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Terminal Automation System

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ABSTRACT: This paper examines how to design a system for safety measure in highly hazardous area. Highly hazardous area includes zone 0, zone 1 where process like nuclear power plant and chemicals industries takes places. In zone 0 or zone 1due to the industrial process there may be disastrous like explosions ormuch damage like Bhopal incident may occur.To reduce or to minimizethis damage,a shutoff valve is introduced by rotork company limited, and by using this valve in the process the disaster may be minimized. Generally the operation of receiving, storing in a specific temperature, pressure and then distribution of different types of oil like crude oil, fuel like petrol, diesel etc is usually done in terminal automation system. While doing this process, if there is any leakage (or) mismatch in the whole plant will cause damage to the process. If ROSOV (remotely operated shutoff valve) is placed in highly hazardous area, it will control the whole plant and automatically produce emergency alarm and it will make the plant shutdown for sometimes. The problem in this process can be analysed and acquired by using scada simulation.

KEYWORDS: ROSOV valve, Level transmitter, multi point RTD, Gate valve, Level gauge, Motor operated valve, Radar tank gauge.

I.INTRODUCTION

[1]Generally the operation of receiving, storing in a specific temperature, pressure and then distribution of different types of oil like crude oil and fuel like petrol, diesel etcis usually done in terminal automation system. The transportation of the oil, fuel and gas is from pipeline, train and truck. In the system there may be severe lack of safety to the human and the environment and due to this many consequences occur. Generally terminal automation control includes three major controls,and they are process control, safety control, fire and gas control. Process control includes the controlling of level, temperature, flow and pressure in process application. Safety control includes a controlling of equipment for safety purpose. This is the major parts to be control in terminal automation system. The area to be control for safety measure comes under the SIL (safety integrity level) 2(or) SIL3. So the elements to be control for safety measures are tank form, loading area, pump area of the plant. Safety is an important element to be control in the plant. Because itincludes environment safety, equipment safety and personal safety while coming under the [2] fire and gas control includes controlling the explosion that may occur in fire area. In case of fire there should be automatic water replenishment and the smoke, heat should be sensed using flame detector and alarm should be produced in case of emergency and thenautomatic control and interlocking control must be implemented in the fire pump.

At first the safety is improved by SIS (safety instrumented system) and that include many safety instrumented function. The risk assessment of each SIF (safety instrumented function) is calculated by means of safety integrated level. The basic process control system is used in many industriesapplication. There are many disadvantages in that process and that is overcome by using SIS (Safety instrumented system) because of monitoring health, solving problem by use of developing the program with logic associated with process. The operation of design a control system to respond to the condition of plant, in which the plant itself may be rise to hazardous and that designing of control system, comes under SIS.ROSOV (Remotely operated shutoff valve) is based on SIS.

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II. BLOCK DIAGRAM

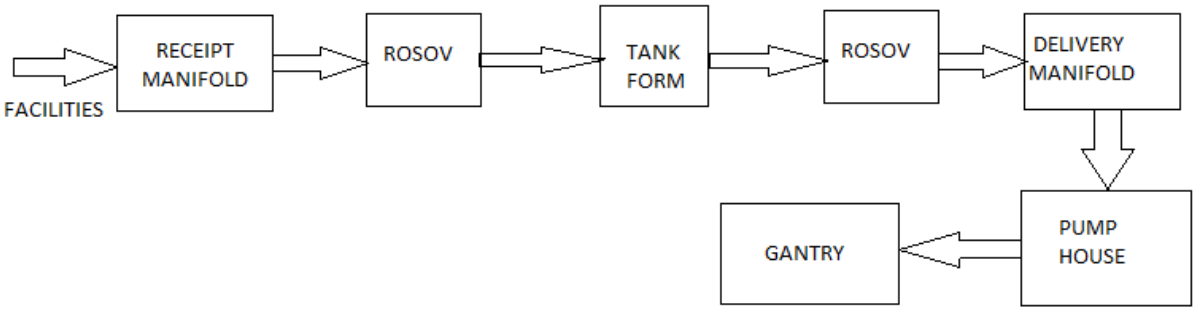

Fig 1:Terminal Automation System

The above diagram shows the concept of TAS (Terminal Automation System) using ROSOV (Remotely operated shutoff valve) valve which include receiving the elements like oil, fuel from various parts of the world by means of pipeline, trucks and trunk. The element from the transportation and those parts of whole work is done in receipt manifold. Then the element is send to the tank form by needs of ROSOV valve storing the element a suitable element pressure, temperature and level and then it is taken to delivery manifold by means of ROSOV valve. [3]The work of delivery manifold is that receiving the element from tank form and proceeding it to the pump house. Because pump house will directly pump the elements to the gantry section for distribution of oil and fuel. In gantry section the element is loaded into the transportation such as truck, trunk etc. From that truck the element is distributed to bunks (or) industries for industrial purpose.

III.PIPING AND INSTRUMENTATION DIAGRAM

A piping and instrumentation (P&ID) is a diagram used in the process industries for calculation the process flow of the equipment which is to be installed. This diagram includes the layout of the entire plant monitoring and the components that are required to run.It shows the detail information on operating, repairing (or) modifying the process andit helps to design the system for connecting the components to the process.in this journal it include seven instruments like level transmitter, level gauge, gate valve, ROSOV valve, motor operated valve, multipoint RTD etc and how they are connected to the tank form. It consists of tag number, line number, service description for each and every instrument that are used in P&ID diagram.

