SEA (INDIA)

INDIAN SAFETY ENGINEER

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Factory Visit to GMR Corporation, Chennai

A Factory Visit was organized to GMR Power Plant, Chennai on 25th July 2009. Fifteen SEA members participated. Mr. Sonney George, Fire & Safety Manager of GMR Power Corporation who is also a Member of SEA (India) coordinated the visit. Video presentations were made about the factory and Safety & Environmental management systems were explained. The visitors were taken on a walkaround tour of the power generation plant, utilities and other auxiliary units and tankfarm area. During the feedback session, SEA members offered their safety observations & recommendations to GMR's senior officials. Mr. Rakesh Kohli, General Manager (O&M) and Mr. Marappan, AGM (Materials) thanked SEA members for their useful observations and agreed to consider them towards improving their safety practices. Finally Mr. S. Ulaganathan, Jt. Secretary, SEA (I) proposed a formal vote of thanks to Mr. S. Ravishanker, Vice President, Mr. Sonney George, Fire & Safety Manager and other officials of GMR Power Corporation. Members who participated in the factory visit gave a positive feed back that some of the safety practices followed in GMR Power Corporation were good for consideration and requested SEA to organize more such factory visits, once a quarter.

Inside....

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NEBOSH COURSE – SEPTEMBER 2009

BATCH-I

BATCH-II

NEBOSH Course Update

Thirty Nine students attended the tutorial classes conducted for the NEBOSH International General Certificate course during 27th August 2009 to 6th September 2009 and appeared for the examination held on 9th and 10th September 2009. Some of the resit candidates also appeared for the examination. This time, as discussed in the Tutors review meeting, more number of class tests and model exams were conducted. Students welcomed the idea of writing more tests, as it gave them an opportunity to bring back their speed writing practice after several years. Students were advised to enhance their writing skills to the extent of answering the questions in a way most preferred by NEBOSH. Results of these examinations have come out in November 2009 and more than 60% have come out successful.

Dr. S. ANANDAN, Dean & Head of Dept. of Dermatology & Venereology, SRU inaugurated the Nebosh classes

Admissions are open for the next NEBOSH IGC examination scheduled on 3rd and 4th March 2010. Already enrolment letters have been sent to a number of aspiring candidates. SEA (India) encourages its members and other safety engineers in pursuing this international qualification to enhance their professional knowledge and career prospectus. All those aspiring to join this course for writing the forthcoming examinations can contact the Secretary (email: info@seaindia.org) at the earliest to ensure getting admissions, as only limited seats are available.

FROM THE DESK OF PRESIDENT

Dear members,

One more set of NEBOSH course tutorial was conducted to two batches during August - September 2009 and the feedback from the participants are good and encouraging. Enrollment for the next two batches towards March 2010 examinations are in progress and the limited seats available are fast getting filled up. We had our 47th Executive Committee meeting held on September 21, 2009. Journal for the II Quarter of 2009 had been released and the combined issue of the III and IV quarters is under publication. Still the response from the members towards bringing out the journal is poor and all are advised to actively participate by sending HSE news items, case studies, technical advancements in safety etc. to the editorial board. Two Technical Meets were conducted during the period. First one was "Occupational Diseases – Measures to prevent & control" and the second one was on "Behaviour Based SafetySystem – Safety Engineers' Success Tool". Members are encouraged to participate in large numbers and get benefitted from the Technical Meet programmes. A factory visit to GMR Power Corporation was organised on 25th July 2009 and many members have participated and made use of it. The committee is working out to organise next factory visit to Southern Railway workshop at Golden Rock, Trichy during February 2010. Members may get ready and wait for further communication from Secretary. I am happy to inform you that our www.seaindia.org website is being given a facelift by a service provider and is expected to be ready shortly.

Members are advised to continue the safety professional discussions in all possible forums and participate actively in the activities of SEA (India).

Best Wishes.

R. Thiruvengadam
President, SEA India

21st TECHNICAL MEET

Dr. V.S. Ananthan, MBBS, DTCD, AIFH, Senior Pulmonologist & Occupational Disease Centre in Charge, ESIC Hospital, KK Nagar, Chennai was the speaker of the Twenty First Technical Meet programme held on 10th October 2009.

His presentation included number of case studies that were reported to ESI hospital, Chennai. He pointed out that most of the cases were brought to the hospital only at advanced stages where the situations had already reached beyond recovery. Hence he emphasized that early detection of occupational diseases would help in curing the illness and also in working out preventive and control measures for the occupational diseases concerned.

Gist of his presentation on "Occupational Diseases – Measures to Prevent & Control" is brought out as follows:

Some of the occupational diseases in Industries:

1. Byssinosis	Cotton & Textile industries
2. Silicosis	Cement, glass, ceramic, foundries
3. Lead poisoning	Storage battery, alloys, printing press
4. Chrome Ulcer	Leather tanning, chrome plating, paint, dyes
5. Skin diseases	Chemical industries, solvents, cement
6. Organophosphorous	Ferilizer & insecticides
7. Asthma	Cotton, wood, nickel, rubber industry
8. Occupational cancer	Asbestos, dyes, exposure to radiation
9. Asbestosis	Asbestos miners, manufacture of asbestos sheets, brake lining, railway workshops
10. Bagassosis	Agricultural & related industries

Some illustrative cases of Occupational Diseases:

1. **Silicosis:** It is an occupational Lung disorder caused by inhalation of silica dust. Some of the industries where this can occur – Ceramics, Insulator manufacturing units, Stone crushers, tile industry, quarry workers, pottery, Agate (stone polishers), cement industry, miners, etc.

2. **Bysinossis:** A respiratory disease resembling exclusively seen in cotton mill workers & jute & coir industry.
3. **Chrome Toxicity:** Chrome is a carcinogen (causing cancer). Seen in chrome platers, leather industry. More commonly it produces small slow healing ulcers in the fingers & hands.
4. **Lead Poisoning:** Lead can affect all systems – blood formation may be affected producing anaemia. Paralysis of the peripheral nerves. Abdominal pain (lead colic), can produce FITS, can affect kidneys – renal failure. The industries where exposure can occur – storage battery manufacturing units, petroleum industry – lead added as "Anti-knocking agent". Lead exposure can also occur in paint industry, rubber industry & in welders. Above all lead is an important environmental pollutant.
5. **Manganese toxicity:** Manganese affects the central nervous system – produces rigidity & tremors. Exposure can occur in a welder & also in the manganese miners. It produces a progressively crippling nervous disorder called Parkinsonism.
6. **Methanol toxicity:** Methanol is widely used industrial solvent. Exposure can lead to complete blindness.

