

Innovative Approach for BPCS Reliability Calculation in Risk Analysis



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The Basic Process Control System (BPCS) is dedicated to monitor and control chemical process automatically with the operator intervention, while the Safety Instrumented System (SIS) is providing mainly automatic actions, to protect the people, assets, and environment against potential hazards.

Sharing of a single sensor in BPCS and SIS is unacceptable in risk analysis studies like HAZOP and LOPA. The control and safety functions are not independent, both fail when the sensor fails. When sharing more than a single instrument, BPCS can be treated as a partial protection layer in addition to the risk reduction provided by SIS.

The risk reduction provided by SIS can be assessed by risk analysis and verified based on instrument reliability data, while BPCS contribution is normally neglected. International standard IEC 61511:2016 allows shared elements without being specific regarding conditions and methodology. Therefore, previous studies and recommendations were conservative, discouraging the use of shared instrumentation.

Sharing instrumentation may provide the same functionality for BPCS and SIS but at lower cost. Without considering the real contribution of BPCS, the safety studies may result in SIS overdesign and extra cost.

This study supported by several case studies, demonstrates how BPCS can improve overall safety when sharing the instrumentation with SIS. The methodology is based on fault tree analysis and simple probabilistic calculations (AND/OR functions). The calculations demonstrate the impact of BPCS on safety reliability and plant availability with up to an order of magnitude higher. Overall, the plant availability is increased while reducing both CAPEX and OPEX.

Biography:

Florin is Fluor Fellow in Process Control and Functional Safety working as Process Engineering Manager in Amsterdam office. He joined Fluor in 2005 later becoming a subject matter expert in process control. In 2018 he was certified as Functional Safety Expert by Exida. He also worked as Chief Engineer in an ether glycol and derivatives plant at Chimopar SA in Bucharest, Romania. In 1999, he joined the Chemical Engineering Department at the University of Amsterdam as a researcher in process simulation and reactive distillation of fatty acids. He holds a PhD in catalyst modification, slurry reactor performance and scale-up.