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REVIEW

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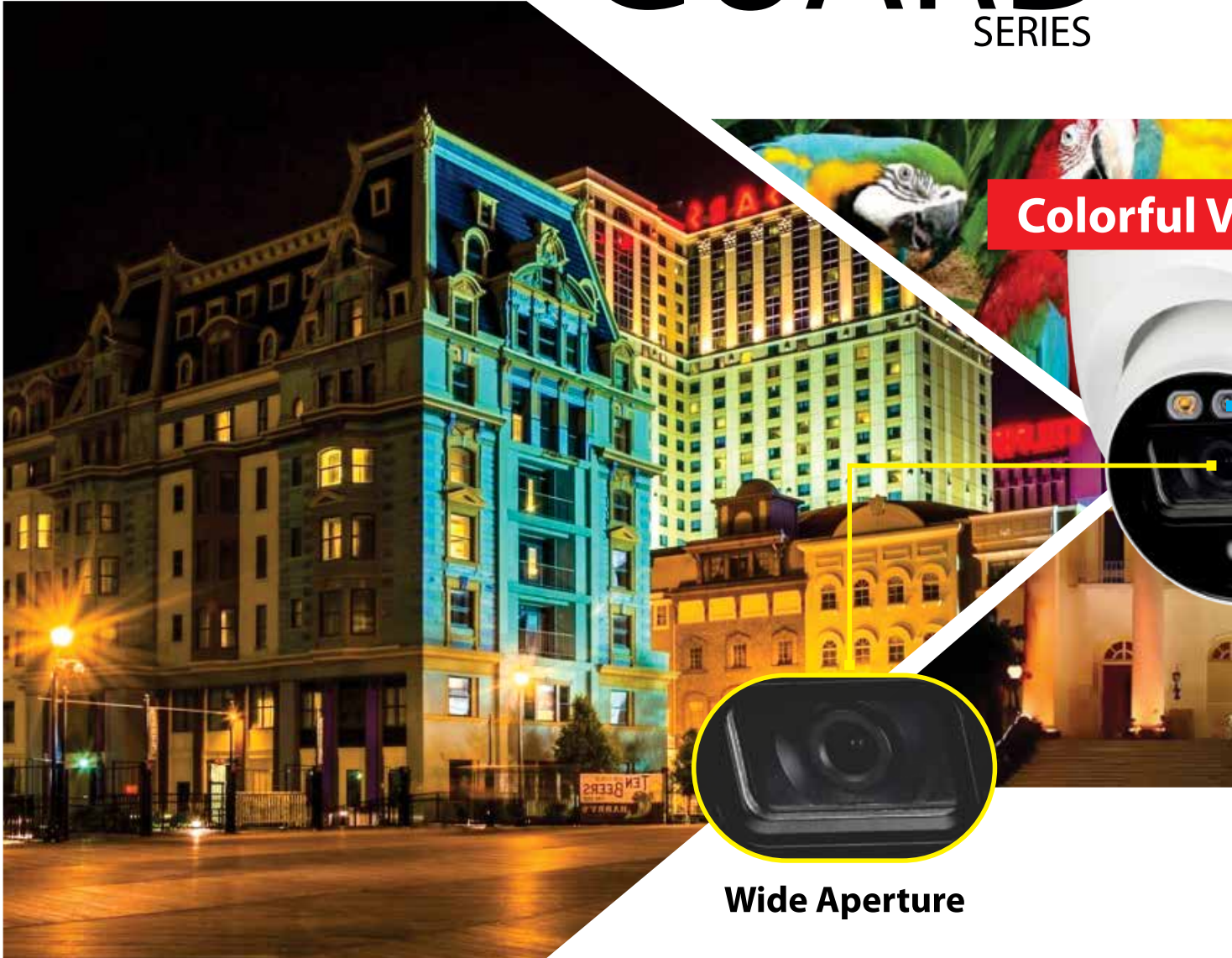
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AN INTERFACE WITH:
MR. ALLEN,
CEO
ZKTECO BIOMETRICS INDIA PVT LTD
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CEO CORNER

Fire Safety Industry: Eyeing the prospect for next 5 years

The fire safety systems market was valued at USD 10.26 billion in 2019 and is expected to reach USD 15.71 billion by 2025, at a CAGR of 7.5% over the forecast period 2020 - 2025. Knowing all, future fire alarm systems will be software-based, where one need to find a way to train one or two programmers to avoid being dependent on the equipment supplier. This can also help the supplier and should lead to better pricing. Also with the improvement of the sensors' capabilities and communication channel technology, IoT devices present in industries and residential spaces have boosted the adoption of new-tech fire safety solutions.

The increase in the number of deaths and property loss has increased the awareness of fire safety system which is driving the market. The countries with low infrastructure development investments are showing an interest in the installation of fire safety systems. Factors, such as poor-handling of burning lamps and cooking gas leakage, alternating voltage and electric spark, and overheating of electronic equipment, were identified as the prime causes for fire outbreaks in the incidents.

Stringent government regulations and mandates is driving the market. The implementation of unified building codes in various developed and developing countries across all end-user segments, mandated by local authorities, has pushed the demand for fire safety systems. For instance, UK government recommends that all fire alarm and detection systems should be installed and maintained under the relevant British Standard, i.e., BS 5839.

High installation and maintenance cost is restraining the market to grow. The fire safety systems' costs vary, depending on the lifespan, size, use, and type of the building. In general, fire alarm systems are more expensive to install in older buildings than in the newly constructed ones. With increasingly stringent compliance requirements for manufacturing and service sector companies as well as real estate developers to install fire & safety equipment, coupled with increasing frequency of consumer awareness programs and safety audits, demand for fire & safety equipment in India is expected to continue growing over the next five years.

CEO

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Firephant 1 kg

The 1 kilo Firephant is a compact and easy to use piece of fire protection equipment. It effortlessly extinguishes minor fires in the homes and serves as a complement to a 6 kg powder extinguisher.

Diameter	: 114 mm
Height	: 279 mm
Classes of fire	: ABC
Extinguishing Agent	: Mono Ammonium Phosphate 90% and UL approved Clean Agent (FK5112) FK5112 has zero ODP and low GWP
Performance rating	: 1A 34B for MAP 90 Powder Type 1A 13B for Clean Agent (FK5112) Type
Areas of use	: Modern Homes, Villas, Hotels, Offices, Corporate Buildings, Cars, etc.

Firephant 2 kg

The 2 kilo Firephant is an easy to use and dependable piece of fire protection equipment. Its extinguishing performance is the highest in its class currently in the market and can be used for all types of minor fires when a 6 kg powder extinguisher may be too large.

Diameter	: 114 mm
Height	: 374 mm
Classes of fire	: ABC
Extinguishing Agent	: Mono Ammonium Phosphate 90% and UL approved Clean Agent (FK5112) FK5112 has zero ODP and low GWP
Performance rating	: 2A 55B for MAP 90 Powder Type 2A 21B for Clean Agent (FK5112) Type
Areas of use	: Modern Homes, Villas, Hotels, Offices, Corporate Buildings, Cars, etc.

Operating Instructions

Pull the Pin

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Explore personal protective equipment - safety wear, head/ eye/hand protection, fall prevention, height safety, gas detectors, ergonomics, occupational health and many more safety products and services	Rich content led knowledge forums bringing together eminent speakers from the safety industry	Exclusive first look at occupational safety & health products and services as they hit the market	Industry experts showcasing best practices and know-how that are vital for a safer work environment	One on one interactions with suppliers, manufacturers, distributors, key government officials, key association officials, and thought leaders from the safety industry

PRODUCT PROFILE

Hard Hat	Gloves	Safety Goggles	Gas Mask	Head Set	Helmet	Safety Shoes	Jackets

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ZKTECO: Benchmarking Growth with **TECHNOLOGY INNOVATION**

Q. Security is the need of the hour in current scenario, how is ZKTECO managing the demand of security systems in India?

Rapid industrialization and continuous development of various sectors have increased the demand of security in the market. As per current scenario, there is a huge demand for innovative solutions from industries for more safety & security point of view.

ZKTeco is a globally-renowned provider of security, access control and the management solutions. We've developed world leading biometric solutions for the access control, time & attendance, video surveillance & many other applications too like easy TimePro, easyWDMS & ZKBiosecurity3.0, "All in One Solution" software solution platform. Whereas we majorly focused on a security solution in various sectors like Government, Education, Banking & Healthcare etc., to provide a complete solution.

ZKTeco is setting a benchmark by their rapid growth into these verticals & spreading their networks into these markets.

Q. ZKTECO has diverse range of security products; can you highlight some of the top line products & their applications?

ZKTeco has wider & diversified security products range such as Entrance Control Management, Security Inspections, Baggage X-ray Scanner, Parking Barrier Solution, Elevator Management System, Vehicle Management, and Video Surveillance which integrate Artificial Intelligence (AI) & Computer Vision Technology. Whereas we offer software application like ZKBiosecurity "All in One Solution" ultimate software at a single platform.

These products are based on integration with technology & solutions which gives wide security measures in public transport systems such as airports, ports, metro stations, toll gates and in corporate parking areas, IT parks, Industrial areas as well as in government and private sectors.

Q. What is ZKTECO product marketing strategy to confront the competition?

ZKTeco is already a well-established and recognized industry in biometric system and security products market globally. But as far as India is concerned, it had initially entered the Indian market as an original equipment manufacturer of biometric and security components. Hence, ZKTeco will focus on establishing the brand value of its products in India with the help of its customer value and trust from the global market.

Furthermore, ZKTeco proved its expertise in almost every segment of biometric and security market and showcases a wide range security products and solutions in a single platform, thereby creating a convenient environment for clients to fulfil all of their security requirements with the commitment of "Your Security Our Responsibility". Clients are showing interest to buy ZKTeco's products because of the excellent customer service and advanced products at affordable price—all in one place.

Q. How do you account R&D activity in ZKTECO?

As today everything goes around the software which provides communication through the network and op-

Mr. Allen, CEO,
ZKTeco Biometrics India Pvt. Ltd.

erability of the applications. That's where ZKTeco India R&D Bangalore stands for providing multitude applications at affordability to the customer's requirement according to projects. Basically, Bangalore is known as Silicon Valley of India that's why ZKTeco opened R&D Centre here. It gives a live demo experience about the technologies and solutions which develops a massive application that enhances security software with hardware at next level.

ZKTeco India also has experience centres in different states like Delhi, Chennai, Udaipur, and Kerala. It evolves the huge scope for technology solutions of future security by delivering the best application and fool-proof mechanisms that involve incorporation of software into hardware with the help of skilled engineers and professional technical support. In this way we are moving towards our next stage of growth-oriented development.

Q. Do you think India as a market has a great potential? What are the key performance areas?

Of course, India has biggest market potential in different segments including security sector too. The security industry has grown several folds in recent years, due to its rapid implementation in almost every private and government sector as a result of increased security concerns, human resource management requirements as well as numerous biometric applications.

Q. Could you brief us about the Indian & Global scenario of electronic security systems and solutions industry?

The electronic security systems and solutions industries play a crucial role in establishing security across various sectors. It witnessed a tremendous growth in the recent years, mainly driven by factors such as public safety concerns and increasing demand for technologically advanced security products

as well as safety and security legislations that mandate the implementation of electronic security systems.

As far as India is concerned, rapid industrialization, safety concerns associated with growing population and expanding cities are the main factors accounting for the growth of electronic security systems market. The Indian government's initiatives taken to implement digital and smart security systems in various public transport facilities and industrial areas as well as development of smart cities will offer tremendous opportunities for the growth of electronic security systems market.

Q. According to you, what are the factors affecting the electronic security business?

Safety and security concerns associated with public transport systems, population growth, rules and regulations that mandate the use of electronic security systems, Investment by industries in R&D to develop innovative and advanced security solutions, practical difficulties in implementation of these technologies, rising worldwide threats such as cybercrime attacks, data breaches, illegal activities and users expectations for advanced and sophisticated security products, rapid adaptation of security solutions by multinational companies as well as by residential facilities are the key factors affecting the growth of electronic security systems market.

Q. What are the key technological trends that are driving the electronic security industry?

Electronic security systems industry is undergoing a rapid transformation due integrated technology and solutions in the products and applications for

advanced safety and security. Incorporation of Artificial Intelligence (AI) in security systems, IP-Based Video Surveillance, Adoption of Higher Resolution HD Cameras, Cloud-based technology, IP-Based Access Control Solutions, Wireless Access Control Solutions & Communication and Incorporation of IoT in electronic security solutions are some of the major technological forces revolutionizing the electronic security systems industry.

Q. What is your vision for ZKTECO?

ZKTeco's India vision is to simplify, protect and secure the lives of the Indian people by providing complete, end-to-end, high quality Security solutions, as a trusted and responsive partner and ensuring profitable growth through innovation and operational excellence.

Q. What initiatives need to be taken by governmental & non-governmental bodies that are related to the electronic security industry?

Although the electronic security systems witnessed several technological breakthroughs and advancements, the high installation and maintenance cost associated with it is still a main issue, privacy concerns associated with CCTV cameras, falsely trigged alarms, System failures under certain environments, physical damage to the security systems, effectiveness of crime prevention, hacking, spoofing, power outage are some of the other common issues associated with electronic security systems that need to be addressed.

Government bodies need to focus on accelerating the Smart city projects and other mega infrastructure development projects by more investments as well as by facilitating manpower and resources required for these projects. In addition, both governmental and non-governmental bodies can promote the growth of electronic security industry thereby facilitating the overall infrastructure development. **ISR**

Hikvision bags Innovative Achievement Award at the 2019 Detektor International Awards

Hikvision, leading supplier of innovative video security products and solutions, has been awarded the Innovative Achievement Award for its Thermal & Optical Network Turret Camera at the 2019 Detektor International Awards in Sweden. The award was given in the category of Alarm and Detection. About the Hikvision camera, the jury said, "Through a combination of smart analytics, thermal and optical technologies, Hikvision succeeds in offering an impressive solution for early detection and optimum performance."

Marcel Wiechmann, Thermal Products Manager at Hikvision Europe was present at the ceremony to receive the award. He said, "Hikvision

is excited to receive this accolade. Our innovative Thermal & Optical Network Turret Camera was launched in July to empower security teams to stop a fire before it's truly started. It's also very cost-effective with such advanced fire detection. We're delighted that this product has been so well recognized by the security industry."

