

INFRARED NEWS BREAK

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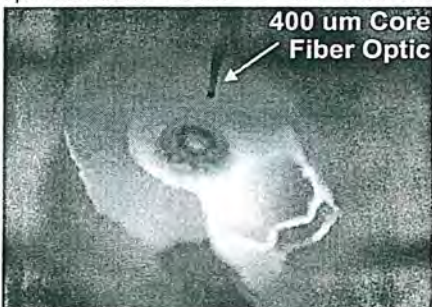
INFRARED THERMOGRAPHY IDENTIFIES LASER IGNITION THRESHOLDS

The National Institute For Occupational Safety and Health (NIOSH) Pittsburgh Research Laboratory (PRL) are conducting research to provide a scientific basis for developing appropriate safety guidelines for optical equipment in the presence of flammables to determine laser ignition thresholds for methane-air mixtures and/or coal dust. Researchers from NIOSH-PRL are working with safety standards committees such as: The International Society for Measurement and Control (ISA) and the International Electrotechnical Committee to develop safety recommendations for lasers in hazardous locations.

In phase I of the "Laser Safety for Hazardous Locations" project, infrared thermographs recorded temperatures of iron oxide particles on optical fiber tips heated by laser powers that previously have produced methane-air ignition. About 120 experiments were conducted to determine laser-heated target temperatures at and near laser powers required to ignite methane-air, under several different test conditions producing temperatures in the range of 1300 to 1500 Celsius.

The research is part of a project to recommend safe power limits for lasers used in coal mines.

In one phase of the project, researchers used a thermal imaging system which measured infrared radiation at wavelengths of 3.6 to 5um, and was calibrated up to 1500°C by the manufacturer. A 30/80-mm close-up lens allowed very high spatial resolution. Prior to observations of the optical fibers, the temperature calibration and spatial resolution of the thermal imaging system were confirmed by using small apertures placed in front of a blackbody source. Temperature measurements were within manufacturer's specifications down to the smallest



aperture, a 340-um hole drilled through a thin metal sheet.

In phase II of the project the infrared system recorded time lapse thermographic images of a laser beam incident on a coal dust layer. The thermal imaging system measures infrared radiation at wavelengths from 3.6 to 5 micrometers (um). The manufacturer calibrated the system to accurately measure temperatures up to 1500 Celsius (°C) for the high temperature tests. The calibration of the system was confirmed here at PRL with a blackbody source.

Of particular interest in our research is the use of this system to provide continuous quantitative analysis of thermal runaway phenomenon. The system is used to observe spatial and temporal temperature variations of a coal hot spot.

Figure 1 shows a coal dust layer being ignited by a laser beam. In this figure, the laser beam is located near the center and the heating is progressing radially outward. The darker area near the center is where the coal dust has turned to ash. The outer thin yellow rings are where the surface coal dust has collapsed to reveal heating coal just beneath, suggesting thermal runaway. The laser beam spot diameter in this particular test was set to 2 millimeters (mm) by adjusting the height of a 400um core optical fiber above the coal surface. The laser power was set to 2 watts, producing temperatures in excess of 1400 °C. Each pixel in figure 1 is approximately 100um and the data sampling rate was approximately 170 milliseconds (ms).

In another phase of the project, researchers measured temperatures of small laser irradiated targets that would ignite explosive methane-air mixtures. **Continued Page 2**

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"MR. SONY" DEAD AT 78

Akio Morita, the co-founder and chairman of Sony Corp., died last month of pneumonia. He was 78. Morita was a leading world industrialist who, in 1946, established the Tokyo Telecommunications Engineering Corp., which 12 years later changed its name to Sony. The company produced the world's smallest transistor radios, cassette players, stereo components and eventually branched off into hundreds of other electronic consumer items including video cameras, short-wave radios and televisions. Morita married Yoshiko Kamei in 1950 and they had two sons and a daughter.

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Researchers found that with small targets, laser powers of a few hundred milliwatts (mW) could ignite the mixture. For example, 600 mW of laser power heating a particle on the end of a 200 um fiber optic cable did ignite methane-air mixtures. Measured temperatures at ignition thresholds were in the 1300 to 1500 °C range.

