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IMPLEMENTATION OF HEALTH AND SAFETY IN WIND ROTOR BLADEMANUFACTURING INDUSTRY

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ABSTRACT

Wind blade manufacturing sector is very essential and an integral part of green energy development which gives tremendous boost to our country's economy. In India, the wind blade manufacturing industry is one of the largest employees whereas it is chemical hazardous industry in our country. Wind mill employees are one of the most numerous and vulnerable segments. Most of them are unaware of the nature of chemical hazards in the workplace and mostly dust pollution in the shop floor. The number of health hazards are occurring from painting section and it is quite disturbing and causing health issues to the employees. The aim of the study to analyze the health issues associated with the painting and grinding (or) sanding works, implementation of the occupational Health & safety management system and create a safety culture among the employees.

Keywords— chemical hazards, dust pollution, safety implementation

1. INTRODUCTION

Fiber Reinforced Plastic (FRP) industry is generally classified as the most chemical hazardous industrial sector. Among the various activities in the shop floor, sanding activities usually emits dust exposure in the workplaces and impose negative effects on the workers health. Measurements of chemical gases in the workplaces showed that most of the concentrations are more than the permissible limits for longer duration. Polyurethane paints recorded high levels of exposure are present. This exposure creates chronic poisoning to the employees.And aim of this study using auto CAD software to design the exhaust system for pant booth. This method to give proper exhaustion layout design for paint booth. The study concluded that the modern exhaust design method to be implemented to the factory and have reduced the severity of occupational exposure to physical and chemical hazards in workplaces.

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2. LITERATURE SURVEY

This chapter firstly discusses the hygienic design of exhaust systems for the removal of effluent such as dust, toxic gases, polyurethane paint exposures, obnoxious odors. It covers the hygienic design and installation of exhaust hoods, grease removal devices, exhaust ducts and enclosures, exhaust fans and outlets and means of odor control. Further, the appropriate installation of these systems within the factory building is discussed, followed by a section dealing with their cleaning and maintenance. Subsequently, the hygienic functioning of exhaust infrastructure for the removal of heat, aerosols and bio-burden out of process areas is addressed, followed by a section discussing dust control systems. The final section describes how exhaust and air supply systems can affect the air flow and quality within FRP processing areas.

In order to suppress the diffusion of high concentrations of dust towards the operating area in a fully-mechanized excavation face effectively, this study constructed Auto CAD model that describes the interactions among filters, dust exhausts and airflows, and then validated the accurate dimension of the established model. Finally, under single-forced ventilation conditions, the dust suppression rules when different nozzles were used at different spraying pressures were investigated in detail. The results reveal that when different spraying schemes were used, the dust mass distributions in different regions along the tunnel were basically the same; they all first decreased, then increased and finally decreased. At a exhaust pressure and dust suppression efficiency followed a logarithmic function. However, with an increase in the vacuum pressure, the dust suppression efficiency increased gradually at a declining rate. Under a high vacuum pressure and the dust concentration in the fully-mechanized excavation face were reduced significantly.

The great majority of industrial-used polyurethane coatings contain polyisocyanates. This section is concerned with precautions to be observed in the handling and application of these materials. The two most important isocyanates are Toluene di-isocyanate (TDI) and di-phenylmethaneisocyanate (MDI).The mixing of these paints should be in well ventilated areas with the appropriate respiratory protection worn.When isocyanate paints are fully cured, if they have been applied for more than 24 hours at room temperature or heated for one hour at 70°C, and are sanded down, the dust produced will not present an isocyanate hazard. This is because fully cured paints contain no free isocyanates. In such instances a dust mask should be worn to provide protection from the general nuisance dust present. Where new paint that may not be fully cured is sanded down, the dust will containfree isocyanates.A particulate respirator fitted with Class H filters should be worn. Where practical, the use of wet sanding methods is recommended as a means of reducing the amount of dust generated.The employer must instruct workers on the hazards of working with isocyanatecontaining paints and how to

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use them safely.The employer is also legally required to provide all the necessary safety equipment.

Employees have a duty to use all the safety gear the employer provides. Employees owe it to themselves to protect their health - and the job they have spent years learning.

3 PROPOSED METHODOLOGY TO ANALYZE & IMPLEMENT THE SAFETY, HEALTH AND WORKING CONDITION IN THE FACTORY

3.2 DUST HAZARDS

Indoor air quality (IAQ) is a major concern to wind mill industry workers because it can impact the health, comfort, well-being and that poor IAQ can be hazardous to workers'\ health and that it is in the best interest of everyone that managing director, managers, and employers take a proactive approach to address IAQ concerns

Air quality may be determined by the original design, renovations, whether air handling systems have been maintained, occupant densities, activities conducted within the building, and the occupants' satisfaction with their environment. IAQ problems can arise from the sanding works or any combination of factors. Inadequate IAQ may begin with poor building design or failure of the building enclosure or envelope.

