

Think Thermally[®]

Practical news for practicing thermographers

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Welcome to The Snell Group

We are proud to introduce The Snell Group – the world's leading expert on using Infrared Thermography (IR) and Motor Circuit Analysis (MCA) to reduce risk, increase uptime, save money, conserve energy and improve safety.

Previously known as Snell Infrared, Snell Inspections, and Snell Infrared International, we have embarked on a new strategic direction to provide our existing and future customers with an expanded portfolio of training, certification, inspection, consulting and information services for IR and MCA professionals and their programs worldwide. As always, The Snell Group remains vendor neutral in these efforts and continues to support all types of IR and MCA equipment regardless of manufacturer.



The Snell Group offers comprehensive solutions to all our customers, whether or not you have an existing condition monitoring program, own your own equipment, or are considering ways to optimize and/or outsource maintenance procedures and practices.

The Snell Group will continue to provide quality infrared training and support services with regularly scheduled classes throughout the United States, Canada, United Kingdom and South Africa, as well as the option to bring our qualified instructors to your facility anywhere in the world. We are also pleased to announce the availability of on-site and public MCA training courses for technicians who are looking to add motor testing to their predictive maintenance program.

Complementing our existing array of training programs is the growing popularity of live and recorded webinar sessions covering both IR and MCA topics. These one-hour online seminars provide continued professional development opportunities for those who have benefited from attending our other training programs. They are also for individuals who are new to the industry and are considering learning more about these technologies and their respective applications.

The Snell Group continues to offer infrared and MCA inspection services along with program audits, assessments, consulting and mentoring assistance. Snell Group technicians with their many years of experience and expertise are available to assist your facility by providing services that will help you monitor the condition of your motors and maximize the return on your investment.

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The Snell Group is the world's leading expert on using Infrared Thermography (IR) and Motor Circuit Analysis (MCA) to reduce risk, increase uptime, save money, conserve energy and improve safety.

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S, M, L, XL: Infrared Cameras Come in Lots of Sizes

Bigger is not always better in either the visual or the infrared world. What is better? An infrared camera that has precisely the features you need to do your work. Sometimes that may be a small system (size “S”), sometimes “XL” (extra large) and sometimes in between, so you need to choose with care!

The issues regarding cameras are many, but let's start with the one that most people consider first; the cost of the system. Understandably, people often try to spend too little and end up not getting what they really need. Recognize that buying an infrared camera is really only an investment and, as with any investment, you should also consider the returns you'll get. Ask yourself, “What level of investing will optimize my return on this purchase?”



When faced with the many attractive choices in the market, people are often seduced by the “bigger is better” argument with regard to the size of the detector array. The argument might be, “If a 160 array is OK, isn't a 320 better? Shouldn't I really have a 640 system?” The real question should be, “What kind of detail do I need to see and mea-

sure at my working distance?” Looking at electrical panels typically has very different requirements than conducting aerial roof inspections. But it is also important to define the scope of your work; for instance, do you simply want to detect problems (a smaller array) or do you need to make a more detailed analysis (a larger array)?

You may be pleasantly surprised that a smaller, and less expensive detector does most or all of what you need. A simple calculation of your required resolution or, better yet, a few hours trying out a camera on the job, should clarify your needs – and the solutions for them. That said, I'm well aware we don't even know what we may be missing in some applications, and I'm excited to see what the larger arrays

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Happy & Healthy New Year

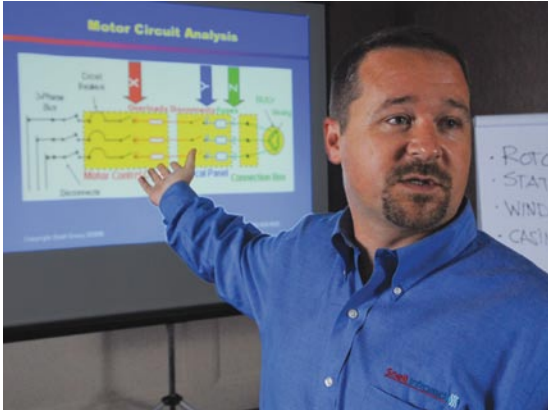
To celebrate the past year's accomplishments and in recognition of the true rewards of collaboration, The Snell Group is pleased to make a donation to the Vermont Foodbank in honor of our customers, clients and colleagues who contributed to our success in 2007.

