

SERIOUS ACCIDENTS IN MARCH-APRIL 2022

Massive Blaze Erupts at Srinagar Bone & Joint hospital, all Patients Evacuated



A massive fire damaged Bone and Joint hospital. There was no casualty reported.

8 Sustain Burn Injuries in Fire at Scrap Processing Unit in Pune



Eight persons sustained burn injuries after a fire broke out at an industrial scrap processing unit in Pune's Moshi, where used oil barrels were being cleaned.



THIS ISSUE

Editorial **P.1**

CoE Activities **P.2**

Evaluation of Accidents Based on PSM Elements **P.3**

Dust Explosion Hazard in Powder Handling **P.4**

Mitigating Electric Arc Flash Hazards **P.6**

Courses & Services Available **P.8**

EDITORIAL

“Survive the disaster and improve the overall resilience of the organisation through safety consciousness”

First and foremost, the Safexcellence team sincerely wishes you and your family to stay healthy and safe amid the present situation when the virus covid-19 seems to have reverted back with newer strains variants and several parts of the world are experiencing war like situation, scarcity of food, economic collapse. It is imperative that all of us should continue to follow the laid down protocols as precautionary measures. The vaccination drive is underway, and we trust the concerted efforts from all quarters which will enable us to get rid of this worst phase. Another concerned area is the rise in industrial accidents (Fire – Explosions - Toxic Gas Release) in India. The data collected by Safexcellence team shows 27 accidents this year between January to April taking death toll of 155 and 230 injuries. This implies every other day there is one accident resulting in one death and two injuries. To counter this trend, chemical manufacturers must immediately re-evaluate their plant risk posed by the current hazards, consider adaptive actions to reduce and bring the risk in acceptable region where required and prepare changes for future as well as

meditative moves to address the root causes to secure long term solution. Improving resilience by adaptive actions to correct these root causes should be a strategic priority.

This Safexcellence issue brings forth two special articles along with the regular features. These are “Dust Explosion Hazards in Powder Handling” and “Mitigating Electric Arc Flash Hazards.”

In regards to the aspects of Safety and Fire hazards of any organisation or workplaces or office buildings, Fire hydrant system plays a pivotal role. In UPL University campus, a fire hydrant system has been set up recently that will take care of all the buildings in the campus along with the hostel building. It comprises 79 Fire Extinguishers, 20 Hydrant Points, 20 Hose Boxes and 34 Hose Reel.

Trust you will relish this issue with several kinds of varieties in articles. Safexcellence will feel happy in accepting your precious comments and valuable suggestions with a view to continuously feeding you thoughtful information of your preference.

Dr. Omprakash Mahadwad
Professor, Chem. Tech. Dept.
S.R.I.C.T.

**3 People Dead in
Telangana Coal Mine
Mishap**



A portion of the roof and sidewall in a state-run coal mine in Telangana collapsed, trapping seven people under the debris.

**Six Killed as Blast
Triggers Fire at
Chemical Factory in
Gujarat's Dahej**



ANI

According to police, the incident took place at Om Organics where eight employees were present when a reactor in the distillation unit exploded and a fire that followed soon spread, killing six workers.

**Haryana: Fire Breaks
Out at Chemical
Factory in Sonapat**



A major fire broke out in a chemical factory in Kundli, Sonapat.

CoE ACTIVITIES

INAUGURATION OF FIRE HYDRANT SYSTEM



UPL University of Sustainable Technology organized the inauguration ceremony of fire hydrant system on 11th march 2022 with the worthy hands of Mr. P.M. Shah, DISH- Director Industrial Safety & Health, Government of Gujarat and Mrs. Sandra Shroff, Chancellor, UPL University of Sustainable Technology, in the presence of Mr. Ashok Panjwani, President, UPL University, Mr. Bhupendra Dalwadi, CEO, BEIL Ltd. And Prof. Dr. Shrikant Wagh, Provost, UPL University. In this ceremony, Dr. Omprakash Mahadwad, Dean-Engg, Dr. Snehal Lokhandwala, Dean-Sciences, Mr. Dharmesh Patel, Registrar, Head of all departments, faculties and students were present.

On the occasion of inauguration, the training of fire fighting system was given to the students.

Students of SRICT and SRICT-ISR were felicitated by the Hon. Mr. P. M. Shah (Director, DISH, Govt. of Gujarat) for successful completion of the "Basic Awareness Training Program on Fire and Safety", which was organized by the Centre of Excellence (CoE) at SRICT. Total 279 students had participated in this training program.



CoE members involved in one of the fundamental tools for managing change are the Pre-Start-up Safety Review (PSSR) at BEIL Dahej incinerator plant for 28th to 30th April-2022.

