Prevention of Fire Hazards and Control in South Indian PowerLoom Industries using SHAPA Sensors.

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Abstract - *This Research paper provides a far better to preventing and avoiding the hazards of fireplace in power loom industries. We have identified and designed SHAPA sensors (Selenium Hazardous and Prevention Articulate) which is one of the facilitates of technological improvements and this cut the sources of oxygen to cut the fire. The automations give the higher response while hearth fire accidents. The machineries in Power loom area and power system of carry and machineries area units are in the state of activation of automatic alarm systems can activate, SHAPA sensors can activate and smoke sensing alaram can monitors the environment to stop and alert the employees of power loom industries. The target of this paper is to minimizing the risks in power loom industries and loss of life, resources.*

Keywords – Fire Hazards, Style, SHAPA (Selenium Hazardous and Prevention Articulate)Sensors,

1. Fire Risk Hazards

Textile and nonwoven mills have full-fledged fires within the gap between the Blending, Cleaning, Weaving, Spinning, and Filtration areas since the introduction of electrically operated machinery. In the past, these fireplaces were controlled by alert mill staffs in the Textile industries were ready to bring operated by fireplace extinguishers and fire hoses to the machine and fight with the fire. The fire was comparatively giant, it unremarkably solely broken one or 2 machines and results in loss of life and damaged in machines in power loom industries.

With the introduction of machine-driven high speed Production Machinery and Air Filtration systems, the merchandise moves from the gap through Carding processes while not being touched by humans. The fabric is transported at regular speeds starting from ten meters per second to twenty five meters per second. If a hearth is started in one machine it are often transported to subsequent machine in but one second. the hearth are often unfold through a whole Blow space installation in but one minute. this can be unremarkably too quick for the restricted personnel within the space to react and stop the machinery in order that they'll fight the hearth. notwithstanding the machinery can be stopped quickly enough by associate degree operator, the machines square measure unremarkably fully encircled in their housings, so creating it not possible for someone to discharge associate degree or hose into the machinery.

As a results of the high stock transport speeds, the encircled machinery, and a reduced variety of personnel within the space - once fireplace strikes an automatic Blow space installation it's potential to go bad many machines also because the filters. With the hyperbolic value and potency of the new machine-driven machinery, latest power looms have solely 3 or 7 lines of this machinery. Therefore, once a line of machinery is burned out, the assembly of the Blow space is reduced by one 1.95 or one third till the machinery are often repaired or replaced. this massive call in production underlines the requirement for serious fireplace protection designing by production-conscious mill managers. and nonwoven mills have experienced fires in the Opening, Blending, Cleaning, Weaving, Spinning, and Filtration areas since the introduction of electrically operated machinery. In the past, these fires were controlled by alert mill employees who were able to bring manually operated fire extinguishers and fire hoses to the machine and fight the fire. Even if the fire was relatively large, it normally only damaged one or two machines.

2. Using the SHAPA Sensors to cut the Sources of Oxygen

In the past decades, the sensing element is a component of the emissions system and feeds input to the engine management in power loom industries. The goal of the sensing element is to assist the engine run as with efficiency as attainable and additionally to supply as few emissions as attainable.

A internal-combustion engine burns hydrocarbon within the presence of selenium element . It seems that there is a selected magnitude relation of air and hydrocarbon that is mixed perfectly which magnitude relation of ratio 3:7 which has good magnitude relations. The ratio depends on quantity of Hydrogen and carbon found in an exceedingly given amount of fuel. If there's less air than this good magnitude relation, then there'll be fuel left over when combustion. this can be known as an expensive mixture. wealthy mixtures . The

SHAPA(Selenium Hazardous and Prevention Articulate) sensors are designed in such a way that it identifies the sources of oxygen and cut the sources of oxygen. As a result the turn of fuel lags oxygen and it get less chances of fire in the power loom industries. . If there's a lot of air than this good magnitude relation, then there's excess selenium mixture in the air .This can be known as a SHAPA(Selenium Hazardous and Prevention Articulate) lean mixture. A SHAPA (Selenium Hazardous and Prevention Articulate) lean mixture tends to supply a lot of nitrogen-oxide pollutants, and, in some cases, it will cause poor performance and even engine injury.

The selenium sensing element is positioned within the pipe and might discover wealthy and (Selenium Hazardous and Prevention Articulate) lean mixtures. The mechanism in most sensors involves a chemical change that generates a voltage in the power loom industries.

