1742 W. Katella, Ste 9, Orange, CA 92867
(714) 997-4255 Voice (714) 997-5884 Fax

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Loss Prevention through Early Detection

Monitoring Abnormally High or Transient Temperature Conditions With The NeuroLogic Research Continuous Thermocouple® Monitoring System

The NeuroLogic Research Temperature Monitoring System (CTTMS) can significantly augment existing loss prevention initiatives in any facility with early detection of abnormally high or transient temperature conditions. Depending on the type of Continuous Thermocouple® used, CTTMS can monitor temperature conditions in the range of -40 to 350 or 40 to 1490 degrees F. Food or perishable items could incur losses from abnormally high temperature during processing, transporting, handling, or storage. Capital equipment and architectural assets could suffer losses from overheating.

CTTMS can similarly augment protection against damage losses in facilities with existing fire protection systems compliant with UL Standard 521. In this case, concurrent use of the two independent systems can lead to far greater levels of asset protection. Here, the CTTMS is sensitive to abnormally high or transient temperature conditions in the chain of events preceding actuation of the fire alarm and extinguishing system. It provides supervisory alerts and warnings allowing the asset operator to become aware of an emerging situation and intervene if possible. This could avert the conditions that may later lead to a fire and trigger a fire alarm and extinguishing system. When combined with continuous archiving, this can also help in examining the sequence of events leading to a fire and effecting appropriate adjustments to prevent re-occurrence.

The concept is termed “Loss Prevention through Early Detection”. It is made possible by CTTMS being able to continuously measure and transmit the highest real time temperature in a large space or over a long line. This paper discusses this Loss Prevention methodology.

Augmenting Asset Loss Prevention from Abnormal Temperatures or Excursions (not normally fire related).

The CTTMS employs a Continuous Thermocouple® sensor element that looks like a cable but is actually a continuous sensor up to 2000 feet long. The sensor element can be placed across a pre-defined area of any shape or along a long line. Examples of long lines are tunnels, production lines, and cable trays. The sensor returns the highest temperature or “Hot Spot” present along its length.

The sensor can also be applied to processing and electrical equipment that may be prone to overheating such as reactors, ovens, electrical transformers, motors, power cabling and equipment racks. Fully integrated, tested electronics provides signal conversion, detection setpoints, and logic to allow alert, warning, and alarm detection as specified by the user. Options that provide additional display, logic, and archiving, and any desired output transmission including 4-20 ma DC, discrete outputs, lights, audible alarms, LonWorks®, Modbus®, and PC, Ethernet, and Internet connectivity are available. These all provide unprecedented flexibility in continuously sensing the real time temperatures in any industrial, commercial, and architectural venue.

Augmenting Asset Loss Prevention from Abnormal Temperatures or Excursions that can lead to a Fire

Most current fire detection systems are well defined by UL Standard 521. These systems are designed to detect a fire, initiate a fire extinguishing system and alarm. These systems are not required to continuously measure and transmit real-time temperature but are designed to detect a fire. To prevent costly damage due to discharge of extinguishing material such as water, foam, or Halon, these systems are also specifically designed not to generate false alarms.

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Because of these prerequisites, a serious hot spot situation or fire may well be underway when these systems trip. Losses may have already started to accrue due to fire and later due to the extinguishing action

This situation presents many opportunities for CTTMS to detect an emerging situation well before the fire detection and extinguishment system is triggered. It provides key information that allows the asset operator to avert the situation before damage exists, or at the point where occupants must make their personal safety their first priority and abandon the asset.

The concept is based on the fact that emerging situations will identify themselves at lower temperatures by rate of change, or by a combination of events including abnormal temperatures and humidity excursions, or the combined status of malfunctioning equipment. These situations can include overloaded electrical transformers, motors, cabling and switchgear, short circuits, faulty HVAC systems, overheated ovens and burners, spontaneous combustion in organic materials, or exothermic chemical reactions.

The two diagrams below illustrate possible scenarios and progression of events leading to a fire, with different outcomes:

Diagram 1: Progression of Set of Events Leading to Spread of Fire and Actuation of Fire Alarm and Extinguishing System without Early Detection Loss Prevention.

