

# The Zombie Thermographer Apocalypse

## Preparedness 101: Zombie Thermographer Pandemic

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### Key Words:

Zombie Thermographer Apocalypse /Pandemic, Culpability, Commodity economics, the Ten-thousand-hour Rule, Quality training, Application development, Liability and risk avoidance Hazards of unrealistic expectations of results Program sustainability

### Abstract:

Fact: The U.S Government Centers for Disease Control and Prevention (CDC), Office of Public Health Preparedness and Response, rather remarkably has dedicated part of their web site to "Zombie Preparedness". See: <http://www.cdc.gov/phpr/zombies.htm> for more information. This is a tongue-in-cheek campaign with messages to engage audiences with the hazards of unpreparedness. The CDC director, U.S. Assistant Surgeon General Ali S. Khan (RET), MD, MPH notes, "If you are generally well equipped to deal with a zombie apocalypse you will be prepared for a hurricane, pandemic, earthquake, or terrorist attack. Make a plan, and be prepared!" (CDC Website, April 26<sup>th</sup>, 2013).

Today we can make an easy comparison between the humor that the CDC is bringing to light, and what is actually happening in the Thermographic Industry. It must be acknowledge there are "Zombie Thermographers" out there. At times, it can be observed from the sidelines as a pandemic apocalypse attacking the credibility and legitimacy of the science and the industry that so many have been working to advance for over 30 years.

This paper outlines and explores the trends currently taking place, the very real risks to facility plant, property, and human life as a result, and the strategies to overcome these problems.

### Author's Note:

Please note: The author and analyst is using the humorous analogy and ecological model used by the United States CDC to bring awareness to the significance of prevention in the event of a catastrophe. While this paper is using the same humorous overtones that the CDC used, it is important to realize the problems faced in the industry are readily tangible and extremely serious. One must acknowledge and be aware of the problem to find solutions and to be able to fix it. It is the author's intention to use humor as a way to bring attention to the situation, so that the industry can come together and further improve the science and art of thermography.

## Background

The equivalent of the 'Night of the Living Dead, Zombie Thermographers' can be seen in the field and seems to be growing rapidly. These beings are flooding the industry, striding around with thermal imagers in hand, believing all they must do is just point and shoot, and are oblivious to the critical science and nuance of use that would legitimize their work with the Infrared (IR) Cameras. In essence, Zombie Thermographers suffer from lack of awareness of their ignorance, as Socrates wisely said, "*I know that I don't know, but the others don't even know that.*" Awareness, education, practical expectations and understanding of the science behind thermal imaging is vital.

A steep decline in the quality of professional thermographic consulting services has become obvious, coupled with a serious deterioration in the skill sets of the IR camera operators who perform thermographic surveys for in-house IR programs. While doing research for this paper, the analyst searched the internet (especially YouTube) for numerous farcical examples of the technology's factual value. Here are just a few classic examples of Zombie Thermographers demonstrating their abilities to:

- **See through walls:** Sandlin, Preston. "Infrared Camera Lets Charlotte Home Inspector See Through Walls", 30 Sept 2010 (<http://www.youtube.com/watch?v=AC9a-etdC34>), April 25, 2013).
- **See mold:** KOMO News. "New technology detects mold with infrared camera" 1 Jun 2010 (<https://www.youtube.com/watch?v=GIIE3PJOIgo> April 25, 2013).
- **See ghosts:** IPDA Team. "Ghost moving objects caught on infrared" 12 September 2008 (<http://www.youtube.com/watch?v=5NwC7C2-Hwk> , April 25, 2013).
- **See "UFO Squadrons" :** Huffington Post. 1 June 2011 "Infrared Videotaper Kevin McCracken Captures UFO Squadrons Over Oakland, California (VIDEO)" ([http://www.huffingtonpost.com/2011/06/01/infrared-videotaper-kevin-mccracken-ufo-squadrons-oakland\\_n\\_869141.html](http://www.huffingtonpost.com/2011/06/01/infrared-videotaper-kevin-mccracken-ufo-squadrons-oakland_n_869141.html) April 25, 2013).
- **Even engage FLIR Systems themselves to search for Bigfoot:** Officer.Com. 17 October 2012 (<http://www.officer.com/article/10762056/a-skeptics-encounters-with-finding-bigfoot> "A skeptic's encounters with 'Finding Bigfoot'" by FLIR System's Haley Ellison, April 25, 2013).