The mission of the Vermont Foodbank is to gather and share quality food and nurture partnerships that will end hunger in Vermont.

Roy Huff CMRP, ASNT NDT Level III
New Product/Service Development Manager
The Snell Group



MCA Training Now Available from The Snell Group



Motor Circuit Analysis Level I Training to Support Offline Motor Testing

Includes: Electrical theory, motor construction and failure modes.

Overview: Manufacturers of motor testing equipment all use similar methods of data collection for the analysis of motors and motor circuit faults offline. Their respective training

Hot off the press! The Snell Group is offering Motor Circuit Analysis (MCA) training. In truth, MCA training is nothing new to The Snell Group. We have been training and mentoring internally for about seven years and Snell Inspections has been offering MCA testing services since 2000. But technicians with this background do not grow on trees. So, we have been utilizing MCA equipment OEM training to familiarize our field technicians with the proper operation of the test equipment. Taking advantage of the years of field and lab experience with MCA of some of our most qualified instructors and technicians, we have now developed our own training curriculum. This training covers electrical theory, motor construction and failure modes as well as testing tips, analysis methods, safety, troubleshooting and motor management. Proven to prepare our technicians for their field assignments, this same quality training is now available to our customers.

The following courses are available immediately and specialty courses will be offered in the future.

courses are geared toward the operation of their particular equipment, with a great deal of time spent on software. The intent of The Snell Group's training course is to simplify the motor testing process by examining the individual tests utilized by today's motor circuit analysis equipment. To help the student understand the theory behind these individual tests, sample motors and motor components are tested using specific test equipment designed to identify specific failure modes. Instructors help draw a correlation of the results of these individual tests with the integrated and computer controlled equipment developed by today's motor tester equipment manufacturers. This will enable the student to build a sound theoretical foundation to safely and successfully analyze, troubleshoot




and maintain motors and their circuits regardless of what equipment is utilized or eventually procured at the customer site.

Motor Circuit Analysis Level II Training To Support Online Motor Testing

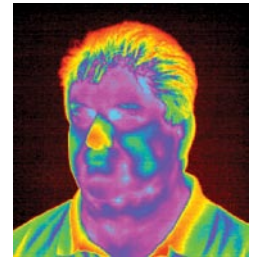
Includes: Electrical theory to identify electrical, mechanical and power quality failure modes.

Overview: Motor testing equipment manufacturers use similar methods of data collection for the analysis of motors and motor circuit faults online. Not surprisingly, training courses sponsored by manufacturers are geared toward the operation of their particular equipment, with a great deal of time spent on software. By contrast, the intent of The Snell Group's training is to provide trainees with the theoretical knowledge and procedural awareness to utilize current time domains and spectral data to localize electrical and mechanical anomalies that affect motor performance. Technicians will gain a solid understanding of current and voltage FFT's and will be able to identify electrical, mechanical and power quality failure modes. The student will develop a sound theoretical basis for safely and successfully analyzing, troubleshooting and maintaining motors and their circuits – a must-have skill set applied to existing equipment and future procurements.

The Snell Group is pleased to present these unique educational opportunities to our customers with a need to learn Motor Circuit Analysis from our highly qualified practitioners. Let our technical expertise and quality instruction help you acquire the knowledge to understand industry best practices with regards to MCA and motor management. 

Thermal Inspections of Mobile Equipment

Harold Van de Ven, Instructor and Consultant
The Snell Group



The first thing that I want to explain is what I consider to be “mobile equipment.” There are thousands of machines that move around in different manners that could be considered “mobile.” For the sake of this article, the mobile equipment that I am address-

expect it to do so. Thermography will work as a predictive or troubleshooting tool for mobile equipment. A key element in making an infrared program successful on mobile equipment will be the camera operator’s knowledge and training for equipment which they are assessing. It would be very difficult for a person to go from years of electrical inspections to inspecting mobile equipment if they have not been properly trained.

not only go forward and backward, but they can go right, left, up, down and, in some cases, all of these movements at the same time. So, once again, stay in sight of the operator and know where you are with regard to the path of movement at all times.