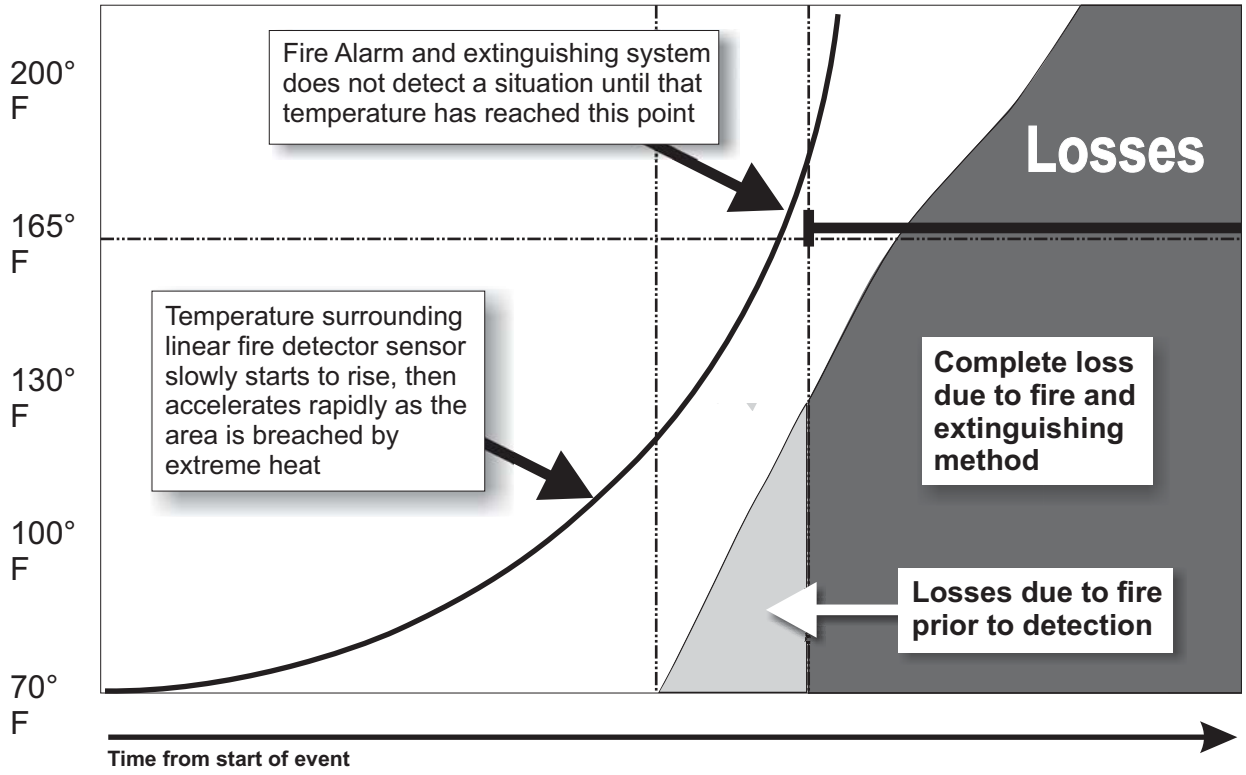

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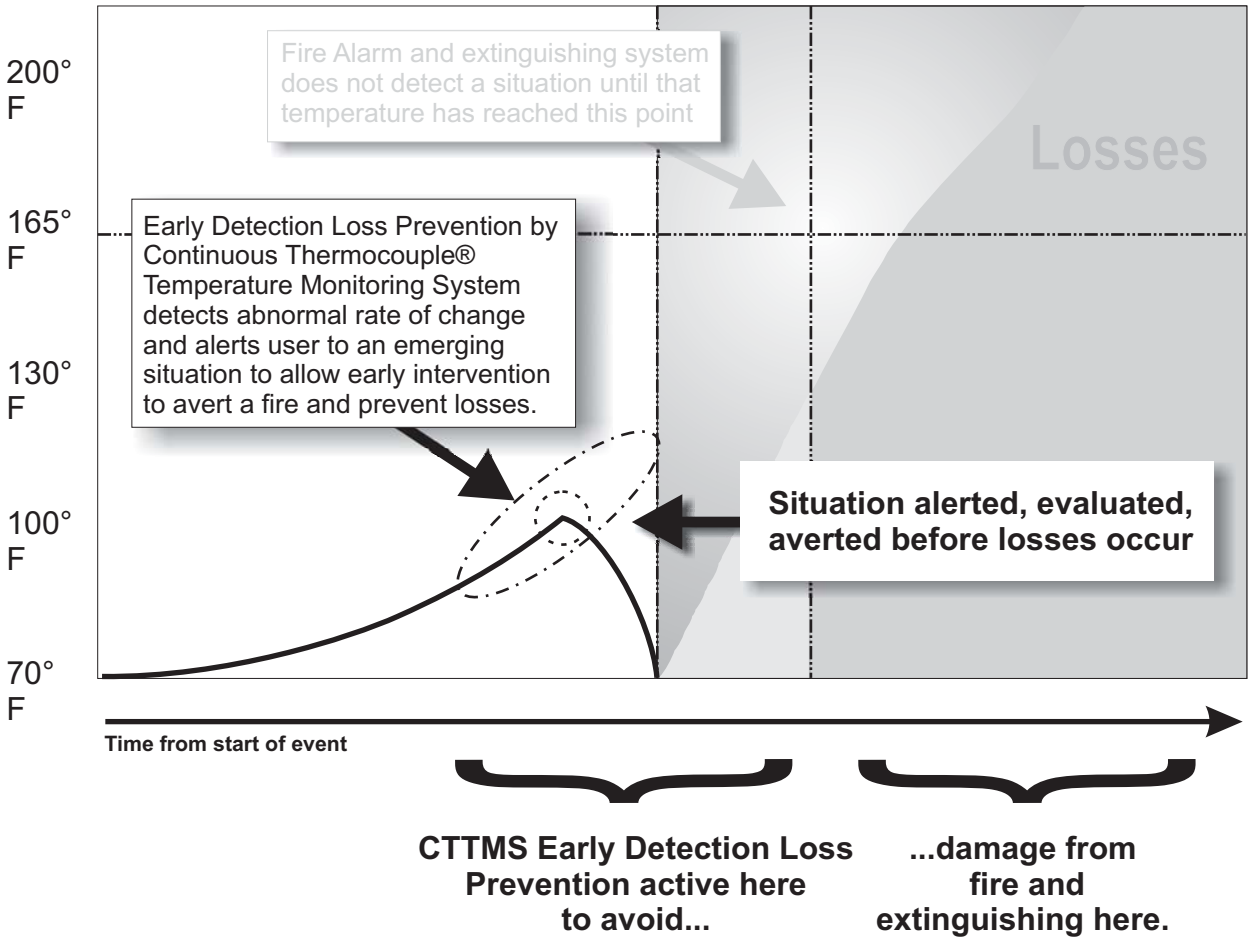
Diagram 2: Progression of Set of Events Leading to Successful Intervention with CTTMS Early Detection Loss Prevention.