The award winning Hikvi-

sion camera DS-2TD1217-2/V1 enables rapid indoor fire detection through bi-spectrum technology, which captures images using both thermal radiation and visible light. By displaying optical and thermal images together through image fusion or picture-in-picture, the camera helps safety personnel to quickly pinpoint the source of a fire. Importantly, the

camera also triggers an alarm once the temperature goes higher than a user-set limit – potentially allowing personnel to prevent ignition or combustion.

In addition, the camera contains a built-in GPU for running the Hikvision deep learning algorithm, in order to support indoor monitoring and advanced intrusion detection. Equipped for double-duty – both fire detection and intrusion detection – this camera is highly recommended for indoor solutions, especially in application scenarios such as warehouses, museums, data centers, and offices.

For more information, www.hikvisionindia.com

Hikvision's Smart thermal camera wins GIT Security Award 2020

Hikvision, a supplier of innovative video security products and solutions, has won a GIT Security Award for its Thermal Explosion Proof Camera (DS-2TD2466T-25X). In a vote by GIT's security professional readers, the product was hailed as the winner in the 'Fire and Explosion Protection' category of the popular annual awards.

One focus of the awards is innovation in products – and the Hikvision camera does not disappoint. It uses a vanadium oxide uncooled focal plane sensor to deliver enhanced thermal image quali-

ty. It also uses a smart fire detection algorithm to identify potential fire risks by monitoring irregular temperature rises in a sensitive area.

The camera adopts 316L stainless steel material to meet the requirements of environments that have a risk

of explosion, like chemical plants, oil depots and gas stations.

Allen Xue, Hikvision DACH Area Manager, said, "We are honoured to receive this award from GIT Security. The fact that this is the result of voting from GIT readers –

representing our customers – makes it even more poignant. It's also interesting that video surveillance cameras do not usually win in the fire prevention category, and we believe this reflects the innovative nature of our products. We pride ourselves on using our innovation to solve customer problems, and this award is testimony to that goal."

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Videonetics honored with CSI IT Excellence Award 2020

Videonetics announced that it has been honored with the CSI IT Excellence Award 2020, for its AI & DL Deeper-Look™ Platform. The award was presented at 53rd Annual Convention of Computer Society of India (CSI) at Kalinga Institute of Industrial Technology, Bhubaneshwar.

Initiated by CSI, this award recognizes the achieved exceptional results through the organization's outstanding implementation of technology and its high levels of professionalism in IT. CSI is the largest association of information technology professionals in India, with over 90,000 members and the CSI society has 70

chapters all over India.

Videonetics AI & DL DeeperLook™ enabled Intelligent VMS and Video Analytics along with Intelligent Traffic Management System (ITMS) was adjudged as winner after surpassing rigorous evaluations by panel of IT

professionals, scientists, academicians, project managers, CIOs and CTOs.

The state-of-the art DeeperLook™ is a distributed video and data analytics platform which is deployable at cloud as well as in edge devices. It not only improves the performances of the conventional analytics, but also paves the way for many new security and surveillance applications.

Commenting on the achievement, Dr. Tinku Acharya Fellow IEEE, Founder & MD, Videonetics said, "We are thankful to CSI for acknowledging our innovation. Trained with humongous amount of video

data, AI & DL DeeperLook™ enabled solutions are successfully deployed across a range of verticals to efficiently address their security & safety challenges and improve business efficiency along with productivity."

He further added, "We will continue to invest in R&D to generate Indian Intellectual Properties with a mission tocreate local solutions for local problems."

The three-day 53rd Annual Convention attracted a congregation of more than thousand delegates, decision makers, stalwarts from government, healthcare, hospitality, education and many more. **ISR**

Alban Lijo Varghese of SOLUS wins emerging leadership award at the PPPA 2020

Alban Lijo Varghese, Vice President of SOLUS Security Systems Private Limited has won the Emerging Leadership Award at the Power, Petroleum and Process Automation (PPPA) Meet 2020 organized by International Society of Automation (ISA), Maharashtra Chapter on the 7th of February 2020 at Taj Santa Cruz, Mumbai.

The award was received by Alban Lijo Varghese, Vice President Technology of SOLUS Security Systems Private Limited. Lijo has built a Micro, Small, Medium Enterprise that is ranked

amongst the top 40 MSMEs in India by the Indian MSME Chamber of Commerce.

Lijo has established a service network at 130+ locations, served 3,000+ customer sites, obtained UKAS

ISO 9001 - 2015 Company certification, CE certification and a CRISIL SME 1st rating for SOLUS. Further, Lijo has provided career opportunities to over 140 professionals.

Lijo is also responsible

for promoting the design in India and make in India philosophy at SOLUS. Lijo's products use Bluetooth Low Energy (BLE), Multi Technology Readers that read Mifare, DESFire, iClass, Pico pass Card Serial Number, 125 KHz Prox, Scosta, SEOS, Prox, etc. allowing one reader to read credentials from multiple companies and meet IP 54, IP 65, ISO / IEC 14443 A / B and ISO / IEC 15693 standards. SOLUS Access Control Devices, Software and Allied Solutions are commercialized and delivered at 3,000 plus customer sites. **ISR**

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ROBUST AND RELIABLE

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EZVIZ introduces first C3W colour night vision Wi-Fi camera to bring 24X7 colour images

EZVIZ, a global smart home security brand has introduced the First EZVIZ C3W Colour Night Vision Wi-Fi Camera featuring colour night vision. This innovative security camera that makes it dramatically easier and smarter for users to protect their home and business anytime, anywhere. This camera enables to see colour images in the dark using the new

EZVIZ colour night vision camera, a new breakthrough technology in EZVIZ's product line. This latest camera offering from EZVIZ enables to see colour images in the dark making them look more real and clear.

This is the latest offering from EZVIZ Smart Home product portfolio. The innovative products and services from EZVIZ can be applied to home, workplaces, stores, schools, and more. EZVIZ empowers partners to share its unique cloud services, and together build a thriving Internet of Things (IoT) ecosystem.

The camera comes with

IP67 certification, making it dustproof, waterproof, enabling it to be used outdoors. The camera also has an inbuilt microphone and speaker so that a user can have a two-way communication with family and friends through mobile. Along with the camera that allows the user to record, three 10-second audio messages to either welcome or deter visitors.

The camera also has two spotlights. They not only help in viewing colour images, but can also offer outdoor lighting that can be turned on or off with one touch of mobile. The user can also adjust the brightness. The

active defence system with inbuilt siren and alarm can help the user deter unwanted intruders. Upon detection of intruders, the camera will set off loud siren and two spotlights to scare them off.

In addition, it has got all other EZVIZ security features like 2-way communication, instant motion alert, active defence system (alarm and flash light), IP67 certified and storage slot up to 256 GB. It works seamlessly with the Google Assistant and Amazon Alexa (Virtual Voice Assistant).

For more information, www.hikvisionindia.com

Prama Hikvision showcases latest security solutions in SITA IT Expo 2019

Prama Hikvision recently participated in SITA IT Expo 2019 in Surat to showcase its latest innovative security products and solutions. The 'SITA IT EXPO' was organized by the South Gujarat Information Technologists Association (SITA) from 6 -9 December, 2019 at Vanita Vishram Ground, Surat.

Prama Hikvision booth at SITA event displayed a new range of HD-TVI and IP camera specially Color Vu technology and AccuSense Technology, AI technology-based Product, high end CCTV product like Explosion proof, thermal based, face recognition-based access control, time attendance, video door phone and intrusion alarm system.

The key Hikvision products and solutions displayed at the SITA IT Expo 2019 included Hikvision's

HD-TVI (High Definition Transport Video Interface) Solution, Hikvision Professional IP, Easy IP 4.0 & PanoVu cameras, EZVIZ Wi-Fi Cameras, Alarm Devices, NVRs, etc.,Hikvision Analog and IP VDP product series, Hikvision's access control products, including access controllers, standalone terminals, card readers, turnstiles, and elevator controllers, Hikvision AXHub intruder alarm system, POE Switches (Power Over Ethernet) Switches, CAT6 & 3+1 Network Cables.

"SITA IT Expo 2019 is a relevant B2B platform of South Gujarat region. Prama Hikvision has a good penetration into this regional market. We had showcased the latest Hikvision products and solutions to update the security professional community and System Integrators," said Ashish P. Dhakan, MD & CEO, Prama Hikvision India Pvt. Ltd.

Prama Hikvision's booth at SITA event got a good response from the dealers, distributors and end-users. Many leading diamond and textile industry representatives had visited the booth and appreciated the innovative security solutions and products. SITA association had invited more than 1000 partners across south Gujarat (Vapi, Valsad, Surat, Ankleshwar and Bharuch). **ISR**
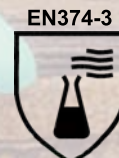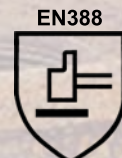
SOLUS wins Outstanding Enterprise award at the PPPA 2020 event

SOLUS Security Systems Private Limited announced that it has won the Outstanding Enterprise Award at the POWER, PETROLEUM AND PROCESS AUTOMATION (PPPA) MEET 2020 organized by International Society of Automation, Maharashtra Chapter on the 7th of February 2020 at the Taj Santa Cruz in Mumbai, India.

The award was received By SOLUS Director Narasimha Swamy. SOLUS Access Control Devices, Software and Allied Solutions are commercialized and delivered at 3,000 plus customer sites. SOLUS has built an enterprise that is ranked amongst the top 40 SMEs in India by the Micro, Small, Medium Enterprise Indian Chamber of Commerce.

SOLUS has established a service network at 130+ locations, served over 3000+ customer sites, obtained a UKAS ISO 9001 - 2015 Company certification, CE certification, CRISIL SME 1st rating. SOLUS has provided career opportunities to over 140 professionals. It has promoted design in India, made and make in India philosophy.

SOLUS products meet Bluetooth Low Energy (BLE), Multi Technology Readers that read Mifare, DESFire, iClass, Pico pass Card Serial Number, 125 KHz Prox, Scosta, SEOS, Prox etc., allowing one reader to Read credentials from multiple companies and also meet IP 54, IP 65, ISO/IEC 14443 A / B and ISO / IEC 15693 standards. **ISR**

Belimo celebrates the production of the 100 millionth actuator

At the beginning of the year, Belimo produced its 100 millionth actuator and in doing so reached another milestone in the company's history. Today, hundreds of thousands of buildings around the world incorporate Belimo actuators into their HVAC systems.

The Swiss based world market leader for field devices for controlling and regulating heating, ventilation and air-conditioning systems continues its growth course by reaching this milestone as well as the demand for innovative products that sustainably increase comfort, energy efficiency and safety in buildings. **ISR**

Matrix bags Excellence in Telecom & Connectivity Solutions Award

The award for "Excellence in Telecom & Connectivity Solutions " was bestowed on Matrix at the Rail Analysis Innovation & Excellence Summit 2020, held at Le Meridien Hotel, New Delhi on January 22, 2020. Rail Analysis has honored the companies demonstrating innovative solutions, excellence and expertise in the rail and metro sector.

On winning this prestigious award, Ganesh Jivani, Chief Executive of Matrix said, "We are happy to win this award for excellence in Telecom & Connectivity Solutions. We thank Rail Analysis for recognizing Matrix for our technologies, products and solutions. Matrix offers cutting-edge physical security and telecom solutions in more than 50 countries including many first-world technologically advanced nations. With 250+ R&D engineers, world-class processes and infrastructure, Matrix is committed to designing cutting-edge products. This award is a validation of Matrix's innovation and design capabilities and will go a long way in motivating us towards building world-class solutions." **ISR**

'Adequate fire protection & preparedness is crucial'

Q. What are the criteria and considerations while choosing fire safety products and solutions?

When it comes to Fire safety, there are two criteria that needs considerations, one if any product or solution is intended for Fire prevention or second if it's for Fire protection. Many users or even consultants focus more on Fire protection measures but ignore on prevention fronts. Fire codes and standards plays vital role in first identifying the risk and then designing the adequate fire protection/detection measures. In India National Building Code 2016 Part 4 is the most acceptable building code available for us to adopt the basic fire measures following rulebook.

Based on the code guidelines, engineer can then design and engineer a required system or equipment meeting the objectives. It is extremely important to understand the role of Codes and Engineering before installing the systems or equipment in your facility. The systems or equipment if installed at your facility, not adhering to any codes and standards and or not engineered it, may fail to provide adequate protection in real fire emergency.

Just to save the design cost by hiring independent engineering professionals, many users don't follow the best practice and get the fire systems and equipment installed looking at the fancy broachers given by selling agents. This is a trap and will ultimately doesn't help in fulfilling the fire safety objectives. One must understand the application before usage and selection of fire safety equipment. It is also equally important that, equipment that being used for specific application must be tested by third-party laboratories so user must see that every fire safety system and or equipment must be "listed and approved".

Q. How have fire safety solutions upgraded over the years?

Currently, the fire safety solutions are modern, effective and more responsive because of the technological change and extensive product research. Today, people want to use technology to reduce cost and time. Also the products are more integrated, networkable and communicative in nature, this advances the use of systems in emergency and even in normal scenario. IT has changed the face of Fire detection and other electronic systems. Remotely operated Jet monitors in large port and POG facilities benefits to fire fighting operations. Video detection coupled with Flame detectors are new technology for detection market.

Q. What is your outlook for fire safety in smart cities in 2020?

Fire safety systems technology is vital for Smart Cities. Facility manager would expect all updates on fire safety at his fingertips. The system activation and shutdown also would happen automatically. False discharge or activation of system would not be possible due to built-in logics etc. Building system integration is the requirement in smart city project. More focus will be given on inspection and maintenance of electro mechanical systems. It would also be intuitive in nature so human intervention is less and less time consuming. IT, AI and IoT would also play major role in near future. Fire and Life safety shall be the core element in smart city, however this would also pose challenge and require to revisit our building codes and standards.

Hemant Khadse, CEO, East Corp Group

Q. According to you, what are the most common causes of fire accidents at work sites?

Historically, electrical short circuits are very common cause of fire accidents in most of the places. Malfunction of electrical system or it could be human error that may also lead to fire. Old unsafe cabling, panels and appliances are also susceptible to fire. Area segregation, compartmentation & fire rated equipment are critical to follow. Unsafe acts such as hot work without authorized permit, smoking are also seen as common causes of fire accidents in various industries.