When the selenium sensors fails, the back up sources of selenium stored can be used to cut the fire hazards in the power loom industries. Due to the Advancement in the automated high speed Production Machinery and Air Filtration systems, the product moves from the Opening through Carding processes without being touched by humans. The material is transported at speeds ranging from 10 meters per second to 25 meters per second. If a fire is started in one machine it can be transported to the next machine in less than one second. The fire can be spread through a complete Blow Room installation in less than one minute. This is normally too fast for the limited personnel in the area to react and stop the machinery so that they may fight the fire. Even if the machinery could be stopped quickly enough by an operator, the machines are normally completely enclosed in their housings, therefore making it impossible for a person to discharge an extinguisher or fire hose into the machinery.

As a result of the high stock transport speeds, the enclosed machinery, and a reduced number of personnel in the area - when fire strikes an automated Blow Room installation it is possible to burn out several machines as well as the filters. With the increased cost and efficiency of the new automated machinery, most modern Blow Rooms have only two or three lines of this machinery. Therefore, when a line of machinery is burned out, the production of the Blow Room is reduced by one half or one third until the machinery can be repaired or replaced. This large drop in production underlines the need for serious fire protection planning by production-conscious mill managers.

3. fire explosions carried in power loom industries

By compounding the gas associate degreed compound (dust) in concentrations that make an explosion, combustion yield at high supersonic speed) from the purpose of ignition. The face of this growing ball of fireside is termed 'flame front. If there square measure no obstructions, this high pressure flame burns itself out after traveling a distance. however if it restricted in any means, the pressure will increase hugely. By knowing the speed of increase of this pressure for a selected compound, the hazard that it will cause will be glorious. The bag house has associate degree inherent advantage with its air cleansing method which will keep mud concentrations below the lower limit of explosion. On the opposite hand, shaker dust collectors are liable to explosions since static charges could go off a spark while 'shaking' or bag filter cleaning is in process. Explosions square measure of 2 varieties. Primary explosions square measure those enkindled by mud concentrations being at explosive levels. These primary explosions may participate in one a part of the system. on the other hand they move quickly on the system ductwork. once the flame front reaches the mud collector it may cause more explosions (by making explosive mud concentration by unsettling all mud particles on the filter bags). this could cause a secondary explosion.

4. FIRE HAZARDS SCENARIO ANALYSIS METHODOLOGY (FHSA)

The goal of fire fire hazards scenario analysis methodology (FHSA) is protective the building and its properties. It calculates the fireplace risks of the building s and its properties; this methodology is not suitable for outdoors. This (FHSA) methodology is employed to evaluate the risks of buildings because of fireplace and therefore the result of the analysis are going to be values, positive and negative aspects. FHSA Methodology is predicated on the six basic principles they are; protected building has a good balance between protection and threat, possibilities of fireside may be calculated by some influence factors, once the exposure level is 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 distinguishers. 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.

5. FIRE SQUARE PROCESS

The design fire square could be a description of the intensity of fire with respect to time. The planning of hearth curve is divided into four phases: ignition, growth, steady-burning, and decay. as a result of there is not a single framework for developing the entire style hearth Square .Every step is often developed individually so brought along as one curve.

It is not perpetually necessary to quantify every part of a style hearth curve, counting on the goals of the analysis. as an example, to predict once a hearth detection or suppression system would activate, it would solely be necessary to quantify the expansion part. For filler a smoke management system, solely the utmost heat re- lease rate could be required. A structural analysis may would like the height burning rate and also the length of peak burning. Perform-

Ignition is the planning hearth square starts at ignition point in upwards is an easy approach to developing a style hearth curve is to assume that associate ignition supply of comfortable intensity is obtainable to instantaneously ignite the initial fuel package to determine burning. However, if the warmth transfer to a flammable object or the tem- premature of the item is thought, calculations is performed to predict whether or not the item can ignite. Calculations to deter- mine whether or not ignition happens depend upon the state of the fuel: solid, liquid, or gas.

