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Automated Safety Integrated System for Chemical Industry

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Abstract - *This automated safety systems lays an emphasis in controlling of parameters such as smoke, temperature, and toxic chemical etc. in many industries which also preserves the necessary safety condition that are required for the normal operation of these plants. The system detect all the fire, smokes but not aerosols at some point during boiling or combustion process.*

An automated safety system which also known as Prosafe-RS safety instrumented system can be integrated with the CENTUM VP integrated production control system and are used in emergency shutting process in case of any abnormal conditions occurs at the plant site. A software component (functional blocks) that defines the operation and function are performed when smoke, heat, and/or gas detection is an essential aspect of any F&G system. These system face plates are added for the integrated. Display of any abnormal conditional information's such as gas concentration level & device status.

Key Words*: *FGS, control system, ESD, CENTUM VP, Prosafe-RS

1. INTRODUCTION

In recent fashion in technology and Automation plays an important role in fertilizer industries. Fire and gas (F&G) detection and moderation systems are key to the overall safety and operation of plant facilities. Fire and gas technology systems include ammonia & urea producing (fertilizer & chemical plants) operations, pipelines and power plants. A fire and gas technology continuously monitors the abnormal position such as a fire, or combustion gas or toxic gas release within the plant and provides early warning and moderation actions to prevent the occurrence and protection of the process or environment. By implementing a combine the fire and gas action based on the current automation technology, the plants can meet their plant safety and framework protection requirements while maintaining a secure operational and business readiness at the project start-up.

2. OBJECTIVE

The objective is to automate some of the chemical production and utilization processes, implicated in the Ammonia, Urea Fertilizer industry using Yokogawa Prosafe-RS (Emergency Shutdown System).

- To design and develop online/remote monitoring process control which reduces and indicates the risks of hazardous issues.
- To make sure our design system is completely interfaced with the HMI which helps us to give the complete trace of the plant.

3. PROCESS DESCRIPTION

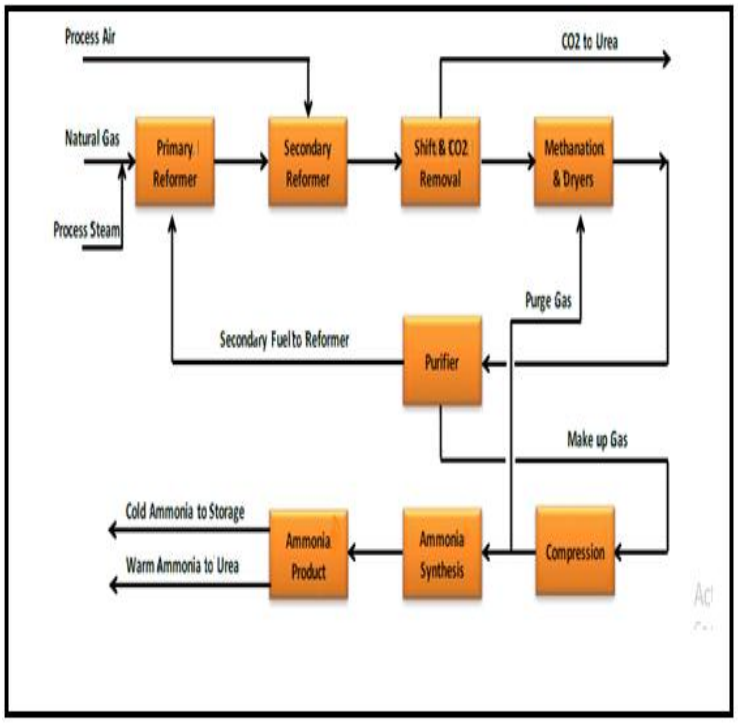

Fig -1: Block diagram of Ammonia Plant.

4. METHODOLOGY

The process automation of a plant includes project engineering as well as system engineering this chapter deals with project engineering. The following things

explain the steps needed and the operations involved in the project engineering.

- System configuration
- Front loading
- Nest loading
- Wiring diagrams
- Marshaling process
- Loop drawings

Nest loading is a selection of the various I/O cards and configuring them in an optimized way is called nest loading. Nest loading is one of the very important activities done during DCS and ESD Engineering. The Engineering considerations for Nest loading are dealt in section. The existing marshaling cabinets were utilized for mounting I/O modules, power supply unit and terminal boards.

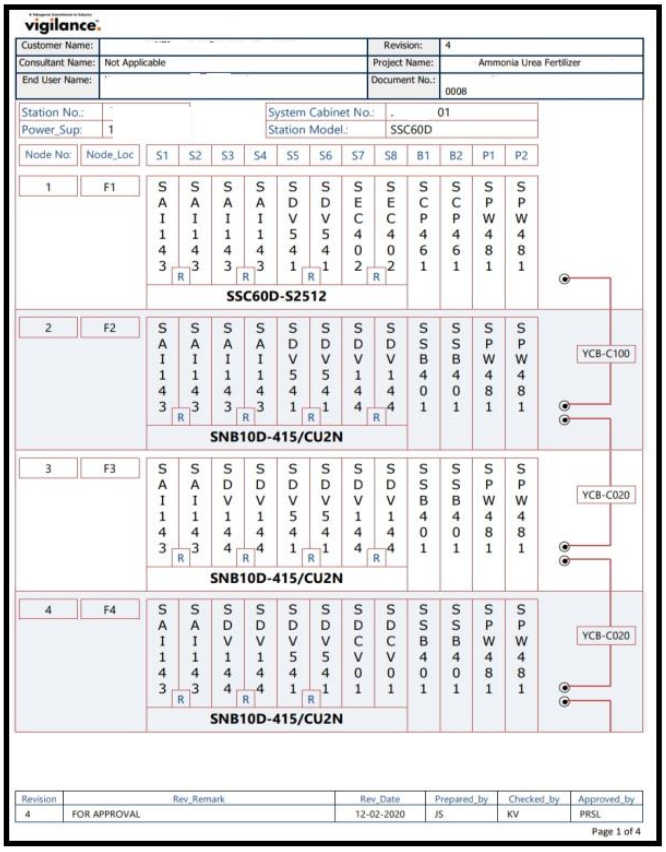

Fig -2: Front loading.

