

Safety Corner

What is HAZOP?

With applications in many industry sectors, including the petrochemical, offshore oil and gas, water and waste treatment, aerospace, railway, shipping, etc., the Hazard and Operability Study (HAZOP), initially developed for the chemical process industry four decades ago, is by far one of the most widely used qualitative technique for hazard identification.

HAZOP is generic in nature and extremely flexible that it can be applied to identify operability hazards embedded in processes or procedures (rather than the hardware or software) of systems of varying complexity. HAZOP utilises a team of multidisciplinary experts to methodically "brainstorm" what can go wrong in a process through the application of "guidewords" (e.g., high, low, too high) in a series of meetings to structurally identify undesirable deviations to process "parameters" (e.g., flow rate, pressure) between well-defined "study nodes" in the process. A study node is usually a specific point or location in the primary system elements of a design, such as tanks, pumps, and pipes, at which the process parameters between the study nodes are investigated for deviations.

The "what-if" thinking and brainstorming techniques in HAZOP encourage the participants to think outside the box rather than concentrating only on the process design criteria and specifications. The techniques also promote innovation and creativity in the design process, and particularly so with the change of emphasis from just "designing for success" to "designing against failure" through cross-fertilisation of knowledge between the multidisciplinary participants during the identification of problems areas, which would otherwise be missed by design personnel.

Although HAZOP can be done practically at any stage of a system lifecycle, it is generally agreed the most effective time to conduct a HAZOP is as soon as a process design is fairly firm. At this point, the design is well enough defined to allow meaningful answers to the what-if questions raised, while it is still possible to change the design without a major cost implication.

The HAZOP methodology is so successful and widely used that many preliminary hazard analyses are often wrongly referred to as a HAZOP. The use of brainstorming, what-if, guidewords, and group meetings has somewhat become the trademark of HAZOP; however, a hazard identification exercise using a combination of these techniques cannot be really called a HAZOP unless the participants focus on defined study nodes, one at a time, when applying the above techniques.

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The Safety Corner is contributed by Ir Dr. Vincent Ho, who can be contacted at vsho.hkarms@gmail.com