## Problem Definition

Marketing economics proven to increase commodity sales of material products, such as light bulbs, are being incorrectly applied to engineering/technical consulting services. Unsuspecting consumers and naive purchasing agents are made to feel wise and comfortable awarding contracts based on price alone. The current market dynamics dictate that the

consultant with the lowest cost will naturally be the lowest bidder. These prices are possible only by sacrificing the quality of the work offered, that is, investing in the least expensive and lowest resolution cameras and foregoing the cost of continuous training. The leading mistake made in this scenario is attempting to purchase quality technical services using the decision-making criteria appropriate for purchasing commodities. Conflating the two, very different purchasing decisions increases risk and can have serious detrimental consequences for the facility.

Infrared thermographic inspections are dependent upon the value-added piece. Cameras alone have elements that can be commoditized; but the operator of that camera cannot. The infrared scan is only of value because of the human eye behind the lens, and the human brain that interprets what that eye views. It is the combination of those two factors – the technical specifications of the camera, and the quality of the human processor that create the valuable end product: the reliable, operational, and organized information helping the end user to make educated decisions. Therefore, the most important criteria for the buyer of Thermographic Services is to consider the quality of germane characteristics of the living breathing human beings delivering the service. Human beings are by nature complex and unique. In the world of thermography there is a range of capabilities of service providers, which makes it more difficult to predict how a certain human will perform. Regrettably, it is the purchaser's human discomfort with the inability to precisely predict the human (thermographer)'s performance which often leads to an aversion to even try to account for that human factor (qualitative assessment), and instead focus solely on easier quantifiable data. This has wide potential to lead to disastrous outcomes.

Considering the history of bridge engineering design in Washington State (USA) would be a perfect example. Over the past century, decision makers chose to focus on expedient quantifiable data – the length of time spans, the lowest cost, and the most inexpensive materials - even when offered alternative designs that incorporated the human knowledge of prior historical failures. Thus, the public witnessed the engineering disasters of the Tacoma Narrows Bridge (a.k.a. "Galloping Gertie") which broke apart in 1940. The Hood Canal ("floating") Bridge, which sank on Valentine's Day Eve 1979 during a severe windstorm. Finally yet importantly, the Interstate-90 Floating Bridge that sank over Thanksgiving Weekend in 1990. Currently, there is a report that the State Route 520 Bridge over Lake Washington, a major commuter artery between Bellevue and Seattle, is at risk of collapse in the event of an earthquake. When the controlling element in a complex decision is the lowest cost, catastrophes such as these are inevitable and bound to occur. The technical services cannot be commoditized for a reason – the wisdom of the human brain is precisely the point in the equation where the "added-value" is added.

## **Solutions**

There are four key areas where the industry and the consumers can become more prepared and broaden their knowledge to understand the undesirable outcomes of the 'Night of the Living Dead, Zombie Thermographer Apocalypse'. These are Camera Manufacturers, Consumers (camera purchasers, contractors of services), Trainers and Practicing Professional Thermographers.

### **Camera Manufacturers**

Just a few years ago, IR Cameras sold at a base price point of 45,000USD. If one was in the market for a professional camera with a quality eyepiece, high-resolution detector, additional lenses and superior analysing software it was the norm to spend upwards of 65,000USD. If a high I speed/slow motion, time-lapse application was the desired feature one would easily be spending 85,000USD or more. At that point, in time, companies making this kind of an investment in hardware would also carefully weigh their investment in the 'human factor'. That is, who would be trained and who would do the training. The emphasis was on making sure that the investment in the camera was fully supported with smart investment in the human element.

In the book "*Outliers, The Story of Success*" by Malcolm Gladwell, he brings to light the one critical fact in differentiating between those who are successful, and seen as experts in their field (regardless of what that field is) and those who are not. It is called "The 10,000-Hour Rule" (Gladwell, 2008, Chapter 2). He makes the argument that, regardless of the skill in question, from playing ice hockey, to chess, to music or programming a computer it will take about ten-thousand hours to achieve the level of mastery associated with being a gold standard expert – in anything. Currently, most camera manufacturers are foregoing the science and the expertise needed in the field to flood the market with inexpensive cameras that do not adjust for emissivity yet still promise to perform the job for the thermographer. Poor quality, low price and limited capability over simplify the science and physics behind non-contact thermal imaging and quantitative thermography. All the above exemplify the effort to flood the market with low cost imagers and to dummy down the facts so as not to get in the way of making a sale.

