to minimize these possibilities. Most use double batteries, rugged cases and protection from over heating. Since they must be used by people wearing heavy gloves, they also have only essential controls. Often that is just an on/off switch. A fixed focus, wide-angle lens and an auto-adjust circuit mean high-quality images even in adverse conditions.

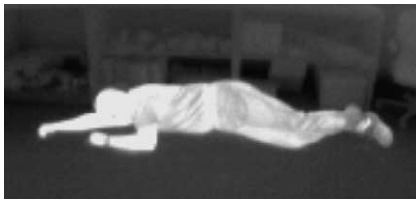
Courtesy Bullard

Two firefighters, easily identified by the cooler air pack, manage a hose in a burning building.

The culture of firefighting has always been a "touch and feel" one because visibility is so limited inside most burning buildings. For that reason, many firefighters find it difficult to make the transition to being able to see using the thermal image. The basic safety procedures for entering a building are the same with or without a camera. Rule #1 is to keep track of your route out. Traditionally, firefighters follow the water hose in and, when necessary, out to safety. The hoses, filled with water and cold compared to the hot, smoke-filled environment, show up clearly in the thermal image.

The primary benefit of the technology is the rather non-glamorous job as a tactical tool to help fight the fire more intelligently. It may be possible prior to entering the building to see where the source of the fire is located—whether it is in a wall, ceiling, attic or basement. This leads to fighting it more effectively and safely.

Infrared vision has dramatically reduced the time a firefighter needs to search a burning building for people trapped inside. This vital activity can also be accomplished with much greater safety and with less likelihood of missing someone during the process.

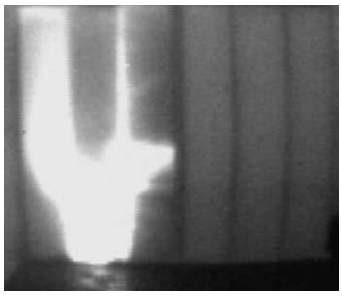


Courtesy Bullard

Locating people in a fire can be greatly facilitated by IR.

John Snell, President of Snell Infrared, asserts "People who are familiar with the power of industrial infrared inspections can play an important role in helping local fire departments realize the benefits of investing in the technology. I'd ask thermographers to see what they can do personally with their local departments." Cameras sell for $15,000–$20,000, so the funds for fire fighting cameras are often raised by the local community through fund raisers like bake sales or car washes and through private contributions. "This is the kind of project the whole community can get behind with just a little educated and inspired leadership."

The Federal Government offers grants to subsidize the cost of fire systems (see http://www.usfa.fema.gov/grants/ for details). Demand for grants is very competitive. This popular program has seen increased funding since 9/11, but local departments will still probably be faced with raising some of their own funds.



Courtesy Bullard

This fire is located in the wall and is spreading upwards and across.

If you'd like to find out more about fire fighting cameras, check them out via the links page on our website at http://snellinfrared.com/resources/_view_sub.asp?refid=48. Give your local fire department a call. If they are not yet using infrared, ask them how you can help them raise the money to make a purchase. The use of infrared for firefighting will save lives, period.

Un Nivel un curso que viene pronto a Miami!

Editor's note:
This article describes the Level I course Snell Infrared will be holding in Miami, Florida December 2nd, in Spanish. Call us at 800-636-9820 or email info@snellinfrared.com if you'd like to know more.

Snell Infrared llevará a cabo en español un curso Nivel I del 2 al 6 de Diciembre en Miami, Florida. Este curso, como todos nuestros cursos, están abiertos a usuarios de cualquier tipo de sistema de imágenes y se recomienda para individuos sin capacitación previa, así como tambien a los que cuentan solamente con capacitación de operador o capacitación de su representante de ventas.

Reconocido como el líder en la industria, Snell Infrared ha capacitado a termógrafos de todo el mundo desde 1983. Somos la organización independiente de capacitación mas grande y hemos capacitado a miles de termógrafos. Tomamos en serio nuestro compromiso con la industria, y creemos que es nuestra responsabilidad asegurar que la gente que ha pasado nuestro curso de capacitación entienda los conceptos necesarios para hacer trabajo infrarojo. Varios instructores nuestros tienen certificados ASNT NDT Nivel III, y nuestros cursos siguen las reglas de ASNT. El curso es una experiencia de aprendizaje participativa enseñado por instructores que cuentan con mucha experiencia. En pocas palabras, nuestra capacitación es de calidad.

¿Por qué es tan importante que sea de calidad la capacitación? Los termógrafos capacitados proporcionan mayores indices de ganancia por la inversión en equipos infrared. Los termógrafos capacitados saben qué inspeccionar y cómo, entienden las limitaciones de la teconología, y comprenden las ideas que les ayudan a descubrir nuevas aplicaciones. La capacitación asegura resultados consistentes y profesionales con mayor ahorro. Para lograr este fin, nuestro curso de Nivel I incluye:

1- Aprendiendo a Pensar Termalmente (*Learning to Think Thermally®*)

El entender la teoría del calor y los principios básicos sobre cómo se comporta el calor es crucial para poder entender qué estás viendo con tu camara. Algunas leyes básicas de física proveen la base para interpretar los imagenes infrared. Aquí también se enseñan las propiedades de algunos materiales que ayudan o limitan la posibilidad de inspeccionarlos.

2- Conociendo las aplicaciones:

Se aprende qué inspeccionar y cómo inspeccionarlo. Las aplicaciones principales del mantenimiento son sistemas eléctricos, estructuras mecánicas, edificios, y techos. Se descubrirá por qué las alacenas tienen que estar abiertas para las inspecciones eléctricas, cuáles medidas de seguridad se necesitan tomar al encontrarse cerca de alto voltage, cuáles partes de un motor se prestan al análisis infrared, si es posible inspeccionar finas capas de plástico, y cómo crear las condiciones óptimas para la inspección de los edificios.

