

CERIOUS ACCIDENTS IN NOV-DEC 2022

Six workers injured in explosion at steel plant in Jalna



At least six workers were injured after a boiler exploded at a steel rod manufacturing plant in central Maharashtra's Jalna district. Three of them were in critical condition, officials said.

Three injured in explosion in chemical unit



Three workers suffered minor injuries in an explosion at a chemical facility in Kurkumbh MIDC near Daund, about 75km from the city. The reactor and tin shed of the company incurred damaged in the explosion



THIS ISSUE

Editorial P.1

CoE Activities P.2

Mechanical Integrity and Quality Assurance in PSM P.3,4,5

Elements of Process Safety Management P.6

Courses & Services Available P.7

EDITORIAL

Emerging concern over business sustainability and the organisation through adopting standard suitable safety measures amidst a plethora of hurdles that are looming large in the world nowadays in the form of like war-mongering between powerful nations, possible spread of pandemic across the globe by use of lab-made synthetic virus as bio-weapon, summoning of recession, inflations, unprecedented and extreme climatic conditions like brutal winter storms, sudden flash-floods, crops damage, food crisis, insurrection and sedition of rebellion groups across many nations.

First and the foremost, the Safexcellence team sincerely wishes you and your family a very prosperous and auspicious *Happy New Year 2023* with a view to let you staying healthy and sustaining the immunity against flurry of atrocities looming large and engulfing the world gradually. The earlier SARS-CoV covid -19 virus has presently gained the potential to evade immunity of human physiology by virtue of several mutations resulting into a soup of its sub-variants like XBB, B.Q. 1, delta and omicron etc. Lab made synthetic virus has now become a potential threat for the whole of humanity with its strongest-ever mutant forms like BF.7, XPP1.5 that are wreaking a havoc in the foreign countries. Healthcare systems and modern infrastructure have proven to be easy prey and fallen totally inadequate before this pandemic virus. The war between the promising two nations take no sign of restraint and only set to intensify thereby adding more to the ongoing Global geopolitical crisis across the globe. The war is gradually going to intensify further with the involvement of other powerful nations taking part into it and causing a Serious Energy crisis across the globe.

Another concerned area is the escalation in industrial accidents (Fire – Explosions - Toxic Gas Release) in India. The data collected by Safexcellence team shows 13 accidents this year between Nov-Dec taking death toll of 46 and 130 injuries. This implies every other day there is one accident resulting into one death and two injuries.

This magazine offers you the details of ghastly industrial accidents, informative detail on PSM issues, new initiatives of CoE and the activities carried out under the aegis of CoE.

To counter this trend, chemical manufacturers must immediately re-evaluate their plant risk posed by the current hazards, consider adaptive actions to reduce and bring the risk down to the acceptable region wherever required and prepare changes for future as well as meditative moves to address the root causes to secure long term solution. Improving resilience by adaptive actions to correct these root causes should be a strategic priority. This Safexcellence issue brings forth a special articles along with the regular features which describes the important of PSM in mechanical integrity and quality assurance.

Trust me that this issue is going to fetch you a taste of varieties in articles. Safexcellence will feel better while it receives your invaluable comments and pertinent advice with a view to continuously feeding you thoughtful information of your preference.

Dr. Omprakash Mahadwad
Coordinator, CoE, SRICT.

Factory fire kills 38 in Chinese city of Anyang



Thirty eight people were killed and two people were injured after a Fire at a plant in central China. The Fire broke out at a plant in Anyang city in Henan province.

New wave of missile attacks hits Ukraine; explosions reported at Russian air bases



Intelligence Avril Haines said the U.S. expects to see a "reduced tempo" in the fighting in Ukraine to continue over the next few months before counteroffensives resume in earnest in the spring.

Fire Breaks Out In Delhi's Jhilmil Industrial Area



Fire broke out in a factory in Jhilmil Industrial area. Eleven fire tenders were rushed to the spot. No casualties were reported.

CoE ACTIVITIES

Post Graduate Diploma in Process Safety

UPL UNIVERSITY OF SUSTAINABLE TECHNOLOGY
UPL Center of Excellence In Process Safety

UPL Rotary Ankleshwar

- Part-time Post Graduate diploma in Process Safety.
- Specially designed for working professionals.

Post Graduate Diploma in **PROCESS SAFETY**

UPL University Logo

Post Graduate Diploma in Process Safety

Duration of Course – 1 Year (Two Sem) (70% on job & 30% off job).
Faculties: Indian SMEs / Retired PSM Professionals / Industry Experts / Faculties from UPL University
Participants: Chemical / Instrumentation / Mechanical Engineers from Industry / B.Sc. (Relevant Experience) / M.Sc.