Massive Fire in Atul Plant, No Casualty



A massive fire broke out in a chemical plant at the industrial campus of Atul Limited in Valsad.

6 Killed in Fire at Chemical Factory in Andhra Pradesh



Six people were killed & 12 injured in a huge fire & reactor blast at a chemical factory in andhra Pradesh 's Eluru district.

Explosion at Nigerian Illegal Oil Refinery Kills More Than 100



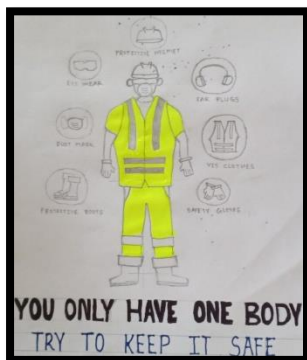
More than 100 people were killed overnight in an explosion at an illegal oil refining depot in Nigeria's Rivers state.

ELEMENTS OF PROCESS SAFETY

In the 1st Issue of SAFEXCELLENCE, SRICT CoE has selected 17 process safety elements and based on these elements and published literature, an attempt is made to analyze the disasters taken place during the month for the probable cause/s. SAFEXCELLENCE team points out the missing process safety element/s in the events that happened.

MISSING PSM ELEMENTS WHICH CAUSED The Accidents, March-April 2022

Accidents	Missing PSM elements																
Toxic Chemical Fumes leakage from Tanker in, GIDC Surat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire in printing and dyeing mill Palsana, Surat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Durgapur Steel Plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at firecracker factory, Sivakasi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Toxic gas leak from Truck	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Secunderabad	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire at Winston Weaver fertilizer plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Massive Fire At Thermocol Factory In West Bengal's Howrah	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
5 labourers killed as portion of under-construction building collapses in Pune	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Six killed, 12 injured in factory fire in Himachal's Una	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
4 Dead After Fire Breaks Out At Factory In Japan	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17



Use Personal Protective Equipments



SpaceX Rocket Blasts off for International Space Station with First all-private Crew



A SpaceX rocket ship blasted off carrying the first all-private astronaut team ever launched to the International Space Station (ISS), a flight hailed by industry executives and NASA as a milestone in the commercialization of space flight.

Indian National Dead, Seven Others Injured as Explosion Hits Oxygen Plant in Nepal



Kathmandu: An Indian national died and seven others were injured as an explosion hit an oxygen plant in an industrial area in Lalitpur district near Kathmandu.

Dust Explosion Hazard in Powder Handling



Gopal Gajananrao Pishe
Manager HSE, UPL Ltd.

1. Introduction

In most of the Industries, Powder Handling is one of the inevitable part of Operations. Due to inadequate unawareness about Safety Hazard of Powder Handling among the people, this part normally gets ignored.

If we refer Industrial Accidents across the Globe, there are many incidences happened due to abnormality in Powder Handling. Powders are complex. One powder may be hazardous while another with the same composition may not. There are many hazards associated with Powder Handling. It is having Health Hazards like toxicity, irritant, Chemical Hazard like Reactivity and Explosion & Fire Hazard.

Most of the times people believes that "I've worked with this material a lot it doesn't burn"

2. Dust Explosion

A dust explosion is the rapid combustion of fine particles suspended in the air, often but not always in an enclosed location.

Conditions that are required for Dust Explosion to occur

- Presence of Combustible Material / Dust / Vapour
- Ignition Source
- Oxygen
- Dispersion of Dust Particles in sufficient Quantity & Concentration (Between LEL and UEL)
- Confinement of the Dust Cloud

3. How do we know if Dust is Explosive?

“Any particle that has a minimum dimension of less than 500 microns could behave as a combustible dust if suspended in air.”

- Reference NFPA 484-2012 A.3.3.6.1

To evaluate combustibility of dust below are some important tests:

Burning Test

- For evaluating the combustibility of material (what extent a fire started by an external source will propagate in a dust layer of a dried product.

Ignition Test for Airborne dust

- For determination of the minimum temperature at which a given dust cloud auto ignites at a Hot surface

Lutolf Oven - DTA Open Cup

- For determination of the lowest temperature at which a substance shows a exothermic reaction.

Greuer Oven

- For determination of the lowest temperature at which a substance shows an exothermic reaction in a fresh air stream.

Dust Explosion Test

- For determining explosiveness of dust and violence of explosion, It gives explosion class

Percussion test

- For evaluating the sensitivity of percussion (Impact sensitivity of a material upon its exposure to impact energy)

Gas Evolution test

- For determining the amount of gas evolved on decomposition along with flammability of the gases of decomposition.

