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## **Review on "Hazards in Manufacturing Industry"**

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### **ABSTRACT -**

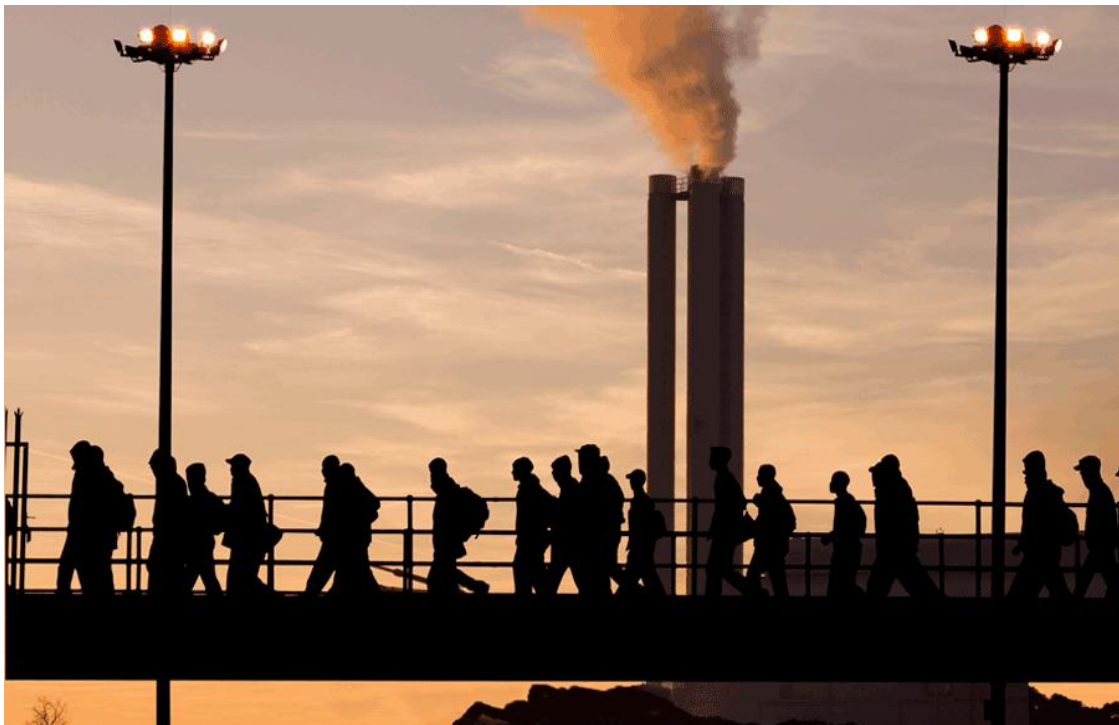
This paper summarizes the findings of a literature review conducted to identify and assess methods for identifying and analyzing occupational accident hazards in the manufacturing business, with a particular focus on the food industry. The methods were divided into two categories: morphological methods and methods for 'ahead' or 'backward' event tracking analysis. The methodologies are offered along with a brief overview of the procedures, the scope of the analysis, and the significance to the food sector. There are also some method characteristics listed, as well as references to earlier major publications on the approaches. Based on the breadth and type of accessible input data, a methodological framework was designed to differentiate three alternative methods to risk analysis. Sivakasi, a town in the Virudhunagar district of Tamil Nadu, produces the majority of the firework items consumed in India. The firework industry's manufacturing process necessitates the human handling of a variety of chemicals. As a result, the fireworks industry is recognized to be extremely dangerous. The purpose of this article is to examine the risks associated with the fireworks industry, as well as the causes of accidents and the effects of fireworks on air quality.

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**Key words** -Food Industry, Manuals Handling, Morphological, Accident, Framework Quality.