Q. Suggest measures to deal with any such aftermath.

Regular thermography, fire and electrical safety audits can mitigate risk. Adequate fire protection and preparedness at site to deal such aftermath are important. The combination of first aid equipment such as Fire extinguishers, Hose reels, Fire blankets, sand buckets, Breathing apparatus, smoke inhalers, etc., must be available & accessible at site. Regular mock drills enhances the awareness. Onsite emergency and disaster management plan with SOP can also help in building safety culture in the organization. ISR

Are you ready to learn what causes over 95% of serious injuries and fatalities in the workplace, community, and at home?

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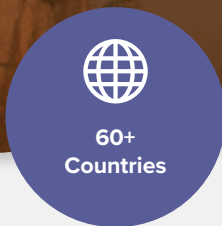
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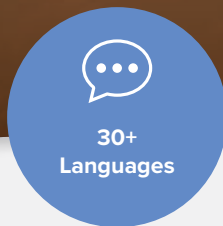
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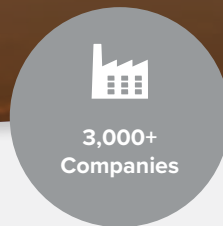
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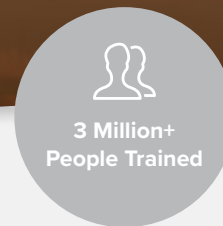
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'Budget shows commitment towards 'Make in India' and Smart City Mission while doing structural reforms'

**Ashish P. Dhakan,
MD & CEO,
Prama Hikvision India**

In the Union Budget 2020, Finance Minister Nirmala Sitharaman, had unveiled a series of far-reaching reforms, aimed at energizing the Indian economy. This is a growth oriented budget with a long term commitment towards Make in India, Digital India, Smart City Mission, Technology Empowerment, Structural Reforms and Entrepreneurship. It is clear that customs duties were hiked to push the 'Make in India' agenda.

While keeping the long-term commitment of 'Make in India' especially in Electronic Industry, the government has moved a step further to pave the way for making India an Electronic Export Hub.

This will certainly increase the Indianization (Localization) of key components in India by local manufacturing driven by the 'Make in India' initiatives. The Custom Duty increase on certain electronic items, which can be produced domestically has shown the government's intent to safeguard the intent of 'Make in India' stakeholders. However, an announcement with regard to R&D in India was expected, as it's a highly capital intensive affair for any business to develop the manufacturing sector in India.

The Finance Minister had given a reassuring statement that the policy of 'Make in India' has started reaping dividends. She also proposed a new scheme for promoting domestic electronics manufacturing. Under the 'Make in India' initiative, the minister further proposed to promote the manufacturing of electronics by setting up a new scheme that would incentivize mobile manufacturing, electronic equipment, and semiconductor packaging.

5 New Smart Cities

Moving forward on the ambitious scheme for urban transformation, the central government in its budget has proposed to set up five new Smart Cities in public private partnership (PPP) mode. The Centre has allocated Rs 6,450 crore for the Smart Cities Mission for 2020-2021.The development of smart cities in collaboration with states reaffirms the government's commitment to Smart City Mission. We hope that the government will allocate sufficient funds to these newly announced Smart Cities while fast tracking the progress of 100 Smart Cities.

Focus on AI, IoT & ML

The Union Budget has clearly indicated a huge focus on Internet of things (IoT), machine learning (ML), artificial intelligence (AI) and analytics, we at Prama Hikvision believe that the budget will provide a boost to the country's digital economy. The positive interest towards the use of AI and ML also opens up the new era for surveillance and security industry at large to explore. The long pending demand for rationalization in the Goods and Service Tax (GST) rate on surveillance and security Products has remained unfulfilled. The Finance Minister must consider a rate cut for security and surveillance products as they are the key components of the homeland security and the national security imperative.

Big Infrastructure Push

In Infrastructure sector Rs 100 lakh crore would be invested over the next 5 years, National Infrastructure Pipeline was launched on 31st December 2019 of Rs 103 lakh crore. The Infrastructure sector was given more priority in the budget through lucrative schemes and programs. The core themes of an Aspirational India, Economic Development and Caring Society were delivered in a prudent manner. Infrastructure sector received a boost, with 100 more airports by 2024 to support Udaan scheme; and operation of 150 passenger trains to be done through PPP mode. The government's special thrust on infrastructure development across the various sectors such as roads, railway, airports, ports, economic corridors, health, safety, sanitation, and education is praiseworthy. This Union Budget clearly provides essentially the impetus to National Infrastructure Pipeline with the 6,500 infra projects under consideration and this indirectly helps each industry to grow. The security industry is also among the fastest growing sectors, which will get lots of business opportunities in the coming days once the financing process of projects gets start. The PPP model will also get a boost with the big announcements along with the formation of the investment protection cell. This will help to take care end to end investment grievances and enhance the investor confidence.

US$ 5 Trillion Economy

Overall the Budget 2020 is made with a clear roadmap to meet the target of US$ 5 Trillion economy. It has provided a stimulus to the various industry sectors by multiple schemes and programs. We can see that emphasis is more on the digital India by encouraging AI and ML through policy framework and government support. The effective implementation of all big announcements and core sector reforms will surely bolster the economic growth. It will further help the GDP to grow and reduce the fiscal deficit. We at Prama Hikvision wish to compliment the Government for showing long term commitment to 'Make in India' and Smart City Mission. We will continue to strive to enable security solutions for a safe and secure India.

Data Center Parks & FTTH Connectivity

On New Economy, a policy to enable the private sector to build Data Centre parks throughout the country will be brought out soon. The government's plan to set up Data Park for data management in India will go a long way in ensuring data security awareness among the key stakeholders. These Data Parks (Data Centers) in India will help to maintain the encrypted data banks in India. This will further will help to address the data security concerns in a proactive manner. Fiber- to-the-Home (FTTH) connections through Bharatnet will link 100,000 gram panchayats this year. It is proposed to provide Rs 6000 crore to Bharatnet programme in 2020-21.Measures proposed to benefit the Start-ups include a digital platform for seamless application and capture of IPRs, Knowledge Translation Clusters to be set up across different technology sectors including new and emerging areas. For designing, fabrication and validation of proof of concept, and further scaling up Technology Clusters, harbouring test beds and small scale manufacturing facilities to be established. It is proposed to provide an outlay of Rs 8,000 crore over a period five years for the National Mission on Quantum Technologies and Applications.

Boost to Exporters

For exporters, the Finance Minister had announced schemes such as Export Credit Insurance Scheme, NIRVIK, which will increase insurance cover for small exporters, and RODTEP (Remission of Duties or Taxes on Export Product), which will digitally refund local taxes to exporters and will replace the current Merchandise Exports from India Scheme (MEIS).The NIRVIK scheme holds lots of promise for exporters with higher insurance cover (90% coverage in pre and post shipment credit against 60% pre-budget) to boost the exports from India. It is being planned to bring the ease in the lending process and enhance the availability of credit to exporters, relaxation of corporate tax on start-up, power business, etc.

These are positive moves towards the generation of employment in India, the government is encouraging the youth to take the lead through entrepreneurship. The government has also shown the growth in Government E-Marketplace portal, which depicts the transparency in procurement system, encouragement of Digital India. To keep pace with GST reforms, 'National Logistics Policy' will be released very soon to manage the industry logistics business needs.

About Prama Hikvision India

Prama Hikvision is the India's leading security and surveillance solution provider. In addition to the security industry, Hikvision extends its reach to smart home products and solutions, industrial automation, and automotive electronics industries to achieve its long-term vision. The endeavor is to provide superior pre- sales and post-sales service through collaboration with local distributors and its allied partners.

Building on a growing global footprint, Prama Hikvision India is committed to provide high quality products with agile technical support serving a large network of dealers and system integrators across India, through its 51+ branches and a motivated workforce of 2000 + employees. It has a 'Make in India' manufacturing facility near Mumbai.

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7 key trends for the security industry in 2020

Ashish P. Dhakan, MD & CEO, Prama Hikvision India shares his thoughts on a few key trends that will affect the security industry in 2020, and probably even longer into the future

Significant changes have shaped the security industry during the last decade, and more exciting innovations should be expected in the 2020s. Emerging technologies and applications – such as multi-dimensional perception, UHD, low light imaging, artificial intelligence, and cloud technology – open new possibilities for the security industry. At the same time, millions of cameras and other security devices are being connected into networks, making the security industry a very important part of the future IoT world.

We at Hikvision would like to share our thoughts on a few key trends that will affect the security industry in 2020, and probably even longer into the future.

1. Multi-Dimensional Perception

For security cameras, image capturing simulates our sense of sight, extending the power of people's "eyes." But what if security cameras could use other kinds of "senses," like "hearing," "smelling," or even detections that are beyond visual range, to identify and respond to incidents?

For example, video cameras integrated with centimeter and millimeter wave radars are becoming popular in object detection. With deep integration of radar and video, a multi-dimensional camera extends perception beyond visual range to improve the detection of objects and movement tracking – up to a distance of 100 meters and in any weather.

Another approach is the integrated automobile horn-detection camera. Equipped with sonar arrays, this camera can precisely detect and locate the source of a vehicle's horn, while identifying the vehicle and generating photos and videos of the event as evidence. This ability can help reduce noise pollution on roadways and in communities with rules against the unnecessary use of horns.

More "senses," like smoke detection, heat detection, or even pressure detection, can be embedded in cameras to precisely monitor and report events or incidents.

The multi-dimensional perception trend will powerfully shape security systems and endow them with more capabilities to create safety in the near future.

2. Multi-Intelligence Cameras

Artificial intelligence applications have been slowly emerging in the security industry for many years already, but most AI-powered security cameras can only run a single algorithm because of the

Low Light Imaging

Multi-Intelligence Cameras

limitation of computing power, which means they can incorporate only one intelligent function at a time, counting people or counting cars, for example.

Now the computing power of security cameras has been enhanced greatly with the increased performance of AI chips. Multi-intelligence technology will be the trend for the next generation of AI-empowered cameras as several intelligent tasks will be accomplished by one camera.

Let us use vehicle intersections as an example. In many cities you can see ten or more cameras installed at intersections to detect traffic flow, to identify violations, to detect vehicle types and license plate numbers, protect sidewalks, and so on. But now, with multi-intelligence cameras, 2 or 3 cameras will be enough for an intersection. Since fewer cameras will be equipped for one application scenario, the cost of equipment, installation, and maintenance and management will all be reduced.

Moreover, scenario-defined cameras will become common as manufacturers can insert different algorithms into security cameras according to specific ap-

**Ashish P. Dhakan,
MD & CEO,
Prama Hikvision India**

plication scenarios, allowing customers to choose customized functions for their needs.

3. Proactive and Comprehensive Security Systems

Merely reactive CCTV systems will no longer meet the demands of security operations teams as they are often looking for new opportunities to enhance their operational efficiency. Many customers are now asking for proactive and comprehensive security systems that combine CCTV monitoring, alarm systems, access control, and even fire protection.

With the development of AI tech-

nology, monitoring processes of CCTV systems are becoming more automated by analyzing live and recorded video to detect, classify, and track predefined objects. These processes can be especially effective in proactively identifying events as they happen and extracting information instantly from recorded video.

Meanwhile, proactive and intelligent video analysis enables deployment of valuable comprehensive security systems and improves the return on investment for integration of CCTV and non-CCTV systems. For example, now,

when a camera detects an incident, a linkage will trigger the alarm system automatically, telling security personnel to check the surveillance camera live feed. Conversely, when alarm, access control or fire protection systems report an incident, the CCTV system will be activated to verify what actually happened.

Digital transformation to increase productivity is a business imperative for most organizations nowadays, and proactive and comprehensive security systems will be the direction for security operations to increase their efficiency and value.

4. Ultra-High Definition

People want to see more and see with more clarity; thus pursuing ever higher image resolution has been a key driving force in the development of security industry technology. After the HD era, the Ultra High Definition (UHD) era will be the natural next step.

UHD used to mean "expensive cost", but now UHD is benefiting from improvements in transmission and encoding technologies. It is becoming more and more cost-effective for large-scale use in the security industry, from entry levels to the top.

With greater bandwidth and lower latency transmission technology, the smooth transmission of UHD images is becoming possible, and widespread adoption of 4K and 8K resolution cameras will meet real opportunities.

Furthermore, continuously optimized encoding technology – which is vastly decreasing the bitrate of video – is another stimulus for UHD applications in the security industry. As the bitrate of recorded footage is greatly reduced, bandwidth and storage costs are reduced as well.

5. Visibility, Any Time & Any Condition

Most security incidents happen at night, but images and footage from conventional security cameras may easily lose colors and critical details in ultra-low light environments. Low light imaging technologies have become more and more popular in the security industry, enhancing the visibility of objects for identifying details at any time and in any condition.

Another important innovation is thermal imaging, which can detect the heat information of any object with a temperature above absolute zero. Taking advantage of heat zone imaging, thermal imaging technology allows cameras to "see" in low-visibility conditions, such as fog, smog, rain, and snow – even at night. And thermal cameras have huge potentials in various applications, like perimeter defense, fire detection and temperature measurement.

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6. Moving to the Cloud

As we mentioned at the beginning, more security devices, including cameras, are being connected over the Internet, making them parts of the IoT world. Thus, "moving to the cloud" has been a focus for the security industry – especially for video surveillance operations. Why are people enthusiastic about the cloud? It's because cloud services can bring vast benefits in efficiency, flexibility, cost-effectiveness, and security.

Among security operations, video surveillance as a Service (VSaaS) has been a major trend in the security industry as it is an ideal choice for small and medium-sized businesses to move their video-based security systems to the cloud. It is a technology to host the hardware and software of security operations in the cloud, so that users can access their IP cameras and IoT devices and check video footage or alarm linkage from anywhere. Since no on-site server installation and system configuration is needed, it is often more convenient than traditional video surveillance solutions. On the cloud, users can distribute costs over a contract term and pay for exactly and only the services that are used.

For enterprises running chain stores, demands on VSaaS are increasing greatly. Moving video surveillance services to the cloud, these businesses can quickly and economically centralize their security operations and remotely check the status of their stores.

To greet the "moving to the cloud" trend, security system integrators are also taking hold of VSaaS as it is a good chance to strengthen their business models. With VSaaS, system integrators are able to provide services for their clients using the cloud – such as system checks and remote maintenance – and consistently scale their business with efficiency.

7. Higher Demands on Cybersecurity

With millions of security devices being connected in IoT, security systems are evolving from single and isolated to open and connected. People are getting more and more concerned about the security of their data and privacy, and accordingly have set higher demands for the security industry on cybersecurity.