Hot Storage Oven

- For determining the lowest temperature at which, a substance shows an exothermic decomposition under insulated conditions (Accumulation of Heat)

Minimum Ignition Energy MIKE

- For determining of the lowest energy required to ignite the dust / air mixture

Powder resistivity

- For determining the importance of static charges as hazard

4. Major accidents in Industries due to Dust Explosion

Source: www.csb.gov



Imperial Refinery; Savannah, 2008



West Pharmaceutical Services, Kinston, 2003

5. Important considerations to avoid Dust Explosion

If flammable content in the powder is more than 0.5%, powder to be handled with precautions of Handling a Solvent.

If the solvent content in the powder is between 0 to 0.5 % and if the product is stored for period in large volumes in a silo or vessel without Special ventilation after size reduction then formation of Solvent / Hybrid mixture expected and must be inerted positively.

If particle size is more than 500 Micron and fines in it less than 10 gm / m³, then presence of explosive atmosphere not expected.

If Particle size is less than 500 Micron and fines in it is more than 10gm / m³, then check for its MIE, If the MIE is more than 1 J then ignition due to static is not expected. However other sources of ignition needs to be controlled.

If Particle size is less than 500 Micron and fines in it is more than 10gm / m³, then check for its MIE, If the MIE is less than 1 J then Earth all conductive plant components, vessels and containers including those capable of discharge.

If Particle size is less than 500 Micron and fines in it is more than 10gm / m³, then check for its MIE, If the MIE is less than 30 m J then Earth all conductive plant components, vessels and containers including those capable of discharge.

Also all personnel must be grounded by means of conductive footwear and flooring where explosive concentrations are present.

As Particle size decreases, MIE also decreases.

As Temperature increases, MIE decreases.

If the powder resistivity is < 10¹⁰ ohm, it is Conductive.

If the powder resistivity is > 10¹⁰ ohm, the powder is not conductive and there are high chances of explosion if precautions are not taken.

If the Explosive atmosphere cannot be avoided, then

- Provide inerting
- Avoid ignition source

In case of mixing operation and during emptying and filling, the tip speed of the ribbon should not be more than 1 m/s

While charging a powder into a flammable solvent, Charge the material at below the Flash Point of the Solvent. Purge the vessel with Inert gas and maintain Oxygen content below LOC. Do earthing & bonding of the vessel & Charging system. Use closed Charging system.

**Gopal Gajananrao Pishe
Manger HSE, UPL Ltd.**

Mitigating Electric Arc Flash Hazards



Praful Chudasama
Assistant Professor, S.R.I.C.T.

1. Introduction

While the threat of shock and electrocution from inadvertent contact with energized parts has long been recognized, the arc flash and arc blast hazards have only fairly recently been incorporated into the electrical safety standards. The Occupational Safety and Health Administration (OSHA) enforces electrical workplace safety standards outlined in the National Fire Protection Association’s NFPA 70E: Standard for Electrical Safety in the Workplace.

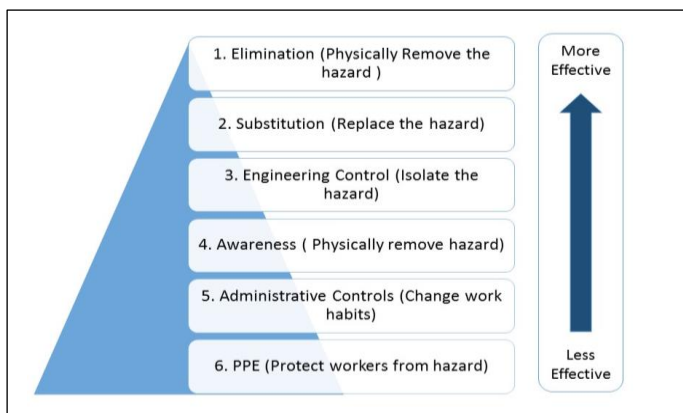
Basic compliance to the requirements of NFPA 70E is established through a six-step process:

1. Develop and audit electrical safe work practices policy.
2. Conduct an arc flash risk assessment to evaluate the likelihood of occurrence and severity of arc flash hazards.
3. Follow strategies to mitigate and control arc flash hazards.
4. Conduct regularly scheduled safety training and audits for all electrical workers.
5. Maintain electrical distribution system components.
6. Ensure adequate supply of personal protective equipment (PPE) and proper tools.

2. What is Arc Flash Mitigation?

According to Webster’s dictionary, mitigation is defined as, “to make milder, less severe or less violent”. When applied to electrical workplace safety, arc flash mitigation involves taking steps to minimize the level of hazard and/or the risk associated with an arc-flash event.

