

Quantitative risk assessment in process safety studies: an overview

Monday, 26 November 2018 14:00 (20 minutes)

In framework of process industries (e.g., chemical and petrochemical facilities), major accidents are accidental events connected with the use of hazardous materials in an industrial site. Major fires, explosions, toxic dispersions/contaminations constitute examples of possible events leading to serious danger to human health and/or the environment. These events feature high magnitude or impact, but an extremely low expected credibility (probability), thus they are often framed as HILP (high impact –low probability) events. In order to undertake the risk assessment of HILP events, there are specific procedures and related tools, which are widely adopted in the technical and scientific literature.

The present contribution is firstly aimed at providing a summary of the currently applied tools to support QRA studies and the analysis of HILP events in the process industry; in particular, hazard identification techniques, probability and frequency assessment, consequence or impact assessment are briefly framed, highlighting key aspects and limitations. The advances in this field based on the development of simulations codes, such as computational fluid dynamics, are also remarked.

Secondarily, the relevant risk metrics and indicators based on the outcomes of the previous analyses (also named “risk recomposition stage”) are discussed. The procedure for the evaluation of the more frequently used risk indexes in this framework is discussed. Examples of typical results obtained in QRA analyses are also shown.

Finally, the aforementioned risk metrics are discussed in the perspective of supporting the discussion of two relevant aspects: 1) definition and adoption of specific risk acceptance criteria, especially in the framework of land use planning around industrial process facilities; 2) application in domino effect studies, dealing with the optimization of critical protection systems. Specific examples related to the European industrial context are finally provided.

Presenter: Dr LANDUCCI, Gabriele (Department of Civil and Industrial Engineering, University of Pisa)

Session Classification: SESSION III