### **Consumers**

The 'Zombies' make an appearance again and are sure to provide their 'non-expert' advise to prospective and current customers, as many have shared with the author, "Our consultant explained the image a camera produces is an image of 'Temperature', is that correct?". It is essential to educate customers of the fact that an image is of 'total radiance' and not temperature, which is a common misunderstanding. In addition, another very important fact needing clarification is that "to obtain an accurate temperature measurement is as simple

as to correct for the emissivity of the object by looking it up in a table value loaded in the cameras menuing system". Well, in fact nothing could be further from the truth, effective emissivity is attained by an accurate temperature measurement. Also taking into consideration the wavelength of the sensor, the temperature of the target, the viewing angle incidence, the background reflected temperature, and even the effects of the atmospheric attenuation. How does a Professional Thermographer explain all these subjects to a purchasing agent? How can a purchasing decision become an educated decision not based on the bottom line? The consumers and the industry can collaborate to make the necessary changes to avert this pandemic affecting the trade by increasing knowledge and campaigning the science behind the IR cameras.

### **Trainers and Practicing Professional Thermographers**

Once upon a time, in the field of Infrared Thermography there were various levels of skill sets amongst thermographers, and they could be differentiated fairly easily based on whether they really knew their craft and earned a living doing it every day. Those that met that criteria, were called 'Professional Thermographers' and were very similar to Professional Photographers. Some of these individuals were very skilled in the field in which they worked and some others may even have won awards for their work (such as the Pulitzer Prize for Photo Journalism). While there is (at least not yet) no Pulitzer Prize for Thermography, this doesn't mean that some of the images created and the skill sets possessed by some Professional Thermographers are not at par with some of the best photographers in the world... those images most certainly are! On the other end of the spectrum, there are the 'amateur thermographers' - individuals who use an infrared camera on a limited basis and not in their daily job, but rather as a tool they pick up to 'toy with'. Unsurprisingly, this results in varied levels of outcomes. It is much like amateur photographers taking pictures for their amusement while documenting an event. The images are captured in the context of developing their skill sets. Even the amateurs understand when they are in need for more advanced training. Professional Thermographers are very rare; sometimes even recognized as a dying breed facing possible extinction.

Thoughtful, big-picture decision makers can reverse the trend and significantly reduce the risk of human and material catastrophes. Pictures in the news of major industrial fires in a variety of settings (cruise ships, utilities, chemical plants) are reminders of the "worst case scenarios." Utilizing Professional Thermographers for every infrared inspection goes a significant way towards making sure the facility, staff, clients, and shareholders, are well protected against a catastrophe.

### Current Levels of Thermographers

Professional Thermographers	People making a living based on their ability to provide quality Thermographic Consulting Services. They are rigorously trained, skilled, experienced and capable of being able to accomplish the required tasks, as needed to provide high quality data and analysis. Utilization of their services reduces risk of equipment failure, disruption to customers, and possible injury to staff or public.
Amateur Thermographers	Individuals who understand that there is a lot more to the interpretation of the image than they are qualified to provide, who want to obtain more quality training from true professionals in the industry. However, they are unable to obtain the required training for a host of reasons. They have limited use and knowledge of the camera. A basic degree of common sense and luck has allowed them not to get themselves or the companies that they work for into too much trouble. Because of their low level of professionalism, they do not reduce risk significantly. Use of their services tends NOT to have the desired effect of reducing risk of loss of materials or profit or reducing injuries at the facility.
Zombie Thermographers	Individuals who are walking around with an IR Camera in hand, but without the knowledge and wisdom required to accurately evaluate and interpret the image and results that the IR camera produces. They add no interpretation to the data reported by the camera lens. The Zombies are limited to following the instructions of a salesperson, the ad-literature, advertisement and the manufacturer's manual. Risk to facility is significantly increased due to possibility for mis-interpretation, leading to false negatives (missed problems) or false positives (wasteful repair costs).

The invasion of the Zombie Thermographers can be compared with the Preparedness 101: Zombie Thermographer Apocalypse Education Kit. The industry must raise consciousness

of the lack of knowledge exhibited by the Zombie Thermographers and their inadequate IR equipment. These individuals are unable to produce and deliver the superior work previously delivered by the Professional Thermographers in the business. The reason can be quite simple, consulting services have become commodities along with IR Cameras. The Zombie pandemic must be contained and the spread of the commodity mentality stopped. Legitimate IR Thermography Consulting Services are valuable and not just a requisite for the insurance companies; most importantly, they can save lives, jobs, facilities, equipment and prevent disastrous consequences.

## **References**

Centers for Disease Control and Prevention. <http://www.cdc.gov/phpr/zombies.htm>. April 25, 2013.

Gladwell, Malcolm. *Outliers, The Story of Success*. Little Brown & Co., 2008.