A Thermographer checks engine components such as exhaust ports, the turbo charger, accessory drives, fuel systems and heat exchangers.

ing is defined by the use of an internal combustion engine to make it move or operate. A few examples of mobile equipment would be trucks (both light and heavy), dozers, front-end loaders, forklifts, cranes, excavators, locomotives, boats, ships, mobile welders, pumps, generators and even cars.

Why should mobile equipment be inspected using infrared?

It is common to have some equipment costs that exceed one million dollars on today’s market. Many plants and/or operations depend heavily upon mobile equipment to carry out their missions. This equipment can range from the 300-ton off-road hauler at a gold mine in the western United States to the forklift in the warehouse at a paper mill on the east coast. In either case, if the hauler or the forklift should fail to complete its mission, plant production can be effected.

Conducting thermal inspections can help ensure your equipment is going to perform its task when you

Safety

I had a gentleman once tell me something so simple yet so true that I have never forgotten it. He said, “Safety is first, during and after.” This holds particularly true when working around mobile equipment. Quite often,

a thermographer will be standing near or on a piece of mobile equipment that is going to be running, since in many cases the equipment must be operating to allow the thermographer to do the inspection. This could mean that the machine will be moving in many different directions with little or no warning. The most important objective of the person doing the inspection should be to stay in visual contact with the operator of the machine. Don’t assume that the operator sees you. Get an acknowledgement of your presence before approaching any machine. For the most part, machines are designed to keep the operator safe while all others in the area are subject to harm. Never walk under anything a machine is holding up. Stay out of the machine’s directional path even though the path of movement can sometimes be hard to understand. In some cases, such as a locomotive, the path of movement is well defined. If you stay off of the rails, you are most likely out of the path of movement. On the other hand, there are machines that

Inspections

Let’s acknowledge that reading a short article about inspecting mobile equipment will never be enough to make you an expert equipment inspector. With that in mind, consider the following information an overview of where to look and what to look for during a thermal inspection of mobile equipment.

Some machines can be quite complex. I find it very helpful to break down every machine into different categories and then break the categories down to sub-categories. An engine will have a fuel delivery system, lube system, cooling system, filtration, heaters, starters, alternators, pumps, drives, heat exchangers, and so on. The fuel system can have pumps, filters and assorted plumbing. Fuel filters can be inspected for bypassing due to stuck valves or dirty filters. The fuel plumbing can be inspected for proper flow patterns. If one injector line is a different temperature than all of the others, it could be and indication of a fuel flow problem.

Engine exhaust systems are inspected for proper overall temperatures and even temperatures at each exhaust port. Hotter than normal temperatures can be an indication of a lean fuel-to-air mixture. If an engine is allowed to run lean for extended periods of time, it can cause catastrophic damage. Cooler exhaust temperatures could be an indication of either a rich fuel-to-air mixture or little to no fuel at all. If equipped with a turbocharger, the overall temperature should be



On a front end loader one can use IR to analyze fluid levels, pivot bearings, U-Joints and final drives.

checked and the lube line inlet and outlet temperatures should be monitored for proper flow to the bearing and as an indication of bearing temperature.

Heat exchangers, such as the radiator, should be inspected for proper operation by looking at the radiator face. Look for a fairly even temperature across the face. Hot or cool spots on a radiator can be an indication of internal or external plugging. Inlet and outlet lines can be inspected looking for the expected temperature drop across the heat exchanger. Be sure to look for multiple heat exchangers. Many machines will have engine coolers, hydraulic coolers, transmission coolers and don't forget the one that the operator will be most interested in, the air conditioner heat exchangers.

Engine electrical systems have many components to look at – a starter, alternator, wiring, plugs, fuses, circuit breakers, and so on. Some of these components will be very difficult to see and inspect. You should consult the equipment manual for hidden locations.

