

AUTOMATIC FIRE DETECTION AND ELIMINATION BY CO₂ SYSTEM IN CNC MACHINE

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ABSTRACT

CNC machines which uses coolant oil is prone to fire hazard. The proposed system automatically activates fire extinguishing system by the sensor hence, fire can be averted at the initial and workers hazard can be reduced to the minimum most level. This system would enhance the workers to work with more confidence.

Keywords-MCP, Fire Alarm Control Panel, Fire Suppression System, UV/IR detector

I.INTRODUCTION

Fire accident in CNC machines are getting increased year by year. AL they it is highly unexpected that fire accident are prone to occur, there are many reason for CNC machine to get damaged by fire.

Hence serious and stringent fire safety measures have to be taken to prevent fire. In this aspect of prevention of fire in CNC machines, good maintenance procedures and installation of fire suppression systems are playing vital role.

Heat production, vibration and electrical short circuit are the key factors of fire hazard in CNC machine

Sources of heat in CNC machines are ambient heat, continuous working in CNC machine, ambient dusts, can aggravate fire. Prolonged vibration in CNC machines due to damages in electrical cables and static electricity may also be an important factor.

Maintenance procedures of CNC machines like replacement of used coolant oil with new solution. May also be an important draw back which poses fire hazard?

Formulation of safe operating procedure and safety manual for CNC machines by collecting all the necessary details from the workers and the manufacturer of CNC machine, such serious hazards may be eliminated.

II.FIRE SUPPRESSION SYSTEM

An automatic fire suppression system can operate without human intervention. To do so it necessity possess a earnings of finding, actuation and delivery.

In many systems, detection is accomplished by mechanical otherwise electrical means. Mechanical detection routines fusible-link or thermo-bulb detectors. These detectors are calculated to separate at a exact temperature and release tension on a discharge mechanism. Electrical detection habits heat detectors equipped through self-restoring, normally-open links which close when a predetermined temperature is extended. Remote and local manual operation is also possible.

A Why Carbon Dioxide

Carbon dioxide is an effective fire suppression agent applicable to a Wide range of fire hazards. Carbon dioxide works quickly, with no outstanding clean-up associated with a system release which Trans latest Into minimal business interruption. an Environ mentally effective, Safe Fire Suppression agent Which I S colorless, Odorless, And Electrically non- Conductive

B.Total Flooding and Local Application SystemsBothCO₂Systems consist of a fixed supply of carbon dioxide connected to a piping network for agent distribution. A total flooding system speedily extinguishes equally surface and deep seated fire hazards by Dis charging the agent in to an bounded volume. A limited application System is used when the hazard is non-enclosable. Local submission Systems protect two-or three-dimensional hazard by discharging the carbon dioxide directly on the burning material

C.How does carbon dioxide work

Carbon Dioxide systems use smart, dependable, and fast acting Controls to fast sense a fire before it can cause costly damage to your stuff. Carbon dioxide gas takes a high rate of growth which allows it to work fast. When realistic to a fire, CO₂Delivers a heavy Blanket of gas that reduces the oxygen level to a point where Combustion cannot arise. Then carbon dioxide is a gas, there is No clean-up related with a system release which means Minimal business interruption

III FIRE LOADS AND THERE USAGE IN FIRE PRODUCTION DESIGN

Fire load, also called fire loading, refers to the quantity of flammable material and the amount of heat that

can be generated by a substance if ignited within a particular area. It is most generally used to refer to the amount of heat that can be generated by the materials in abounded area, such as a compartment or room. The fire load of a room or extra area can be used to quantify the potential severity of a fire in that location and so is an important concept in fire protection, firefighting, and construction.

A Fire load can be calculated as follows.

Determine the weight of combustible materials in the compartment for which you wish to calculate fire load. This value is represented by "M" and is measured in kilograms.

Determine the value of these materials in calories. This value is represented by "C" and is measured in kilojoules/kilogram.

Determine the area of the compartment. This value is represented by "A" and is measured in square meters.

Multiply M by C and divide the total by A to determine the fire load. The equation aspects like this:

$$\text{FIRE LOAD} = (M \times C) / A$$

IV METHODOLOGY

A.Engineering And Administrative controls

Eliminate or decrease exposure to a chemical or physical hazard through the use or substitution of

engineered machinery or apparatus. Examples contain self-capping syringe needles, air circulation systems such as a fume hood, sound-dampening materials to decrease noise levels, safety interlocks, and radiation defensive.

B.Engineering:

Engineering controls engineer the hazard out by initial design specifications or by applying substitution methods, isolation, enclosure, or ventilation. Of the three types of controls, engineering control methods should be considered first.

