Safety Corner

What is an Event Tree?

In contrary to Fault Trees which use a deductive approach to identify causes to a Top Event through backward logic, Event Trees are inductive logic methods for identifying the various accident sequences or outcomes following the occurrence of an Initiating Event, which is a perturbation to a normal running system or a triggering event that sets off an accident sequence. While a Fault Tree is drawn traditionally from the Top Event vertically downward to reach the Basic Events (causes), an Event Tree is graphically represented horizontally starting with an Initiating Event and then expand from left to right until reaching the End States, which are the consequences or the final outcomes of the accident sequences. An End State can be a safe state or different level of damage states.

An Event Tree has a set of pre-determined events that register the progression of an accident sequence. Most Event Trees contain events with only two outcomes – success or fail; however, not all Event Trees are binary. Some may have more than two outcomes, depending on the events being modelled. Quantitatively, the sum of the probability of all outcomes of an event must add up to 1. That is why the probability value of event branches are often called split fractions value.

The frequency of an event sequence is simply the product of the Initiating Event frequency and the split fraction values of all the event branches along the event sequence. The consequence of an accident sequence can be determined by evaluating the characteristics of the accident progression due to the success or failure of the events along the path.

Event Tree analysis is generally applicable for almost any type of risk assessment application, but used most effectively to model accidents where multiple safeguards are in place as protective features. Event Tree analysis is highly effective in determining how various Initiating Events can result in accidents of interest.