Symptoms related to poor IAQ are varied depending on the type of contaminant. They can easily be mistaken for symptoms of other illnesses such as allergies, stress, colds, and influenza. The usual clue is that people feel ill while inside the factory, and the symptoms go away shortly after leaving the factory, or when away from the building for a period of time. Failure of working style and operators to respond quickly and effectively to IAQ problems can lead to numerous adverse health consequences. Symptoms may include irritation of the eyes, nose, and throat; headaches; dizziness; rashes; and muscle pain and fatigue. Diseases linked to poor IAQ include asthma and hypersensitivity pneumonitis. The specificpollutant, the concentration of exposure, and the frequency and duration of exposure are all important factors in the type and severity of health effects resulting from poor IAQ. Age and preexistingmedical conditions such as asthma and allergies may also influence the severity of the effects. Long-termeffects due to indoor air pollutants may include respiratory diseases, heart disease, and cancer, all ofwhich can be severely debilitating or fatal.

3.2 PAINT(POLYURETHANE) HAZARDS

Paint Combination

The major constituents of most paints can begrouped into four general categories:

1. Resins

2. Pigments

3. Solvents

4. Additives

Substances can enter the body through

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inhalation, absorption through the skin, or ingestion, with themost common route being inhalation. There is a risk of chemicals entering the body during mixing,application and clean up when using paint.

1. Resins

Resins themselves are not classified as toxic, however, it is possible for some resins to be asthma causing agents and induce inflammation of the mucous membranes and nose. Some also react with the moist tissues of the respiratory system and eyes, causing irritation, or may be very irritating to the skin. Although there are a lot of misconceptions about isocyanates, it is important to understand the major health issues and these are addressed under 'Polyurethane paints and lacquers' in this brochure.

The typical effects of overexposure to isocyanates includes chills, fever, flu like symptoms and tightness of the chest.Epoxies, polyamines, polyamides have been known to cause dermatitis. When skin contact does occur, wash thoroughly with lukewarm water and soap.

2. Pigments

Lead and Zinc/lead chromates: The toxic effects of these are well documented. Lead poisoning symptoms include general weakness, loss ofappetite, inability to sleep, irritability, pains in the muscles, joints and abdomen, mentalretardation, anaemia, sterility, central nervous system disorders and reproductive effects. Refer 'Lead-based paint' in this brochure for further information. Zinc/lead chromates have been implicated in lung cancer of workershandling these pigments.

3. Solvents

Solvents cause headaches, drowsiness and unconsciousness, irritation to the skin, eyes and respiratory tract, and central nervous system depression with similar symptoms to drunkenness. People can become addicted to some of these solvents and drinking alcohol during the day may increase the toxic risks of these solvents. Cleaning hands in solvents, such as turpentine, will de-fat the skin and can cause dermatitis and repeated exposure may result in chronic dermatitis.Most solvents used in paints are highly flammable so care needs to be taken that there are no sources of ignition available to the solvent or to solvent/air mixtures.

4. Additives

Additives may irritate the eyes, skin and respiratory organs.

Routes of entry

- Inhalation
- Ingestion
- Skin contact

IsocyanateOver Exposure

- Sore eyes
- Running nose
- Sore throat
- Coughing
- Wheezing

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- Fever & Breathlessness

5. CORRECTIVE ACTIONS

Ideally, an employer should use a systematic approach when addressing air quality in the workplace.The components of a systematic approach for addressing IAQ are the same as those for an overallsafety and health program approach, and include management commitment, training, employee involvement, hazard identification and control, and program

audit. Management needs to be receptiveto potential concerns and complaints, and to train workers on how to identify and report air quality concerns. If employees express concerns, prompt and effective assessment and corrective action is theresponsibility of management.

5.1 Factory Systems Design and Maintenance:

When the heating, ventilating and air conditioning (HVAC) system is not functioning properly for any reason, the building is often placed under negative pressure. In such cases, there may be infiltration of outdoor pollutants such as particulates, dust and air exhaust, humid air, etc.

General dilution ventilation systems, when properly designed, operated, and maintained, willcontrol normal amounts of air pollutants. A well designed and functioning HVAC system controlstemperature and relative humidity levels to provide thermal comfort, distributes adequate amounts of outdoor air to meet the ventilation needs of building occupants, and also dilutes and removes odors and other contaminants.

5.2 Design Specifications:

In this paint booth layout contains two intake filters and two exhaust filters for suction and exhaustion purpose. Wind rotor blade have a 61.2 meter, away the root support trolley from the starting point at a distance of 1m from root side. Next tip support trolley at a distance of 38.5m from root support trolley. Root support trolley and tip support trolley with a base to construct a concrete block because of to withstand the load. Root support trolley and tip support trolley length are 1.5m. From the beginning, to provide the ramp for entry (or) exit purposes. Concrete block only fix at the support base, remaining base to fix the exhaust filter. Root support trolley load resting at 7.8 ton capacity and tip support trolley load resting at 7.5 ton capacity. These are the important terms of paint booth layout design.