To help minimize the risk of security breaches, a multi-layered approach – including network, application, and device layering – that addresses a full range of cybersecurity threats concurrently will be demanded and expected by security organizations and IT departments. Security manufacturers, will also have to cover the security of their products throughout the whole lifecycle.

Final Words

Just as 2020 is the beginning of a new decade, we expect to see a new decade of innovation in technologies and applications. Along with the prominent security industry trends mentioned above, other trends such as 5G, big data, smart enterprise operations, and stricter data protection regulations like EU's GDPR, might also greatly affect the industry in the 2020s. **ISR**

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Why companies must have a strategic business plan for growth

**Mr. Adel Singh Bhinder, CEO,
Datar Security Service Group**

Wherever you operate, the truth is that technology is advancing, risks are emerging, and security is adapting. However, strategic planning is a critical component of safety that can transform an organization from passive to proactive. You have a vision and you have the desire to transform that vision into goals and objective step by step through planning is Strategic Planning. It's a sequence of processes that somebody uses to attain their goal. Some claim strategic planning in today's quickly evolving technical environment is no longer practical or necessary, but strategy stays an important component of identifying specific company-wide objectives and how to attain them. It's about working in the right direction on your long-term goal.

There are numerous tools accessible to teach us methodologies for strategic planning. Unfortunately, the way to implement a strategic plan in the real world is something that these resources cannot teach.

Plan to fit business goals and compliance standards

To get started, you need to be precise about your business mission: why does your business exist, and what do you want it to achieve? The goal of the company lets you create a perfect plan for your business, keeping all the points in mind and creating a precise plan just for your business.

Strategic planning offers the general direction for the security program and prioritizes initiatives and related tasks in the execution plan, while at the same time encouraging compliance with suitable laws and current procedures related to security. This strategic plan can significantly improve the efficiency and effectiveness of security decisions when completed as arranged in the plan. Once you have set the goals of the business, set a strategic plan for each goal. Set goals that extend your resources and capabilities. Once this process is completed you can start the process of strategic planning and determine the direction in which you want to take your business.

Synchronize and focus on short-term and long-term goals accordingly

Committing to short-term goals will assist you to remain focused and connected while minimizing distractions, this synchronization enables you to take rapid steps while moving in a definite path as well. It is simpler to be precise with shorter-term goals and the more particular you are, the better you will be prepared to evaluate your progress.

Effective approach shifts the focus from day-to-day problems to your broader and longer-term business objectives. Long term goals assist you with the big picture, this plan is effective because it offers a timeframe, a schedule and a continuous development plan. It is important to add planned checkpoints of small strategies along the way of your long-term goals, a step-by-step action plan execution and regularly having an eye on the tasks can be a smart move in the growth of the organization.

To sum up, measurable goals are crucial for an organization as they enable executives to evaluate progress and development and stay on the right track.

DSSG team, a helping hand in our strategic plan

It was a big and trustworthy step to involve the DSSG team in the strategic plan, we decided to get a variety of ideas and merged them to create our objectives, these objectives were correctly accomplished as each person had a good understanding of what mission he/she had to fulfil.

Strategic planning is a significant instrument to bring together your team and motivate them to work together. Employees always have distinct views of how the company is operated, when a team is involved in a plan, outstanding ideas come together. A planning team consisting of those people who can add value to the planning process is the most effective strategic planning process.

No one person can be an expert at everything, but when you combine a different set of minds working altogether to solve a problem it can make a lot of difference. For an organization, strategic planning is essential as it gives a sense of path and describes measurable objectives. Strategic planning is a useful tool for guiding daily activities and for assessing progress and changing policies in the future. To create the most of strategic planning, your business should carefully consider the strategic goals and then back them up with meaningful, carefully investigated measures to evaluate outcomes. Remember that strategic planning can change the manner your company works both organizationally and culturally. ISR

Hazardous substances:
How to minimize the dangers

Unsafe storage of hazardous material and ignorance of basic safety rules pose a severe fire risk and may cause massive destruction. Here's how we can minimize the risks associated with hazardous substances
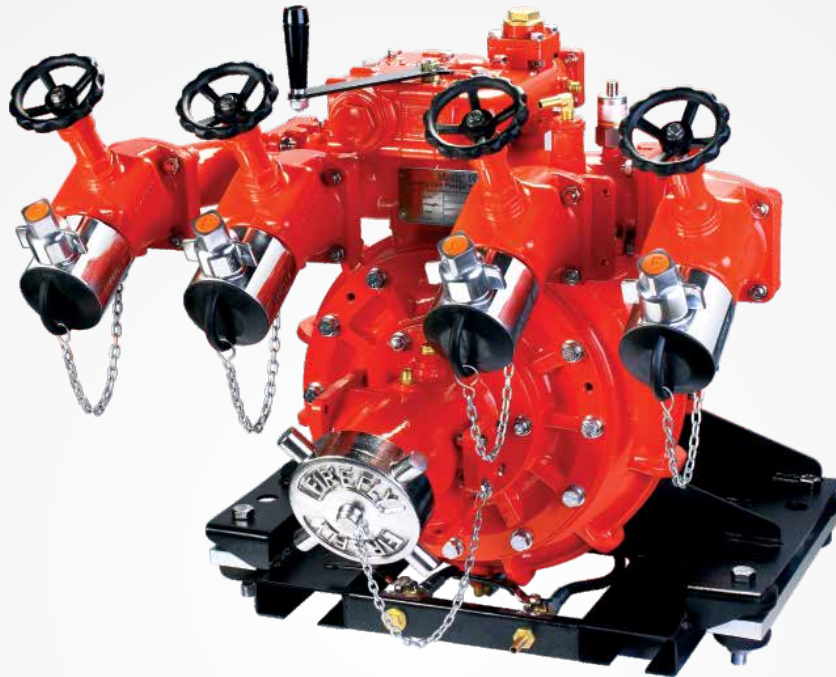
**Kaushal Vora, Fire Safety Auditor,
British Safety Council India**

Hazardous substances are around us all the time. They include gas, liquid fuels, hazardous chemicals, solvents, paints and electrical components of industrial machinery, as well as consumer electronic products. Chemical manufacturing plants and industrial laboratories store large quantities of flammable materials on their premises at any given time. They pose great risk of fire and present variety of hazards, particularly when safety is compromised while handling or storing them. At times, they can result in loss of life and cause irreversible damage to property and the environment.

A growing demand for energy, particularly in heavy industries, as well as proliferation of electrical and electronic equipment, have contributed to many incidents of fire in commercial premises. Material recycling centres also face new challenges in relation to fire risks. Hazardous vapours emitted by various products in a recycling process also carry a risk of fire.

Causes of fire

Although there are many different causes of workplace fires – from flammable materials being ignited to electrical equipment overheating – many are the result of human mistakes, such as poor planning and carelessness, or system failures. For example, fires caused by faulty wiring can usually be prevented through the regular inspection and maintenance of electrical equipment.

For a fire to start, three essential components are needed – a source of ignition, a fuel source and a supply of oxygen. Possible sources of ignition include heaters; light fittings; electrical equipment; cooking equipment; smokers' materials (such as cigarettes and matches); arson and anything that can get very hot or cause sparks, such as machinery or welding and grinding work.

Possible fuel sources include wood; paper; plastic; rubber; foam; packaging materials; textiles; display materials; furniture; plastic and timber storage units; waste; and flammable liquids, chemicals and gases. Sources of oxygen include the air, air conditioning systems and medicinal or commercial oxygen supplies – for example, in cylinders.

If a fire breaks out people can suffer burns or smoke inhalation, both of which can prove fatal. Smoke can also quickly travel ahead of a fire and block escape routes, trapping people in the danger area.

Very often, fires break out in garbage dumps as a result of careless disposal of industrial waste materials. Personnel working in such places should be trained to segregate and dispose waste in a safe manner. They are likely to be directly affected by a fire, but they are often least prepared and least educated about it. They include garbage pickers, truck drivers, and waste handlers.

Hazardous substances may also go up in flames during transport. They are often transported by road in tankers and storage lorries which make very long journeys across the country in the scorching sun. Drivers and cleaners maintaining these vehicles should be well trained about the hazards of these materials and what to do in case of emergency. The vehicles should clearly display signs that they are carrying hazardous materials, to caution other users of the road.

Storage of hazardous materials

The importance of safe storage of hazardous materials cannot be overempha-

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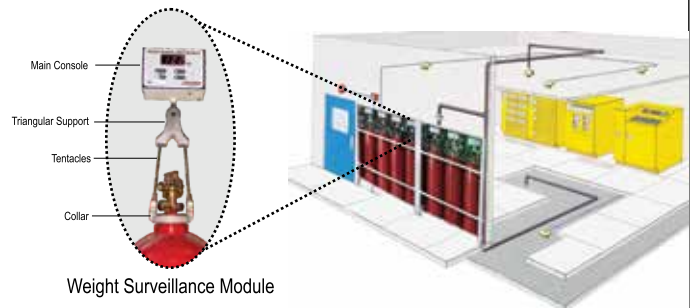
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sised. The areas where they are stored should be clearly demarcated. Standard operating procedures preventing unauthorised entry into such storage areas should be communicated to anyone who is likely to come into contact with them in course their work. Periodic checking by authorised personnel is very important. Areas where volatile materials are stored should also be checked for accumulation of vapour and, if necessary, it should be released in a controlled manner at specified intervals.

Case study

On 14 April 1944, during the second world war, a manmade disaster of an unprecedented magnitude took place in India, as a result of negligence and lack of safety awareness. A ship docked at Victoria Dock of Bombay (presently Mumbai) carrying a mixed cargo of cotton bales, gold, and ammunition, including around 1,400 tons of explosives caught fire as a result of negligence of a crew member. The fire engulfed half of the Mumbai, taking lives of about 1,300 people working at the dock, 500 civilians, 71 fireman and approximately 80,000 homeless people. The power of the explosion broke windows in a 12-kilometre radius. It destroyed three Royal Navy ships and 50,000 tons of shipping got damaged. Two explosions created earth shocks which were felt in Shimla (north India). Two square kilometres area got engulfed in fire within seconds from the first blast. It took 8,000 people to clear 5,00,000 tons of burned debris and clean the port. Every year, the week of 14 April is commemorated as Fire Services Week.

This example illustrates the magnitude of destruction caused by unsafe storage of hazardous material and ignorance of basic safety rules. These considerations are particularly relevant today in India, where industrial growth has reached an all-time high. Chemical and manufacturing units deal with huge quantities of hazardous materials and employ large numbers of permanent and contract staff, all of whom should receive basis fire training.

Fire prevention and handling hazardous substances

Adopting basic fire safety rules and practices is an essential requirement of any modern enterprise. Regular fire inspections and audits of the existing fire systems and fire-fighting equipment, availability of personal protective equipment, as well as regular inspection and maintenance of fire escape routes and emergency lighting are just some of the elements of a modern fire safety system in the workplace.

In industrial establishments, personnel with the responsibility for fire safety should be provided with fire-resistant outfits. Fire alarms and lifesaving equipment should be inspected and tested regularly. Their volume should be set at a level audible to all staff who may be engaged in a variety of jobs. Regular fire drills must be conducted, and all the workforce should be taught the fire procedures and the steps to be taken when the fire alarm goes off. Each department should have a designated area to assemble when evacuating from the scene of risk. One member from each department should be charged with the responsibility of taking a headcount and ensuring that all staff are accounted for. The 'safe' areas designated as temporary shelters should be located away from any toxic material. Escaping personnel should not be allowed to block exit ways or hinder movement of other staff or the emergency services.

All company's staff should be aware who are fire wardens in the company – the personnel designated to deal with the fire once it begins. They should be well versed with operating a fire extinguisher and familiar with the location of the fire extinguishers on the premises.

Although untrained staff must not be required or expected to attempt to extinguish a fire, all staff should be made familiar with the location and basic operating procedures of the fire-fighting equipment provided, in case they need to use it. If employees with fire safety duties are expected to use firefighting equipment when it is safe to do so, they must be trained in its correct use.

All fire precautions and equipment – including alarms, extinguishers, emergency lighting, safety signs, fire exits and fire doors – and the fire separating elements designed to prevent fire and smoke entering the escape routes, must be adequately maintained in good condition

It is advisable that large commercial establishments be fitted with fire extinguishers every 50 metres or so. In large plants that are centrally controlled, the person operating the mains must immediately cut off the power supply to the entire plant as soon as the fire alarm is sounded.

These requirements apply to all the employees of the company – permanent employees, as well as contracted and casual staff working on the premises.

With so many workplace activities and materials posing a fire risk, it is essential that those in charge of industrial, commercial and public buildings identify the fire hazards and risks present and do all they can to reduce the risk of a fire occurring. Employers must also ensure they have adequate fire precautions in place, such as fire alarms, escape routes, fire safety signs and fire-fighting equipment, so that in the event of a fire everyone can safely escape. By following these steps, business owners can help to make their buildings and sites safe for everyone – and help to reduce the number of injuries and fatalities caused by fire. **ISR**

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Ashish Shah, Managing Director at Ambetronics says, "Since we have long been catering to B2B market only, we are now venturing into B2C market with our newly designed residential LPG/PNG leak detector that is a plug and play leak detector which can be installed in every home kitchen."