Course Contents

- Basic of Chemical Engineering
- Process Safety Overview, Information and its interpretation.
- Reaction Hazard Assessment.
- Technical Safety-1 (Stage gate methodology, Inherent Safety, Hazid)
- Workshop-1 (PHA)
- Workshop-2 (LOPA (Layer of Protection Analysis)
- Incident Investigation Techniques
- Technical Safety-2 (Emergency Response & Preparedness, Emergency Relief System, Safety Critical Equipment, ORA and its interpretation)
- Management of Change & Pre-Start-Up Safety Review Operational Control Procedure, Operational Safety Hazard Identification & Risk Assessment
- Workshop-3 (Bowtie & Barrier Management)
- Workshop-4 (Hazard Area Classification Risk Assessment)

Objectives to be fulfilled

- * Understanding of basic process safety principles.
- * A Practical understanding of process hazards and risks, and its mitigation.
- * Understanding of the technical elements of Risk-Based Process Safety.
- * A basic understanding of qualitative and quantitative methods, techniques and tools used in process safety management (PSM).
- * A basic understanding of what can go wrong and key technological safeguards.

Dr. Omprakash Mahadwar
Coordinator, Center of Excellence
+91 8275033060
omprakash.mahadwar@upluniversity.ac.in

Block no- 402, Ankleshwar - Valia Road, Ta Valia, Dist Bhavnagar 393135 9727745875/76

Safety Training for School Students

The Centre of Excellence (COE) at Shroff S. R. Rotary Institute of Chemical Technology (SRICT) Ankleshwar organized work place and Life Safety training program for the school students of CM Academy, Vidya Mandir, Chanakya School, Glorious International School, Shraavan School and Sewa Rural students. In all total 1205 students had actively participated in this awareness training program.



MIQA : Mechanical Integrity and Quality Assurance in PSM



Mr. Jayesh Gol, Safety Head, UPL UNIT-2

I] What is Mechanical Integrity (MI)?

MI is the programmatic implementation of activities necessary to ensure that important equipment will be suitable for its intended application throughout the life of an operation. It varies according to industry, legal requirements & regulations, geography, and company culture. Mechanical Integrity (MI) can be defined as the management of critical process equipment to ensure it is designed and installed correctly and that it is operated and maintained properly.

Good MI program's characteristics are:

1. Incorporate activities that ensure that equipment's designed, fabricated, procured, installed, operated, and maintained in a manner appropriate for its intended use only.
2. Prioritize equipment to help optimally allocate resources (e.g. personnel, money, storage space).
3. Helps plant staff recognize when equipment deficiencies occur and includes controls to help ensure that deficiencies do not lead to serious accidents.
4. Incorporate Recognized and generally accepted good engineering practices (RAGAGEPs).
5. Helps a plant staff perform planned maintenance and reduce the need for unplanned maintenances.
6. Helps ensure that personnel assigned to inspect, test, maintain, procure, fabricate, install, decommission, and recommission process equipment are appropriately trained and have access to appropriate procedures for these activities.
7. Maintain history of service documentation and other records to enable consistent performance of MI activities and to provide accurate equipment information to other users, including other process safety and risk management elements.

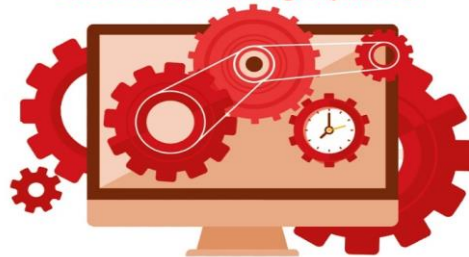
PSM mechanical integrity requirements apply to the following equipment:

- Pressure vessels and storage tanks;
- Piping systems (including piping components such as valves);
- Relief and vent systems and devices;
- Emergency shutdown systems;
- Controls (including monitoring devices and sensors, alarms, and interlocks); and
- Pumps.

Why MI is required?

Can you use 15 years old two-wheeler which is not undergone any maintenance throughout its life? Answer will be NO. So why should any chemical plant & equipment be any different? Similar aspects are applicable for any industry. MI ensures that the integrity of the manufacturing process equipment is maintained to the original design specifications.

Mechanical Integrity (MI)



Explosion, fire in Marengo fuel plant leads to injuries and evacuation



An explosion resulted in a fire and multiple injuries at an alternative fuel plant in, prompting the city to urge residents to evacuate and avoid the area.

5 killed, 49 injured in cooking gas cylinder blast in Jodhpur



Five people were injured after a cooking gas cylinder exploded in a house in Rajasthan's Jodhpur where guests had gathered for a wedding.

Three contract workers injured in explosion in Visakhapatnam Steel Plant



Three workers were injured in an explosion at a chemical by-product plant in the Visakhapatnam Steel Plant (VSP).