Engines will have lubrication systems. While in most cases the majority of the lube system will be internal to the engine thus making it very difficult to inspect, there will usually be some external components such as pumps, filters, plumbing and heat exchangers from which a thermographer can get useful data.

Engines will have external drive systems attached to them for things such as the fan, alternators and pumps. These

drive systems can have bearings and drive belts that can be inspected for failure indicators.

With just the engine alone, there can be hundreds of inspection points. A mobile equipment inspection should be treated no differently than a plant inspection. Your first step should be to determine what equipment you are going to inspect and then every piece of equipment should be broken down into an equipment list. The equipment list should have the component, component location and what panels, if any, that are needed to be opened or removed to gain access to the component listed. By the time you get the list completed, you may be surprised at the amount of inspection points a piece of mobile equipment may have. 🌀



Infrared can help check fluid levels, final drives, and carrying rollers on a bulldozer.

S, M, L, XL: Infrared Cameras Come in Lots of Sizes

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can do as they are more fully deployed into the field!

You should, by the way, expect that you may encounter some confusing data, difficult concepts and, perhaps, some plain old “disinformation” when you shop for a camera. Some salespeople, for instance, are apt to tell you a 160 camera has only one-quarter the resolution of the 320 they want to sell you or that their 640 system has four times the resolution of the old 320 camera. Forgive them for their exuberance but that's not quite how it works. In fact, as the arrays get larger, although

the number of pixels goes up by a factor of four at each step, the resolution simply doubles.

When it comes to thermal sensitivity, smaller is, in fact, better. A 30mK detector is more sensitive than a 150mK detector. But, again, the question is “how sensitive does my camera need to be?” For buildings work a 150mK camera may do the job but it won't allow you to see as much as often as a system with an 80mK or better detector. Since time is money, purchasing a more sensitive – and typically more costly – camera may be a wise investment. For most condition monitoring work, however, the additional sensitivity is often unused, so why bother with it?

There has never been a better time to buy an infrared camera. Because we don't sell them, we can better help you define your needs and find cameras that meet them. What's our interest? We want you to get the right product so we can help you learn to put it to use correctly and begin getting those returns as soon as possible.

As with cameras, there are many choices. To get clear, unbiased answers to your questions, you can call us, read any of several articles we've published on the subject, visit IRTalk.com, listen to our webinars, or attend a Level I course. Let us know how we can help. 🌀

Benefits of Attending – Level II Infrared Thermography Training

Byron Furman
Inside Sales Representative, The Snell Group



Rob Spring, Principal of The Snell Group.

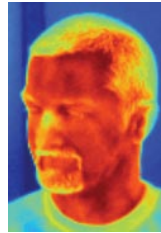
There are many benefits to attending a Level II infrared thermography course, essential training for the professional thermographer who has completed their Level I and has at least three months of experience under their belt.

Attending a Level II class builds confidence and understanding of what you are seeing in your predictive maintenance routes. Whether you are the only thermographer in your company or part of a team, taking advantage of professional development opportunities will help you become a more credible thermographer.

The practical and technical applications of infrared are covered in much greater detail than in Level I, allowing you to delve deeper, test assumptions, and put into perspective the value of thermography in your workplace.

Level II training also helps you understand all the functions and practical uses of your specific camera (regardless of manufacturer). This level of competence allows you to make an informed analysis of the images you are presenting to identify problems before they become serious issues.

From an employer's perspective, knowing you have competent, well-trained thermographers on staff can give you greater confidence in their detection



and analysis of potentially crucial situations. Their reports can result in cost savings to the company by preventing a failure from happening and reducing insurance costs. Level II training also builds on the company's initial investment in a camera for which Level I is a foundation.

Level II thermographers have the ability to make competent and confident decisions in regards to what they are seeing in the presented images. They can become the resident thermography resource in your maintenance department. Level II thermographers can also be put in a supervisory role for your Level I thermographers and can pass on practical knowledge in the workplace. With Level II training, a thermographer will also give you the repeatability of results that should take place in establishing routes and trends.

