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DCS Implementation of Emergency Safety System of Steam Turbines in U 300 Plant from Boiler Accumulator in KMML

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ABSTRACT: The implementation of an emergency safety system for steam turbines in the U300 plant at KMML involves using DCS software to integrate control strategies and protocols. This system aims to monitor and regulate steam turbine operations, ensuring rapid response and protection during emergencies. Steam accumulators store steam at 7 kg/cm² and supply it to all regions. When power is turned off, the on-off valve in front of the turbines opens, allowing steam to enter and restart the turbines automatically. This system also activates the scrubbing system in the U300 plant to maintain operational integrity and prevent leakage of process gases.

KEYWORDS: Emergency Safety System of Steam Turbines, DCS Implementation, Scrubbing System.

I. INTRODUCTION

In industrial processes, particularly in power generation, ensuring equipment safety and reliability is crucial. The emergency safety system for steam turbines is vital for safeguarding operations during events like power outages. Implementing a Distributed Control System (DCS), such as Yokogawa Centum VP, can greatly enhance safety and efficiency. This DCS controls the emergency safety system of a steam turbine, activating when electricity is cut off. It allows steam from a boiler accumulator to enter the turbines at 7 kg/cm², ensuring they run automatically. This prevents downtime, maintains operational integrity, and prevents leakage of process gases in the U300 plant.

II. GENERAL BACKGROUND

Implementing an emergency safety system for steam turbines in a U300 plant from a boiler accumulator involves several steps:

- **System Design:** Define the requirements for the emergency safety system. This includes determining the critical parameters, safety protocols, and actions to be taken in case of emergencies.
- **Sensor Integration:** Install and configure sensors and instruments to monitor steam turbine parameters such as temperature, pressure, flow rate, and vibration. These sensors will provide real-time data to the DCS software.
- **Programming and Logic Development:** Develop the necessary logic and programming within the DCS software to establish safety protocols and responses based on predefined scenarios. This includes setting up alarms, trip systems, and emergency shutdown procedures.
- **Interfacing with Boiler Accumulator:** Integrate the DCS system with the boiler accumulator controls to ensure seamless communication and coordinated responses in emergency situations.
- **Training and Documentation:** Train operators and maintenance personnel on the operation and maintenance of the emergency safety system. Document all system configurations, protocols, and procedures for future reference
- **Continuous Monitoring and Maintenance:** Regularly monitor the system's performance and conduct periodic maintenance to ensure its continued effectiveness and reliability.

III. METHODOLOGY

Our team designed the emergency safety system for the steam turbine using Yokogawa Centum VP, integrating key instruments like temperature sensors, pressure transducers, flow meters, and control valves. These provided real-time data to the DCS for precise control of steam flow from the boiler accumulator to the turbines. The system features

automatic restart functionality for seamless recovery after power outages. The DCS simulated the automatic restart mechanism functioned smoothly. This successful demonstration validated our design's reliability and effectiveness in ensuring safe and efficient turbine operations.

IV. BLOCK DIAGRAM

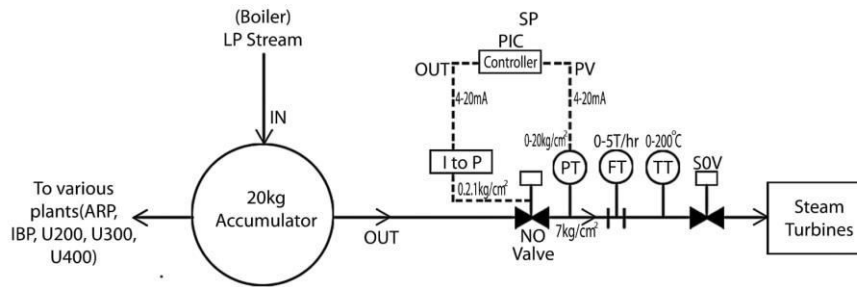


Fig 1 Block diagram

V. WORKING

1. In normal condition

In normal condition, when main power supply is ON, the SOV valve is closed. And turbines are at rest.