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21st Technical....

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General principles in the control & prevention of occupational diseases

This means that occurrence of occupational disease or death calls for intense survey and strengthening of control measures to avoid further recurrences.

This would include :

- Walk through surveys
- Audits & Inspections
- Notification
- Education & Training
- Administrative / Punitive Actions

Exposure to toxic substances can be controlled as follows:

I. Control at the source

II. Control at the pathway / transmission

III. Control at the receiver (worker)

I. Control measures at the source

1. Substitution (e.g. silican carbide in place of silica in grinding stone)
2. Engineering control (e.g. Change in process – wet methods)
3. Local exhaust ventilation i.e. capturing at the source
4. Adequate maintenance programme
5. Monitoring instruments and protective guards

II. Control measures at the airpath during transmission

1. Environmental monitoring (by industrial hygienist) / Administrative control
2. Housekeeping
3. Dilution ventilation
4. General exhaust ventilation
5. Increase distance between source & receiver by semi automatic, remote control, robots
6. Alarms
7. Engineering control (provide barriers)
8. Adequate maintenance programme

III. Control measures at the receiver (worker) end

1. Personal Protective Devices (PPD)
2. Training & Education
3. Rotation of workers (Split up of toxic dose)
4. Personal monitoring device – Dosimeter, personal air sampler etc.
5. Administrative controls
6. Pre-placement medical examination
7. Periodic medical examination

Some equipments used by Industrial Hygienists

1. Anemometer – Air velocity – ventilation measure
2. Noise Dossimeter – Noise level measure
3. Air samplers – Area & Personal
4. Lux meter (Light Intensity)
5. Heat stress monitor (Dry & wet bulb thermometer & gata thermometer)
6. Gas analyser
7. Spirometer (Measures lung function)
8. Audiometer (Hearing capacity)
9. Complete vision tester – Acuity, color vision & field vision (all in one)
10. Stethescope, BP apparatus

Summary

All occupational diseases are preventable. Also it is important to detect the disease early and remove the person from the hazardous atmosphere so that we can check the progression of the disease. However some occupational disease like silicosis continue to progress even after the exposure has ceased or the worker removed from the hazardous place. So it is vital to keep silica levels in the working general environment to acceptable safe levels – called "Threshold Limit Values". This can be done by engineering controls like wet methods, good ventilation, environmental monitoring & periodic medical examination of the exposed workers etc. Some diseases like Mesothelioma (cancer of the lung covering called "pleura) can occur even after a single exposure to even a single asbestos fiber. So it is vital to withdraw such substance altogether. ■

PICK UP TIPS ON HOW TO LIFT SAFELY

If your work involves lifting, you are likely at some risk of injury, especially to your lower back. Whenever possible, try to eliminate the risk by revisiting the work methods – reduce awkward postures and forceful movements. Reduce the weight, lifting time, distance the item is carried, and the repetitive nature. While it may not be realistic to completely eliminate all of the risks associated with lifting, the number and the severity of injuries may be greatly reduced by implementing the following safe work practices.

Prepare and plan for the lift

- Wear lightweight tear-resistant clothing, safety boots with toe caps and slip-resistant soles, and protective gloves
- Warm your muscles up with gentle stretches before you lift, especially if it is cold or if you have been sitting for a period of time.
- Test the load for weight and shifting contents by pulling or sliding it towards you. This will give you a good idea of how much it weighs and if you can lift it without over-exertion.
- Know the contents of the package if possible so that you can determine the proper lifting and lowering techniques to use.
- Get help with heavy or awkward loads. If available, use equipment such as hoists, lift trucks or carts to help with the lift.
- Know where you are going. Check that the path where you will travel is clear of obstacles and debris.
- Plan where to set the load down. Place loads on raised platform to avoid bending.

Lifting technique tips

- Stand close to the load and face the way you need to move. Stand with your feet shoulder-width apart to give you the best balance.
- Get a good grip on the load using your full hands (not just fingers), and grasp opposite corners to avoid dropping the object.
- Slide the object toward your stomach (around the navel), and tighten your abdominal muscles in preparation for the lift.
- Tuck your chin into your chest.
- Lift smoothly, keeping your back straight, and hold the load as close to your body as possible.
- Whenever possible, avoid bending. If bending is necessary, keep the natural curve of your back and bend your knees to reach or place low-level objects.
- To move and change direction, move your feet and turn your whole body. Step or pivot, but don't twist or side bend.
- Keep the load between shoulder and knee height. Avoid over reaching.
- Take time to stretch, relax and rest your tired muscles to recover your strength between lifts.
- Rest more often when it is hot and humid.
- Repeated and long lifts are the most tiring so be sure to switch between heavy loads and lighter ones.
- Employees should regularly review and train employees on safe lifting methods including some exercises. ■

FIRE SAFETY IN CABLE GALLERIES

How Fires Occur in Cable Galleries:

The causes of cable fires are not unique or mysterious. There are basic fire safety issues which are all familiar to everyone. Common causes are electrical breakdowns, welding and cutting, electrical arcs igniting the coal dust or other combustible dust on the cables, poor housekeeping and external ignition sources, which are within the ambit of good engineering and management practices.

Typical Problems of Fighting Cable Gallery Fires

Smoke produced either by combustion of cable insulation or by degradation and chemical breakdown of overheated insulation poses many problems for fire fighters.

Thick smoke obscures the seat of fire and also access ways. Fire fighting action is often delayed because of these reasons. In a cable gallery fire at a chemical factory, fire fighters could not even enter the cable gallery for hours because of smoke obscuring the approach and they had to handle the hose streams blindly through the smoke. Hot smoke travels easily upwards towards control panel rooms above the gallery (through unsealed cable passes) and ignites combustible materials there, thus creating multiple fires to fight. The speed of flame spread in the PVC sheathed cables is significant. The flame is self propagating at about 1m/minute in horizontal run and nearly 20 m/minute in vertical run. The rapid propagation of fire is challenging in fighting cable fires.

Further, the decomposition (due to heat or fire) of the outer PVC sheath of cables releases toxic smoke containing highly corrosive HCl gas, and even traces of highly poisonous gas, Phosgene and other substances having carcinogenic effect. One kg of plasticized PVC with a 35% chlorine content is known to emit 360 gm of HCl gas which forms one litre of concentrated hydrochloric acid in presence of water vapour. Combustion products may include CO and CO_2 also. Fire fighters need to protect themselves with gas masks or self contained breathing apparatus. Many times the smoke and toxic products of combustion render manual fire fighting extremely difficult.

