

## Director's Corner



The importance of process safety continues to dominate the news as demonstrated by high profile incidents such as the Tianjin incident in China on August 12, 2015. I have always thought that process safety education and competency in process safety is a very important component of the solution. We know that everyone needs to know and practice the principles of process safety on a regular basis if we are to accomplish anything close to the zero goal of fatalities and injuries. In this issue of **Centerline**, I am sharing my thoughts about the different levels of education needed in terms of process safety. I would opine that there is a common agreement among our professional bodies that, “safety is really important.” The question though is that do we give it sufficient emphasis in the undergraduate degree and other levels of education?

At the undergraduate level, I believe that some process safety education should be included in all engineering disciplines. That is because it is not just chemical engineers who have to deal with process safety matters. It is quite often we find mechanical engineers, electrical engineers, civil engineers, as well as other engineering disciplines who end up working on process safety projects or managing projects where process safety is a key component. For this very reason, I am also opposed to creating a Bachelor's degree specifically for process safety because it has the possibility of some specific negative outcomes. A really unwanted negative outcome of creating a Bachelor's degree in process safety would be the perception that other engineering disciplines do not have anything to do about process safety. And that would be disastrous because good process safety performance requires the active commitment and participation by everyone working in the plant.

With regard to integrating process safety into the chemical engineering curriculum, I believe that key individual elements of process safety should be threaded into undergraduate chemical engineering courses that serve as the foundation of chemical engineering discipline (e.g., thermodynamics, kinetics, fluid mechanics, heat and mass transfer), that safety topics should be the seamless and almost invisible threads that bind the whole together. In addition, process safety should be taught as a stand-alone final year course (like process design – with which it should have a close relationship) that should integrate principles from all the foundations on which it is based. A similar approach could be tailored for other engineering disciplines as well. Finally, some thought needs to be given to integrating components of process safety, inherent safety, management systems and leadership to disciplines outside engineering, such as chemistry, management, and accounting. Often chemists are the ones who synthesize processes and materials and are in the best position to implement inherent safety options. And often management and accounting majors find themselves in leadership positions which have a direct and major impact on process safety.

At the Master's and PhD level, I believe some degree of specialization and expertise is necessary. These are people who develop specialty expertise in process safety and are able to solve open-ended problems and bring special value to the company/organization. In addition, hopefully some of the PhD graduates would go on to academic/research careers of their own to keep new and other university programs continuing to evolve and flourish. Some people have

the opinion that a PhD is not worth the investment and makes you over-qualified. I certainly do not agree with that opinion. In my career, I have had the opportunity of advising 46 PhD students who have graduated and gone on to successful careers. Of these 46 PhD graduates, only three are in academic/research jobs. The remaining are working in the energy and petrochemical industry in different kinds of jobs including production and operations jobs. I believe that industry is snapping up these PhD graduates with process safety expertise because industry recognizes the depth and breadth of knowledge and expertise they bring to the job. These PhD graduates from the Mary Kay O'Connor Process Safety Center have completed research on an open-ended problem but have also achieved expertise in applying their knowledge of the fundamentals of science and engineering to solving practical process safety problems. These PhD graduates develop skills to think out of the box, to work with minimum or no supervision, to propose new ideas, defend arguments, disseminate knowledge, be a self-learner, solve problems, handle projects, and many other things. That is why I believe the PhD graduates from the MKOPSC are in such great demand. Also, as an engineer a PhD broadens the horizon/job pool and gives one access to a broad diversity of jobs. PhD graduates can work in industry, consultancy, academia, R&D, as well as many other occupations. In a period of economic uncertainty and limited job security, this type of flexibility offered by a PhD is a very wise investment for the future. Unemployment figures for PhD's is very low and starting salaries for PhD's are much higher than Bachelor's degree holders.

Continuing education and certification programs are another way to acquire and maintain competency in process safety. The MKOPSC offers about 60 different short courses on different topics in process safety, loss prevention, risk assessment and related topics. The MKOPSC also provides a curriculum for Process Safety Practice Certificate.

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