

New NEBOSH/HSE qualification in process safety management

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The Health and Safety Executive (HSE) and NEBOSH have collaborated to develop a new specialist Process Safety Management qualification specifically for the process industries. The qualification combines the advanced technical 'high hazard' expertise of HSE with NEBOSH's ability to deliver strong vocational occupational health and safety qualifications. The course aims to raise awareness of major hazards/accidents (process safety) as opposed to personal safety (e.g. slips and trips) and in turn highlight the importance of process safety management in reducing major accidents.

The NEBOSH HSE Certificate in Process Safety Management is designed to provide a sound breadth of knowledge and understanding of Process Safety Management. This will allow participants to contribute to the effective management of process safety risks that they encounter on a day to day basis at work.

Primarily the qualification is aimed at process operators, supervisors and managers. The paper outlines the key characteristics of the qualification (e.g. syllabus) and the process by which this was determined by HSE and NEBOSH. There has been worldwide interest in the qualification and training providers can use the syllabus developed to put together training courses. The experiences of NEBOSH and HSE in developing the qualification (including syllabus, course material and the exam question set) are discussed.

Keywords: training, process safety management, process safety leadership, management of change, competence, process risk, hazard control, fire, explosion.

Introduction

The National Examination Board in Occupational Safety and Health (NEBOSH) regularly reviews its qualifications, typically on a five year cycle. NEBOSH has previously offered a qualification called the International Oil and Gas Certificate which is aimed primarily at managers, supervisors and health and safety advisers with safety responsibilities in the oil and gas industry. The qualification focuses on operational issues and is intended to enable students to apply and implement effective safety management across all areas of their operation, anywhere in the world (up-mid-downstream). The qualification was designed, with industry, to provide the underpinning knowledge and understanding, which when combined with experience, enables holders to identify, evaluate and control a wide range of hazard and risk potential within the hydrocarbon industries.

When (re)developing a qualification, NEBOSH undertake extensive research with health and safety professionals, employers, professional bodies and regulators to ensure that they are relevant (and remain so), rigorous, as well as achievable and practical. What became evident during the redevelopment of the International Oil and Gas Certificate was that employers were keen to improve their process safety culture, and felt that there was a gap in the marketplace for such a qualification. Although approval ratings were very high for the existing Oil and Gas qualification, feedback from students was also that they would welcome more focus on what process safety management actually meant and how it could be applied. NEBOSH therefore decided to develop an entirely new qualification, looking purely at Process Safety Management (NEBOSH, 2019).

When developing qualifications, NEBOSH takes the opportunity to talk to as many employers within a relevant field, as well as our students and accredited course providers. NEBOSH are very active internationally and operate in many of the countries known for their hydrocarbon exports. Typically, employers working in the hydrocarbon industries also stipulate NEBOSH qualifications within their competency requirements; NEBOSH therefore has very good relations and ambassadors within industry. These professional networks were used to explore ideas for how a qualification could look, and what content would be essential. Industry standards, legal duties and best practice are also used when developing a syllabus. The Process Safety Management (PSM) qualification and assessment methodology was piloted with around 100 students, to ensure that it was fit for purpose. Before the pilot (or launch) of a qualification, approval is gained from a Panel of industry experts that the qualification is fit for purpose. Panel members for the PSM qualification came from, amongst others, HSE, AB Ports, Amec Foster Wheeler, Emirates National Oil Company (ENOC), and Kuwait Gulf Oil Company.

The syllabus was developed in the first instance by the NEBOSH Qualification Development Department. The original author began his working career as a process operator in a top tier COMAH site before moving into SHE roles and then eventually education. The initial approach was ‘what did I need to know’, based on experience of working within high hazard environments. Based on this premise, research was then undertaken on existing process safety frameworks and best practice, and further exploration of employer needs. The syllabus was also checked with colleagues who work for the Health and Safety Executive (HSE).A Qualification Development Panel was then held, with employers, typically health, safety and environmental specialists/practitioners, before the syllabus was approved for pilot.

Collaboration between HSE and NEBOSH

HSE through its commercial training portfolio develops and delivers training that is built around current real-world expertise fully aligned with the requirements of the regulator. In 2013 HSE made the decision to bring in-house the training of its own regulatory inspectors and they invited organisations to tender for the accreditation of a post-graduate programme. NEBOSH were successful in the competitive tender exercise (and subsequent re-tender) and now offer, exclusively to HSE, the

Diploma in Regulatory Occupational Health and Safety; this diploma forms part of HSE's new inspectors' initial two-year training programme. Based on the success of this collaboration, when NEBOSH were considering developing the new PSM qualification they approached HSE and a partnership approach was agreed. It is an ideal fit for the two organisations. HSE employs more than 2,500 inspectors, policy makers, scientific, medical and technical specialists, who help make working environments and working lives safer in Great Britain and around the world. The unique collaboration combines the advanced technical 'high hazard' expertise of HSE with NEBOSH's ability to deliver strong vocational OSH qualifications.