Understanding your camera and getting the most from your investment are crucial parts of thermography. A Level II class gives you that added assurance that you have the knowledge, skills and training reinforcement to help your program achieve the next level of cost savings. ☺

“ Level II
thermographers
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decisions. ”

Welcome to The Snell Group

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Through our online Knowledge Center and e-mail subscriber lists, we will continue to provide monthly e-newsletter updates, Our “Think Thermally” newsletter publication, professional white papers, industry news, announcements and educational tips from the world of infrared and motor circuit analysis. Thermal Solutions, our educational conference for professional thermographers, motor circuit analysis technicians and reliability leaders, is another outstanding venue for learning and meeting peers from a cross-section of industries. The conference now features both IR and MCA tracks.

Finally, our brand-new web site – **www.thesnellgroup.com** – is where you'll find a comprehensive listing of all Snell Group services including training schedules, product descriptions and educational tools as well as details on the new Snell Certification Standard for thermographers and MCA technicians seeking professional certification for themselves and their programs.

Contact us at 1.800.636.9820 (toll-free in the US and Canada) or 1.802.229.9820, or via e-mail at info@thesnellgroup.com to receive more information about our products and services. We look forward to working with you and having the opportunity to turn our knowledge into your advantage. ☺

ONLINE TRAINING UPDATE

New Webinars
Available from
The Snell Group:

www.IRwebinars.com

Global Course Schedule

January Thru April, 2008

Infrared Thermography

To Register: www.thesnellgroup.com

UNITED STATES	Level I-Thermographic Applications	Date	\$1,695 USD/person
	Phoenix, Arizona	February 11-15	
	Tampa, Florida	March 10-14	
	Cincinnati, Ohio	April 7-11	
	Charlotte, North Carolina	April 14-18	
	Level II-Adv. Thermographic Applications*	Date	\$1,695 USD/person
	Phoenix, Arizona	February 11-15	
	Tampa, Florida	March 10-14	
	Charlotte, North Carolina	April 21-25	
	Electrical Applications*		\$1,095 USD/person
Phoenix, Arizona	February 26-27		
Building Systems*		\$1,095 USD/person	
Phoenix, Arizona	February 28-29		
CANADA	Level I-Thermographic Applications	Date	\$1,695 CAD/person
	Toronto, Ontario	14-18 January	
	Montreal, Quebec	4-8 February (French)	
	Toronto, Ontario	3-7 March	
	Edmonton, Alberta	31 March-4 April	
	Toronto, Ontario	21-25 April	
	Level II-Adv. Thermographic Applications*		\$1,695 CAD/person
	Toronto, Ontario	28 April-2 May	
	Electrical Applications*		\$1,095 CAD/person
	Toronto, Ontario	19-20 February	
Montreal, Quebec	8-9 April (French)		
Mechanical Equipment*		\$1,095 CAD/person	
Toronto, Ontario	21-22 February		
Montreal, Quebec	10-11 April (French)		
UNITED KINGDOM	Level I	Date	£1,165 GBP/person
	Birmingham, England	3-7 March	
SOUTH AFRICA	Level I	Date	Please call for pricing
	Johannesburg, Gauteng	18-22 February	
	Level II*		Please call for pricing
Johannesburg, Gauteng	25-29 February		
* Pre-requisite: Level I Infrared Training ** Pre-requisite: Level I & II Infrared Training			

Available By Request:

► **Non-Destructive Testing** ► **Motor Circuit Analysis** ► **Any Level Course Available On-Site**

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Learn new techniques and discover best practices of infrared (IR) and motor circuit analysis (MCA) for your professional development that:

- ▶ Reduce Risk
- ▶ Save Money
- ▶ Increase Uptime
- ▶ Conserve Energy
- ▶ Improve Safety



Call for Papers – 2009 Conference

Share **your** knowledge with other IR and MCA professionals. Write a brief summary of your topic and submit it for review. e-mail: abstracts@thermalsolutions.org / fax: +1.802.223.0460

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