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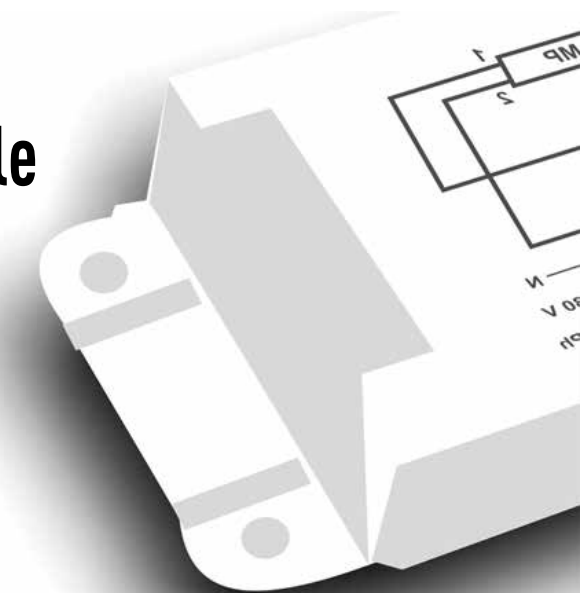
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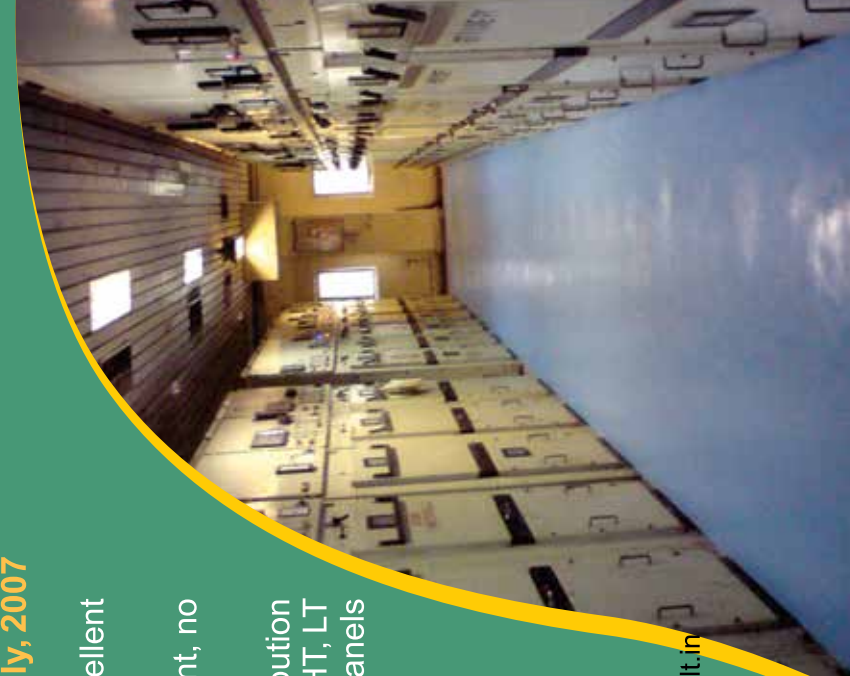
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Hazards in Process Industries

"Every industry must evaluate its potential fire and explosion hazards and take adequate preventive measures to eliminate these hazards".

- R. Rajasekharan Nair & Vinod R. Alappad

1.0 INTRODUCTION:

Process industries generally consist of chemical, petroleum and petrochemical industries, which handle large quantity of flammable materials. There are three major hazards in plant operations of process industries, viz. Fire, Explosion and Toxic Release. Of these three, fire is the most common, while explosion is particularly significant in terms of fatalities and loss.

Fire is normally regarded as having a disaster potential less than explosion. The hazard potential of a toxic substance depends on the conditions of exposure and on the chemical itself. It ranges from a sudden brief exposure at high concentration to prolonged exposure at low concentrations varying a working life time. Both these situations present a series of hazards. A very large release of a toxic chemical can lead to a disaster greater than that of a fire or an explosion. Toxic release has the greatest potential to kill a large number of people, but large-scale toxic gas fatalities hardly occur. The problem of avoiding the major hazards is essentially that of preventing escape of material from leaks and avoidance of an explosion inside the plant vessels and pipe work.

Though the process industries are encountered with fire, explosion and toxic hazards, this article is focused only on various aspects of fire and explosion hazards.

2.0 INDIAN SCENARIO:

India has witnessed some major chemical disasters. We in India have suffered the worst industrial disaster in the whole world, due to the release of toxic gas, Methyl Isocyanate (MIC) at Bhopal, in December 1984, wherein about 4000 people were killed and about 3 lakhs people were injured.

Several other important chemicals accidents have occurred since then. India does not have a comprehensive accident database management and updating system. Accident data remains scattered with multiple agencies, and are to be informed to the respective authority specified under various legislations. As a result, accident data is not presently compiled at a central location.

Compiling statistics from industry on the nature, type and cause of fires and explosions will enable managements and government agencies towards implementation of preventive measures. Unfortunately, detailed statistics of this form, is not easily available in our county. However, selected major fires and explosions **(See Fig. 01, 02 and 03)** occurred in India are given in **Table 01.**

Fig 01: Fire at IOCL Jaipur Oil Deport.

Fig 02: Fire at BPCL Refinery, Mahul.

	TABLE 01 - SELECTED FIRES & EXPLOSIONS IN PROCESS INDUSTRIES IN INDIA
01	On 09-11-1988, a major Fire and Explosion occurred at BPCL Refinery, Mumbai, in which 12 persons were killed and 40 injured. The possible cause of the fire was due to the blowing off the floating roof. The chemical involved in the fire was Naphtha.
02	On 17-01-1989, a major fire occurred due to the gas leak at National Fertilizers Limited, Bathinda, Punjab in which more than 500 persons injured. The chemical involved in the fire was Ammonia.
03	On 29-05-1991, a huge fire occurred due to the lightning strike at HPCL, Visakhapatnam, which killed 8 persons. The chemical involved in the fire was Naphtha. The estimated property loss was 55 lacs.
04	On 11-07-1991, a huge fire occurred at the plant of ONGC, Mehsana, due to the lightning strike, which killed 9 persons. The fire resulted in the blowing off the roof and shell. The chemical involved in the fire was Crude Oil. The estimated property loss was 10 crores.
05	On 31-12-1995, a huge fire occurred at a pharmaceutical factory in Mohali due to static electricity. The estimated property loss was 3.25 crores.
06	On 07-03-2003, a huge fire occurred at IOCL Refinery, Digboi, Assam. The chemical involved in the fire was Motor Spirit. The estimated property loss was 11.25 crores.
07	On 09-04-2003, a huge explosion occurred at the Fertilizer Plant in Paradip, Orissa. The cause of the explosion was due to pressurisation of tank because of the reaction between phosphoric acid and steel. The estimated property loss was 4 crores.
08	On 29-11-2009 a fire broke out at the IOCL Oil Depot's giant tanks holding 8000 KL of oil in the outskirts of Jaipur, which killed 12 and injured 200. The blaze continued for a week and during the period half a million people were evacuated. The explosion recorded a tremor measuring 2.3 on Richter scale (See Fig. 01)
09	On 16-07-2013, an FCC plant of Vadodara oil refinery, Gujarat caught fire.
10	On 08-08-2018, a compressor shed of a hydrocracker plant at BPCL refinery, Mahul, Mumbai caught fire as a result of a leakage of an oil-water mixture in an adjoining plant which injured 45 persons (See Fig. 02)
11	On 03-03-2019, a fire broke out at the ONGC gas processing plant of Uran, Navi Mumbai, which killed 5 persons and injuring 11 persons. (See Fig. 03)
12	On 30-12-2019, a Warehouse of chemical storage tanks near IOCL Refinery at Kandla Port, Gujarat caught fire due to poor maintenance of the pipeline, which killed 3 persons and injured 2 persons.

Fig 03: Fire at ONGC Gas Plant, Uran.

Fig 04: Jet Fire at Piper Alpha Oil Plantform.

Fig 05: An example of a pool fire.

3.0 TYPE OF FIRES:

Fire and explosions are major hazards in process industries, which cause not only serious damage to the property and disrupt production but also loss of precious human lives in process industry.

Large volume of flammable material handled at high temperature does pose a serious threat due to loss of containment or mal-operation. A material such as liquid petroleum gas (LPG), which is held as a liquid above its normal boiling point at high pressure contains large quantities of energy, which cause a large proportion of it to vaporise by instantaneous flash off and to disperse, if there is a loss of containment.

Fire in the process industries can take several forms such as Jet Fires, Pool Fires, Running Liquid Fires and Flash Fires, which are outlined below briefly:

3.1 Jet Fires:

There is a wide variety of situation in which a jet fire or ejected flame, can occur, either by design or accident. The principal situations in which flames occur by design are burners and flares. Ejection of flammable liquid from a vessel, pipe or pipe flange, can give rise to a jet flame if the material ignites. Jet fires dissipate thermal radiation away from the flame's visible boundaries. The energy transmitted could be hazardous to both life and property.

Jet flames are not easy to handle, because a large jet flame may have substantial 'reach' sometimes up to 50 meters or more. A jet fire would appear as a long narrow flame through a small aperture / hole / orifice.

Jet fires or flames have been involved in a number of accidents. Amongst these, the accident at the **Piper Alpha Oil Platform in the North Sea** occurred on the night of 8th July 1988 is important **(See Fig. 04)**. A series of violent explosions and a large fire destroyed the oil platform, which was hit by a large Jet Flame from the gas riser. Only 62 crew members survived out of the 229 persons on board. Many workers were trapped because rescue helicopters could not approach when confronted with flames 100 meters high.

3.2 Pool Fires:

A pool fire is defined as "a pool of flammable liquid burning with a stationary diffusion flame or the combustion of material evaporating from a layer of liquid at the base of fire".

A pool fire occurs when a flammable liquid spills onto the ground and is ignited. A fire in a liquid storage tank is also a form of pool fire, as in trench fire. A pool fire may also occur on the surface of flammable liquid spilled onto water.

A pool fire is a complicated phenomenon. The characteristics of pool fire depend on the pool diameter. The liquid burning rates increases with the diameter until for large diameters it reaches a fixed value.

A pool fire can take place in a storage tank, as for example, in a tank, which has lost its top, as a result of either internal or external explosion. An example of a pool fire is given in **Fig. 05.** The fire may also take place in a bund. Other types of pool fire occur after a liquid is discharged on the ground, the shape and depth of the release of flammable vapour from a process plant followed by ignition is not uncommon.

A pool fire burns with a flame, which is often taken to be a cylinder with a height, twice the pool diameter. In still air, the flame is vertical, but in wind it tilts. Wind also causes the base of the flame to extend beyond the downwind edge of the pool, thus exhibiting flame drag.

Pool fires, especially in bunds, which are either circular or square, have an approximately cylindrical shape. In the absence of wind, this would be an upright cylinder. But usually wind is present and the cylinder is oblique / tilted / inclined. A notable feature of pool fire is that of down-wind 'spill over' or 'flame drag'. This 'spill–over' increases the effective diameter of the pool fire by 50% of the bund diameter.

The pool fires have occurred at many places and the one occurred at **Cleveland, Ohio, USA,** in 1944 is important to remember. In this fire about 3,000 T of LNG 'spilled over' from several storage tanks and caused large scale pool fires. The accident resulted in 128 deaths and 400 injuries.

3.3 Running Liquid Fires:

A running liquid fire involves the spread of flame across the surface of a flammable liquid spillage. In spread and extent,

the fire is greatly influenced by local topography. As the spread is often promoted by, drains and trenches, it is necessary to consider the radiative effects from fires spread in this way.

Thin flames are less radiative than thick flames. Hence, drains can be built with narrow necks, opening into larger volumes below the surface. The design shall allow for presence of firewater and for separating immiscible liquids when desired.

3.4 Flash Fires:

Flash fire is also known a vapour cloud fire. Flash fire is defined as "the combustion of a flammable vapour and air mixture in which flame passes through the mixture, at less than sonic velocity (speed of sound in the medium), such that negligible over pressure is generated". A flash fire, occurs when a vapour cloud forms from a leak and is ignited, but without creation of significant overpressure. If such overpressure occurs, the event is a vapour cloud explosion (VCE), rather than a vapour cloud fire (VCF).

Release of flammable vapour from a process plant followed by ignition is not uncommon occurrence. If the ignition is prompt, the cloud may be modest in size, but if the cloud has time to spread over an appreciable part of the site and is then ignited, a major cloud fire may result. This occurs in only a very small proportion of ignited release.

In a flash fire, the gas burns, but does not explode. The heat radiation or the flames may cause severe burns. It may also cause sudden depletion of oxygen. When controlled quickly, the flash fire may not cause serious damage to the main plant and equipment, but can extensively damage electrical cables and other vulnerable items of equipment.

In the petrochemical industries, flash fire can occur at collection points, compressor stations, refineries, etc. Industrial flash fire and explosions result from the accidental release and ignition of flammable fuels. The size and duration

of the flame that result from this ignition is determined by the amount of fuel available, the efficiency of combustion, and the environmental and physical characteristics of the site of the flash fire or explosion. The temperatures attained by flash fire have been estimated to range from 550 to 1050°C, although higher temperatures are believed to occur. If the flash fire or explosion is sufficiently intense, the heat produced may cause regular clothing to melt or begin burning. Large and destructive vapour cloud fires occurred at **Port Newark, New Jersey,** in 1951 and at **Mexico City,** in 1984.

4.0 TYPE OF EXPLOSIONS:

Explosion in the process industries are fewer than fires but it often inflicts greater loss and damage than fire.

Explosion is a sudden and violent release of energy. The violence of explosion depends on the rate at which the energy is released.

The explosions in process industries can take several forms such as: Vapour Cloud Explosions, BLEVE and Fire Balls, which are outlined below briefly:

4.1 Vapour Cloud Explosion:

A vapour cloud explosion (VCE) is defined as "an explosion of a cloud made up of a mixture of flammable vapour or gas in air

It may be noted that until the early 1980's, a vapour cloud explosion (VCE) was generally referred to as unconfined vapour cloud explosion (UVCE). The term "Unconfined Vapour Cloud Explosion" apparently was carried following the 1st June 1974 accident at a chemical plant near Flixborough. U.K. The term "unconfined", is now generally omitted.

A vapour cloud explosion is one of the most serious hazards in the process industries. Vapour cloud explosions do occasionally occur and they tend to be very destructive. A feature of vapour cloud is that it may drift some distance from the point where the leak has occurred and may thus threaten a considerable area.

A vapour cloud explosion occurs when a sufficient amount of flammable or combustible material is released, mixes with air and is ignited. When the flammable vapour cloud is ignited, it can explode, producing a blast wave which can cause major destruction at a large distance.

Vapour cloud explosions could be of the two types viz., (i) Confined explosions – these are the ones, which occur within some sort of containment, such as a vessel or a pipe work. Explosions in building also come under this category, and (ii) Unconfined explosions – these are the ones in, which the cloud burns in the space or open air, with sufficient rapidity.

Normally, the shape of the vapour cloud before ignition is not spherical but is influenced by wind or air movement and by nearby structures. The fire will burn at all locations where the vapour cloud concentrations are about half the lower explosive limit or higher; however, ignition takes place between the lower and upper explosive limit values.

A number of industrial vapour cloud explosions were occurred worldwide and some of them are listed below:

- The accident at a chemical plant near **Flixborough, U.K.** involved the rupture in a 20-inch bypass pipe dumping almost 40 tons of cyclohexane which vaporized. The resulting vapour cloud found an ignition source;

Fig 06: Vapour Cloud Explosion at Flixborough, U.K.

Fig 07: Vapour Cloud Explosion and Fireball at Philips Petroleum Chemical Complex, Pasadena.

the blast and fire destroyed the entire chemical complex killing 28 people and injuring 89 **(See Fig. 06)**.