IV.INSTRUMENTATION DATA SHEET

Instrument datasheet is documents which consist of information of a particular instrument that have been used. The information includes the location, range, material type, service description access required tag number, and hazardous certification etc. It helps to choose instrument that can be used for the required process. In this instrument data sheet hazardous certification must be checked because it helps to select the instrument that can be used under highly hazardous area.

V.INSTRUMENTATION INDEX SHEET

Instrumentation index sheet is a document that contains full details of instruments that have been used within the plant. Instrumentation index includes instrument type, Location, Service description, P&ID Number, Line number, tag no, hook up drawing no, calibration rate etc. This instrument indexsheet used as a live document of plant process, Because it contains details of list of instruments that is been used in the plant. The purpose of instrumentation index sheet is that it can be easily used for listing, filtering, searching the required instrument within the plant.

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VI.INPUT AND OUTPUT LIST

I/O List is a document that is used for calculating the input and output of the instrument that have been used .This shows how the instrument is connected to the control system by means of process control system or safety instrumented system. This document consists of details of instrument how that are connected to the control system. The complete details of instrument such as a tag no, piping instrumentation number, hook-up number of particular instruments within a tank. It includes the size of control and the system that are required to the process.

VII.HOOK UP DIAGRAM

Hook-up drawing that shows installation of the instrument, the instrument should be connected in a correct manner so that the instrument can operate properly. This diagram shows how the instrument is connected. This instruments is connected to the field by means of male connector and female connector. It also gives the information that is required for each installation.

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VIII.LOOP DIAGRAM

Loop diagram is a diagram that shows the connection of one point to control system. It can also used for connecting the control system to the field instrument, control panel, MCC. It includes multiple label, cable number, cabinet number and it also indicates the location of each instrument. It is used for showing how the system is connected to single input, single output and purpose of this is to check the connection and for trouble shooting.

IX.REMOTELY OPERATED SHOUTOFF VALVE

Remotely operating shutoff valve is defined as shutoff valve designed for the purpose of achieving isolation of plant That contains hazardous substances. When a failures occurs (which may include fire) the valve is capable of closing [4]Maintain tight shutoff. These valve are called as emergency isolation Valve designed, installed and maintained for the Primary purpose of achieving rapid isolation of plant items containing hazardous substances in the event of a Failure of the primary containment system including, but not limited to, leaks from pipework, flanges, and pump. Closure of the valve can be initiated from a point remote from the valve itself. [5]The valve should be capable of closing and maintaining tight shutoff under foreseeable conditions following such a failure (which may include fire). Valves performing the same or similar function may also be referred to as: emergency isolation valves (EIVs) Remotely-operated block valves (RBVs); or emergency shutdown valves (ESDVs).

The guidance is for operators and managers of hazardous installations handling, storing or processing the hazardous substances detailed in the scope. [6]It will also be of interest to plant supervisors, design, process, and maintenance engineers and safety professionals. Throughout this guidance references to the implementation of a ROSOV should be taken to mean a ROSOV or other equally effective measures that will achieve an equivalent degree of risk reduction. [7]The law requires that you undertake a suitable and sufficient risk assessment to determine the measures necessary to ensure that risks to health and safety are adequately controlled.HSE expects suitable controls to be in place to address every significant hazard and that as a minimum those controls must achieve the standard of recognised good practice precautions for your industry's inspectors seek to secure compliance with the law and may refer to relevant codes, standards and guidance as illustrating good practice. HSE's publication Reducing risks, protecting peopleand the supporting document Assessing compliance with the law in individual cases and the use of good practice4 discuss [8]HSE's policy on the role of good practice. The latter includes a definition of good practice in this context. Adopting relevant good practice precautions for your industry is a straightforward way to demonstrate that you are controlling risks effectively frees you from the need to take explicit account of the costs and benefits of each individual risk control measure (system of work, item of hardware. [9] These will have been considered when the good practice was established. However, this does not mean that you will never need to do any more to satisfy the law. You still have a duty to consider if there is anything about your circumstances that means further action is necessary's considers that this guidance represents good practice for emergency isolation within the limitations of the scope. However, the guidance is under continuous review and advances in technology or new knowledge of hazards may lead HSE

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inspectors to seek a higher standard in some cases – the standard set here should, therefore, be regarded as the minimum.

X.RESULT

The expected outcome of this paper is that high zone damage can be minimised and the problem that can occur will be detected and if that problem is detected it will produce the audible alert so that the problem will be controlled and this process is acquired by SCADA simulation. In SCADA the solution of the problem will be available because while designing the plant, already much solution will be diagnosis in case of emergency.

XI. CONCLUSION

By using the terminal automation system with ROSOV (Remotely Operated Shut off Valve), the damages that can occur in the highly hazardous area can be minimized and the disastrous like explosion in the industries can be reduced. This journal can be implemented for highly hazardous fluid such as petrol, diesel etc. and can be used for efficient purpose. Further this can be more useful if it comes with a limited time delay. If that is done it will be useful to many purposes.

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