Fire Control Measures

Fire-resistant cable insulation

Use of fire-resistant kind of insulation for power, control and signalling cables is one effective measure of controlling the spread of fire. Fire resistant materials are recommended for cable servings also. Mineral insulated, metal sheathed, metal clad or armoured cables resist fire spread by their design. These and other cables found to resist fire spread in appropriate test, can be installed in cable trays with low fire risk such as: Thermoplastic or thermosetting. Insulated cables present higher fire risk. The flame retardant type PVC sheathed cables reduce the risk significantly when they conform to required specification.

Fire Separation/Segregation and Control of Fire Spread

Cable insulation is not the only factor to be controlled for eliminating the potential fire hazard in a cable gallery. A mechanism for quickly identifying any incipient fire problem and promptly controlling the situation is essential.

Towards this end, as a first step, the cable gallery should be isolated from other fire areas either spacially or by means of fire walls or fire resistant enclosures of at least 60 minutes fire resistance. Very long cable galleries need to be compartmented to localize the fire and restrict its spread. This can be done by providing fire walls at intervals of not more than 30 meters and sealing the openings around the penetrations by fire resistant materials. The fire rating of these materials and the fire doors for the entrance and exit should match with that of the fire walls. The fire walls may also have fire check doors to facilitate inter-compartment movement.

It is always safe to have horizontal cable tray arrangement such that the trays are separated as much

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Fire Safety....

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as possible and to avoid multiple cable trays stacked one above the other wherever possible. The multilevel cable tray arrangement require protection to prevent fire originating in one cable tray from spreading to others above it.

It is important that cable segregation should also include separation of power cables from control, instrument and communication cables. Such separation can be achieved by installing them in separate cable trays separated by a fire resistant barrier. Regarding power cables, generally, cables rated over 600 V should not be grouped with lower voltage cables. In multilevel tray installations, power cables may be installed in the top trays, with cables of different voltages stacked in descending order with highest voltage cables on the top. Signal and instrument cables are preferred in the lowest tray.

Cable trays should be constructed of sheet metal and earthed. It is necessary that electrical continuity of various section (covers, side rails or equivalent structural members, extensions, branches, fittings for changes in direction and elevation of runs) of the cable trays is maintained by earthing all connected sections. As metal trays are susceptible to corrosion, they should be adequately protected against corrosion, by painting or other means. In highly corrosive areas, the trend is to install non-metallic cable trays.

In principle, cable routes should avoid risks of exposure to high temperature such as steam pipes, circulating lub coil pipelines, boiler gas ducts, etc. Such risk is virtually non-existent in cable galleries.

Fire Detection System

Cable gallery should also be provided with automatic fire detection system to detect fire in incipient stage and give alarm for prompt action. Fire detection may be by Linear Heat Sensitive Cable (LHSC) laid along the length of the tray or by detector heads on the sealing.

Fire Extinguishing System

The agglomeration of cables in the gallery and as a consequence the large volumes of smoke and / or toxic products of combustion render manual fire fighting extremely difficult. Hence there is need for fixed automatic fire protection throughout the gallery in the form of wet pipe sprinkler system, water spray, or CO_2. Water and high expansion foam can also be applied manually. Fire hydrants and other fire fighting equipment should be located at entrances of cable gallery. Water is considered very effective on cable fires since water cool, suppresses gaseous products of combustion and extinguishes the flame.

The choice of fire protection system for cable gallery is influenced by its layout and design and on the type and duty of cables. Although automatic sprinkler system is the basic protection against fire spread in any occupancy, it may not be effective with a fast spreading fire. For this reason, this form of protection may be suitable only for single cable tray run with fire resistant or non-fire resistant cable, but may not be quite suitable for cable gallery where non-fire resistant cables are laid in group on cable trays. In view of obstructions inherent in multiple ties of cable trays and high cable congestion, specially designed deluge water spray system is required to cope up with the fire spread problem in such tray configuration. The system consists of a number of spray nozzles mounted on piping work spanning all the horizontal and vertical stretches of cable trays. Depending on the size, cable galleries are sometimes divided into zones, each zone controlled by a deluge valve assembly connected to fire detection and alarm system corresponding to the zone. This arrangement facilitates operation of nozzles within the zone area instead of all the ones in the entire cable gallery area and avoids flooding of the total area.

Water Drainage

Cable gallery floor should have a slope towards a sump provided at a corner with a sump pump so that dewatering is possible at all times and especially during fire fighting with water. ■

BEHAVIOURAL SAFETY IS BECOMING INCREASINGLY SUCCESSFUL – WHY?

Unsafe acts account for approximately 88% of accidents, followed by unsafe conditions (10%) and acts of providence (2%). Unsafe acts result from unsafe behaviour. In an analysis of management-system faults that trigger accidents, unsafe behaviour is the most common, while tracking injury-related incidents. The incidents themselves are the result of actions taken by one or more people.

Although tracking incidents is important, measuring the potential for incidents to occur also is important.

A proactive approach measures safety in terms of ongoing behaviours and measures how often employees perform "safe" vs. "at-risk" behaviours on a daily basis. This approach is most effective when behaviours that relate to previously incurred incidents are studied.

For example, review of injury records showed a high occurrence of hand-related injuries. Knowing that appropriate use of gloves should prevent those injuries, a behaviour-based safety process measures how often employees wear gloves in situations warranting their use. By observing conformance to this safe behaiour (i.e. use of gloves during critical times), remarkable reduction in hand-related injuries can be achieved. With the appropriate use of gloves, it can be ascertained that "No hand-related injuries" is achievable.

Behavioural safety is a safety process in which the workforce really particpate in it. This systematic behavioral-safety process can be implemented and monitored such that both management and the work force receive feedback. The intention is to focus workers' attention and action on safe behaviour to avoid injury. Interventions are aimed at observable interactions between safe behaviour and the working environment.

Behaviour based safety was a major safety initiative introduced in early 2000. This initiative focused on improving performance by targeting people's behaviour. Unsafe behaviour triggers most workplace incidents. People often behave in an unsafe manner because they perceive that "cutting corners" make their job easier, yet will not result in injury or incident. However, these "shortcuts" can result in serious accidents with severe injuries. Eliminating all incidents by means of engineering solutions and management procedures appears ideal. However, these strategies do not always work as intended, simply because it is the individual who chooses whether to adhere to safety or take a risk. Behavioural safety targets these types of behaviours to reduce the number of incidents, with the aim of achieving a zero accident rate.

