Risk and Hazard control hosted on Cloud

GHEORGHE FLOREA, RADU DOBRESCU

Societatea de Inginerie Sisteme SIS SA, Bucharest, ROMANIA

University "Politehnica" of Bucharest, Romania

Corresponding Author: gelu.florea@sis.ro

Abstract: We live in a modern industry based society where automation undoubtedly is the key for success. The technology has been changing over the last decades towards full control systems and the requirement specifications for Safety Instrumented Systems (SIS) forms the central network for the process risk and hazard assessment to be carried out. Process Control has evolved very much in the last years. Plants become more complex, they require more efficiency and reduced costs while maintaining the product quality. Advanced process control appeared to be the most effective technology to realize these objectives, but it is not enough anymore. Process control and optimization represent the current base for safer and more efficient industrial plants, while risk management represents the base for new control algorithms and strategies. There is a stringent need for the enhancement of process operations at plant production management level, because plants should often operate near criticality, meaning in conditions far from ideal ones from the point of view of control and stability. Risk and hazard control is for sure one modern approach to keep plant running even under big perturbations or uncertainty. Emerging technologies used for design and implementation; modeling, simulation, concurrent engineering, on line diagnosis, merger techniques needs big computational capabilities that Cloud can offer.

Keywords: risk and hazard control, levels of protection, concurrent engineering, algorithms for hazard and risk management, generic algorithm representation.

1. Introduction

Process Control has evolved very much in the last years. Plants become more complex, they require more efficiency and reduced costs while maintaining the product quality. Advanced process control appeared to be the most effective technology to realize these objectives, but it is not enough anymore.

According to the IEC 61511/ISA 84 process safety standards, the process risk has to be reduced to a tolerable level as set by the process owner [1]. The solution is to use multiple layers of protection. The current architecture of the process control systems uses three levels:

- Basic Process Control System Layer (BPCS);
- Operator Intervention Layer (OI);
- Emergency Shut Down system Layer (ESD);

BPCS represents the lowest layer of protection and is responsible for the operation of the plant in normal conditions. If it fails or is not capable of maintaining control, then, the second layer, the Operator Intervention (OI) Layer attempts to solve the problem. If the operator also cannot maintain control within the requested limits, then the ESD Layer must attempt to bring the plant in a safe condition, usually meaning turning off the process. If ESD also fails in restoring to the normal operation, the hazard occurs.

The operators in the control room are constantly monitoring the plant but their intervention is limited to reacting to the hazardous situations that may occur. The operator reacts to the problem that appears in order to correct it and to restore the plant in normal operating conditions.

Therefore, a new level of protection is needed, to take action between OI and ESD layers, having the main function to prevent hazardous situations in order to avoid the ESD intervention [2]. Fig. 1 shows the position of the new layer in the current architecture.

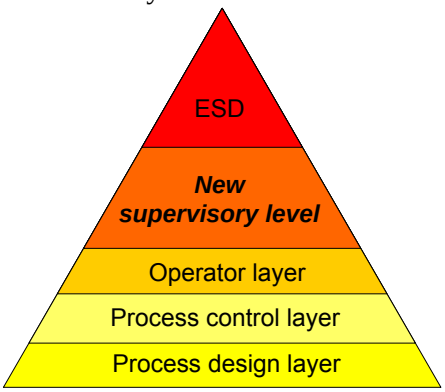

Fig. 1. Layers of protection

Poor performance costs money in lost production and plant damage and weakens a very important line of