4.1 WIRING DIAGRAMS

A wiring diagram is a simple representation of the physical connections and physical layout of an electrical circuit or system. It shows how the electrical wires are interconnected and can also show where accessory and components may be connect to the system.

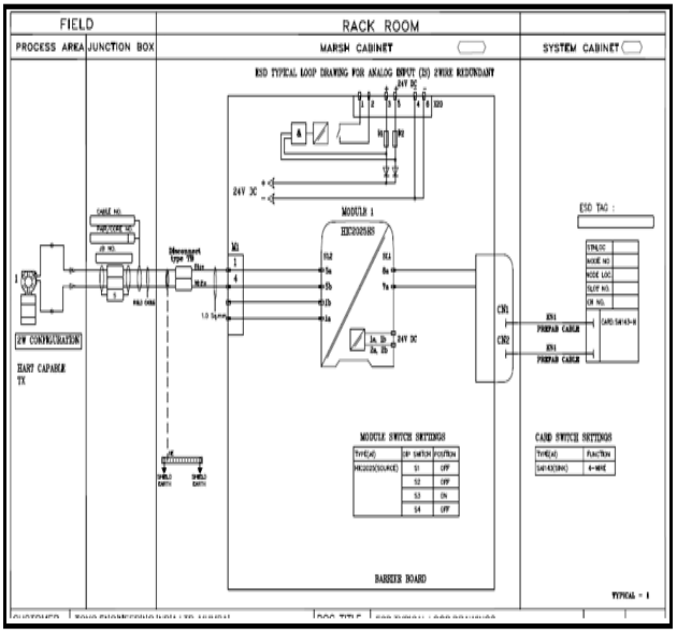

Fig -3: Typical Loop of an Analog Input.

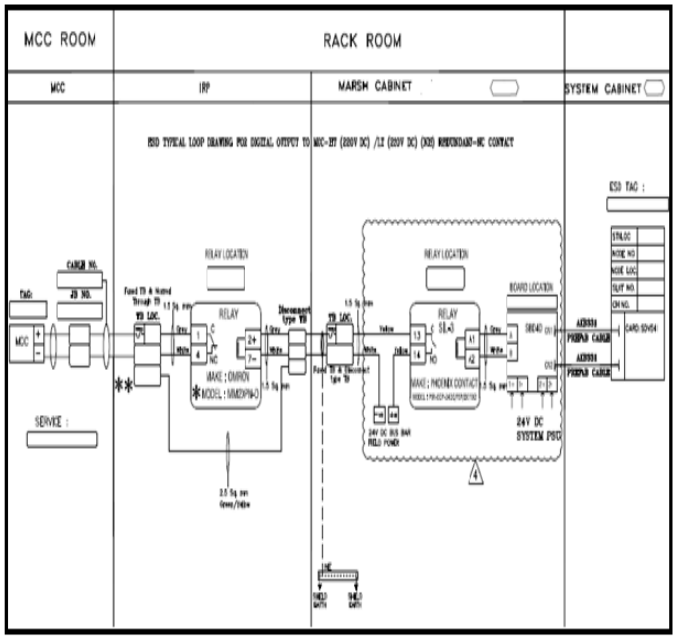

Fig -4: Typical Loop of an Digital Input.

4.2 SIMULATION TOOL:

In this step, the generation of the system target project and whether the required FCS and HIS folders have been created in this project folder are accepted. If the required FCS and HIS folders have been created, it is necessary to create those system targets. A new engineering project is always performed on the default project. The default project is created when the system

view is first started after the system generation function is installed. When creating the default project, the FCS and HIS, which is necessary for the target system, are also created. The system configuration of the FCS and HIS are also created in the default project folder. There are some user defined items which are common to the project and they are as follows:

- Block status character string
- Plant hierarchy
- Operation marks
- Engineering unit symbol's
- security

5. EXPERIMENTAL RESULTS

FAT Procedure

1. The FAT consists of 4 major parts for the `inspection namely:
   - Hardware (GA& IA inspection and front Loading check)
   - System software
   - Loop check
   - System Redundancy Check
2. The Fat Myself Focuses on the Specific Items that These Projects and the Functions Checked through the Operation that the System Doing This phases.
3. The Systems Are to Be an Energized Before Fat Takes Place.
4. All non-conforming items notice not known fact recorded in the "Punch Lists".
5. Daily Progress Meeting is Held to Verify Progress, Problems and the Minutes that Meeting Be Organized on the Last Day

System redundancy checks

1. Redundancy of power supply module for node unit.
2. CPU Backup Function.
3. VNET redundancy (Inner station communication)
4. Redundancy of I/O cards
5. ESB Bus redundancy, the ESB bus1 which is connected to the nodes will be removed in order to check that ESB bus2 will be active or not the marked area

Fig -5: PSU redundancy Check

Fig -6: CPU redundancy Check

6. CONCLUSIONS

The concept of safety system have made the work more eaiser in industries these days. However it is important to aim for automated safety systems which are cable enough in fullfilling all the requirements as well as the standards achievable by the use of technology as expected. To get the desired results factory acceptance test was successfully carried out under the supervision of the end user. The migration of the PROSAFE-RS and Centum V P system in fertilizer industries has given the company a technoligical advantage and also betters operation, control and monitoring of the entire ammonia and Urea production process.

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