Behavioural safety attempts to identify unsafe behaviours that are implicated in the majority of injuries. These behaviours and/or proxies (e.g. hoses, left lying across walkways) are developed into specific behavioural check-lists. Trained observers are assigned to monitor and record people's work behaviour on a regular (even daily) basis. Scores provide feedback to enable tracking of improvement goals. Feedback mechanisms include verbal feedback at the point of observation, graphical charts, and/or written performance summaries with corrective actions to be taken. Results indicate that significant reductions in injury rate are possible within a relatively short time, with the effect lasting for many years.

People take action on the basis of events that come before behaviour (antecedents that

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Behavioural ....

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direct) and events that come after behaviour (consequences that motivate). The active part is the consequence, and people will behave either to avoid unpleasant consequences or to receive pleasant consequences.

The behavioural-safety process can provide tangible benefits including a reduction in total recordable incident rate and lost-time incident rate.

Effective communication is key to successful implementation of the behavioural-safety process. Behavioural safety focuses on proactive monitoring.

Building a confident attitude requires becoming aware of the principles that build positive attitude, promoting a desire to be positive, and cultivating the discipline and dedication to practice those principles.

Managerial commitment includes engaging in and maintaining behaviours that help others achieve a goal. Measurement can be taken in two ways: Direct questions asked to managers or monitoring their commitment to behaviours. Few managers admit they are committed to safety when asked, whereas behaviour provides the ultimate proof of commitment. The managerial commitment is directly proportional to employees' safe behaviour.

Senior-management's commitments play a crucial role in shaping employee behaviours. They also shape lower-management's behaviour which in turn, influence employee's behaviour.

Steps to be taken by senior management are as follows:

1. Meet with the heads of departments to ensure closeout of remedial actions including all safety-action items.
2. Discuss safety with employees, one-to-one.
3. Review permit-to-work deviations.
4. Discuss safety as first item on meeting agenda.
5. Review the number of incidents in each department.
6. Undertake plant-safety walkabout.
7. Actively support closeout of identified concern areas.
8. Conduct follow-up tracking and ensure timely closeout of process-related root-cause-of-failure analysis.
9. Review safety-device-bypass log book.
10. Conduct and promote safety coaching.
11. Review weekly progress status of the behavioural-safety process for all departments.

A positive attitude leads to safe behaviour by all. Each phase has achievable targets with effective levels of observations. Observers are nerve centres of the behavioural safety process. Also essential are strong management commitment, support and dedicated coordination.

A dedicated coordinator guides the organization to implement the program. Behavioural safety always focuses on the situations (issue and behaviour only) treats people with respect, and provides constructive feedback to all personnel. Observation is the crucial element in achieving 100% safety.

Motivation is most important for promoting positive culture. A new method of motivation will not work until the demotivating factors are removed. Many times, simply removing demotivating factors can start motivation. ■

IN THE NEWS

Tackling climate change through standards – 40th World Standards Day – 14 October 2009

World Standards Day is celebrated each year on 14 October to pay tribute to the effort of thousands of experts worldwide who collaborate within International Electrotechnical Commission (IEC), International Organization for Standardization (ISO) and International Telecommunication Union (ITU) to develop voluntary International Standards that facilitate trade, spread knowledge and disseminate technological advances.

In its groundbreaking report published in 2007, the Intergovernmental Panel on Climate Change (IPCC) cited technical standards, like those published by the IEC, the ISO and the ITU, as a means of mitigating climate change row, while offering the potential to reduce its effects in the future as new technologies are developed and mature.

This message is also at the core of this year's theme for World Standard's Day on 14 October: **"Tracking climate change through standards".**

Increasing human activities and increasing greenhouse gas emissions are raising the earth's average temperature and consequences have an impact on climate change. Experts and scientists agree to say that a dramatic climate change would have enormous developmental, economic, social and environmental stresses on our planet.

The World Standards Day message is signed by the leaders of the three principal international standardization organizations.

A portfolio of adaptation and mitigation actions is required to reduce the risks of climate change. International standards are tools to address this challenge.

The three leaders point out: The three global organizations are coordinating their work to ensure that government business and society are provided with the necessary tools to help combat global climate change and to support the reduction in greenhouse emissions by increasing energy efficiency, while facilitating sustainable development".

All sectors of the economy, each consumer, every politician and every individual is concerned with actions big or small to fight climate change. The leaders of IEC, ISO and ITU expose in their message how International Standards support them: "The IEC, ISO and ITU offer a system of standardization whose output includes standards for the following aspects of the fight against climate change.

- Monitoring and measurement of greenhouse gas emissions.
- Measuring the carbon footprint of networks and products
- Designing and building energy efficient homes and workplaces
- Benchmarking for good practices including environmental and energy efficient labeling.
- Promoting good practice for environmental management and design, and for energy management
- Disseminating innovative technologies that promise to help reduce the effects of climate change
- Fostering the introduction of new energy-efficient technologies and services.

The three leaders conclude their message: "Standards from the IEC, ISO and ITU offer the world's government and industry the best possible benchmarks to be referenced in any policy making decisions or future climate treaties. The three organizations are working together with other international organizations to ensure that participants at the upcoming United Nations Climate Change Conference on 7-18 December 2009 in Copenhagen, Denmark, will be fully aware of the solutions offered by existing and future International Standards.

IN THE NEWS

CSB Investigative Team to examine Hydrogen Fluoride release from ExxonMobil Refinery in Illinois

A four-member investigative team from the U.S. Chemical Safety Board (CSB) is deploying to the site of a release of propane and hydrogen fluoride at the ExxonMobil Refinery in Joliet, Illinois.

At approximately12:30 on August 8, 2009, there was a sudden release of propane and hydrogen fluoride (HF) from the vicinity of a pump in the refinery's alkylation unit, which uses HF as a catalyst. The leak did not ignite, but one operator was transported to the hospital suffering from what were described as serious, HF-related chemical burns; he was initially reported in critical condition. A second operator was examined at the hospital and released. The unit's water deluge system, which is designed to contain airborne HF releases, was activated and the alkylation unit was shut down. Refinery personnel were instructed to take shelter inside their premises.

Chairman John Bresland stated: "We are concerned about the three apparent releases of hydrogen fluoride from refinery alkylation units in Pennsylvania, Texas, and now Illinois that had been reported since March 2009. Because of its high toxicity, any loss or primary containment for hydrogen fluoride is a serious matter". Recent reported releases include those at the CITGO refinery in Corpus Christi, Texas, on July 19, 2009, and at the Sunoco refinery in Philadelphia, Pennsylvania, on March 11, 2009. This CSB has an investigative team currently at the CITGO Corpus Christi refinery examining that incident.

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The agency's board members are appointed by the President and confirmed by the Senate. CSB investigations look into all aspects of chemical accidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management systems.

