Industrial Automation on the Specification of HT Capacitor

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Abstract **-** Designing of capacitors has acquired so much attention in the development and recently different types of capacitors are also developed in the industry. Considering all the benefits such as power factor improvement, reduction of power losses, increasing efficiency so on. Capacitors are also used to raise the quality of supply and safe handling of power equipments. The main objective of this paper is focused on the design process of the power capacitor and different parameter of the capacitor. In the design process of the capacitor, parameters are considered namely microfarad rating of capacitor, Loss angle (tan delta), and temperature of capacitor. All these parameter are measured manually by the operator in the industry and this is sponsored by **Sharada Electronics Pvt Ltd, MIDC Miraj.** Most of the power system fails if there is any damage of capacitor so this system is designed in such a way that it measures all parameter automatically and send it to the control room to avoid the faults that are ignored by the operator.

Keywords: *Capacitor, Microfarad rating, Tan delta, temperature, Impregnation Plant, Microcontroller, LCD*

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I. INTRODUCTION

On the basis of the survey completed in industry, We observe the requirement of industry and as per objective of our system, it is mainly focussed on the faults in the measurement parameter manually taken by the operator. We demonstrate that our system is a measure of all the parameter related to the analog equipment irrespective of the manual measurement by any worker. Software that we have written for our hardware automatically sends out those parameter that are measured by the worker. Finally all the received parameter saved in the personal computer with the help of visual studio and database are generated for the analysis point of view[2].

II. METHODOLOGY:

The work described in this dissertation entitled "Industrial Automation on the specification of HT Capacitor", is focused on the following objectives.

2.1 Real time monitoring of the Capacitor manufacturing Process.
2.2 To increase the productivity.
2.3 To find out the faults on real time parameters.

Following Parameter are considered with respect to the above system.

2.4 MICROFARAD RATING

A capacitance meter is used for testing of different types of capacitor, mainly of discrete capacitors. Once capacitors manufacturing process completed then it may go to the impregnation plant and then testing process is carried out. For most purposes and in most cases the capacitor must be disconnected from circuit. Capacitance measurement test is most essential for diagnostic testing in the field, for high voltage equipments in substations[7].

2.5 TAN DELTA

Tan delta/ power factor/dissipation factor (tan ∂) test set designed for condition assessment of electrical insulation in high voltage apparatus such as capacitor, transformers, bushings, circuit breakers, cables, lightning arresters and rotating machinery.

The test set is designed to provide a comprehensive AC insulation diagnostic test. The high power variable frequency design generates its own test signal independent of line frequency quality and the hardware design uses the latest technology available for digital filtering of the response signal.

2.6 IMPREGNATION PROCESS AND TEMPERATURE

The electrolyte is now added to the assembly by a process called "impregnation." The method of impregnation requires the wound element to be immersed into the electrolyte by a vacuum/pressure cycle either with or without applied heat or simple absorption. The electrolyte contains a solvent such as ethylene glycol and a solute such as ammonium borate. By selecting different electrolytes, capacitor characteristics such as operating temperature range, frequency response, shelf life, and load life, can be further improved.

2.6.1 JACKET OIL TEMPERATURE:

Temperature sensors are located inside the chamber and control panel is also located nearby the tank. All the

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765 - 766

capacitors kept inside the tank for removing the moisture present in the capacitor. The capacitor kept inside the chamber for particular period of time to remove the moisture. Digital display are located in the control panel which shows the jacket oil temperature.

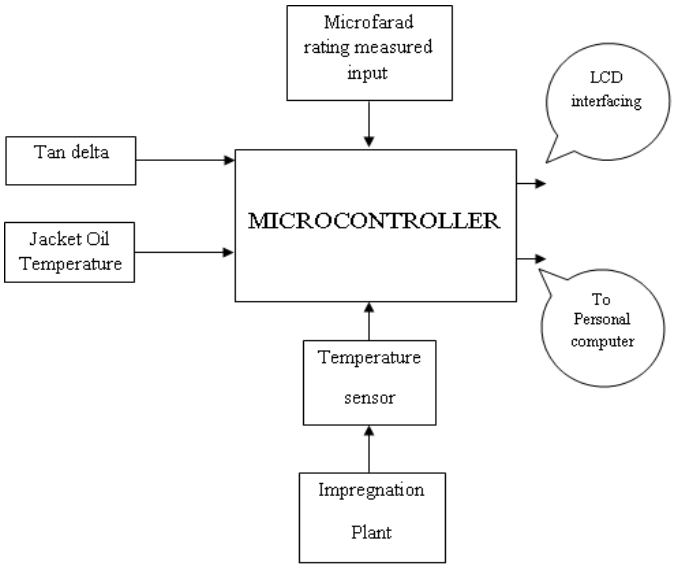


Figure 1: Real time parameter monitoring system

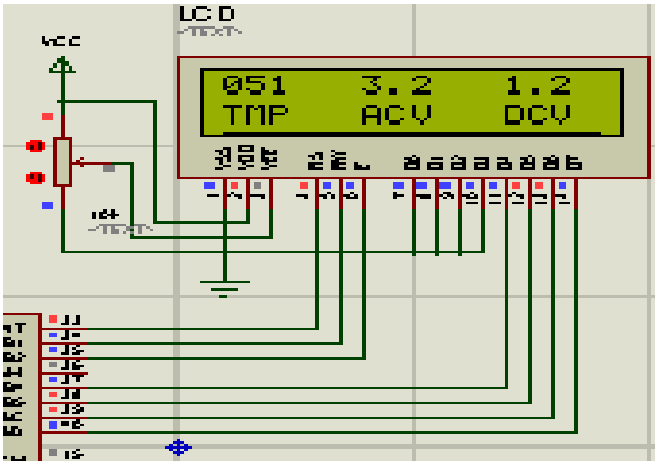
III. WORKING OF SYSTEM

The above parameters namely Temperature of the impregnation process, microfarad rating, jacket oil temperature and tan delta (loss angle) of the Capacitor. As per the discussion with Industry, all the parameters under this automation system are monitored and controlled which is displayed in the control room to find out the correct process is carried out by operator or to detect the faults in measurement readings taken manually by the operator.

The microcontroller reads all the parameter generated by respective analog equipment. For the communication to the other end wired communication is carried out.

IV. RESULT

LCD display shows all the parameter Jacket oil temperature, AC voltage, DC voltage, Microfarad rating, Tan delta periodically shows by using switch key. Finally all the parameter are sent to the personal computer to compare the standard data.



V. DISCUSSION

The system can generate a list of all the parameters being tested, the data can be compared with the standard as per the requirement of industry so that fault identification is done and proper action is to be carried out..

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