III] What is Quality Assurance(QA)?

Quality Assurance(QA) considers quality from the time the equipment is designed until the time it is taken out of service(for retirement or reuse). QA also incorporates QC activities and vary from company to company terminology. QA efforts focus on ensuring that new process equipment is:

- Designed, Procured &fabricated in accordance with RAGAGEP specifications.
- Delivered & Stored in proper condition & location with retrieval system.
- Assembled and installed properly.

Why Quality Assurance (QA) is required?

A facility should examine existing practice at each stage of equipment life to determine whether Quality deficiencies exist and if so, develop a quality improvement plan to upgrade areas of vulnerability.

RAGAGEP: Recognized And Generally Accepted Good Engineering Practice are the standards, be they International, National, Local or even company that are considered best practice, If followed / used then "experts" would consider them appropriate for the application.

MIQA:

The primary reason for doing MI QA is to eliminate process safety incidents and the sufferings and the cost that they cause.

MIQA: MI and QA are 2 different elements of facility sector of Process Safety Management (PSM).

Successful MIQA program includes effective plans for recognizing and reacting to equipment deficiencies. A deficiency is identified through the evaluation of equipment condition based on MI activity results or by the observation of substandard equipment performance or condition during normal operation. Deficiency is reported when parameter is outside the established acceptance limits that define the equipment integrity.

How Deficient Equipment can be discovered?

- During acceptance testing for new equipment fabrication or installation
- Observed during Inspection, Testing and Preventive Maintenance (ITPM)activity
- Parameters measuring during a repair.

Expectations from the MIQA implementation

- Improved equipment reliability
- Reduction in equipment failures that lead to safety, health and environmental incidents
- Improved product consistency
- Improved maintenance consistency, efficiency &effectiveness
- Reduction of unplanned maintenance time and costs
- Reduced operating costs
- Improved Spare parts management/ Zero Inventory concept
- Improved contractors performance & accountability
- Compliance with applicable government regulations
- Clarity on Roles & Responsibilities matrix

Dozens injured in Iran factory blast caused by gas leak



An explosion at a factory in north-west Iran has injured at least 65 people. The blast at a paint factory in the Shahid Salimi industrial zone in East Azerbaijan province was caused by a gas leak.

54 injured in blast at paint manufacturing plant in NW Iran



explosion and the consequent fire at a paint manufacturing plant in the northwestern Iranian city of Tabriz.

South Africa counts damage, death by tanker truck explosion



it got stuck under a low-lying bridge in the town of Boksburg, sparking flames. As firefighters worked to extinguish the flames the tanker exploded, according to emergency services officials.

MI:

1. Maintenance Procedure System: It requires, Top document which provide Site Management system for Procedures and Safe Work Practices, Identification of critical tasks, guidance for procedure writing, procedure control, types & number of procedures and its training. Complete system should be valid, periodically reviewed and accessible to those who need them.

2. Training: All/Any person involved in process critical task must be verified as competent to do the work. Company Training program can be developed considering training requirement & identification matrix, Trainer's training, validation & competency assessment, documentation/recordkeeping. Refresher Training should be arranged. Employees and contractors all should be covered under training.

3. Spares: Team efforts should include:

- Defined spares specification must meet RAGAGEP
- Only use approved supplier(s)
- Appropriate receipt, storage & retrieval system to avoid damage/deterioration
- Segregation of critical & noncritical spares
- Last chance in section must be performed immediately before use
- No changes without approval
- Authenticate origin of spares.

4. Maintenance Strategy: All important/critical equipment must have documented maintenance strategy which must be evergreen (updated immediately based on own or others experience, changes in operation etc), reflect the condition and usage of the equipment and reviewed before decisions are taken. Strategies can be predictive maintenance, preventive maintenance or run to fail. It should capture:

- Potential failure mechanisms
- Potential consequences
- Methods to monitor equipment conditions
- Monitoring frequency
- Tests and inspections which may help measure performance and/or condition
- May include assumptions on spares.

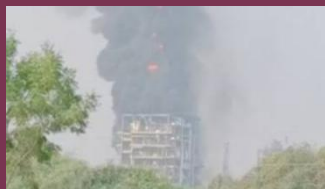
5. Tests & Inspections: Tests and inspections should follow an approved methodology (conform to RAGAGEP) be done by trained and approved personnel and changes/deferments approved. Tests & Inspections are to Evaluate equipment condition, demonstrate equipment functionality and measure a physical characteristic. It can be regulatory, part of maintenance strategy or Integrity check of equipment. Planning is the most important step in Test & Inspections. Planning team should consist of

- Area Engineers
- Maintenance Supervisor
- Operations Supervisor
- Materials Engineer
- Reliability Engineer
- Inspector