ISO and UNIDO reinforce partnership for sustainable development

The International Organization for Standardization (ISO) and the United Nations Industrial Development Organization (UNIDO) have signed a Memorandum of Understanding (MoU) to reinforce their partnership in favour of sustainable development.

The MoU was signed on 23 June 2009 in Vienna, Austria by the ISO Secretary-General, Rob Steele, and the UNIDO Director-General, Kandeh K. Yumkella.

This new agreement strengthens the long-standing strategic partnership between the two organizations in order to promote sustainable development and economic growth through standards development and implementation, capacity building and training, joint publications and related research.

Under this MoU, ISO and UNIDO will undertake joint projects including conducting of seminars and workshops at the regional, sub-regional and national levels on topics such as:

- Standardization practice
- Environmental and energy management
- Food Safety
- Energy use and energy efficiency
- Social responsibility
- Conformity assessment

ISO and UNIDO have a long and fruitful history of cooperation and the agreement will increase the effectiveness of their joint efforts and enhance coordination of their complementary and mutually supportive activities by encouraging the widest use of standards to assist developing countries and economies in transition benefit as they become more involved in the global economy.

The two organisations have collaborated to produce a new book on conformity assessment which will be published later this year.

CASE STUDY: Three crew members were scalded - One seriously, during a repair work on boiler feed water system

What Happened? Three crew members were scalded, one seriously, and one crew member sustained minor burns when they were splashed with hot water of very high temperature contained in the boiler feed water line , during the overhaul of the boiler feed water motorized control valve.

Background: The incident occurred in a ship that was returning after a scheduled maintenance jobs at Singapore harbour. The maintenance jobs included the repair of the boilers motorized control valves, on the boiler feed water line. However the repair was not completed in accordance with the original specification. After the vessel left the harbour and proceeding towards a destination, a moderate leak developed from the valve. The leak reduced after the gland packing was tightened, however, it did not stop completely.

The water in this line was at 135 deg C and at 8.9 Mpa pressure.

A daily job order was completed for the tasks. The Daily Job order had a risk assessment document attached to it. Line isolation and depressurization was part of the Daily job order.

The risk assessment documents showed the risk level as being Low for depressurization but failed to identify hot water as a hazard. A short meeting was held to discuss the procedure before the job, however, none of the hazards, safety aspects or precautions were discussed or reviewed at the meeting. The work culture on board and ashore did not promote questioning or querying the actions/ instructions of superiors.

The boiler was shutdown and the economizer was depressurized and the headers were drained. The line was isolated by shutting valves on the line. There was an 8 meter vertical section of insulated pipeline on the downstream side of the valve. The congested location, the unavailability of proper lifting equipment and the necessity to remove the valve bonnet vertically, made the job difficult.

When the crew resumed work after a break, some water trickled from the valve body. The water was at ambient temperature, and it was assumed that the all the water in the line would also be at the same temperature. This section of line did not have any facilities to drain. No alternative means to drain the line were considered. Due to necessity to remove the bonnet vertically four workers were required to hold the valve stem steady while it was extracted from the valve body. As soon as the valve and stem was removed from the valve body, very hot water gushed from the opening and drenched one crew member and splashed on to the other three workers. Although they were wearing leather gloves, boiler suits and safety shoes, they did not have any additional protection to protect from the hot water.

Immediate Corrective Actions: One worker was air lifted to hospital by helicopter, and two were taken away by boat the next day. One person remained in the hospital for two weeks and the other two were released next day.

Causes:

1. Very hot water remained in the line on which the crew members were working
2. The risk assessment that was conducted, did not properly and adequately categorize the hazards and the hazard was classed as low.
3. The crew members working on the job did not have any experience of doing such a job.
4. The company's Permit to Work (PTW) was not followed as intended.
5. The PPE worn at the worksite was inadequate to prevent injury.

Recommendations:

The following corrective actions / recommendations were identified in the investigation:

1. Means of drainage for the line to be investigated and installed.
2. Insulation material on line to be removed so that an accurate assessment of line contents can be made.
3. Accurate and complete compliance with the Permit to work system should be ensured.
4. Provide guidance on correct PPE to be worn for different jobs and at different locations.
5. The Daily Job order sheet to be revised to make it easier to understand.
6. Risk Assessment procedures to be revised in light of incident to make them easier to understand
7. Crew training to be provided for the Risk Assessment process.
8. Conduct fleet safety campaign to share findings to prevent recurrence.
9. Additional on board audits to ensure safety standards are being complied with.

Lessons Learned:

1. Unusual or infrequent jobs must be treated with special attention to ensure that all hazards are properly and correctly identified and preventative and mitigative measure are put in place to ensure that the job is carried out safely.
2. Experienced personnel should be assigned to assess, supervise and control any hazardous jobs.
3. Company procedures and processes should be written in a manner such that they are effective and are easily understood by people required to conduct the work.
4. Responsible personnel must be fully conversant with the company's Daily Job order form, Risk Assessment process and PTW procedures and requirements.
5. PTW is an important control in managing work safety. It must be complied with at all times.
6. Similar to isolation and depressurization, draining the liquid from the pipeline before breaking the line is essential. Drainage facilities are to be investigated and installed.
7. For safe operations, enhancing the company's fleet safety culture and promoting open communication is imperative. ■

SAFE USE OF LADDERS

Ladders have been commonly used to provide convenient access to a higher or lower level and to perform light duty tasks at height. Each year, many serious injuries result from falls from ladders. Over-reaching, trying to carry out heavy tasks or simply not setting the ladder up securely are among some of the common causes of falls.

While ladders are not prohibited by the Regulations, the Regulations do state that if an employer chooses a fixed or portable ladder to control risk of a fall, the employer must ensure that the ladder is appropriate for the task to be undertaken and is appropriate for the duration of the task and that it is set up in a correct manner.

The Regulations require if an employee is to undertake a task that involves the possibility of a fall from height, the employer must ensure that the risk of a fall is assessed and then eliminated. If it is not reasonably practicable to eliminate the risk then the risk is reduced so far as is reasonably practicable.

The Regulations provide for a 'hierarchy' of controlling risks relating to working at height and they are, in order of preference:

1. Work on the ground or on a solid platform.
2. Passive fall protection devices (e.g. temporary work platform, scaffolding, roof safety mesh or guard railing).
3. Work positioning systems (industrial rope access system or a travel restraint system or any other equipment other than a temporary work platform that enables a person to be positioned and safely supported at a work location for the duration of the task being undertaken at height).
4. Fall injury prevention systems (e.g. industrial safety net, catch platform or safety harness systems other than a travel restraint system.
5. Ladders (fixed or portable) and administrative measures.

