

# Integration of Fire and Safety System with Industrial Automation Control System

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## Abstract

*This paper provides a better way to preventing and avoiding the fire in industrial environment. With help of technological improvements this can be achieved easily. The automations provide the better response while fire accidents. The lifts are closed and power system of lift and machineries are shutdown, automatic alarm systems will activate, water sprayers will activate and smoke sensing sensors will monitors the environment to prevent and alert the employees of industries. The objective of this paper is to minimizing the loss of life, resources and properties.*

**Keywords** — *Sprinkler-Water-Flow Alarm-Initiating Devices, FRAME, Smoke-Sensing Fire Detectors, Notification Devices.*

## I. INTRODUCTION

Work-Place fire safety is the most important part of the industries; industry must well equip with safety precautions. All the employees of the industries must aware about fire and safety. All the employees must able to identify the fire hazards in their working area and also they must know to handle the fire equipments. All the employees of the company must have knowledge about fire prevention and emergency response. With this novel approach the system will take an action to a fire and safety and prevention activities, it reduces the maintenance and pressure among the management peoples and employees. This paper proposes the automatic sensing systems which alerts, prevent and take an appropriate action against the fire accident.

## II. FIRE RISK ASSESSMENT METHOD FOR ENGINEERING

The goal of Fire Risk Assessment Method (FRAME) is protecting the building and its properties. It calculates the fire risks of the building s and its properties; this method is not suitable for outdoors. This method is used to evaluate the risks of buildings due to fire and the result of the evaluation will be values, positive and negative aspects. Frame is based on the six basic principles they are; protected building has a good balance between protection and threat, possibilities of

fire can be calculated by some influence factors, when the exposure level is higher the risk is lower and designing the escape routes.

## III. ALARM INITIATING DEVICES

Initiating device is one that initiates an alarm, supervisory, or trouble signal. There are lot of alarm devices available for fire and safety engineering some of the devices is follows

- Sprinklers
- Alarm system
- Fire doors
- stairwells
- Manual pull alarms
- Smoke detectors

### A. Smoke Detector

The smoke detector is an electronic device which detects presence smoke in a given area. Generally two types of smoke detectors are available in the market one is photoelectric detector and another one is ionization detector. The photoelectric detector emits small beam of light if the smoke affects the light beam it will sound alarm. The ionizing smoke sensor will response for the smaller smoke particles than photoelectric detector. Ionize detector gives a faster response for the flame smoke. The smoke detectors must required for certain areas elevators, electrical room and HVAC systems. Smoke detector will cause the elevator to recall the ground floor and activate the alarm system.

Fig. 1: Smoke detector



### B. Heat Detectors

Heat detectors are similar to the smoke detector, but it detects the heat of environment. Generally two types of heat detectors one is for rise of rate, it will react when the normal temperature of the atmosphere is increased and another one is fixed it will react when the temperature of the atmosphere will reach the particular temperature. It do the same function of the smoke sensor.

Fig. 2 : Heat detector



### C. Water Sprinkler

Water sprinklers are most important fire and safety device; it will reduce the flame by splitting the water. It is mounted on the ceiling. The water supply to the sprinklers is similar to the home water supply system. The sprinkler will not shower the water until the fire heats the sprinkler; there is seal behind the mouth of sprinkler when the seal melts the nozzle will open.

Fig. 2 Water sprinkler



### D. Manual Pullstation

The manual pull station is an active fire protection device, which is manually pushed by the users by pushing the handle downside and the circuit will lock and activates the alarm systems.

Fig. 2 : Pull Alarm System



## IV. SYSTEM MODEL

In this Sensor based fire protection system all the devices related to the fire and safety application has a centralized control system. Generally fire protection is categorized as two types active and passive. In active fire protection the devices used to protect the fire needs some movements and current situational circumstances. But in passive they are manual fire suppression methods by using fire extinguishers. This system introduces the centralized control system to control monitor and maintain the fire protection systems efficiently. The building fire and safety engineering method provides a better scenario based protection methods against the fire accidents. The BFSEM provides a structured framework for fire and safety protection of overall building and analysis the risks. With the help of BFSEM we can evaluate some of fire related factors such as alarm systems, automatic suppression system and manual suppression system and emergency system. Today there is lot of fire and safety controller are available in the market. The Building Automation and Control System. This sys provides a centralized control system for both the building automation and fire protection.