In common with any collaboration, initially there were a number of differing points of view. The shared culture and aims of the organisations enabled them to develop excellent working relationships with very open lines of communication and come to a common viewpoint. A governance process is in place and regular meetings are held ensuring any issues are quickly addressed. Although HSE is the health and safety regulator, the relationship is far from one sided and matured very quickly into a symbiotic relationship.

Training Providers

NEBOSH works in partnership with course providers for mutual benefit – to provide relevant, robust and accessible qualifications while facilitating delivery of these qualifications to enable course providers to attract and retain students. In order to deliver NEBOSH qualifications, training providers need to be accredited to do so. Accreditation is the process NEBOSH uses to ensure that a course provider meets the criteria to deliver courses leading to NEBOSH qualifications and prepare students for examinations. As a UK regulated awarding body, NEBOSH is required to check that course providers have the procedures and resources in place to maintain the integrity of the NEBOSH assessment process.

Organisations seeking accreditation as a course provider are required to submit evidence to demonstrate that they meet the required standard, such as course materials, timetabling, an appropriate tutor team, facilities including examination arrangements etc. In essence, NEBOSH develops the syllabus, assessment criteria and sets and marks the examinations, but all training is delivered by course providers. HSE has been accredited as a training provider for the PSM qualification.

Consistency in training is ensured in a large part due to the accreditation criteria being met, as outlined above. NEBOSH also monitors course provider performance and they are all subject to regular auditing by NEBOSH, so as to ensure ongoing compliance with accreditation criteria.

NEBOSH and HSE have also co-authored a full set of course materials for the qualification – workbook, powerpoint slides and lesson plans. Although it is not compulsory for these materials to be used, should course providers wish to author their own materials, they must be at a similar standard to those of NEBOSH and HSE's, and map fully to the PSM syllabus.

Contents of the Process Safety Management (PSM) Course

The course has a minimum study time of 28 hours and this is generally delivered over four days or via eLearning at a pace to suit a student. In the courses delivered by HSE, the exam is on the morning of the fifth day but some other providers have the exam at the end of the fourth day. It is also recommended that students commit to around 20 hours of private study.

The following sections have a brief description of the material covered by the syllabus of the PSM qualification.

Process safety leadership

- The distinction between process safety vs personal safety; process safety relates to the management and engineering control measures that are in place to prevent or mitigate the major accidents that are characteristic of process industry (e.g. the release of dangerous and/or toxic substances, explosions and fires).
- Process safety leadership: for example the importance of senior management visibility in promoting a safety culture and their awareness of the hazards and risks associated with the processing activities taking place on site.
- The significance of learning lessons from incidences of actual or potential consequence; it is vital that incidents are actively reported and investigated thoroughly/systematically (uncovering root causes, not simply the immediate cause/s) in order for lessons to be learnt and the necessary steps taken for effective prevention and/or mitigation.
- Management of change; in order to successfully introduce change leaders should ensure they have taken account of the impact of the change, and significant changes require a full hazard and risk analysis to determine the implications of the change, together with workforce participation (as they will be most affected by the change).
- Worker engagement: is essential to the success of developing and introducing procedures, risk assessment, accident investigations and safe systems of work.
- Competence; competence management systems (competency matrices/frameworks) and the role of competence in ensuring safe working behaviours and practices.

Management of process risk

- Establishing a process safety management system; the key elements of a process safety management system being based around planning (including policy), doing (implementation and operation), checking (including corrective action), and action (management review and continual improvement).

- Risk management techniques used within the process industries: risk assessment, the theory of barrier models (e.g. bow tie model), ALARP, hierarchy of risk controls; and tools that are applied to identify process safety hazards and risks (e.g. HAZOP and HAZID).
- Asset management and maintenance strategies: an essential safe working practice is to ensure asset integrity throughout the lifecycle of the plant and equipment, through regular comprehensive/thorough monitoring (audits and inspection) and maintenance regimes.
- Role and purpose and features of a permit-to-work (PTW) system: PTW is a useful tool for accident prevention, and the interfaces with other operations taking place, adjacent plants and the work of contractors must be taken into account by the PTW's system.
- Safe shift handover: to be effective the handover is face to face, with adequate length of time set aside for this activity to allow for questioning, challenging, explanation and clarification.
- Contractor management: contractors require an induction programme to ensure they are familiar with the hazards/risk on site, and their accommodation is situated as far from the hazards on site as reasonably practicable.