New and practical alternatives to using traditional ladders are appearing frequently in response to the need to prevent falls.

BEFORE CONSIDERING USING A LADDER

Give consideration to whether:

- the job can be undertaken from the ground with extension tools;
- the construction or repair of the item or part of it can be undertaken on the ground;
- the item being accessed can be relocated to ground level to eliminate the need to work at height temporarily or permanently;
- an elevating work platform such as a scissor lift or cherry picker, or a fixed or mobile work platform can be used;
- scaffolding or use of a mobile scaffold can be used;
- a work positioning system such as a travel restraint or industrial rope access system can be used;
- a step platform can be used; and
- fixed stairs or steps can be installed that comply with relevant standards and building codes.

If the above measures cannot be used or are not reasonably practicable for the given situation, then it may be appropriate to use a ladder provided it can be used safely.

USING LADDERS AS AN INTERIM MEASURE

Where a safer alternative for preventing a fall has been identified but there will be some delay in implementation due to purchasing, design, manufacturing or installation, then in some instances ladders may be suitable as an interim measure. That is, providing the ladder will only be used for a very short period of time until a safer alternative becomes available and a risk assessment demonstrates the ladder can be used safely given the circumstances.

RISK ASSESSMENT INVOLVING USE OF A LADDER

If a task must be done where there is a risk of a person falling more than two metres, a risk assessment must be undertaken of that task by law. The risk assessment must consider:

- the type of task and how long the task will take; and
- the physical surroundings and conditions in which the task is undertaken.

If it's proposed to use a ladder to do a job then some factors that could be considered are:

- Is the person who will undertake the task new to the task, still in training or not trained at all?
- Will the job involve heavy

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Safe Use of ....

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work or the use of both hands to hold something?

- Will the job involve the use of tools such as pinchbars that require a high degree of leverage that may result in someone overbalancing or falling?
- Does the task need power tools or other equipment designed to be operated with two hands?
- Will the person be required to work on the ladder for more than a couple of hours increasing the likelihood of fatigue?
- Will the task require someone to work outside of the ladder styles and possibly over-reach causing the ladder to slip sideways?
- Does the task need to be undertaken in wet weather or where the ladder surface is likely to be slippery or become slippery over time?
- Does the task need to be conducted in windy weather where the ladder may move sideways or backwards?
- Will the job involve work near electricity such as powerlines, neon signs, live wires, etc? If so, is a metal ladder the only ladder available to work on in this situation?
- Could the weight of tools and materials required to do the job exceed the ladder capacity or increase the risk of a fall occurring in some way?
- Are the surfaces the ladder will rest on unstable in any way?
- Is anything likely to hit the ladder when it's set up, such as ropes, cables, other workers, pedestrians, traffic, etc?
- Is there anything stopping the ladder from being set up or secured properly?
- Is the ladder too short to allow the person to stand on a rung at least 900mm from the top or stand on or below the second tread below the top plate?
- Does the person have to face away from the ladder when going up and down or working on it?
- Is the place for someone to stand after alighting from the ladder unsafe in anyway?
- Does the ladder show any evidence of faults such as missing, cracked, broken, loose, worn or warped parts?
- Are there any other factors present that might increase the risk of a fall from a ladder?

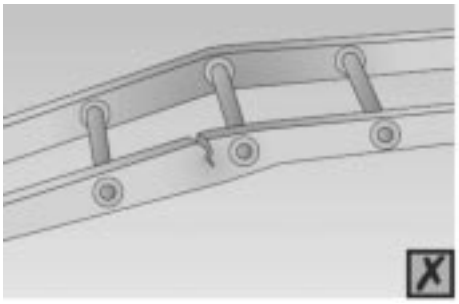
If the answer to any of the above questions is yes, then either additional measures will need to be put in place to allow the task to be done safely or else the task cannot be done using a ladder. If adequate safety measures are not available to undertake a task safely you may need to wait until measures are made available or conditions change or you have a measure purposely designed and built.

Where a ladder is to be used it may be necessary to have a second person and/or witches hats or a barrier on hand to ensure the ladder is not knocked by passing traffic, pedestrians or animals as a routine precaution. An extra person may also be required for assisting with the raising or lowering of plant or materials.

SOME EXAMPLES WHERE USING A LADDER <u>MAY</u> BE ACCEPTABLE

The following are some examples where a risk assessment may indicate that it is acceptable to do work using a ladder:

- As a suitable means of getting to and from scaffolding or large pieces of equipment or the roof of a small building or structure.
- Inspecting, assessing or undertaking minor maintenance on items or fixtures near the ceiling of a small building or structure. *Example: changing a light bulb; cleaning or fixing vents; inspecting or servicing air-conditioning units, hot water services, telecommunication or security devices; cleaning gutters or downpipes; inspecting and undertaking minor maintenance of devices associated with doorways.*



- Installing lightweight items or fixtures near the ceiling of a small building or structure. *Example: installing hooks, nails, ornaments, basic shelving, pot plants, small signs or simple light fittings that do not involve wiring.*
- Inspecting and pruning trees and shrubs where other measures cannot access the site or be used safely or are clearly not reasonably practicable given length of task and/or circumstances.
- Where loading and unloading of material and checking of

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Safe Use of ....

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loads is required and other control measures cannot be used due to access or transportability/storage issues or not reasonably practicable given length of task and/or circumstances.

- Cleaning, maintenance or inspection tasks involving work areas where there is limited space for access for other control measures such as inside tanks, vats, cellars, pressure vessels and other confined spaces.
- Inspection and maintenance of items on communication and utility towers where other control measures are not reasonably practicable due to access difficulties or lack of permanent access ladders and walkways.
- Where shelving or storage facilities are only accessed for inspection or minor maintenance on a weekly or lesser frequency basis.
- Accessing lightweight items on shelving or in storage facilities only a few times a month.

CAUTION: *Under different circumstances, the level of safety may vary from one time to the other depending upon varying conditions.*

SOME EXAMPLES WHERE USING A LADDER AS THE SOLE SAFETY MEASURE WOULD NOT BE ACCEPTABLE

Ladders should not be used where a risk assessment identifies other control measures that would allow the task to be done more safely such as:

- Where it's reasonably practicable to undertake a task or part of a task on the ground or a solid platform, or using a passive fall prevention device such as an elevated work platform, scaffolding or a work positioning system. *Example: where long-handled devices can be used to clean windows, prune small trees and branches and retrieve balls from roof guttering; elevated work platform used to check storage levels in a tank or vat.*
- Where the task is only going to take a few minutes and adequate step platforms can be used safely for the task and are reasonably practicable *Example: accessing or stocking supermarket and other similar shelving.*
- Where large, heavy or bulky items need to be installed or removed. *Example: installing/ removing air-conditioners, hot water services, large displays or frames.*
- Where ladders cannot be set up correctly for safe use. *Example: where there is a likelihood of the ladder slipping sideways or backwards or the person being knocked off the ladder.*
- Where the only type of ladder available is not suitable for the task at hand. *Example: metal ladder to undertake work near electricity and powerlines, load weight of person and material either do exceed or is likely to exceed the ladder capacity.*
- Where faults in the ladder are observed on inspection.
- Where a task involves someone working at height and there is a significant risk of the person falling and being seriously injured or killed.

