
Question 24: Do you use Safety Instrumented Shutdown systems in gasoline units (reformers, alkylation, isomerization, hydrotreaters)? How many of you use DCS-based vs. dedicated hardware shutdown systems?

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In order to comply with auto fuel policy of Govt. of India for introduction of Euro-III and Euro-IV in the country and in all major cities in India respectively, all IOC refineries (10 nos.) had to take up MS Quality Improvement Projects which included new units and revamp of existing units including catalytic reformers, isomerization units, selective hydrogenation units, benzene saturation units and hydrotreaters. All these projects were initiated in 2004-05 and commissioned between 2007 and 2010. All these units are designed with ESDs/PLCs for safe shutdown applications. These ESDs/PLCs are certified for SIL in line with IEC-61508 & 61511 by certified agencies.

However, for the new grass roots refinery of 300,000 BPSD, that we are building and that will go on-stream in 2012-13, we have carried out SIL review for all process plants, general facilities, storage & handling and offsite & utilities complying with IEC-61508 and 61511 to implement required SIL for Safety Instrumented Shutdown (SIS) systems. These studies are based on probability of happening, consequences, frequency, risk of injury, potential financial loss and impact on environment and carried out after HAZOP.

In our country, we have statutory government body which is Oil Industry Safety Directorate (OISD) and their standard demands SIS for all process and operations when mechanical integrity of process equipment, control systems and other protective devices are not adequate to mitigate the potential hazards. OISD advises Layer of Protection Analysis (LOPA) team to recommend use of SIS when design changes for built-in safety cannot mitigate the risk.

It is generally preferable that all protections systems be kept functionally separate from Basic Process Control Systems (BPCS) to facilitate its operation independent of BPCS. It facilitates protection system to operate when process control system is in fault or fails to prevent abnormal process conditions. Also, depending upon the degree of uncertainty in process safety time, the SIS should be capable of completing its actions within one-half of its allocated process safety time which may be difficult through DCS. Keeping this in view, we have progressively changed over from relay based dedicated hardware systems to PLCs/ESDs in all gasoline units.

Also, we are using in new refinery design, High Integrity Protection System (HIPS) which is a type of SIS to prevent over pressurization of the plant and to reduce design flare load. These HIPS are dedicated solid-state/non-programmable logic systems and are independent from other instrumented systems.

Greater than 70% of ConocoPhillips refineries have Safety Instrumented Shutdown (SIS) systems on at least one or more gasoline processing units (Reformers, Alkylation Units, Isomerization Units, and Hydrotreaters). Nearly all SIS systems in ConocoPhillips are dedicated hardware systems and all of them will be by 2016. ConocoPhillips has a standard requiring all SIS systems be dedicated hardware.

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Year

2011
