Managing Process Safety Competency

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Managing process safety competency is under renewed scrutiny in process industries. This article describes some of the recent drivers for managing safety competence in the process industries. It explores why this is important to organisations and individuals. Here competency encompasses not only skills, experience & expertise but even attitudinal aspects and mental makeup of staff. How organisations demonstrate competency management through the practical application of a competency management system is discussed.

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Drivers for managing competency in the process industries

Historically, staff competency has always been a factor contributing to the major process catastrophes and escalations as crises unfold. Across the globe, investigations of major incidents have identified causative factors to include poor shift handover, lack of engineering expertise on site, competence of contracted staff, competence of staff and management and lack of training in the use of safety critical equipment. Training and competence has been cited as one of the top 10 human factor issues faced by major hazards sites. This article looks at why process safety competency management has been difficult, is important and can be managed.

Why is competency management important to organisations?

An organisation has a responsibility to ensure the safety of its workers, the neighbouring society and the environment. Site managers, therefore, need to feel assured that their staff, their contractors and their management board are fully competent in proactively managing process safety, both in preventing and responding to major accident hazards.

Achieving competency should be viewed as part of a larger demonstration that risks are maintained as low as reasonably practicable (ALARP). Within the context of a site’s risk assessments, safety case and external site inspections, competency needs to be demonstrated to the authorities and regulators. In the event of a major accident, it should be remembered that gross incompetency, at any level, offers little defence in court.

As a result of the Buncefield incident of December 2005, the UK Competent Authority set up the Process Safety Leadership Group (PSLG). This group comprised senior representatives of the industry trade associations, the competent authority, the trade unions and the chemical industries association. The group was responsible for going beyond the traditional engineering responses to learn how to prevent a recurrence and was called to “critically examine the leadership issues associated with delivering what has to be excellent operations and maintenance of high hazards processes.”

PSLG raised the profile of process safety leadership, in response to criticisms from both the Baker panel (Texas City) and the MIIB (Buncefield). Their conclusion was that comprehensive and systematic process safety competence assurance requires board level ownership. To ensure visibility of this, site managers may need to influence their senior leaders to demonstrate, invest and commit to good competence management practices. It is worth stressing that recognition of competence as a critical factor in maintaining a safe working environment is, in itself, a key competence.

Why is competency important to individuals?

Competence assurance is not only important to organisations but also to individual members of staff. People generally come to work to do a good job, to have a sense of purpose, meaning and achievement. To each of us, it is important to feel that we’ve done a good job and we know this from the various kinds of feedback we have from doing our work. Feedback on performance at work is something people need in order to have a sense of accomplishment and, often, a sense of development. The jobs in the process industries require skill and awareness of the wider risk picture. Competence management is important in many ways and is certainly key in preventing the stagnation of skills or a sense of fear from retribution if competence is ever found to be at question.

Essentially, what we’re looking for are some key ingredients of a positive competency managed culture, such as frequent positive feedback and constructive communications around things that don’t work. Shared knowledge and understanding across teams is necessary and a willingness to acknowledge problems and seek im-

| Table 1 |
|------------------|------------------|
| **What to have?** | **What to avoid?** |
| ✓ Positive feedback & good communication | ✗ Personal isolation |
| ✓ Continuous development | ✗ Stagnation |
| ✓ Addressed weaknesses | ✗ Complacency |
| ✓ Shared knowledge and understanding | ✗ Ignorance |
| ✓ Reinforcement of positive practices | ✗ Ruled by fear |
Where people begin to work in isolation, where they lack a sense of purpose about their place in a critical system, controls and safeguards start to break-down. Fear of unknown processes, rewarding nil returns of incident/near miss reports, fears of discipline and reprimands will further prevent the aspects needed for a consistent competent culture. These aspects are summarised in table 1.

Something that is central to competence management on an individual level is what psychologist Bandura termed self-efficacy, that is, a sense of confidence to perform reliably to achieve set goals. Positive self-efficacy improves our social interactions and thus, team communications and team performance in process systems.

Intrinsic and extrinsic feedback increases ‘self-efficacy’. Feedback that is intrinsic to a process task includes seeing automatic tank ullage readings, validating your manually calculated tank ullage levels. Feedback that is extrinsic to a process task includes supervisor’s praise, thanks and advice. This feedback directly supports people’s sense of being competent or identifies practice gaps to help them perform better. This feedback typically supports people in feeling more satisfied as well as more effective.