INFORMATION ON HOW TO USE LADDERS CORRECTLY

Setting Up a Ladder Safely

To use a ladder safely it must be used on a solid and stable surface so as to prevent the ladder from slipping.

Slipping can be prevented by:

- ensuring the ladder has non-slip feet;
- placing single and extension ladders at a slope of four to one, and setting up stepladders in the fully opened position; and
- securing single and extension ladders at both the top and bottom.

People using ladders should:

- make sure that the ladder is clear of powerlines;
- use non-conductive ladders when working on live electrical installations;
- set up the ladder in places where there is no chance of the ladder being hit or knocked;
- work from within the ladder stiles and not over-reach. Over-reaching can lead to the ladder tipping sideways;
- always have both the hands free to climb up and down;
- not use tools that require a high degree of leverage, such as pinch bars. This may result in overbalancing or falling;
- make sure that no one works underneath the ladder;
- not allow anyone else to be on the ladder at the same time. (Exception: Emergency Services personnel in certain circumstances); and
- ensure that there is a safe place to land when alighting from the ladder.

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22nd TECHNICAL MEET

Mr. V. Krishnamurthy, General Manager (Retd.), IFF Ltd., Chennai was the speaker on the occasion of 22nd Technical Meet held on 19th December 2009. His topic was on "Behaviour Based Safety System (BBS) – Safety Engineers' Sucessful Tool". He shared his practical experiences in implementing this result oriented safety system in a number of factories. The success of the system is mainly due to the proven results over different time periods, he informed.

He informed quoting examples that the accident rates have dramatically come down in all the factories where BBS system was followed. It is possible mainly due to the participation of all stakeholders, management, staff, workers, contractors and trade unions. But, he cautioned that it takes some time to reap the benefit, as series of systematic steps are required to be carried out.

The concept of Behaviour Based Safety System needs to be imparted to all levels of personnel. Selling this idea of a different work culture will be a real challenge and this can only be implemented with the blessings of Senior management. Therefore the first task in implementing the new system will be to first explain the methodology to the senior management personnel with adequate statistics and cost benefit analysis. Once they are convinced, a timetable can be drawn to train different groups of personnel with appropriate modules to suit the individual groups. Training of personnel and

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Safe Use of ....

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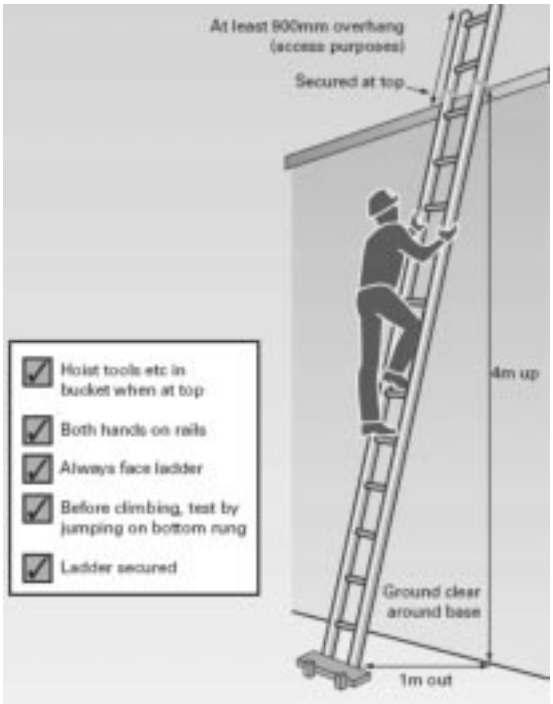
Wherever possible people using ladders should always:

- face the ladder when going up or down or when working from it;
- stand on a rung that is at least 900mm from the top of a single or extension ladder; and
- stand on or below the second tread below the top plate of any stepladder.

LADDER MAINTENANCE

A ladder needs to be regularly inspected to make sure that it does not pose a risk in itself. Ladders with any of the following faults should be replaced or repaired:

- timber stiles that are warped, splintered, cracked or bruised;
- metal stiles that are twisted, bent, kinked, crushed or with cracked welds or damaged feet;
- rungs, steps, treads or top plates that are missing, worn, damaged or loose;
- tie rods that are missing, broken or loose;
- ropes, braces or brackets that are missing, broken or worn; and
- timber members that, apart from narrow identification bands, are covered with opaque paint or other treatment that could disguise faults in the timber.



Safe Practices involving the use of a ladder

Ladders should not be painted as essential safety information may be obscured. ■

ELECTRICAL EMERGENCIES AND RESCUE TECHNIQUES

Electrical accidents cause countless injuries and claim the lives of hundreds of workers each year. Injuries could be minimised and many lives saved if proper resuce techniques are used.

When an electrical accident occurs, the victim may be incapable of moving or releasing the electrical conductor because of the effect of something called "muscle clamping". Muscle clamping is the contraction of muscles caused by an electrical current running through the body.

As a result of this effect, attempts to rescue a victim of an electrical accident by other co-workers could go wrong as they could also be exposed to the same current.

Caution should always be a primary consideration during rescue in response to any electrical accident or emergency. At the same time, speedy and effective response is essential. To save the victim, he must be rescued as soon as possible. This means that employees must understand electrical hazards and know how to act fast and safely in an electrical emergency.

Basics of Electrical Rescue

The first rule of electrical rescue is that co-workers should never rush into an accident situation. While one person calls emergency responders others should visually examine victims to determine if they are in contact with energized conductors.

Metal surfaces, objects near the victim, or the ground itself may be energised. Responders could become victims if they touch an energised victim or conductive surface.

Any active electrical circuits should be de-energised, if possible. For example, the energy could be switched off at the circuit breaker or portable electrical equipment could be unplugged, if this can be done safely.

Once the power is off and it is safe to approach, the victim should be examined to see if he or she can be safely moved.

