

Safety Corner

What is Passive Safety?

Traditional safety systems are “active” in the sense that they are functioning components (operating motors, operator action, etc.) activated to avoid accidents. Activation of active safety systems can be automated or rely on operator actions. An example of an active safety system is the brakes in an automobile actuated by its driver to avoid crashes.

Complex engineering systems are protected from undesirable consequences through multiple layers of active safety systems. For systems whose failure can lead to catastrophic consequences, passive safety features are often incorporated into the design to ensure the safety risk is controlled to a level that is as low as reasonably practicable.

While active safety systems are the most widely used and best known types in engineering, passive safety can be an important contributor to the safety of systems having critical functions. Passive safety is a concept based on achieving safe functioning without intervention by operator or engineering systems. It depends on physical phenomena such as convection, pressure, gravity or resistance to high temperatures to function. Pressure relief valve is an example of passive safety because it is actuated by over-pressure without any command from either operator or engineering components. The containment and hydro-accumulators in pressurized water reactors and the pressure suppression systems in boiling water reactors are also examples of safety systems with passive safety features.

In the nuclear industry, the term “passively safe” is sometimes confused with “inherently safe.” Passive safety refers to safety system components, whereas inherent safety usually refers to control system process regardless of the presence or absence of safety specific subsystems. However, some experts maintain that there is no “passively safe” system but only “passively safe” component of a safety system.

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