6. Repairs & Changes : Typically, repairs are driven by a "fitness" for use issue. Hence, All repairs and changes must ensure continued compliance with RAGAGEP. Approval and Management of Change must be followed for Repairs & Changes. They are :

- Temporary repairs
- Replacement
- Re-rating
- Alteration

2 dead, several injured in blast at chemical factory in Panchmahal district



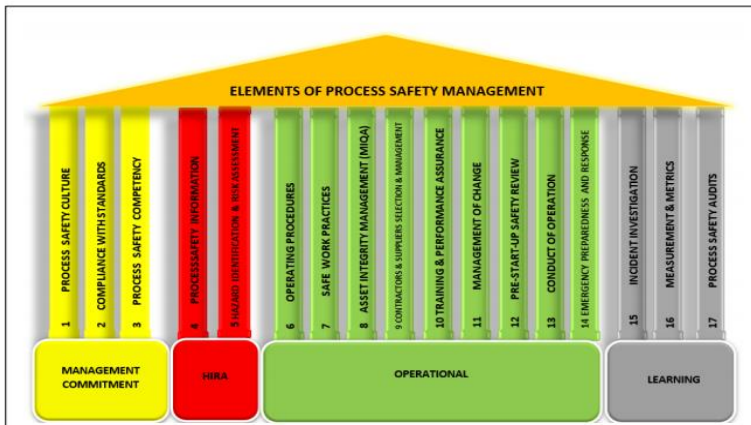
At least two workers died and 14 were injured in a blast inside Gujarat Fluorochemicals Limited (GFL), located in Goghamba in Panchmahal district of Gujarat.

Worker killed, 2 others injured in air pressure control valve explosion in Thane factory



A 28-year-old worker was killed and two others injured in an explosion during testing of an air pressure control valve at an industrial unit in Maharashtra's Thane district.

ELEMENTS OF PROCESS SAFETY MANAGEMENT



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

MISSING PSM ELEMENTS WHICH CAUSED The Accidents, Nov-Dec 2022

Accidents	Missing PSM elements																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at Steel Plant, Jalna, Maharashtra	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at a chemical facility in Kurkumbh MIDC, Daund, Maharashtra	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Factory fire in Anyang City China	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Fire Breaks Out In Jhilmil Industrial Area, Delhi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion, fire in Marengo fuel plant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion in Steel Plant Visakhapatnam	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at a factory in north-west Iran	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion at paint manufacturing plant in NW Iran	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion inside Gujarat Fluorochemicals Limited (GFL), located in Goghamba	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Explosion in a factory at Thane, Maharashtra	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Prepared by,
Dr. Ravindra Kanawade,
 Asso. Professor, Chemical Engg. Dept.
 UPL University of Sustainable Technology

**FOR MORE
INFORMATION
ABOUT TOTAL
SAFETY SOLUTION
MODEL, CONTACT
Us**



(SCAN QR CODE)

OR

**DR. OMPRAKASH
MAHADWAD
(CoE-COORDINATOR)
+918975033066
OMPRAKASH.MAHADWAD
@SRICT.IN**

CERTIFICATION COURSES AND CONSULTING SERVICES OFFERED BY SRICT - CoE

**TRAINING PROGRAMME ON PROCESS SAFETY
MANAGEMENT**



**ASSISTING INDUSTRIES IN IMPLEMENTATION OF
PROCESS SAFETY MANAGEMENT**

**PSM CONSULTING ASSIGNMENTS TO
MEDIUM/LARGE CHEMICAL COMPANIES**



**ASSISTING INDUSTRIES TO CONDUCT HAZARD
AND OPERABILITY STUDY (HAZOP)**

**ASSISTING INDUSTRY SPONSORED RESEARCH
PROJECTS IN PROCESS SAFETY**

CoE NEWSLETTER EDITORIAL BOARD

EDITOR IN CHIEF

**Mr. Piyush Shah
(Head-Health & Safety, UPL Ltd.)**

**Shrikant J. Wagh
(Principal, SRICT)**

EDITOR AND DESIGNER

**Prof. Omprakash Mahadwad
(CoE Coordinator, SRICT)**

CONVENER

**Dr. Shina A. Gautam
(Associate Professor, SRICT)**

**Ms. Monika Patel
(Assistant Professor, SRICT)**

COMMITTEE MEMBERS

**Dr. Ravindra Kanawade
(Associate Professor, SRICT)**

**Mr. Sudeep Wadia
(Assistant Professor, SRICT)**

**Mr. Apurba Chakrabarty
(Assistant Professor, SRICT)**

EXECUTIVE STUDENT MEMBERS

**Juily Pawaday
(Chemical Engineering, Designer)**

**Ankita Shah
(Environment Science & Technology)**

**Richa Patel
(Chemical Technology)**