ANSI Z10-2012, Occupational Health and Safety Management Systems, released a hierarchy of arc flash mitigation controls, as shown in Figure.



3. Reduce Arc Flash Energy Levels:

Arc flash reduction systems do not eliminate the electric shock hazard of working on or inside energized equipment. The amount of arc flash energy reduction will be determined by an engineering analysis.

The goal of reducing arc flash energy levels is to reduce the severity of the potential arc flash hazards to which a worker may be exposed. Personal protective equipment (PPE) is required when an arc flash energy reduction system is employed, but the level of PPE may be reduced.

Obviously, too little PPE can increase the worker’s exposure to burns and injury. Too much PPE can also have a detrimental effect such as heat stress, loss of motion and visibility, and carelessness due to rushing the task at hand.

$$\text{Energy} = \text{Volts} \times \text{Amps} \times \text{Time}$$

$$\text{Faster clearing time} = \text{Lower Energy}$$

4. The Role of the Circuit Breaker or Fuse in Lowering Arc Flash Energy Levels:

Why is a circuit breaker or fuse always considered in the arc flash analysis? Because arcing time is the key determining factor for arc flash energy. Per the equations in IEEE Std. 1584-2002, arc flash incident energy varies linearly with time. If the duration of the arcing fault doubles, the available energy doubles; halve the duration and you cut the energy in half. Since incident energy is proportional to arcing time, the use of faster-acting devices is key. As a result, proper selection of overcurrent protective devices – in particular, selecting devices that will quickly clear arcing faults from the power system.

5. Specialized Relaying, Such as Optical Technology:

Quickly clearing faults is a key to arc flash mitigation. Circuit breaker or relay settings near the source of power may have significant time delays to allow for coordination of downstream devices. A relatively new way to address this issue is to use relays that detect the presence of arcing faults by looking for the flash of light associated with the arcing fault in addition to the characteristic current flow.

Delhi: 9 Injured At Cylinder Blast In Anand Parvat Industrial Area, Five Wounded In Azad Market Fire



New Delhi: Nine people were injured in a cylinder blast during a firefighting operation at a factory in Anand Parvat Industrial Area, reported news agency ANI.

Eluru Blast: Prosecute Management, Officials for Lapses, says Human Rights Forum



VIJAYAWADA: The Human Rights Forum (HRF) has demanded that the chemical plant of Porus Laboratories located in Akkireddigudem village in Musunuru mandal, Eluru district, where a blast occurred on the night of April 13 that resulted in the death of six workers, be shut down permanently.

6. Virtual Main Arc Flash Mitigation System:

Switchgear and switchboards can be subjected to dangerous levels of arc flash incident energy when fed directly from a power transformer. The addition of a virtual main system reduces the arc flash energy on the entire switchgear, including the main incoming section. Digital relay and overcurrent sensing are added to the low-voltage side of the service transformer and are designed to trip an existing upstream fault breaking device, often a medium-voltage circuit breaker or other vacuum interrupter.

This mitigation solution can take one of two forms:

- A maintenance selector switch, which temporarily lowers the instantaneous short circuit current setting. The maintenance setting lowers the available arc flash incident energy and temporarily forfeits selective coordination.
- Zone-selective interlocking with downstream branch circuit breakers in the switchgear eliminates the need for the maintenance selector switch. Arc flash energies can be permanently reduced with zone-selective interlocking.

7. Remove Workers from Harms Way:

- **Infrared Viewing Windows:** Having infrared (IR) windows permanently installed into electrical equipment enables IR scans to be performed without exposing the worker to hazardous energy. IR windows are made of a glass-like material that is transparent to infrared rays and allows hot spots to be registered by a thermographic camera. They also facilitate permanent access for inspection of electrical components without disturbing operations.
- **Online Temperature Monitoring:** Online temperature monitoring, via wireless sensors, provides 24/7 access to critical connection points where traditional thermography cannot be used. This technology evaluates the equipment's current condition without exposing workers to energized parts since equipment covers do not have to be removed.

8. Conclusion:

Electrical hazards are a significant safety and financial risk for electrical workers and their employers. OSHA mandates that work on electrical equipment must be performed in a manner that does not expose the worker to undue risk of injury. Complying with the safe work practices dictated by NFPA 70E and implementing arc flash mitigation strategies through engineering controls will enhance workplace safety for employees and reduce the financial risk for your company.

Praful Chudasama
Assistant Professor,
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**TRAINING PROGRAMME ON PROCESS SAFETY
MANAGEMENT**

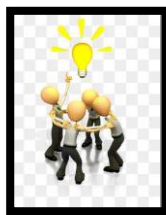


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