If the electrical circuit can't be de-energised, emergency responders must use extreme care. They should:

- Ensure that hands and feet are dry,
- Wear protective equipment such as rated voltage gloves and overshoes,
- Stand on a clean, dry surface, or stand on a dry rubber mat or other insulating material,
- Use a non-conductive material (for example, nonconductive rope or cord, or a dry stick or board) to remove the victim from the conductor.

First aid for a victim of an electrical accident may include CPR if the person is not breathing and has no pulse. If the victim is breathing and has a heartbeat, first aid for shock and burns may be required until emergency medical help arrives. ■

22nd Technical....

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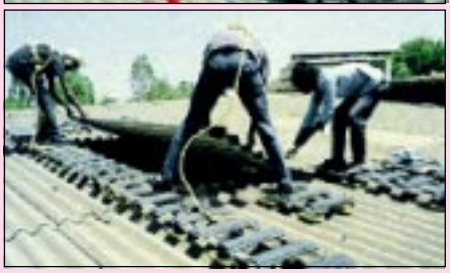
getting their acceptance for implementing the Behaviour based Safety System will be the foundation that is laid to cultivate a different safety culture in the organisation. The attitudinal changes that are made among the personnel will play the trick and help to achieve proven results in reducing accidents/incidents.

He concluded that the Behaviour Based Safety System concept is widely adoptd by leading companies all over the world. ■

ROOF WALK LADDER SET



Roof ladder is a safety device used for working safely above A.C. Sheets and other fragile roofs.

Why Roof Ladders?

Safety of workmen/contract workmen

A.C. sheets even though are manufactured strong, loose the bondage between the asbestos fiber and cement due to hairline cracks, which develop over a period of time. The constant action of environmental pollution, terrain, rain, wind pressure, temperature variation, vibration and other adverse conditions produced over a period of time further weaken them. When a workman unknowingly steps on such a fragile sheet, it may not withstand the load and the person can fall down (sometimes fatally).

Statutory Compliance

The usage of Roof Ladders (Crawling Boards) becomes mandatory in most of the countries. Enforcing authorities can prosecute an occupier and/or the manager for noncompliance of what is required under the rules; be it the providing of Breathing Apparatus, Safety Belt or Roof Ladder. Hence the legal consequence of an accident without them can be understood easily and by anybody.

Damage to A.C. Sheets

The safe load bearing capacity of Asbestos Cement Sheets is much less as compared to the weight of workmen standing over it (reference may be made to the product manuals of leading A.C. sheet manufacturers). With the area of feet together is less than 0.3 sq.ft., the load imposed by human body over A.C. Sheet is much more than its load bearing capacity. This creates cracks on the sheet which may go unnoticed or neglected by the workmen, even though it may not necessarily result in accidents immediately. But, will result in one; when somebody walks on it next time without protection.

SEA (India) – Joint Organiser of a National Seminar

Standing L-R: Dr M Arularasu, *Profesor & Head, Production Department, GCT,* Mr R Thiruvengadam, *President, (SEA (I),* Mr Jayakumar Ramdass, *President, SIEMA, Cimbatore,* Mr S G Darvhekar, *Director General, DGFASLI,* Mr Muralidharan, *Chairman, SIMA, Coimbatore,* Dr Lakshmi Prbha, *Principal Incharge, GCT,* Dr R K Elangovan, *Director (Safety), Central Labour Institute, DGFASLI*

SEA India joined hands with Directorate General Factory Advice Service and Labour Institutes (DGFASLI), Ministry of Labour, GOI and Dept of Production Engineering, Govt. College of Technology, Coimbatore, in organizing a National Seminar on **"Occupational Safety & Health in Textiles, Foundries and Engineering Industries"** on 10th – 11th December 2009. The seminar was inaugurated by Mr S G Darvhekar, Director General, DGFASLI. Mr. R. Thiruvengadam, President, SEA (India) offered felicitations on the occasion. The seminar was well attended by large number of participants across the country and included topics such as: Occupational Safety & Health, Legal Provisions, Education & Training, Accident Prevention & Safety Promotion, Emergency planning, Risk management, Disaster management and Case studies. Mr. P.P. Janarthanam, Treasurer, represented SEA India in the organizing committee of the seminar.

SAFE LOCKOUT / TAGOUT PROCEDURES – HOW TO IMPROVE?

OSHA developed the Lockout/Tagout (LO/TO) standard (29 CFR 1910.147) precisely to prevent the terrible injuries – and deaths – casued by unexpected equipment start-up. The OSHA regulations require any company to develop a written lockout/tagout program, that must:

- Assign responsibilities for workplace energy control.
- Spell out the exact steps employees must use to shut down, isolate, block and secure machines or equipment before beginning repairs or maintenance.
- Define the procedures for placing, removing and testing the effectiveness of lockout/tagout devices.

In addition, the company must:

- Provide locks, tags, and related equipment that meet OSHA standards.
- Inspect energy control procedures (at least annually) and correct problems.
- Train employees to understand and follow LO/TO procedures.

OSHA's lockout standard also requires you to make sure employees isolate and render inoperative any and all energy sources. Depending on the equipment those sources might be:

- Electrical
- Hydraulic
- Thermal
- Force of gravity
- Pneumatic
- Mechanical
- Chemical

Failure to isolate all energy sources could – and often does – result in the injury or death of one or more employees.

LO/TO Step by Step

To make sure lockout/tagout procedures are effective, the following steps will be useful:

1. Think, plan and Check

- If you are in charge, think through the entire procedure
- Identify all parts of any systems that need to be shut down
- Determine what switches, equipment, and workers will be involved
- Carefully plan how equipment will be restarted when repairs or maintenance is completed.

2. Communicate

- Notify all those who need to know that a lockout/tagout procedure is taking place
- Identify all appropriate power sources, whether near or far from the jobsite
- Include electrical circuits, hydraulic and pneumatic systems, spring energy, and gravity systems

3. Neutralise all appropriate power at the source

- Disconnect electricity
- Block movable parts
- Release or block spring energy
- Drain or bleed hydraulic and pneumatic lines
- Lower suspended parts to rest positions

4. Lock out all power sources

- Use a lock designed only for this purpose.
- Each worker should have a personal lock.

5. Tag out all power sources and machines

- Tag machine controls, pressure lines, starter switches, and suspended parts
- Tags should include your name, department, how to reach you, the date and time of tagging, and the reason for the lockout.

6. Do a complete test

- Double-check all the steps above.
- Do a personal check
- Push start buttons, test circuits, and operate valves to test the system

7. Restart safely

- After work is completed, remove only your own locks and tags
- Make sure all related activities are completed and all locks and tags are removed.
- Make sure workers in the area are notified of restart and are at safe distance from equipment
- Turn on the power
- Make sure equipment is running properly.