3- Uso participativo ('hands-on') del equipo termal:

Se aprende la termografía, y las ideas son reforzadas con ejercicios en los cuales los participantes aprenden con el equipo en mano. Se recomienda que todos los participantes traigan su cámara. Aseguraremos que sepan utilizar la cámara y que entiendan cómo aplicar las ideas enseñadas.

4- Aprendiendo los elementos de adquisición y documentación correcta de imágenes.

El éxito que se obtendra será la capacidad de documentar los hallazgos y escribir los reportes de manera efectiva. Entender sus propias ideas y comunicarselas a otros es lo que hace valer el termógrafo en un negocio.

Si desea mas información llamenos al Snell Infrared dentro de los EE.UU al número 800.636.9820 o al 802.229.9820. Nuestro dirección del correo elelectronico es info@snellinfrared.com

Esperamos poder contar y trabajar junto a Uds.

Acompáñanos, entonces para el curso Nivel I en Miami este Diciembre.

Got the picture?

Snell Infrared is in the process of updating the images in our courses. We'd like to include images from you and other practicing thermographers that show examples of your work in any application. Also feel free to send us visual images of the equipment you inspect and of yourself conducting inspections. We'll consider images from all makes of cameras, in any image format.

Tell us the story behind the image; we need to know whether or not we should credit you and your company. Please make sure you have permission to send us images and do NOT send anything that is proprietary!

If we select your image to be included in one of our courses, we'll let you know. We'll also send you a $20 credit that can be used at the Snell Infrared webstore. Call us at 800-636-9820 for image format requirements.

Thermal Solutions® moves to Florida's West Coast in 2003!

Thermal Solutions®

January 27–30, 2003

Radisson Suite Resort on Sand Key
1201 Gulf Boulevard
Clearwater Beach, Florida

Join us in Clearwater Beach in January for Thermal Solutions® 2003!

Snell Infrared has moved their premier infrared conference to Florida's West Coast this year. Thermal Solutions® is by far the largest infrared-specific conference not sponsored by an equipment manufacturer, and has become an incredible success. This conference is the standard for the industry.

The two entire tracks of paper presentations form the core of the conference: *Condition Monitoring/Reliability* and *Nondestructive Testing* (materials evaluation). More than thirty high-quality dynamic presentations will be offered over a three-day period. You'll witness proven techniques and hear interesting case histories that will inspire you to take on new challenges back on the job. Of course, you'll receive both a written and an electronic version of all the papers in the conference proceedings for no additional charge.

More learning opportunities are available at the pre-conference short courses. Six three-hour courses are available on Monday, January 27. Each course comes with a manual you can take back to work with you. Add this to your thermal library and it could be the most valuable reference material at your fingertips for years to come. This year's topics include *Safety, Mechanical Applications, Indirect Heating, Building Inspections and Nondestructive Testing.*

Infrared camera vendors and other companies with something to offer thermographers will be available over a two-day period. You'll see what's new in the NDT and condition monitoring industries and try out the latest equipment. The past few years have been an incredibly interesting time in the industry's equipment market. This is one place you will see ALL OF THE EQUIPMENT available to date. Snell Infrared's independence from any one manufacturer and the size of our conference make that unique opportunity available to you.

We'll wake you up well every morning. Three invigorating keynote speakers will address attendees: John Schultz of Allied Services, Ron Predmesky of Ford Motor Company and Chuck Hellier of Rockwood Industrial Services. Each of them offers a unique perspective colored by years as a leader in the industry. Thursday morning we'll begin with a panel discussion—a fantastic opportunity for you to pose your toughest questions. Hear how others in the industry approach similar situations and come away with a new outlook.

A kick-off dinner and reception start the conference Monday evening, and two field trips will be offered Wednesday afternoon. There is also the option to bring a guest to some of these events. This conference is made to work for **you**!

Who should attend Thermal Solutions in 2003?

- All practicing condition monitoring/PdM thermographers
- Materials engineers and technicians
- NDT/NDE technicians and program leaders
- Consulting thermographers
- Managers of thermography programs
- Engineers who interface with thermography at their facility
- Skilled tradespeople who interact with thermographers at their plant
- Anyone interested in thermography but not yet using it

And what can you expect from the conference?

- Information on the latest thermography applications
- Two tracks of papers: Condition Monitoring and NDT
- Proceedings in paper and electronic format
- Six short courses
- All the latest equipment and other vendor exhibits
- Solutions to your own infrared problems
- Opportunities to network and share experience with peers

For more information call 800-636-9820 or visit http//:www.thermal-solutions.org/2003

Comments from 2002 attendees:

"It is always interesting to hear about, and see the different applications that thermography is used for. Conferences such as this remind me of how lucky I am to be involved in a technology like Infrared."
Rick Sents, Rochester Gas & Electric

"This was a GREAT conference! A fantastic job was done in all areas. Can't wait for next year."
Tom Stivers, DuPont

Snell Infrared Remaining 2002 Course Schedule

Level I

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 II

September 16–20, Indianapolis, IN
October 28– November 1, Toronto, Canada
November 4–8, Dallas, TX

Level III, Best Practices

September 24–26, Montpelier, VT

Thermal Solutions® 2003
Clearwater Beach, FL
January 27–30, 2003

Specialty Courses

Toronto, Canada:
September 25–26, Electrical Applications
November 13–14, Building Applications
Detroit, Michigan:
October 9–10, Mechanical Applications

Snell Infrared
Training, Certification and Support for Thermographers

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FAX 802.223.0460

Don't miss the final 2002 Specialty Courses taking place in Detroit and Toronto. Call today for details…