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### **INTRODUCTION**



**Fig - 1 - Hazards in manufacturing industry**

Any developing country must invest in industrial growth. In India, the fireworks industry plays a significant role in the country's industrial development. It provides work to a significant number of people in and around Sivakasi, Tamil Nadu. 1. Because of the dry climate in this area throughout the year, it is ideal for the production of fireworks. These businesses provide sparklers and crackers for various types of celebrations. During cultural and national festivities around the world, two goods are employed. 3. Around 90% of India's fireworks are made in Sivakasi, where women make up the majority of the workforce. Because these sectors are largely located in rural areas, the individuals who work in them are almost illiterate. Even though all of the work is done by hand, the workers are nevertheless unfamiliar with how to handle chemicals. As a result, when compared to other industries, the accident rate is significant. 4 Workers should be taught how to read and interpret Material Safety Data Sheets (MSDS), which serve as a guide for handling chemicals. When working with chemicals, metallic tools must be avoided. 5 Even if the accident rate is significant, these businesses will rehabilitate as soon as feasible, since they currently supply 90% of the global demand for fireworks. As a result, Sivakasi is dubbed "Mini Japan" (Kutty Japan) 6. Before beginning the manufacturing process in the chemical handling industry, a thorough hazard study and evaluation should be performed. This was done in order to lessen the risk by implementing appropriate control mechanisms. 7 Firework products have a variety of health effects, including eosinophilic pneumonia caused by inhaling fireworks smoke, asthma caused by barium-rich aerosols, and thyroid gland damage caused by perchlorates. 8. It hinders visibility due to the production of thick clouds. 9. During an examination of the workers' welfare facilities, it was discovered that the management fails to provide services such as infant care, recreation, schools, and sports centers for their children. However, there is a drinking water facility.



Fig - 2

- Main Types of Industrial Safety Hazards
- 1) Physical
- 2) Chemical
- 3) Ergonomic
- 4) Biological
- 5) Safety

Several forms of industrial safety dangers can jeopardize your employees' physical well-being. Physical, chemical, ergonomic, biological, and safety concerns in the workplace could endanger your employees' health while reducing your facility's uptime and productivity. Make safety a top priority at your organization rather than an afterthought to reap the most rewards for your employees and bottom line.

### **PHYSICALS -**

When the working environment creates a threat to persons simply standing in it, it is called a physical hazard. Noise, radiation exposure, and temperature fluctuations, for example, can harm everyone in an industrial location, whether or not they are working with equipment. These problems are classified as risks because they take place in physical space.



Fig - 3 PHYSIOLOGICAL HAZARDS

#### ***NOISE -***

Noise exposure can harm the ear permanently, resulting in hearing loss for the rest of one's life. The CDC estimates that 22 million workers in the United States are exposed to dangerous noise levels at work. Tinnitus is a ringing in the ears that can last for hours after being exposed to strong noises for a short period of time. However, especially with loud noises or long-term exposure, long-term harm might occur. Noise can be harmful if exposed to it for an extended period of time. For example, harm can occur after only eight hours of exposure to noise at 85 decibels, the equivalent of a lawnmower or vacuum sweeper. Bulldozers and ambulance sirens are far louder, and they can cause hearing damage in as little as an hour.

#### ***RADIATION -***

RADIATION is a term that refers to the process of transferring energy from one place to Workers who work near uranium or other nuclear-powered materials are not just exposed to radiation. Microwave and radiofrequency radiation from magnetic and electrical fields can also injure the body, though usually without obvious signs. Several studies have found a link between these types of fields and cancer. Employees can be protected by adhering to OSHA rules that limit exposure to no more than 10 milliwatts per square centimeter. Accidental radioactive substance exposure, whether from transportation or nuclear power plant mishaps, demands immediate action. Workers can be protected from lethal radiation exposure if they are prepared for such circumstances with an action plan.

#### ***TEMPERATURE EXTREMES -***

Employees may be exposed to temperature extremes if they work in unheated, non-air-conditioned facilities or outside. The body's thermoregulation systems can be disrupted by both heat and cold. Heat stress is caused by prolonged exposure to high temperatures, which can occur even on cold days when working near furnaces or other heat-generating equipment. Rashes, cramps, fainting, rhabdomyolysis, dehydration, and heatstroke are all illnesses that can be caused by severe heat. The mildest of these symptoms, rash and cramps, warn that the sufferer's health will worsen if he or she continues to be exposed to the heat. When muscles break down when undertaking heavy work in the heat, this is known as rhabdomyolysis. Electrolyte abnormalities and renal damage are possible consequences of this illness. Some folks might not have any rhabdomyolysis symptoms.