**How do organisations demonstrate competence management?**

Going back to the question of Board level Process Safety Leadership, how do organisations demonstrate process safety competence management? The UKPIA (Process Industries Association), together with Cogent (skills development organisation) have recently published a guidance document for assuring process safety competence through Competence Management Systems (CMS) for downstream and petroleum sites.

**Practical application of a Competence Management System**

The implementation of a Competency Management System is not difficult at the top level. It is the detail of measurement and demonstration of competence that can take the most time. It is likely that sites will already have many systems and processes in place, like induction plans for new recruits, training programmes and recruitment pre-requisites. These are essentially sub-systems of an overall CMS and the purpose of a CMS is to pull together these competency-related sub-systems and frame them using a structured and systematic approach around major accident hazards. After defining the scope of the CMS, a site needs to:

- **Define all Safety Critical Tasks**
  Safety critical tasks are those tasks where substandard performance could contribute to a major accident hazard. Therefore, when examining the myriad of tasks which could contribute to a major accident hazard, sites are faced with a number of safety critical steps in standard operating procedures, a similar number in planned and unplanned maintenance activities, and nearly every decision an incident response team makes in response to an incident.

- **Define the roles and responsibilities to be covered**
  Linking the Competency Management System to the Safety Case ensures that the major accident hazards, safety critical job roles as well as safety critical tasks are covered. Critical to this would be carrying out processes such as Hierarchical Task Analysis, Risk Categorisation, Human Error Analysis and involving staff in the designing and updating of safety critical procedures.

- **Define the competence standards to be used for all roles and responsibilities**
  People’s ability to perform reliably is typically defined as competence and this is broken down into three components: knowledge, skills and abilities (including personal attributes). Work in the area of technical knowledge and skills, has been carried out (Cogent) to develop a ‘Gold Standard’ competency framework, which covers a number of process operator and supervisor roles. A Training Needs Analysis, covering all safety critical tasks, could be used to define these components.

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Identify the tools to be used and implement programmes to achieve competence

Subjective judgement in competence assessment and reliance on traditional training methods, such as on-the-job mentoring, can lead to variable standards of competence. It is important to train personnel to defined standards, underpinned by recognised bodies and delivered by accredited trainers. There are numerous tools and methods for establishing competence, from the classroom-based lecture method to computer-based, high fidelity simulations systems. Training methods need to be matched to the competence requirements and types of skill (psycho-motor skills need different training techniques to purely cognitive skills), using a blend of training methods.

Demonstrate being process safety competent

Knowing if someone has process safety competence is a more challenging question. Can we tell by looking at them? Watching the way they turn a valve? Asking them what they’re thinking when monitoring tank level readings? Demonstrating process safety competence at an individual level needs to be both part of a good training intervention as well as a regular programme of testing, exercise and audit. Methods to measure and demonstrate process safety competence include job-relevant tests, emergency exercise debriefs, competency-based interviews and structured observations.

Apply the guidelines to the contractor workforce

One aspect which often clouds the delivery of good competency management is in its application to contractors and their workforce. With a shift towards contracting-out experienced technical skills, organisations are increasingly relying on trust that contractors are fully competent without having a high level of control over that assurance. Any CMS must include a reasonable level of contractor competence assurance. For term contractors, under direct supervision of the client and working to their standards and procedures, it is recommended that they are treated as if they were part of the client company staff. However, for personnel beyond such a scope, the contracting company must maintain a CMS for their own personnel, including their own sub-contractors, whilst the client company maintains a responsibility to assess and assure ongoing contractor competence through audit and procurement processes.

Maintain competence through audit and assurance processes

With these processes in place, it is important that the CMS, as a system, undergoes regular maintenance and assessment. An effective audit protocol is important when updating a CMS, together with a review of well-structured and valid process safety key performance indicators (KPIs).

Conclusion

In addition to the more reliable day-to-day performance of controlling major accident hazards, a comprehensive and clear CMS will reap other benefits, like increased staff motivation and participation, as a result of increased attention to their jobs, their safety and their self-efficacy.

Proactively managing competency, within a Competency Management System and using the human factors techniques described here, is a large part of assuring process safety competence: a critical part of a site’s overall management of major accident hazards. In building and refining a cohesive CMS, owners can more pro-actively manage organisational and individual process safety competence across geographies and sub-contracting organisations.

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