

# Designing of PLC and Control Panel of Vapor Absorption Machine

Smruti Sutar<sup>1</sup>, Pooja Botre<sup>2</sup>, Sheetal Kulkarni<sup>3</sup>

<sup>1</sup>Student, Hadapsar, Pune

<sup>2</sup>Student, Balewadi, Pune

<sup>3</sup>Professor, Instrumentation and control Engineering, A.I.S.S.M.S. Institute Of Information Technology, Maharashtra, India

**Abstract** – A Vapor Absorption Machine (VAM) is a system which is used to produce chilled water using heat source such as steam, hot water, gas etc. These systems require energy in low grade form for cooling effect. The VAM needs very small amount of electricity. These systems were using Siemens make PLC S7-200. Nowadays, these PLC's are being replaced with Siemens make PLC S7-1200. The Siemens make S7-1200 PLC is very much superior and advanced than Siemens make S7-200 PLC. This will help the system to work automatically.

**Key Words:** Vapor Absorption Machine, PLC S7-1200, environment friendly, waste heat, lithium-bromide.

## 1. INTRODUCTION

Basically automating procedure of obtaining chilled water is achieved in this project. This project contains Siemens make S7-1200 PLC, Siemens HMI (Human Machine Interface), RTD modules to measure the value of resistance connected to analog inputs. Nowadays, Programmable Logic Controllers (PLCs) are used in automation. As Vapor Absorption Machine on a domestic level becomes more popular in industry, their simulation becomes more important. Various refrigerant-absorbent pairs are used in the Vapor Absorption Machine. The main function of the Vapor Absorption Machine is to reduce the environmental problems i.e. VAM's are environment friendly. These machines uses small amount of electricity as compared to vapor compression machines. The Siemens S7-200 PLC is replaced by the Siemens S7-1200 PLC. The Siemens S7-1200 PLC is much advanced and superior to Siemens S7-200 PLC. In S7-200 PLC, 4 RTD's can be connected on 1card while 8 RTD's can be connected on 1card in S7-1200 system. The Siemens S7-1200 is the controller for open-loop and closed loop control tasks in mechanical equipment manufacture and plant construction. It combines maximum automation and minimum cost.

### 1.1 Literature Survey:

The VAM is a system where waste heat, hot gases, steam of low pressure is used for generation of chilled water. In the same way, this system can also be used for heating where hot water can be used as refrigerant. The Vapor Absorption

Machine does not use CFCs or HCFCs. The mostly used refrigerant-absorption system in VAM is Lithium-Bromide (LiBr).

#### A. EXISTING SYSTEM:

1. Vapor compression Machine.

#### B. ANALYSIS OF EXISTING SYSTEM:

The Vapor Compression Machine is used in air conditioning of buildings and automobiles. These system needs lot of electricity for working. They do not work silently i.e. they make noise while working. They produce lot of pollution. These systems emit lots of CFCs and HCFCs. The ozone depletion issues are very much associated with the vapor compression machine.

#### C. PROPOSED SYSTEM:

In the proposed system the VAM uses the Siemens S7-1200 PLC instead of Siemens make S7-200 PLC. The S7-1200 controller provides the flexibility and power to control a wide variety of devices in support of your automation needs. The compact design, flexible configuration, and powerful instruction set combine to make the S7-1200 a perfect solution for controlling a wide variety of applications. This system requires small amount of electricity to run pumps only. They do not emit gases such as CFCs and HCFCs which are very much harmful.

## 2. Hardware Description:

#### i. S7-1200 PLC:

The S7-1200 controller provides the flexibility and power to control a wide variety of devices in support of your automation needs. The compact design, flexible configuration, and powerful instruction set combine to make the S7-1200 a perfect solution for controlling a wide variety of applications.

The PLC S7-1200 consists of:

- controller with integrated PROFINET interface for communication with programming device, HMI or other SIMATIC controllers

- powerful, integrated technology functions such as counting, measuring, closed-loop control, and motion control
- integrated digital and analog inputs/outputs
- signal boards for direct use in a controller
- signal modules for expansion of controllers by input/output channels
- communication modules for expansion of controllers by communications interfaces
- accessories, e.g. power supply, switch module or SIMATIC Memory Card
- The miniature controller that offers maximum automation at minimum cost.

ii. RTD module:

The RTD modules (SM 1231 RTD) measure the value of resistance connected to the analog inputs. This value can be either temperature or resistance.

- If resistance, the nominal range full scale value will be decimal 27648.
- If temperature, the value will be reported in degrees multiplied by ten.

iii. Human Machine Interface(HMI):

Siemens HMI Basic Panels are the ideal HMI devices for small machines and applications. They are ideal for use in connection with Siemens S7-1200.

iv. Contactor:

The Contactor is an electrically controlled switch used for switching an electrical power circuit.

v. Overload relay:

A relay that opens a circuit when the load in the circuit exceeds a preset value, in order to provide overload protection; usually responds to excessive current, but may respond to excessive values of power, temperature, or other quantities.

vi. Moulded Case Circuit Breakers(MCCB):

The Moulded Case Circuit Breakers (MCCB) provide overload and short-circuit protection for all applications.

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## BIOGRAPHIES



Smruti Sutar is pursuing her B.E. degree in Instrumentation and Control Engineering from A.I.S.S.M.S Institute Of Information Technology.

Pooja Botre is pursuing her B.E. degree in Instrumentation and Control Engineering from A.I.S.S.M.S Institute Of Information Technology.

Sheetal Kulkarni is a professor in Instrumentation and Control Engineering in A.I.S.S.M.S Institute Of Information Technology.

## 3. CONCLUSION:

In this paper the designing of control panel is present using PLC. Due to the use of PLC the system runs automatically. No manpower is required. The whole process of the plant can be seen on HMI. This is an environment free process and works silently. Thus, it is much advantageous than vapor compression machines.