5 steps to a winning PSM strategy

Process safety management strategies need to consistently adapt to changing facility and staff conditions. An agile system relies strongly on how process controls are designed, and the way information is managed end-to-end.

Not only can safety and risk management be improved, but the strategy can also support business objectives and commercial return. Ahead of Process Safety Management 2014, we spoke with **Corina Glavan, Senior Process Safety Engineer at Thales**, who shared with us five important steps to ensuring an effective PSM strategy.

1. Identifying process controls

The control of major incidents relies on process safety indicators, such as risk assessment improvements, change management, inspection and maintenance, staff competence, operating procedures, permit to work and emergency arrangements.

In order to manage the risk of major and minor incidents, it's vital to identify, understand and control the process hazards to prevent injuries and incidents. Four key strategies underpin this:

- Establishing the right platform
- Defining new standards
- Integrating process safety
- Auditing and monitoring performance

Effective process safety and risk management starts with understanding the hazards which are present in the chemical process. Risk assessments can be accomplished both qualitatively and quantitatively, and at varying levels of detail.

Process hazard analyses (PHA) should be conducted throughout the life of a process from initial concept design, through operation, until the process is decommissioned. At different stages of a process lifecycle, different PHA techniques might need to be used, including:

- Preliminary or inherent hazard analysis
- Hazard and operability (HAZOP) studies
- Layers of protection analysis (LOPA)
- Safety integrity level (SIL) studies
- Failure modes and effects analyses (FMEA)

A risk ranking methodology provides the basis for making risk-based decisions without the need for further quantitative analysis.

2. Implementation

The key to implement effective process safety and risk management systems is to develop a common framework, which includes local regulatory requirements, safety standards and good engineering practices.

Managing the process and defining safety controls requires strong knowledge of the system. Senior managers and process safety specialists need to understand:

- What could go wrong
- What controls are in place to prevent major incidents
- What each control delivers in terms of a 'safety outcome'
- What the conditions which ensure controls continue to perform as intended are
- What response has been prepared for an emergency

Professor James Reason defines the *Safety Space Concept* using process controls which are implemented to restrict the human behaviour. Process controls are based upon rules, regulations and procedures.

Effective safety management is identified by actively navigating the **safety space** between increased resistance at one end of the scale, and increased vulnerability at the other. Managers need to be familiar with the elements contributing to the drift from one side to the other of the safety space.

To navigate through that space, an organisation requires a 'safety engine' and 'navigation aids,' or setting the right goals. The **safety engine** operates based on commitment, competence and cognisance.

Navigational aids like design, hardware, training, procedures, maintenance, planning, budgeting and communication provide information about the safety state of a process in an organisation.

3. Monitoring and data capture

Companies which have adopted process safety performance indicators, have shown that they experienced an increased assurance on this management and protected their reputation.

They've identified suitable risk control measures and avoided costly incidents, improving their efficiency in collecting data. This has resulted in cost savings and better use of already-collected information.

Most controls tend to deteriorate over time, allowing for 'cracks' to develop in the protection barriers. Using effective process safety indicators, organisations can identify early warnings before catastrophic events occur.

Leading indicators actively monitor the safety of the process, and focus on a few critical risk controls to ensure they're continually effective. Leading indicators require a routine, systematic check to ensure they perform as intended.

An example would be preventative maintenance programs, such as periodically testing a level probe and the function of the control loop, to ensure that it would activate the pump trip to stop the overfilling of a storage vessel.

Lagging indicators are reactive measures that result from investigating reported incidents, and show when an intended safety outcome has failed. An outstanding percentage of not implementing recommendations and corrective actions, following an incident investigation, is a lagging indicator.

A more recent concept of **dual assurance** views process safety performance indicators as both leading and lagging. For example:

The number of incidents where plant and equipment could be damaged due to the failure to implement maintenance programs, is a lagging indicator; whilst percentage of permits to work issues where the hazard or risk was correctly specified, is a leading indicator.

Electronic data collection is subsequently used from trending and analysing the performance of critical controls, as well as reporting to management, regulators and interested parties.

4. Visualisation

There are different methods of capturing, analysing and displaying data. For example, active performance is compared and trended against a reference period, such as monthly performance relative to the year to date, past year, decade, and so on.

It is important to note that there are too many elements to a risk control system for each to be measured. Not only does this become an overload of data, but also an expensive process which requires a lot of resources. Therefore, it is necessary to understand:

- What activities or operations must be undertaken correctly on each and every occasion (such as transfer of noxious gases or flammable liquids between storage and transport capacities)
- Which aspect of the system is likely to deteriorate more frequently, and what the mode of degradation or deterioration is (such as transfer hoses)
- Which activities are undertaken more frequently

In general, organisations develop their process safety indicators, collect data at regular intervals, analyse it and compile reports to inform senior management of deviations from tolerance levels.

They can adopt a variety of visual tools, such as a dashboard, pyramid, trend line, or score sheets, where data is presented in succinct, single page reports.

For instance, a traffic light reporting system uses colours to indicate: green – ok and on track; amber – slight deviations; and red – large deviations.

Either way, the bulk of the information sits in the background; whilst the summary information is presented in an efficient way for senior management. Managers must not be blinded by the easily measurable performance safety measures.

5. Ensuring sustainability

The last supporting pillar of process safety management is auditing and monitoring of performance.

The review should consider:

- Are the chosen indicators meaningful and useful, and can collected data be acted upon?
- Are tolerances levels appropriate? Or should the tolerance domain be modified to suit the reality?
- Are you setting achievable targets?
- Do indicators reflect the risk of major incidents?
- Is there a review process in place when:

⇒ A process was modified, or a new hazardous substance introduced (or is likely to be introduced) at the facility?

⇒ Improvement programs, plant upgrade or retrofits are conducted?

⇒ A change of personnel occurs? (And is there a competence matrix embedded in the process?)

At major hazard facilities, where the risk of potential major incidents could significantly impact on the business risk, the emphasis on process safety management is high. Discovering weaknesses in control measures by having a major incident is too late and too costly.

At Process Safety Management 2014, several speakers will present on a range of improvement strategies and case studies, including:

- Paul Cholakos, GM, PNG Operations, Oil Search, who will share insights on measuring and improving the business impact of process safety management
- Nigel Cann, Associate, ARUP, who will discuss the integration of maintenance with process safety
- Corina Glavan, who will run a workshop on preventing incidents and mitigating risks through process controls

Check out our agenda to see the full program or visit www.process-safety.com.au to know more.