C.Administrative:

Administrative controls reduce employee exposures through methods such as education and training, work reduction, job rotation, maintenance/repairs, housekeeping, personal hygiene, and appropriate work practices. Administrative controls depend on constant human implementation or intervention.

V. WORKING SYSTEM

In this system we are using flame detector, which replace the heat detector (or) heat sensor. the flame detector detects fire with high sensitivity. It has high sensing capacity towards UV-IR rays(Ultraviolet,Infrared Rays)

When flame detector detects the flame the signal activates the fire alarm control panel. Further even when this automatic system on or the worker can manually activate the MCP (manual call point)

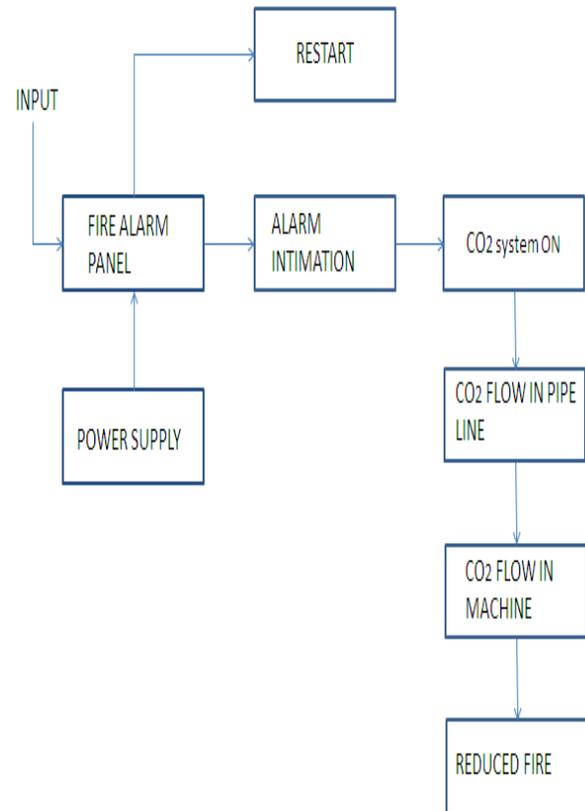
Immediately after the activation of fire alarm the power supply to the CNC machine is stopped. when the power supply forward the CNC machine is stopped an activating signal from the fire extinguishing system (proposed) the co2 cinders valves get opened and the co2 flows through pipeline and it extinguisher the fire in the terminate port of machine .

The quantity of CO₂ in the cylinder is based on the value of fire load of the combustible materials in the CNC machine When the extinguishing process gets over, the workers must be allowed to work only after ensuring the adequate amount of oxygen with good ventilation.

Adequate ventilation system must be installed at the work area which also helps to ventilate the CO₂.

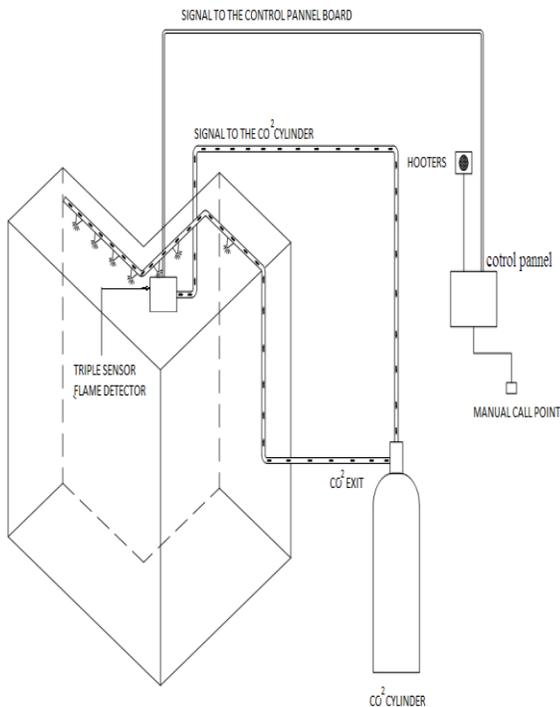
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A. Flow diagram of system



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B. Working diagram modal



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VI Conclusion

The system events fire in CNC machines. Hence, the danger of fire can be mitigated and the effect of coolant oils behavior due to fire is also been prevented. The significance of the work is that property loss is prevented, since the workers working with such CNC machines are always fearful about the fire hazard the fear can now be minimized and the worker can work with enthusiasm and in fearless manner.

VII. REFERENCES

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