## 2) Chemical-

Exposure to harmful chemicals is reflected in chemical risks. This includes anything that can induce sickness through inhalation or contact. Even seemingly harmless compounds in large quantities can cause physical harm. This type of hazard is exemplified by the long-term development of mesothelioma as a result of asbestos exposure. 30 million workers are exposed to toxins on a yearly basis. OSHA mandates that businesses provide workers with easy-to-understand information on all substances and their hazards. You must instruct your employees in the proper operation of your facility as well as the dangers of chemicals. Protecting your workers who must handle or be around chemicals with PPE (personal protective equipment) can help them avoid unwanted exposure.







	<p><b>FLAMMABLE</b> - Materials which burn or ignite.  <b>Examples:</b> Acetonitrile, Methanol, Diesel Fuel, Mineral Spirits</p>
	<p><b>CORROSIVE</b> - Materials which cause visible destruction and/or irreversible alterations at point of contact.  <b>Examples:</b> Acetic Acid, Photographic Fixer, Sodium Hydroxide</p>
	<p><b>REACTIVE</b> - Materials which are liable to explode or react violently on contact with air, water or other chemicals.  <b>Examples:</b> Benzoyl Peroxide, Nitric Acid, Picric Acid, Silane, Sodium Metal</p>
	<p><b>TOXI</b> - Materials which cause harm if they enter the body, such as carcinogens, mutagens, and poisons.  <b>Examples:</b> Benzene, Bromine, Powdered Inks and/or Pigments, Sodium Azide, Formaldehyde</p>
	<p><b>IRRITANT</b> - Materials which cause harm by irritating the eyes and/or skin, and cause allergic reactions, drowsiness, lack of coordination and/or organ damage.</p>
	<p><b>ENVIRONMENTAL HAZARD</b> - Materials which are toxic and/or cause harm to the environment at large, particularly aquatic animals.  <b>Examples:</b> Anthrax, Arsenic, Asbestos, Lead, Mercury, Oil</p>

Fig - 4 CHEMICALS HAZARDS

### 3) Ergonomic -

The human body needs to be moved and exercised on a regular basis. Overdoing the same set of tasks repeatedly, particularly without adequate form or support, can result in overuse injuries. Long periods of standing or sitting inappropriately might cause pain. Ergonomic issues are more than just about your employees' comfort. Musculoskeletal diseases, such as those caused by overuse injuries, accounted for 33% of all workplace injuries in 2013. Tendinitis, carpal tunnel syndrome, low back injuries, rotator cuff injuries, and other issues affecting the muscles, ligaments, and tendons in the body are examples of these conditions.



Fig - 5 ERGONOMIC HAZARDS

### 4) Biological -

Living organisms, whether they are as small as viruses or as massive as animals, pose a biological threat. Bacteria, fungus, viruses, plant contact, and animal bites or scratches all represent serious health dangers to workers. These infections can be contagious and spread throughout the workforce in some situations. Consider how many employees at your organization call in sick during flu season to get a sense of the threat biological risks provide to productivity. Severe illness can result from exposure to illnesses spread by people's blood, breath, saliva, or other vectors. Up to 5.6 million workers in the health-care and allied industries are at danger of contracting blood-borne diseases like hepatitis B and C, as well as HIV. Workers who come to a facility while sick may catch or pass on foodborne illnesses, or they may be exposed to viruses.<sup>10</sup>