- On October 23rd 1989, a vapour cloud explosion and fireball occurred at the **Philips 66 Petroleum Chemical Complex at Pasadena near Houston, Texas,** killing 23 workers, one worker missing and injuring more than 130 others, **(See Fig. 07)**. The accident was investigated by the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency and other agencies. According to OSHA, the Vapour Cloud resulted as a sudden gas release of an estimated 85,000 lbs of a flammable gas mixture (hydrogen, ethylene, hexane, and isobutylene) through an 8-inch open valve. The vapour cloud (estimated to be roughly 1100 feet long, 800 feet wide, and 5 feet high) drifted downwind for about 90 to 120 seconds before contacting an ignition source. The vapour cloud plus ad-

Fig 08: Vapour Cloud Explosion at Hertfordshire Oil Storage Terminal, Buncefield, England.

ditional flammable gas inside tanks at the valve source exploded with a force equivalent to 2.4 tons of TNT based on blast damage.

- Another major conflagration caused by a series of explosions on 11 December 2005 at the **Hertfordshire Oil Storage Terminal, Buncefield in England** with a capacity of about 600 Lakhs imperial gallons fuel **(See Fig. 08)**. The first and largest explosion occurred near tank 912 which led to further explosions which eventually overwhelmed 20 large storage tanks. The explosion measured 2.4 on the Richter scale. The incident described as the biggest of its kind in peacetime Europe and certainly the biggest such explosion in U.K. since 1974 Flixborough disaster.

- A major vapour cloud explosion occurred in 1989 at an **LPG Plant in Ufa, USSR**, in which about 645 persons killed and about 500 injured **(See Fig. 09)**. Another vapour cloud explosion reported in 2005 at a hydrocarbon plant at Texas City, USA, in which 15 persons were killed and about 180 injured.

4.2 Boiling Liquid Expanding Vapour Explosion:

The term 'BLEVE' is an acronym for Boiling Liquid Expanding Vapour Explosion coined by three Factory Mutual (FM) researches viz.: James B Smith, William S Marsh, and Wilbur L Walls.

BLEVE is an explosion caused by the rupture of a vessel containing a pres-

Fig 09: Vapour Cloud Explosion at LPG Plant in Ufa, USSR.

Fig 10: An example of a BLEVE.

surised liquid above its boiling point. A BLEVE is a combination of fire and explosion with an intense radiant heat explosion within a relatively short time interval. In other words, it is used to describe the sudden rupture of a vessel system containing liquefied flammable gas under pressure due to flame impingement.

The phenomena of BLEVE can occur within a vessel or a tank, in which a liquefied gas is kept above its atmospheric boiling point. If the pressure vessel fails as a result of a weakening of the structure, the contents are instantaneously released from the vessel as turbulent mixture of liquid and gas, expanding rapidly and dispersing in air as a cloud. An example of BLEVE is shown in **Fig 10**.

A BLEVE can therefore be caused by a physical impact on a vessel or a tank which is already over-stressed or damaged. It can also be caused by fire impinging upon or engulfing a vessel and thus weakening its structure.

Thus, the essential features of a BLEVE are: (1) the vessel fails (2) the failure results in flash–off of vapour from the super-heated liquid and (3) if the liquid is flammable, the vapour ignites and forms a fireball.

The effects are: (1) BLEVE (2) fragments and (3) for flammable liquids, a fire ball. The BLEVE create an over pressure.

A BLEVE usually generates missiles. There may be fragments created by the rupture event and also the body of the vessel itself. The pressure at the instant

of burst is high and the reaction force is often large enough to cause the main part of the vessel to rocket. A BLEVE arising something from the fire engulfment of a vessel containing a flammable liquid also gives rise to a fireball.

Although most BLEVEs involve a liquid, which is flammable, this is not a necessary feature of a BLEVE. Even rupture of a vessel containing super-heated water can constitute a BLEVE. Likewise, although engulfment in fire is the common cause of BLEVE, it too is not a necessary feature. Any rupture of a vessel containing a superheated liquid may be traced a BLEVE.

The events that can lead to a BLEVE are: (1) Fire exposure, (2) Vapour space explosion, (3) Overpressure (4) Mechanical damage, (5) Collisions, (6) Overfilling, (7) Runaway reactions, (8) Overheating &, (9) Corrosions. The highest frequencies of BLEVE incidents were due to explosions and damage to tanks. Explosion and damage BLEVE incidents resulted in high injuries. Overfilling and fire BLEVE incidents resulted in high fatalities.

The size of the BLEVE is dependent on the size and weight of the container along with the amount of liquid that remains inside the container at the moment of the BLEVE. Generally speaking, the bigger the container, the bigger the BLEVE.

Over the years many BLEVE's have occurred and have taken many lives including fire fighters. Some of the BLEVE incidents are outlined below:

BLEVEs have occurred due to engulfment in a vapour cloud fire. Such a fire occurred at **Port Newark, New Jersey,** in 1951 and led to the destruction of over 73 horizontal bullet tanks, many by BLEVE.

The BLEVE at **Feyzin Refinery in France** on January 1966 has received particular attention. In this accident an operator when drawn water from the bottom of a propane sphere control, a vapour cloud formed, ignited and flashed back to the vessel. The pressure in the vessel rose and the relief valve lifted, but the metal of the vessel lost strength and some 90 minutes after ignition the vessel burst. The accident killed 18 and injured 81 people and caused the destruction of five of the spheres.

There have also been instances where release from one storage vessel has led to a fire which has caused BLEVE of an adjacent one such as the case at **Texas city, Texas** in 1978, where overfilling of an LPG sphere led to a fire which caused the BLEVE of an adjacent sphere which resulted the death of 7 and injury of 10 people.

Engulfment in a vapour cloud fire was also the cause of destruction, largely by BLEVE of 6 storage spheres and 48 horizontal cylindrical vessels holding LPG at the **PEMEX storage (bottling) plant at Mexico City,** on 19th November 1984, which killed 650 people and injured about 7000 **(See Fig. 11)**

The three BLEVE's occurred at **Sainte-Élizabeth-de-Warwick, Quebec, Canada** in June 27, 1993, **Burnside, Illinois** in October 2, 1997, and **Albert – City, Iowa** in April 9, 1998 was investigated by National Fire Protection Association (NFPA), USA. The NFPA Team, who investigated these accidents, made many observations. According to them, in each case, the propane was used to heat building. In each case the tank's relief valves were operating when fire fighters arrived, but they could not stop flames from impinging on the tanks and weakening the tank shells. And in each case, tanks ruptured in BLEVE's that sent pieces of metal flying at high velocities in random directions, kill-

ing those caught in their path. Further, when a BLEVE occurs, debris may travel hundreds of feet, with tremendous force, and the escaping fuel can ignite causing an expanding fire ball. Fireballs several hundred feet in diameter are not uncommon, and deaths from burns have occurred to persons as much as 250 ft from the larger containers.

4.3 Fire Balls:

A fireball burns at about 1400 °C, and are extremely dangerous because of their rate of burn and amount of radiant heat generated. A fireball is inevitable from BLEVE's involving flammable liquids. It is the radiant heat from the fireball that makes the consequences of a BLEVE involving flammable liquids so hazardous. The bulk of the cloud is too fuel rich, so they can only burn around the outer envelope. The cloud will also be lighter than air because of its heat content so that it will lift off to give the appearance of a mini–atomic bomb; complete with mushroom cloud and stem made up of burning fuel reaching up to it from the ground. A massive explosion aboard a chemical tanker blew a fireball and mushroom cloud into the sky over the weekend at the **Port of Ulsan, South Korea (See Fig. 12).**

The pressure burst and the flashing of the liquid to the vapour, creates a blast wave and potential missile damage. It also results in immediate ignition of the expanding fuel–air–mixture leading to intense combustion, which ultimately results in a fireball.

When this cloud is ignited, a fireball occurs, causing an enormous heat, ra-

Fig 11: BLEVE at PEMEX LPG Bottling plant, Mexico City.

Fig 12: A Fireball and Mushroom Cloud at the Port of Ulsan, South Korea.

diation intensity within a few seconds. This heat intensity can cause several skin burn and deaths at several hundred meters from the vessel depending on the quantity of the gas involved.

There are two types of events, which may give rise to fireball. One is, the ignition of a release on a liquefied gas pipeline, where the jet flame is preceded, by a fireball in which un-ignited gas is burned. The other is an eruption in hot oil giving rise to release of burning vapour.

A distinction needs to be made between fireball resulting from the bursting of a pressure vessel and one resulting from a formation of a vapour cloud. In the first case, the bursting many occur under fire conditions and be part of a BLEVE or it may occur in the absence of fire. Momentum forces predominate if a fireball is formed from the bursting of a vessel, and buoyancy forces predominate in one formed from a vapour cloud.

Incidents involving fireballs are not uncommon. They normally occur as part of a BLEVE when vessel ruptures after it has been engulfed in fire or has been subjected to a directed flame. The vessels principally liable to such conditions are storage vessels, rail tank cars, and road tankers.

BLEVES also happen in transport, when flammable material is released and ignited following an accident, so that transport tank cars, often when a jet flame from the relief valve on one tank has played on another. A derailment of rail tank cars at **Crescent City, Illinois, USA**, in 1970 caused a release of propane, which led to a fire and caused a succession of tank car BLEVE's. The BLEVE's were accompanied by, large fireballs and missiles, including rocketing tanks. The diameter of BLEVE Fire Ball was of 150 m to 200 m.

The diameter of BLEVE fireball incidents at **Houston, Texas, USA** in 1971; **Kingman, Arizona, USA** in 1973 and **Bet, Montane, USA,** in 1976, was about 300m. The disaster at **Mexico City,** in 1985, involved a series of fireballs from BLEVEs. The estimated diameter of fireballs at **Donnellson, Iowa, USA** was 610 m.

5.0 PREVENTIVE MEASURES:

Fire prevention is an exhaustive subject needing a great care in all safety aspects of plant operation. Some of the common causes of potential fires and explosions in process industries and the preventive measures need to be adopted are briefed below:

5.1 Leaks & Spillages:

Leaks and spillages are the main causes of fire and explosion in chemical plants. They may give rise to a local fire or explosion, a wider flash fire or a large vapour cloud explosion. Generally, leaks occur in pump glands or seals; gasket failures of joints of flanges; valves and fittings; draining of pipelines, equipment or tanks; spillages from tank trucks or tank cars. Therefore, priority should be given for preventive maintenance in plant operation for control of leaks and remedial action for elimination of gas/oil leaks promptly. Large volume of oil draining should always be done into closed system and small quantities drained under controlled conditions.

5.2 Light Hydrocarbons:

Light ends are volatile. If the pressure is released from liquid light ends, they vapourise rapidly. Remember, that a small liquid leak can become a large dangerous vapour cloud. Hence, top priority should be given to prevent leaks. The following procedures must be adopted to prevent the leaks:

1. Use proper equipment and procedures for sampling liquid.
2. During shutdowns, remove residual hydrocarbons before admitting any air.
3. During start-ups, remove residual air before admitting hydrocarbons.
4. Exercise at-most care when draining water.

5. Keep bull plugs fixed on drains and bleeders.
6. Follow Work Permit System for cold/hot work area where light ends are there.
7. Never overfill containers
8. No air should be used to pressurise containers. Use nitrogen if necessary.
9. Ensure that storage / transport containers are designed properly.

5.3 Runaway Reactions:

In those type of chemical processing where runaway reactions is likely. The design of the process and equipment should be provided with adequate built in Safety Factors such as explosion vents and discharge arrangements to take away discharge to a safe place. In addition to this the following preventive measures should also be incorporated:

1. Automatic hooter alarm system.
2. Automatic shut–off system.
3. Flooding / Dumping system.
4. Flow meters arrangements for controlled feeding.

5.4 Startup & Shutdown:

Some of the principal hazards involved in the start-up and shut down are:

1. Mixing of air and hydrocarbons.
2. Contacting hot oil and water.
3. Thermal and mechanical shock.
4. Water shots and water freezing.
5. Over processing of equipment.
6. Corrosive and poisonous fluids.

Normal start-up and operating procedures and emergency shut down procedures should be periodically updated and personnel trained. Extra care should be taken during start-up and shut down of process units.

5.5 Mixing of Water:

Many petroleum refinery fires and explosions were caused due to the sudden mixing of uncontrolled quantities of water with heated oil. The result of such mixing is the evolution of large quantities of water vapour or steam,

sometimes accompanied by foaming, which takes place when water is mixed with oil at conditions above the boiling point of the water. In addition, water at the wrong place in process system which employ acid may result in greatly accelerated corrosion and eventual failure of a pressure device. Many accidents were occurred due to these types of causes, which resulted in the death of many workers and huge property damage. Hence, effective control measures should be adopted to eliminate the entry of water into process system.

5.6 Dust Explosions:

Dusts and mists can generate high pressure-gas by combustion in air or another reactive gaseous environment. For any given mass of dust or mist, the surface area increases as the particle or droplet diameter decreases, so the violence of combustion for any given substance increases as the particles or droplets become finer.

The chances of igniting a dust cloud is governed by the size of particles, dust concentration, impurities present, oxygen concentration and strength of the source of ignition.

Combustion of dust can occur with virtually any particle or droplet, but in practice most explosion hazards with dispersed materials are encountered with 840-micron size or smaller.

Dust clouds have been ignited by open flames, lights, smoking materials, electric arcs, hot flameless light bulbs, friction sparks, high pressure steam pipes and other hot surfaces, static sparks, spontaneous heating, welding and cutting torches and sparks from these operations and other common sources of heat for ignition. It may be remembered here that the ignition energy required to ignite dust clouds are very much higher than that required for igniting flammable vapour.

Remember, that when a combustible dust is processed or handled, the potential for an explosion is present. It may

be noted that in order to explode, a dust must be combustible, have a source of ignition and be mixed with oxygen.

In general, dust explosion is similar to flammable gases and vapours and hence the precautions necessary to ignite flammable gases and vapours are also applicable to dust explosions. Some of the preventive measures need to be taken to prevent dust explosions are listed below:

1. Minimize dust cloud formations. For this purpose, ensure the size of the dust particle does not exceed the maximum size permitted for that combustible material.
2. Blanketing with an inert gas such as nitrogen, which limits the oxygen percentage so that an explosion will not occur.
3. All equipment and transfer piping should be adequately grounded and bonded to reduce the possibility of ignition by static electricity.
4. Reduce the height and rate of free fall of combustible material to minimize static charge generation and less dust cloud formation.
5. Use small dust filter instead of large control collector units for separation units.
6. All system and equipment used should be designed to have explosion relieving devices.
7. Use automatic fire suppression system.
8. Provide heat detectors and automatic sprinkler systems.