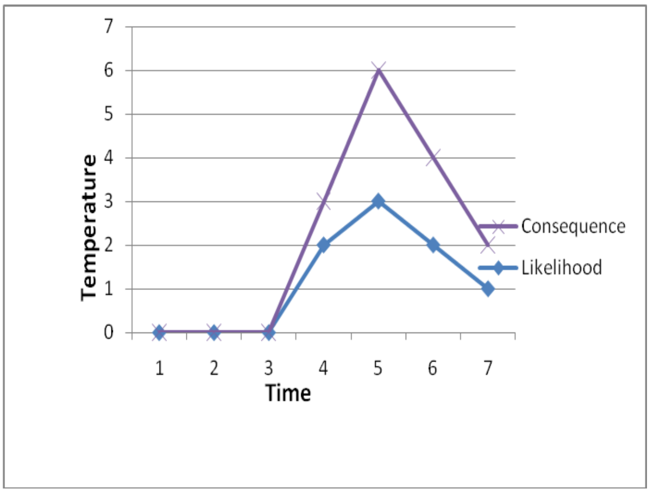
With the exception of smoldering combustion, for a solid to ignite it should 1st be heated sufficiently to unleash burnable vapors. The fire vapors is given off either by transformation or by melting and subsequent vaporization. It happens once a cloth is heated and decomposes, emotional vapors called fireomates. in contrast to melting and vaporization, within which no molecular changes occur, the vapors given off area unit totally different from the fabric that was originally heated. The process of transformation is viewed as "Thermal ioning process" in that larger molecules area unit broken into smaller molecules.

Piloted ignition happens if the concentration of transformation gases is higher than the lower burnable limit and a "pilot" is present. For non piloted ignition to occur, the transformation gases should be at a concentration higher than the lower burnable limit and they should be higher than their auto ignition temperature. due to this, it needs less energy for piloted ignition to occur than for non- piloted ignition.

Fire Risk Matrix			
Likelihood	**Consequence**		
	3	**2**	**1**
3	**9**	**6**	**3**
2	**6**	**4**	**2**
1	**3**	**2**	**1**

Table 1: Fire Risk Matrix

In the Table 1, the fire risk matrix is plotted with the likelihood and consequence and the values is plotted with the real time systems in the various power loom industries 1 and power loom industries 2. The graph is plotted with the observed values in the fire risk matrix in which X axis in Time interval and Y axis is Temperature of fire caused in the hazards which is present in Graph 1.



Graph 1: Fire Risk Matrix with consequence and livelihood.

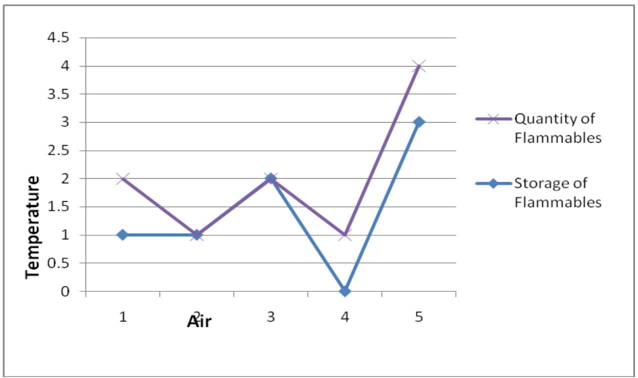
6. Quantity of flammables

In the presence of ignition sources, the quantity of flammables are the major high sources of risk. The storage of flammables has to stored in the high protection as per the sources of fire safety and risk which provides a fire and explosion hazard. Combustion, and more frequently explosion, might occur if the material is present in the power loom industries.

Consequence				
Quantity of flammables*		Storage of flammables*		Cum
Less*	More*	Near*	Far*	
1	0	1	0	3
0	1	1	0	3
0	1	0	1	2
1	0	0	1	1

Table 2: Consequence of Quantity of Flammables

The corresponding sources of fire with temperature and Air mixture is plotted in the graph with the various units. The zone of combustible and flammable may be prevented which is shown in the below graph2.



Graph 2 . Common types of Quantity of flammables of Temperature and air in combustible liquids.

7. Conclusion and Future work

The details of the SHAPA sensors and the hardware configuration is configured in the connection with the PC connected to the server. our Research paper provides a far better to preventing and avoiding the hazards of fireplace in power loom industries. We have identified and designed SHAPA sensors (Selenium Hazardous and Prevention Articulate) which is one of the facilitates of technological improvements and this cut the sources of oxygen to cut the fire. The automations give the higher response while hearth fire accidents. The machineries in Power loom area and power system of carry and machineries area units are in the state of activation of automatic alarm systems can activate, SHAPA sensors can activate and smoke sensing alarm can monitors the environment to stop and alert the employees of power loom industries.

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