Process safety hazard control

- Purpose and requirements of operating procedures: the workforce using the operating procedures must be aware that they exist, therefore it makes sense for them to be involved in their development and review.
- Safe start-up and shut-down: there are various types of start-up and shut-down (e.g. planned, unplanned, emergency, staged and delayed) and during such activity it is imperative that the alarm systems are in full working order, as they will alert, inform and guide operators on the appropriate course of action.
- Safety critical performance standards: necessity of performance standards (functional, available, reliable, survivable and interdependent) for safety critical equipment and systems to prevent and mitigate incident.
- Hazards and controls associated with utilities: the uses and associated hazards of steam, water and inert gases.
- Hazards and controls associated electricity/static electricity: principles of electricity and associated hazards.
- Dangerous substances: how risk potential is determined by the physical nature of dangerous substances.
- Reaction hazards: including understanding the terms exothermic, endothermic and thermal runaway reactions.
- Bulk storage operations: including hazards of overfilling storage tanks (mitigation measures e.g. bunding) and segregation of dangerous substances and goods (e.g. in warehouses)

Fire and explosion protection

- Fire hazards: typical ignition sources, mechanisms that led to specific types of fire (e.g. jet fires and pool fires) and the possible consequences.
- Fire and explosion control: leak and fire detection systems, passive and active fire protection, explosion protection systems (e.g. flame arrestors) and importance of zoning/hazardous area classification.
- Dust explosions: prevention of dust explosions (e.g. through good housekeeping) and mitigation of dust explosions (e.g. through explosion relief venting).
- Emergency preparedness: including development of an emergency plan (e.g. external emergency response and availability), content of an emergency plan (e.g. systems for warning and alerting those on and off site) and the importance of scenario testing and drills.

Examination

The PSM course is examined through multiple choice questions. The exam consists of 40 multiple choice questions, covering a range of topics and difficulty levels. 10 of the questions are 'mini-scenario' questions where the student has to apply the knowledge that they have gained during the course.

A team of subject matter and assessment experts were used to develop the examinations. The Principal Examiner for the qualification is an employee of HSE; this ensures that assessments remain fit for purpose and HSE plays a significant role in quality assuring the qualification.

A question development team was formed jointly between NEBOSH and HSE. This met multiple times to develop, refine and approve questions. Some questions caused considerable debate – the panel had to look wider than just the topic and factual content; it had to make sure that it was understandable from an English language point of view. Considerable effort was put into using plain English that could be understood by those who spoke English as an additional language as the qualification is available worldwide. The panel had to make sure that questions reflected what students would be expected to know and do (from studying the course), covered a range of difficulties and that the paper could be attempted with a reasonable likelihood of success in the time allotted. Of course, no question is ever perfect, indeed finding the initial inspiration can be the hardest part of all. All questions benefit from being peer reviewed, and some questions will be discarded as part of this process or repeatedly worked on until they are fit for purpose. –

In terms of consistency of assessment, everyone sits the same type of exam. Exam papers are created by randomly selecting questions from topic banks. This helps ensure broadly comparable question papers. In addition NEBOSH formally reviews overall performance to ensure that things are working as intended. These reviews do not shy away from making significant changes. For example, our first formal review removed a large case study and replaced it with smaller, more manageable 'mini-scenarios' instead.

Conclusions

The need for a Process Safety Management Certificate qualification, suitable for process operators, supervisors and managers, was identified by NEBOSH based on feedback from industry and former students.

Collaboration between NEBOSH and HSE has facilitated the development of the syllabus, course specifications and examination question sets.

The HSE/NEBOSH collaboration combines the advanced technical 'high hazard' expertise of HSE with NEBOSH's ability to deliver strong vocational qualifications.

A Process Safety Management Course has been developed, that was successfully piloted and is now being delivered internationally by a number of training providers.

The NEBOSH/HSE Process Safety Management qualification highlights and promotes the importance of process safety management in reducing major accidents.

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References

NEBOSH, 2019, NEBOSH HSE Certificate in Process Safety Management, available from https://www.nebosh.org.uk/qualifications/nebosh-hse-certificate-in-process-safety-management/, accessed 15/1/2019