While this research focused on flammable small targets, researchers confirmed small nonflammable targets are also an ignition hazard due to the higher thermal loading capacity. Finally this research supports the concept that a laser power level is an appropriate safety parameter for small beam dimensions, while a power density level is an appropriate parameter for large beam dimensions.

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INTERNATE MARKETING IN SIMPLE TERMS

The Internet is a technology that is effecting our lives on a scale as significant as the telephone and television. The Internet is a marketer's dream come true with the purpose of uploading your corporate image

for worldwide exposure, thereby increasing your bottom line. Over the next 5 issues we are going to discuss several key issues in developing your online strategies issues that are quite often overlooked, preventing you from achieving your goals.

The topics to be covered are:

Choosing A Reliable Web Hosting Company - Why choosing the correct hosting company is critical.

Choosing A Web Site Design Company Thousands of dollars can be wasted on poor web site designs that do not generate the business you expect. Learn how to effectively choose a professional that works with you.

Effective Site Design to Generate Sales Your site must make the sale. After all, that's why your business is online.

Search Engines / Rankings - Learn how to harness the power of the search engines.

Follow Up Follow up is Critical - Learn the how's and why's of online auto follow up.

Choosing A Reliable Web Host When choosing a host for your online business, there are many factors to determine. You might even consider purchasing your own server and parking it on someone else's network. If you do decide to purchase hosting, you will need to contact the provider with the following questions.

1. Do You Use NT or Linux/Unix As Your Server? If you are planning to have a successful online business you will be using PERL scripts (the code that handles your online forms, etc.). Both operating systems can handle PERL. Note: There are factors with both that determine if they can run your script.

2. Do you use a T1, dual T1s, T3 etc? A T1 has 1.5mb of bandwidth, a dual T1 has 3mb and a T3 has 45mb. A T1 is ample for online business.

3. How Much Transfer Do I get? When you see hosting companies offering various amounts of transfer, they are referring to how much traffic you can have. For example, if you have a 20kb index page that is hit 1,000 times in 1 day, that is equal to 2gb. With this scenario you will require at least 2gb per month. Also, be sure to read the fine print and see what the daily limits are.

4. How Often Do You Backup? You really need to find out how often the host does a full backup. Some hosts backup hourly, some do it daily. Find a host that backs up at least twice in a 24 hour cycle and takes the backup off site.

5. What sort Of Redundancy Do You Offer? This is extremely important. Triple redundancy or backup is best. This ensures that if one server dies, another can kick in and make sure that you are still online. Hosts can backup their systems by burning cd roms, using tape backup systems or mirroring data on other servers.

6. Do You Offer Telnet Access? Telnet access is a client that interfaces into a command shell installed on the server to allow you to remotely install the various scripts you will require to operate your site. If they say "No" and then go on to explain that it is a security risk, stay away from them. These types of hosts end up being like a maximum security prison and you will not be able to have your scripts installed.

7. Do I get My Own CGI-BIN? Common gateway interface-binary directory (CGI-BIN) is the location your scripts are executed from. This is MOST important. If you do not get a TRUE CGI-BIN, or none at all, then do not host with this company. You will not be able to run any of your CGI scripts. CGI stands for Common Gateway Interface. DO NOT USE the Frontpage extensions. They are a security risk.

8. Will You Install Extra Packages If My Script Requires Them? Sometimes your script may need an add-on package. The package is added on by the root user for items such as online email forms, email to responders and discussion boards. Make sure that they are supportive of adding packages, or at the very least, find out your script requirements and then have the host take a close look at the add-on.

9. Is There A Setup Fee? Some companies charge a setup fee and others do not. Try to find a good host that DOES NOT charge a setup fee. After all, setup, to a host, is a minor issue.

10. Do You Offer SSL? This stands for Secure Socket Layer, and is critical if you wish to sell products etc. via Visa and other major cards. Without it you will not be doing online business effectively.

Next month we will take an unbiased look at how to choose a design company and what qualifications and tools the designer should have. Until then - Happy Host Hunting! Please address any questions regarding the above article to airt@infraredtraining.NET.

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Monaghan WD, Dubaniewicz TH Jr. [2000]. Infrared thermography identifies laser ignition thresholds. Kamloops, British Columbia, Canada: Academy of Infrared Thermography, Infrared News Break *Feb*(edition 15):1-2.