Addressing the Challenges of Implementing Safety Instrumented Systems in Multi-Product Batch Processes

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Abstract

Adapting the requirements of IEC 61511 to a batch system can be frustrating, particularly for multi-product units. While a Safety Instrumented System (SIS) for continuous operation is often a straightforward detect-decide-act loop, implementing a SIS for a batch system may involve multiple safety functions, time- or state-dependence, intricate calculations, or complex installations. Relationships between the SIS elements and the basic process control system (BPCS) must be tightly managed, providing both for the safety of the unit and its ability to operate without spurious trips or other hindrances. These issues are further complicated when multiple products requiring different functions or setpoints are produced in the same SIS-protected batch unit.

This paper will discuss the challenges particular to the design, operation, and maintenance of a SIS in multi-product batch operations and present practical options for successfully resolving the concerns. A key insight into successful adaptation is treating the batch SIS as a “permission” system for the BPCS to operate. Although many items can be addressed through clever engineering practices, sustainable success relies on proactive, robust management of the safety lifecycle.