

Dynamic Risk Management of Complex Engineering System

Faisal Khan

Canada Research Chair Professor and Director, C-RISE
Centre for Risk, Integrity, and Safety Engineering (C-RISE)
Faculty of Engineering and Applied Science,
Memorial University, St. John's, NL, Canada A1B 3X5

Abstract

Safety is a continuous activity with a constancy of purpose that must be controlled in real-time. As the process operates and generates incidents and near misses, the accident occurrence probability is predicted using accident precursors. The concept of developing a dynamic risk profile for complex engineering systems, which encompasses the likelihood and consequences of a given abnormal event, is presented here. Dynamic risk estimation uses Bayesian theory to update the probability of an event occurrence and a generalized consequence algorithm to obtain the relative consequences of the given event. This approach results in a risk function, which has predictive capabilities and the ability to be updated with time. A dynamic overall loss modelling approach is recommended along with Bayesian Network to calculate the probability of occurrence of different undesirable events. These probabilities are updated utilizing real-time measurements. The integrated approach ensures timely operator intervention for safe and cost-effective operation; it is ideal for accident prevention and effective decision-making. Different applications of the proposed approach to oil and gas operators are discussed here.