As far as possible use remote control operations to avoid personnel entering close to equipment where explosion potential exists.

5.7 Hot Work:

Mechanical work, particularly hot work has been a source of Fires and Explosions in Process Industries. In an effort to establish control over operations using open flames or producing sparks or entry of closed vessels, it is necessary to institute hot work permit system. The

system, requires that authorisation be secured before equipment capable of igniting combustible materials, is handled outside areas normally specified for its use. Work Permit System has to be followed to ensure that an equipment or area has been made safe for employees who are required to work in or around the equipment or area, and to fix the responsibility for the person who is accountable for authorising the work and for the person who is carrying out the work, so that the work will be carried out safely.

5.8 Static Electricity:

The generation of static electricity in process plants cannot be prevented absolutely. Static becomes a source of ignition, under the following four conditions and therefore these should not be allowed to occur:

1. An effective means of static generation.
2. A means of accumulating the separate charges and maintaining a suitable difference of electrical potential.
3. The spark discharge of adequate energy.
4. The spark must occur in an ignitable mixture.

Some of the safe methods adopted to prevent ignition from static electricity are: grounding, bonding, avoidance of flash fitting, agitation, high liquid flow velocities and water contamination.

5.9 Electrical Installations:

Electrical short-circuit was the root cause for many fires and explosions in plants particularly those plants handling flammable materials. Hence electrical installations / equipment used in hazardous areas should be flameproof in accordance with relevant codes/standards such as Bureau of Indian Standards, National Electrical Code of NFPA, USA etc. It should also be kept in mind that all electrical equipment should be regularly inspected and maintained to eliminate potential accidents.

6.0 FIRE PROTECTION:

Provision of adequate fire protection facilities is a basic necessity in process plants, so that any fire can be effectively fought and extinguished. It may be remembered here that fire starts small and if detection is made early and fought and put out quickly, then we could avoid major fires and explosions. For fire protection to be effective, the following aspects should be given priority:

1. Provide adequate Fire Protection facilities as per the standards prescribed.
2. Maintenance of all fire protection equipment, i.e., portable, fixed and mobile in good operating conditions at all times.
3. Provide full time manpower for fire protection.
4. Train personnel from operation, maintenance, etc., who will be members of the fire squad.
5. Prepare a detailed Fire Emergency Manual and conduct mock drills periodically.
6. Investigate every fire occurrence, and take preventive measures.
7. Carry out Risk Assessments.
8. Prepare Onsite Emergency Plan.
9. Observe Safety Regulations.

7.0 CONCLUSION:

Fires, Explosions and Toxic Releases are the major hazards encountered by the process industries. Fire / explosion potentials hazards are much more in Industries which handle large volumes of hydrocarbons such a petroleum, petrochemical and chemical in process operations. Apart from huge property loss, loss of many lives and serious injuries have resulted due to fires and explosions in process industries all over the world. During the last 50 years, India too had witnessed a number of major fires and explosions in process industries. Hence, each industry must evaluate its potential fire and explosion hazards and take adequate preventive measures to eliminate these hazards.

Fire Prevention and Fire Protection measures have to be instituted right from the time plant is planned.

Some of the aspects like plant design and layout, safe operations and maintenance, fire safety training, fire safety audit, risk assessment, fire protection facilities, fire emergency plan, etc. are to be given due importance while planning / adopting an effective fire prevention and protection programme for process industries. **ISR**

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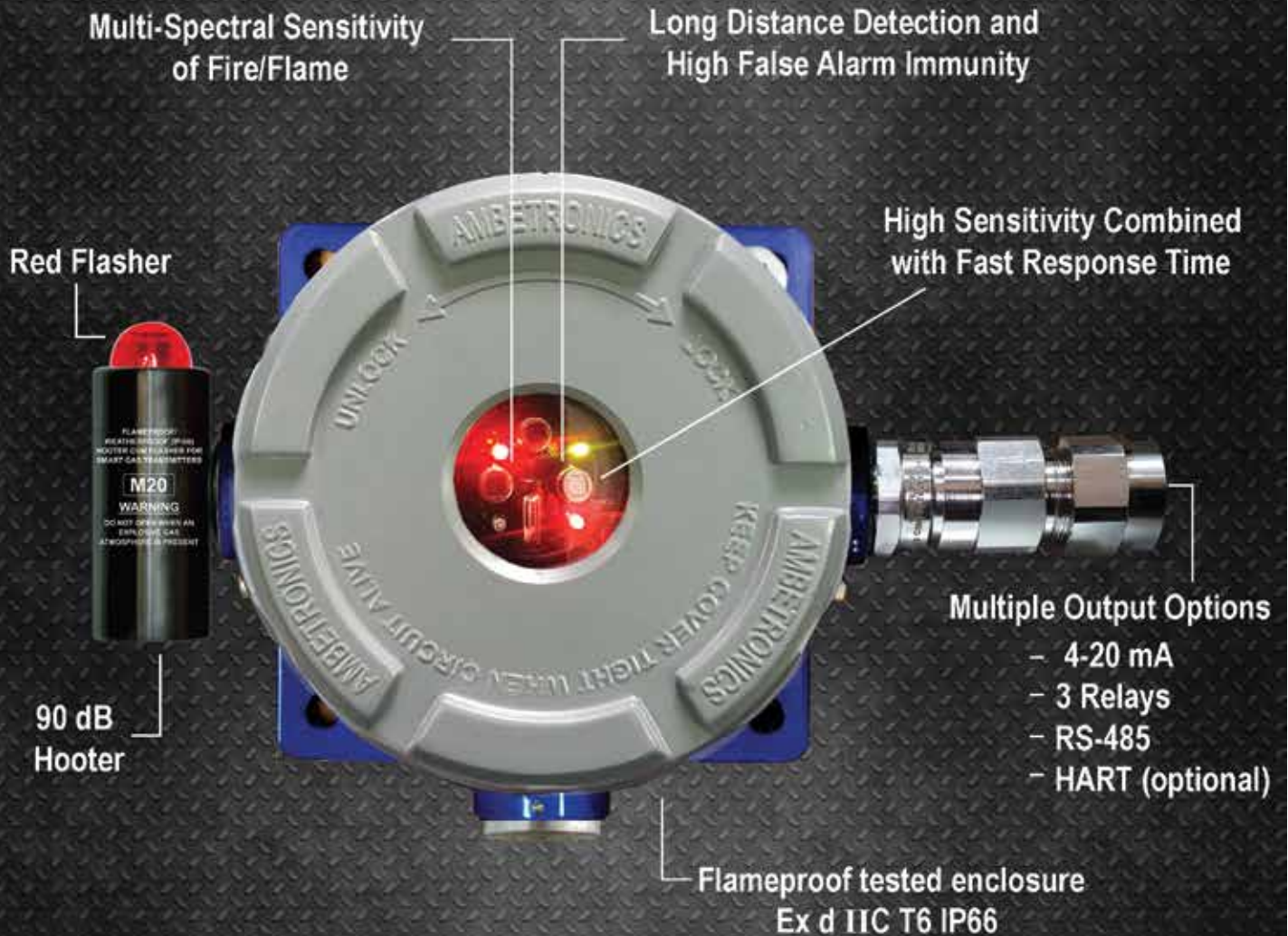Website: www.shib.co.in

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1. Turnstile-

LEAPTOR 3-arm, tripod turnstile only rotates an arm 120 degrees, enough to let one person pass, and then it locks. These turnstiles are often also used for counting the numbers of people passing through a gate. There are tripod- Bridge or Pillar type Variants or the Full height turnstiles -Single & Dual lane are also available. Pillar/Bridge types Turnstiles being small in size can accommodate at less space to control the pedestrian access and also ensures discipline /aes-

thetics in the office. Turnstiles are easy to operate and integrate with any access/BMS systems and are very popular in every industry. Both turnstiles create freeway in case of power failure & panic situation automatically to immediate escape. Turnstiles are very popular at security desks, governmental facilities, schools, banks, hospitals, universities, sports and entertainment centers.

2. Flap Barrier-

LEAPTOR Flap barriers series are articulately designed to suit the internal office layout and add aesthetics value to the reception area. The ease to use & its simple integration makes it very popular in every industry. SS 304 casing & acrylic flap which moves inside the casing in operation makes it suitable for handling heavy crowd public places like commercial office, Metro stations, Railway stations, Airports, etc. As per site conditions these can be either single lane/dual lane. These can be specially designed to have high width lane for handicapped entry keeping same aesthetics & access control integration system. These are installed in indoor applications like offices, admin buildings, IT parks, large business facilities, industrial areas, etc.

3. Swing Barrier

LEAPTOR Swing barriers Series designed with SS bent tubular section which act as swinging section to allow/restrict the access. These have high performance drives & control system. These are available in single & dual swing mechanism suitable for the various requirements. These are most popularly installed in corporate office entrances, government offices & heavy crowd premises. As the number of visitors in the restricted premises get increasing on everyday basis, security guards and receptionists find it difficult to keep a track of growing human traffic in a building. Swing barriers are more attractive & specially designed to match the premises. Swing barriers are either single/dual lane with metallic/acrylic flaps depending the site requirements.

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LEAPTOR, P type swing gate is an alternative solution for pedestrian entries wherein trolley movements, material handling or handicap wheelchair entries in minimal space. The elegant design makes it suitable for lobby entrances and offers a low to mid-level security. These have pillar type design which accommodates in very less area & performs the heavy operations. These have facility to integrate with access control system for controlled & monitoring of entry & exit.

5. Sliding Barrier

LEAPTOR Sliding barriers series are of SS 304 construction having very sturdy design & high aesthetics value. Sliding barriers are very popular in Airports/Metro stations & commercial premises. Various inbuilt sensors make these products very safe in operation. Heavy duty drives & control mechanism is adding value to be used in crowded places. Sliding Flaps are majorly used for high speed operations & flap retracts inside the casing body in operation. These can be either single/dual flap depending upon the requirements.

6. Boom Barrier:

LEAPTOR Boom barrier series comes in various form factors for varied applications and is sturdy & sleek designed in aluminum bar up to 7 meters for outdoor application and is designed for very high degree of operations. The Boom Barrier is corrosion resistant and power coated with casing of arrow LED indicator-based profile. Based on the requirements & site conditions these can be designed 90 deg folding arms for parking area. Boom barriers are used for heavy-duty applications like toll plazas, commercial premises can also be specially designed. There are straight type, articulate type, fence type and advertising barriers used for different sites based on the footfall and security parameters.

For more information
Website: www.leaptor.com

Keep Hazards at Bay & Make Welding a Pleasure

by S.K. Palit

Safety is a critical consideration for any welding project. Arc welding is a safe occupation when proper precautions are taken. But, if safety measures are ignored, welders can face an array of hazards which can be potentially dangerous, including electric shock, fumes and gases, fire and explosions and more.

In order to help keep welders safe, organizations such as the American Conference of Governmental Industrial Hygienists (ACGIH) and the Occupational Safety and Health Administration (OSHA) offer safety guidelines to help control, minimize or to help employers and workers avoid welding hazards. Employers should ensure that all workers comply with the following important guidelines in the workplace:

- Read and understand manufacturer instructions for equipment
- Carefully review material safety data sheets
- Follow the company's internal safety practices

Awareness of the most common welding hazards and knowing how to avoid them ensures a safe, productive work environment for all.

Electric Shock

Electric shock is one of the most serious and immediate risks facing a welder. Electric shock can lead to severe injury or death, either from the shock itself or from a fall caused by the reaction to a shock.

Electric shock occurs when welders touch two metal objects that have a voltage between them, thereby inserting themselves into the electrical circuit. For instance, if a worker holds a bare wire in one hand and a second bare wire with another, electric current will pass through that wire and through the welding operator, causing an electric shock. The higher the voltage, the higher the current and, thus the higher the risk for the electric shock to result in injury or death.

The most common type of electric shock is secondary voltage shock from an arc welding circuit, which ranges from 20 to 100 volts. Bear in mind that even a shock of 50 volts or less can be enough to injure or kill an operator, de-pending on the conditions. Due to its constant change in polarity, alternating current (AC) voltage is more likely to stop the heart than direct current (DC) welders. It is also more likely to make the person holding the wire unable to let go.

To avoid secondary voltage shock, welding operators should wear dry gloves in good condition, never touch the electrode or metal parts of the electrode holder with skin or wet clothing and be sure to insulate themselves from the work and ground, keeping dry insulation between their body and the metal being welded or ground (such as a metal floor or wet surface).

ADOR Welding Limited (AWL) offers a wide range of PPE (Personal Protective Equipment), like Welding Gloves, Safety Shoes and other safety products to ensure welders' safety. In addition, AWL offers VRD (Voltage Reducing Device) as a built-in feature as an option, and also VRD Units which can be fitted externally to any AC or DC SMAW Welding machine, which keeps the secondary voltage down to a safe level of 18-20 V when no welding is being

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done (machine switched on, but in idle condition). Full welding power is automatically enabled whenever the welder strikes the welding arc.

An even more serious shock, primary voltage shock, may occur when a welder touches electrically "hot" or "live" parts inside the welder case or the electric distribution system to which the welder is connected. This action can lead to a shock of 230 or 415 volts. AWL offers ELCB as an option in their welding machines to completely eliminate this hazard.

Fumes and Gases

Overexposure to welding fumes and gases can be hazardous to the health of the welder as well as any other person who is working in the vicinity of the welding area. Welding fume contains potentially harmful complex metal oxide compounds from consumables, base metal and the base-metal coatings, so it is important to keep the head out of the fumes and use enough ventilation and/or exhaust to control the exposure to substances in the fume, depending on the type of rod and base metal being used.

The specific potential health effects which relate to the welding consumable being used can be found in the Health Hazard Data section of the Safety Data Sheet available from the consumable manufacturer.

Welding areas require adequate ventilation and local exhaust to keep fumes and gases away from the breathing zone and the general area. In most situations, a ventilation system- such as a fan, and an exhaust system or fixed or removable exhaust hoods- to remove fumes and gases from the work area are provided.

