Taking the control system for granted

Ensuring the performance of instrumented functions through Computer / Control Hazard and Operability (CHAZOP) process.

In order to minimise risk to an individual, operators must ensure their layers of protection are adequate.

Most organisations routinely over-estimate the performance of their layers of protection; claiming the maximum permitted contribution for non-safety (sub-SIL 1) Instrumented Protective Functions (IPFs) during their SIL determination reviews. Similarly, claims for the reliability of the Basic Process Control System (BPCS) also impact on the overall calculation of safety requirements. Often these claims are made in terms of alarm system performance, operator response and control system availability.

With the increased use of instrument-based technologies to reduce the risk of hazardous events, there is an increasing use of the BPCS as part of the total risk reduction strategy. Process plant operators often claim an element of risk reduction from their BPCS during their SIL Determination studies. Typically, the maximum allowable risk reduction specified in IEC 61511 is used as a default value without any supporting justification. The plant safety system is then built based on this information, meaning that when required, the safety system may not be sufficient, which may lead to an incident.

Issues can also occur when the plant is modified over time and the control system is not altered, causing potential gaps in cover.

It is essential that operators fully understand the performance of their BPCS.

What we offer

The ABB CHAZOP provides a full analysis of the control system’s effectiveness. Using our operational experience and knowledge we are able to examine potential threats to the claimed performance of the BPCS.

Detailed BPCS assessments need to be systematic but, because of the wide range of components, functions and failure modes, they do not lend themselves to examination by simple repetitive questioning traditionally found in a HAZOP study. The CHAZOP process, on the other hand, is a cost effective, team-based methodology which utilises structured reviews to provide documented assurance to operators and regulators that:

- The hardware architecture has sufficient redundancy and separation to deliver the claimed performance
- Support systems are identified and in place to reduce downtime, enable prompt recovery and re-build following equipment failures and the BPCS is resilient to environmental threats and secure from unauthorised operations
- The claimed performance of operations and maintenance staff is achievable with respect to human factor constraints
The control systems performance is challenged and currently recorded performance measures are analysed. A group meeting is held between maintenance and operations workers to discuss known problems, and brainstorm potential solutions. This joined up thinking and sharing of group knowledge ensures real operating conditions are uncovered.

ABB also check current competencies of operations and maintenance staff.

A report is produced which reflects and records all possible scenarios, providing evidence that the claimed risk reduction provided by the BPCS as a (sub-SIL 1) system is credible and achievable. Where deficiencies are found actions are raised to ensure issues are resolved.

Recommended actions can include:

- Not enough alarms / too many alarms
- Redesign of control room

ABB Consulting are able to implement many of the actions of the CHAZOP study to ensure benefits are realised.

Benefits
- Reduced risk of incidents
- 3rd party assurance that control systems will perform as expected and safety systems are sufficient
- Compliance with legislation
- Robust and systematic approach to a complex study
- Efficient and effective methodology

Why ABB?
ABB Consulting have a team of experienced CHAZOP leaders with extensive control and safety backgrounds.

We have a broad knowledge of standards, legislation and best practice. We have trained many control/electrical technicians and engineers on SIL awareness and the requirements of IEC 61508/61511.

Our engineers and consultants have operational backgrounds and make pragmatic technical judgements based on their experience. It’s an approach that ensures cost-effective, practical-to-implement solutions which work.

We can also implement recommendations from the study to ensure that benefits are realised, by calling upon our broad in-house expertise in control systems, process safety, human factors and training.

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