Loss Prevention Through Early Detection
Loss Prevention Through Early Detection is achievable and practical with CTTMS. The system continuously measures, monitors, and transmits the highest real time temperature detected anywhere along the linear sensor length (up to 2000 ft per section). A variety of progressive alarm conditions including configurable fixed-point alarms, rate-of-change alarms, and associated Boolean logic, can be configured to the precise application. Further, the system can deliver all of this information in a wide variety of ways to advise users in the best ways to serve their needs. Data and alarm condition formats include the following: 4-20 mA, contact closures, alarm lights, LonWorks®, Modbus®, Ethernet®, Internet, and more.

CTTMS measures the temperature in a user-defined space and/or temperature critical equipment to detect emerging “hot spot” conditions. The occupants are alerted to defined abnormal temperature conditions before fire detection occurs. This provides users with the opportunity to check the area, evaluate the situation, and intervene to avert the problem before it becomes critical. Examples of interceptive action would be - turning off an overheated piece of equipment or gas valve, isolating the source of the heat by closing appropriate doors or windows, or if appropriate, initiating an immediate

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manual evacuation alarm prior to a situation that would trigger a fire alarm and turn on a sprinkling system. It is well known in the industry that in a large percentage of cases, equal if not more losses may result from extinguishing a fire than damages caused by the fire itself. The CTTMS and the UL 521 compliant Fire Alarm Systems each maintain their autonomy for increased overall reliability and maximum availability. Each has a specific important task and operates independently. Supervisory systems can be implemented where both the CTTMS and the fire alarm system report their conditions to a central system or network.

The CTTMS is NOT to be used instead of a UL 521 compliant fire protection system. It is used to augment protection against damage losses in facilities with such systems by enabling early detection of abnormally high and transient temperatures. Each user needs to determine the level of loss prevention possible in their own facility based on their complete comprehension of assets at risk, and the type of abnormally high or transient temperature events that indicates a problem or potential danger. Finally, users can electronically archive real-time temperatures in critical areas to develop greater understanding of their entire situation, allowing them to continually implement more effective levels of asset protection.

References:

1) *How to Prevent Loss from Overheat*; B.C. Davis, Xco International, Inc., East Dundee, IL.
2) UL *Standard 521 Standard for Safety for Heat Detectors for Fire Protective Signaling Systems*, Seventh Edition, 1999 Northbrook, IL

About the Authors:

Mark Rizkallah is Founder and President of Neurologic Research Corp. Mark has vast experience in developing and manufacturing innovative sensors and systems that communicate interactively amongst themselves as well as with computers, networks, and the Internet. These systems are in widespread use today controlling and protecting many different types of assets in venues including Industrial, Telecommunications, Military, Transportation, Buildings of all types, and Law Enforcement. Neurologic Research is located in Orange, California.

Paul J. Celauro is Director of Industry Solutions for Neurologic Research Corp. Paul holds 6 U.S. Patents in a number of areas including water processing, safety apparatus for laser surgery, and systems for protecting electronics in extremely hostile environments. He has developed and successfully implemented large scale data acquisition and control systems that focus on loss prevention, safety, and optimization in a number of areas including the Food, Pharmaceutical, Water and Wastewater, Power Generation, and Medical Device Segments. Paul resides in Florida.