AWL has introduced in their range different models of Welding Fume Extraction Systems, both stand-alone as well as centralized systems (KING EXTRACTORS), with advanced technology, special filters and with or without built-in compressors

Fire and Explosions

Welding arc creates extreme temperatures, and may pose a significant fire and explosions hazard if safe practices are not followed. While the welding arc may reach temperatures of 10,000 degrees Fahrenheit, the real danger is not from the arc itself, but rather the intense near the arc & the heat, sparks and spatter created by the arc. This spatter can reach up to 35 feet away from the welding space.

To prevent fires, before beginning to weld, inspect the work area for any flammable materials and remove them from the area. Flammable materials comprise of three categories: liquid, such as gasoline, oil and paint; solid, such as wood, cardboard and paper; gas, including acetylene, propane and hydrogen.

Ergonomics

When welding heavy material manually and during assembly welding the loads are very static. Positioning welding also gives high loads. Ergonomic control of Welder's position, arrangement of rotating tables (rotators and turn tables) is important to reduce welder fatigue and chances of poor weld quality.

Other Safety Considerations

Welders should also be aware of other safety considerations within the work environment. For example, those working in a confined space or in an elevated area may need to take extra precautions. In any welding situation, welding operators should pay close attention to safety information on the products being used and the material safety data sheets provided by the manufacturer and work with their employer and co-workers to follow appropriate safe practices for their workplace.

Good common sense is also key while opening cans of electrodes, keep hands away from sharp edges. Remove clutter and debris from the welding area to prevent tripping or falling. And never use broken or damaged equipment or PPE. To keep up with the most recent safety practices, welding operators should utilize resources from the American Welding Society (AWS), OSHA and welding manufacturers.

By following these safe practices and using common sense, operators can stay safe and keep production moving with no lost-time accidents. Safety & Health Fact Sheets are provided in the ANSI Z49.1 Standards.

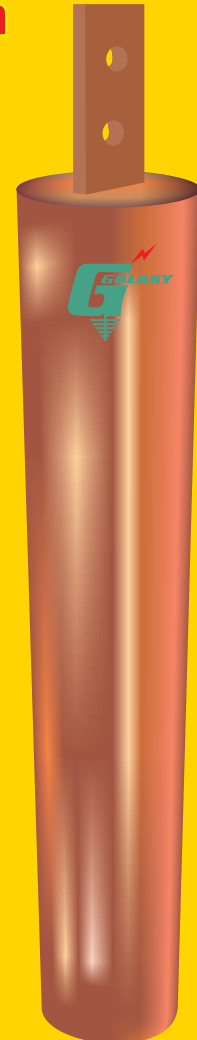*[The author is Head-CCC & Strategic Support - Equipment, SGP & WAPS at Ador Welding Ltd.]*

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Navata Road Transport enhances employee productivity with **Matrix Time-Attendance Solution**

By acquiring the solution from Matrix Comsec, Navata has been able to eliminate errors in the data of time-attendance and overtime. This has increased employee productivity and enabled accurate and timely payment of salary

Navata Road Transport, a road logistics service provider, established in the year 1982, by founder Late Parvataneni Subhas Chandra Bose, now occupies a place of pride among the leading Road Transport Organizations in South India. Navata is spread across a network of 672 branches across India. Warehouses and distribution centers are an integral part of a hub and spoke operations at Navata.

Challenges:

HR people at the Navata Road Transport had to manage and do manual work for time-attendance and overtime data. With manual work, data is prone to error. With error-prone data, it was difficult for them to proceed for salary payment. Not only this but centralized monitoring of time-attendance data of employees of 20 locations across Andhra Pradesh was a difficult task for them.

As they already had their in-house application, communication/integration of the time-attendance devices with that in-house application was the biggest question for them. To communicate with the Linux Server and devices, they required a third-party application interface which was not feasible.

Solution:

Established in 1991, Matrix is a leader in Security and Telecom solutions for modern businesses and enterprises. As an innovative, technology driven and customer focused organization, the company is committed to keeping pace with the revolutions in the Security and Telecom industries. With around 40% of its human resources dedicated to the development of new products, Matrix has launched cutting-edge products like Video Surveillance Systems - Video Management System, Network Video Recorder and IP Camera, Access Control and Time-Attendance systems as well as Telecom solutions such as Unified Communications, IP-PBX, Universal Gateways, VoIP and GSM Gateways and Communication Endpoints. These solutions are feature-rich, reliable and conform to international standards. Having

MATRIX
SECURITY SOLUTIONS

APPLICATION LAYER
EPR, HRM, Payroll etc

Navata's Own Software
Application (Developed
Inhouse)

DEVICE API (TCP/IP) Pushes
Raw Events to The Third
Party Application

DEVICE LAYER
Matrix COSEC Devices

LOCATION 1

LOCATION 2

LOCATION 3

UP TO LOCATION 21
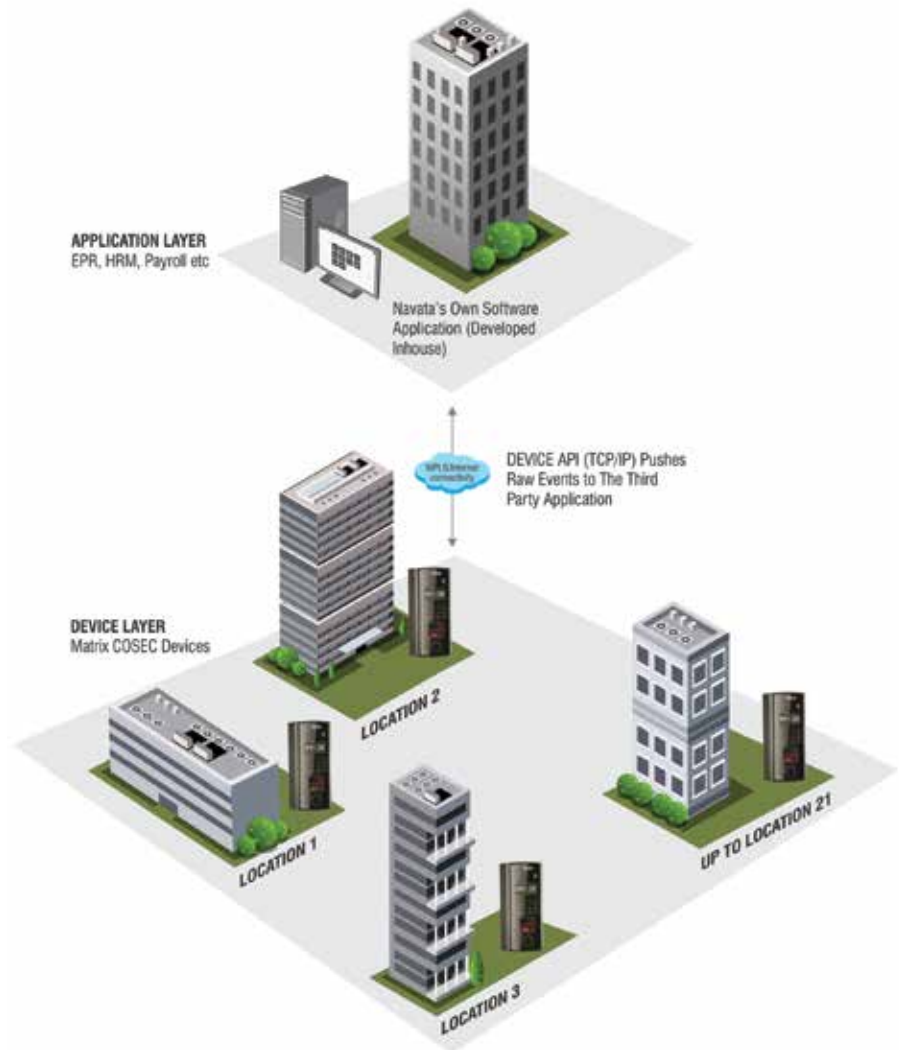
global footprints in Asia, Europe, North America, South America, and Africa through an extensive network of more than 2,500 channel partners, Matrix ensures that the products serve the needs of its customers faster and longer. Matrix has gained trust and admiration of customers representing the entire spectrum of industries. Matrix has won many international awards for its innovative products.

With extensive analysis of the existing system and Navata's requirements, Matrix came up with the solution to provide Door Controllers. Matrix Door Controller comes with built-in API for system integration. It directly pushes all the entry and exit records to the company's Linux server. In addition to that, the customer can command and control the devices now through the in-house Attendance Management and Payroll Application which was not possible earlier.

So, there is no requirement of any additional dedicated server for the interface with Matrix's Door Controllers. Ultimately, these Door Controllers have overcome the challenge of communication with the company's Linux server. By overcoming the challenges of the entire system, the customer enhanced the productivity of the employees and can effectively use the resources.

Product Offered:
COSEC DOOR FOT
A Door Controller with higher storage capacity and touch sense keypad. It identifies the user in less than one second. With multiple connectivity options like 3G/4G/LTE it gives flexibilities with the customer's existing system and therefore, reduces installation and maintenance cost.

Results:
After acquiring the solution from Matrix Comsec, Navata got the efficiency in Time-Attendance management. Elimination of the errors has been possible in the data of Time-Attendance and overtime. Now, employees get an accurate and timely salary at Navata Road Transport after the atomization of Time-Attendance record and calculation. This increased the productivity of the employees because of the accurate data. This also made the HR work smooth and hassle free. Through live monitoring, centralized control of all the 20 sites has been taken.

For more information,
www.matrixaccesscontrol.com

Helping Gujarat's cultural hub become a new-age Smart City

In line with the Government Vision of developing Vadodra as a smart city, Videonetics has provided a solution based on its Unified Video Computing Platform for the entire city, aimed at ensuring effective security of the city's people, property and assets

The Smart Cities Mission is an innovative initiative by the Government of India to drive economic growth and improve the quality of life of people. It aims to achieve this by enabling local development and harnessing technology as a means to create smart outcomes for citizens. A hundred cities across the country were shortlisted by the government, which were to be promoted as 'Smart Cities'.

Vadodara was selected among those 100 cities to be developed as a smart city in India, to enhance economic growth, and improve the quality of life of people by enabling local area development, deploying smart solutions and harnessing technology.

THE CHALLENGE

With a population of approximately 2.39 million, Vadodara is the third largest city of Gujarat, and a major industrial, cultural and educational hub of western India. The city is compact and crowded, with a vibrant cultural life that draws a lot of traffic. It is vulnerable to situations of overcrowding, road accidents, criminal activity, and natural disasters.

Vadodara Smart City Limited wanted to heighten safety for its citizens and visitors, along with optimizing traffic management, without disrupting daily lives. To this end, they sought a state-of-the-art, open platform that could expand in phases, in sync with the city's growth.

THE SOLUTION

In step with Vadodara's expansion plans, discussions had been underway about growing the city-wide surveillance system. As part of the initial process, a project team comprising Smart City officials, Videonetics, and technology partners did an extensive research to mark out key areas and traffic junctions across the city. Going a step further, Videonetics developed a solution based on its Unified Video Computing Platform (UVCP™) for the entire city,

so that its people, property, and assets remain secure.

The key elements of this solution included the following:

1. State-of-the-art AI & DL powered **Intelligent VMS** and **Video Analytics** to provide continuous viewing and recording, enabling security operators and law enforcement to proactively identify, and effectively respond to, events to mitigate their impact. Specifically, now the law enforcement authorities can automatically detect overcrowding, unattended baggage, and perimeter intrusions, even under the cover of darkness.

2. **Automatic Number Plate Recognition (ANPR)** system across 15 traffic junctions in Vadodara, to identify suspected/ unwanted vehicles and non-standardised number plates, as well as to generate detailed reports on vehicle movements, and much more.

3. **Command Control Centre,** to provide a bird's eye view to operators, about what is happening across the city. From traffic control to citizen security, operators remain alert and ready. With greater situational awareness, municipality officials are proactively responding to incidents

such as garbage overfill, incidents of water-logging, traffic congestions, hazardous debris on roadways, illegal parking, and more.

THE IMPACT

Under this project, video surveillance was deployed along public ways, in urban passenger transport stations, municipal buildings, traffic junctions, entry and exit connecting roads to city, and more. To date, Videonetics's solution not only manages over 550 IP cameras throughout the city, but also proactively identifies and effectively responds to events, to mitigate their impact. Eventually, helping in maintenance of peace in the city, in upholding law and

order, and providing better policing services. The key results are:

1. Increased safety and security with 24x7 monitoring of city area
2. Faster crime investigations
3. Traffic police having in-depth knowledge on vehicle count and movement
4. Swift action by on-site traffic police, as they get alerts on traffic congestion, unwanted/ hot-listed vehicles, and so on.

Moreover, Videonetics's solution has also been able to help the police in monitoring celebration of festivals and VIP movement in the city, and building a security net for its citizens. Overall, it has been successful in ensuring the safety and security in the city of Vadodara, and has played an important role in becoming a smart and connected city.

VIDEONETICS
the future of video computing

For more information,
Website: www.videonetics.com

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Ansuman Ghosh
Assistant Vice President, **Aditya Birla Group**

Anurag Jain
Vice President, Quality & EHS, **ReNew Power Pvt. Ltd.**

Arvind Bodhankar
Jt. Executive President & Chief Sustainability Officer, **UltraTech Cement Ltd.**

Ashish Dave
Head HSE, **Tata Cummins Pvt. Ltd.**

Ashok Pote
DGM (HSE), **Tata Motors Ltd.**

Badal Roy
Group General Manager - Head Offshore Safety, **Oil & Natural Gas Corporation Ltd.**

Col. Sunil Sharma
Head Health Safety Security & Environment, **APM Terminals Mumbai**

Devesh Ghuley
Deputy General Manager– EHS, **Tata Housing Development Company Ltd.**

Dr. Hasit Dangi
Vice President– Operations & QA, **National Peroxide Ltd.**

Geetali Thakur
Head HSE, **Deccan Fine Chemicals Pvt. Ltd.**

Mahesh Chandak
Head of HSE – South Asia, **Bayer Group**

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Chief EHS, **Pidilite Industries Ltd.**

Pankaj Singh
Director - Road Safety, India Region, **LafargeHolcim Ltd.**

Shalin Shah
Head & GM - Environment, **Adani Ports & SEZ Ltd.**

Sudhir Shenoy
Regional Director of Safety, Health & Environment, **Henkel India Pvt. Ltd.**

Surendra Jagtap
Group HSE Head, **L&T Hydrocarbon Engineering Ltd.**

Tirtha Chattopadhyay
Group Head - HSE, **Sterling and Wilson Pvt. Ltd.**

Viren Dhulla
Former Vice President & Head – Health Safety & Wellbeing, **Vodafone Idea Ltd.**

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