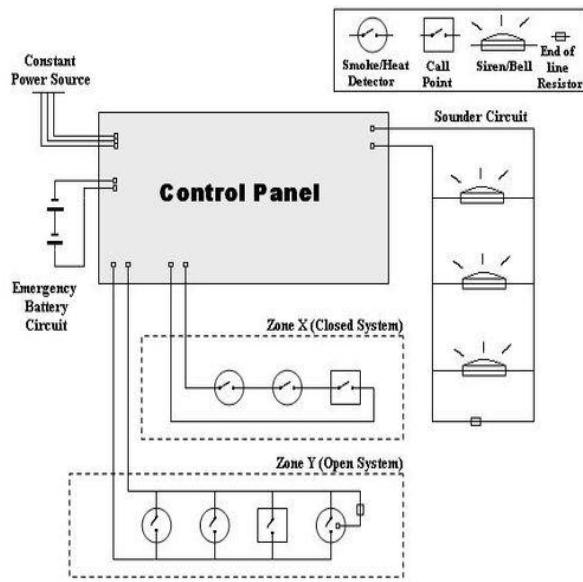


Fig.2 : A Typical Fire and Safety Network Diagram

BAC net protocol is standard communication protocol provides a set of rules to communicate two systems. The BAC provides very small and low cost building control systems. It comprises more number of building controls within the one BAC. It uses communication protocols and able to inter connect with Local Area Network. The reason for combining the BAC with fire system is to sharing the sensor information between two buildings, identifying location people during emergency and easier maintenance. Fire protection systems are integrated with HVAC and automatic door system for smoke control. The fire alarm system will command the HVAC system to turn on the smoke control mode. The information of sensor are used for the control of HVAC system The multiple use of sensor information makes the system more efficient.

## V. CONCLUSION

The technologies on industrial engineering are improved day by day as the technology improves there must be need of protection against them. This Fire safety system integrated with the industrial automations provides an efficient cost and maintenance. The author believes with the help of BACnet we can integrate the building automation and fire protection system. Even though the system provides a better utilization, there is some problem with the compatibility; this compatibility problem is taken as a future work and identifies the better solution for that problem.

## REFERENCES

- [1] Kathleen H. Almand, P.E.,” Structural Fire Resistance Experimental Research - Priority Needs of U.S. Industry”January, 2012.
- [2] AISC. 2005. “ANSI/AISC 341-05 – Seismic Provisions for Structural Steel Buildings,” American Institute of Steel Construction (AISC), Chicago, 334pp.
- [3] Kai Tang, Xilin Dong, QiyunGuo. .Research on China Petroleum and Chemical Fire Safety Countermeasure[J]. Journal of Chinese People’s Armed Police Force Academy, 2007,23(10):44-47.
- [4] Juanjuan Cui. Oil Depot Fire and Explosion Risk Analysis and Prevention[J]. Xinjiang Chemical, 2008,18(4): 55.
- [5] GuangchenGuo, Wenlan Dong, Zhilian Zhang. The Oil Depots Design and Management[M]. Dongying: China University of Petroleum Press,2006.
- [6] Yongming Xia. Oil Storage and Transportation of Environment Pollution Control[M]. Beijing: China Petrochemical Press, 1992.
- [7] Jianrong Huang, Maosheng Liu, The Evaluation Methods of Depot Fire Safety Effects and Fire Fighting[J]. Fire Technique and Products Information, 2006, 13(12): 29-31.
- [8] Erbang Hu. Practical Techniques and Methods of Environment Risk Assessment[M]. China Environmental Science Press, 2000.
- [9] Yongming Xia. Oil Storage and Transportation of Environment Pollution Control[M]. Beijing: China Petrochemical Press, 1992.
- [10] Jianrong Huang, Maosheng Liu, The Evaluation Methods of Depot Fire Safety Effects and Fire Fighting[J]. Fire Technique and Products Information, 2006, 13(12): 29-31.
- [11] Erbang Hu. Practical Techniques and Methods of Environment Risk Assessment[M]. China Environmental Science Press, 2000.