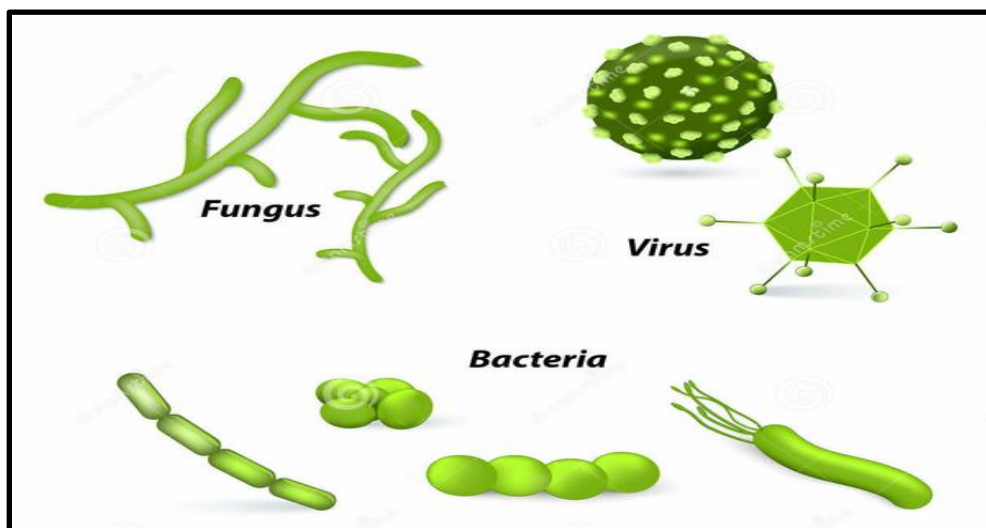


Fig - 5 BIOLOGICAL HAZARDS

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**SAFETY HAZARDS -****FALLS -****Fig - 6**

In the manufacturing industry, working at heights may be less typical. However, equipment and trash can provide multiple slip and trip dangers. Employers must take steps to ensure that their workplaces have adequate fall protection systems in place. During frequent toolbox lectures and daily safety tips, safety leaders can assist in reinforcing fall protection methods. In the manufacturing industry, emphasizing the significance of keeping walkways clear and free of debris or equipment would also help to promote safety.

**MACHINE GUARDING -****Fig - 7**

The type of equipment necessary in the manufacturing industry poses a number of potential hazards. For the numerous individuals who handle heavy machinery on a daily basis, proper machine guarding is critical. Employees are protected from flying chips, sparks, and moving parts by machine guards. Machine guards are the last line of defense against damaging machine parts if employees are irresponsible when operating the machinery. OSHA finds illegally mounted machine guards much too frequently in manufacturing sites. Employees are at risk of having their hands crushed, having their limbs amputated, or dying if any part of their body gets trapped in the machine's parts. Frequent machine inspections are required to reduce the possibility of this hazard. This holds true for other heavy machinery, such as the aerial lift inspection regulations in place to prevent accidents.

***POWERED INDUSTRIAL TRUCKS -*****Fig - 8**

Another of the top three manufacturing dangers confronting the sector is injuries and deaths caused by powered industrial trucks. When not managed properly, these vehicles, like any heavy machinery, represent a significant risk to employees. As a result, OSHA has established suitable training processes for manufacturing businesses whose employees use forklifts, motorized hand trucks, platform lift trucks, and other vehicles on the job. In order to limit the threats of this hazard, workers must adhere to OSHA's rules for these sorts of vehicles. Powered industrial trucks should only be operated by people who have acquired sufficient training and certification.

***ELECTRICAL -***

Electrical hazards exist in the manufacturing industry as well. Improperly installed equipment, exposed wires, unlocked electrical panels, and other electrical risks may all be present. Puddles of water are not unusual on the shop floor, especially when the weather is poor. Electric shock could easily occur if cables are not adequately covered. Electrical training is emphasized by OSHA to assist the manufacturing industry in mitigating these dangers to personnel

**Fig - 9**

**LOCKOUT/TAGOUT -****Fig - 10**

The unexpected release of energy or restart of the equipment while personnel are maintenance these pieces of heavy gear could result in significant injury or death. This is why, in order to avoid this, organizations must follow strict lockout/tagout policies. Each organization's lockout/tagout policy may differ significantly, but they must all comply with OSHA's Lockout/Tagout standard. The main notion is that before servicing equipment, certified staff must utilize lockout devices to properly de-energize it.<sup>11</sup>

**CONCLUSION -**

Conclusions The following conclusions were derived from the review:

- When compared to other businesses, the fireworks industry is extremely dangerous. Every year, accidents occur in these industries as a result of risky acts and situations.
- This article examined the manufacturing processes used in such industries, as well as potential hazards, accident causes, safety analyses using various approaches, and the effects of fireworks in the air. There are just a few literatures dedicated to determining the root causes of accidents.
- Because the majority of the workers are illiterate, mandatory safety trainings on safe work procedures and chemical risks might be regarded of as a way to raise worker awareness.
- Prioritizing hazards in various production processes prior to an accident will assist workers in taking preventative measures in their own work. Human error in each process can also be discovered, and mitigation measures can be implemented to lower the risk of death.
- If the management provides welfare, safety, and health to the workers in accordance with the law, the workers may work in a risk-free environment.

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