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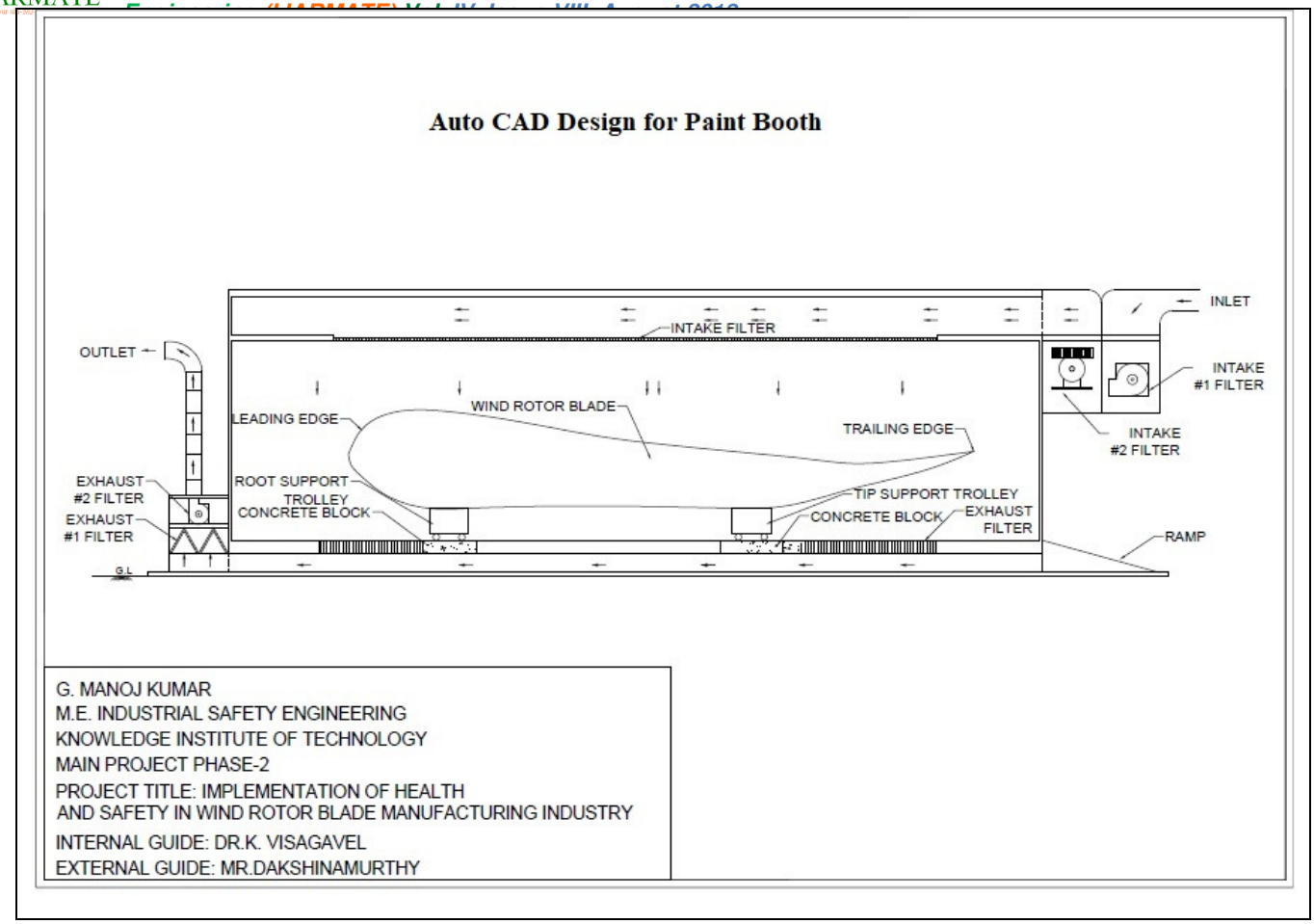

6 CONCLUSION

The rate of health risks in wind mill industry is relatively high when compared to other manufacturing industry such as engineering, pharmaceutical, etc. This is mainly due to the nature of the wind engineering works and also partly due to the difference and disparity in training and skill of the workers employed in said industries. It's essential that they are made safety conscious by the supervisors and engineers under whom they are directly working. This project highlights the importance of health issues, safety implement for health hazards, the various unsafe act and condition are to be reduced by an Auto CAD exhaust design to the paint booth, providing basic training and create awareness among workers and implement the safety precautions for health hazards and it will sure reduce the health problems and gives growth to our Indian economy and a green energy development.

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