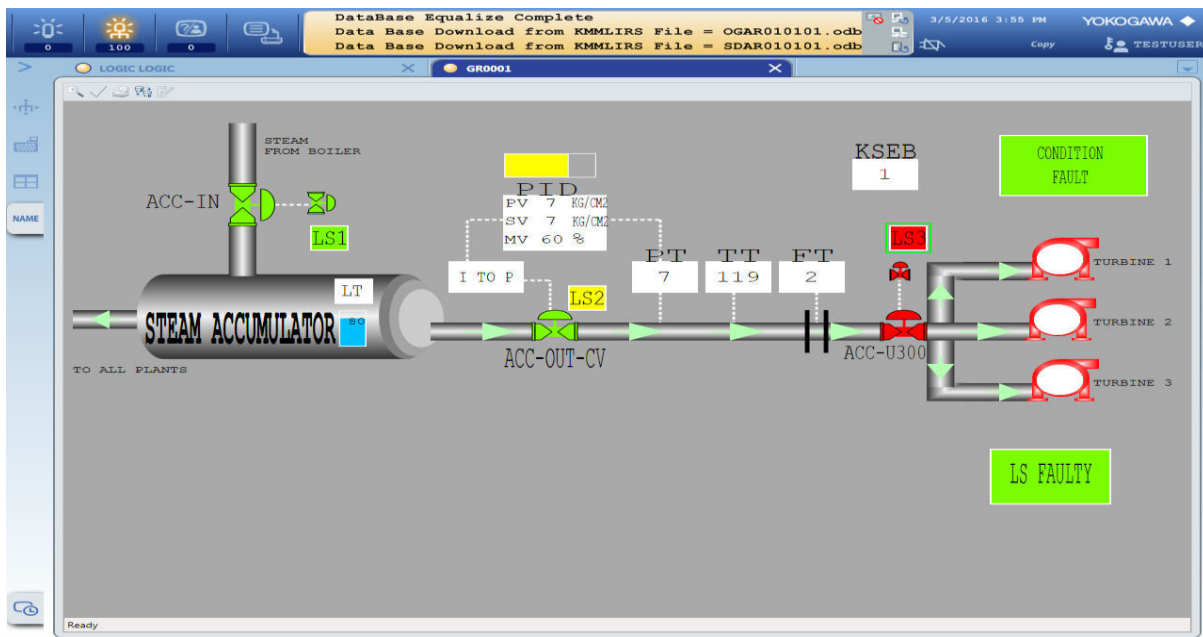


Fig 2 when main power supply is ON

2. When main power supply is OFF

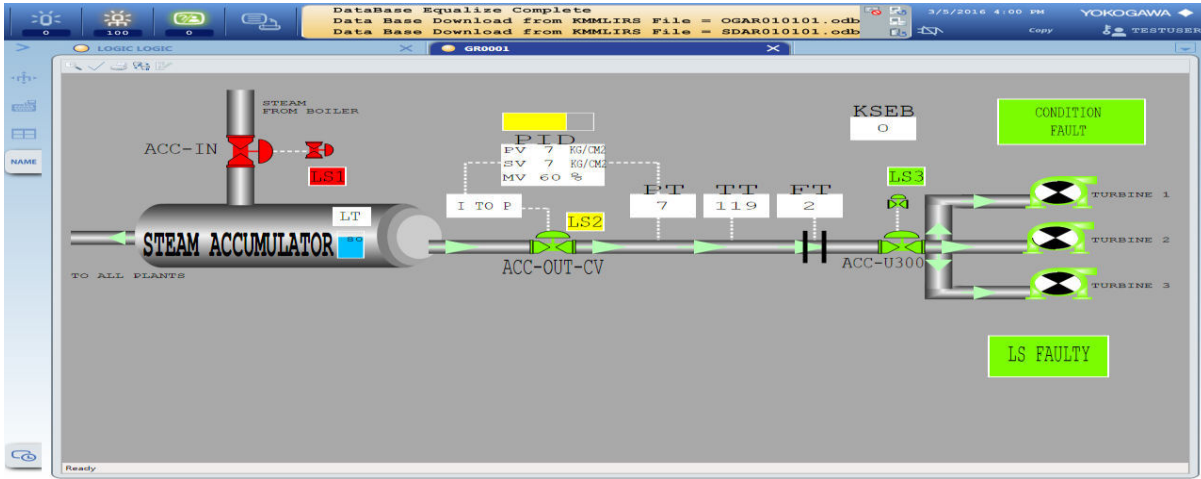


Fig 3 when main power supply is OFF

When main power supply is OFF there is no steam is supplied to accumulator from boiler. Also the SOV control opens and the steam turbines start to function, for emergency safety purpose in U 300 plant.

VI.CONCLUSION

We successfully got the results of above-mentioned conditions. All pressure, temperature, flow interlocks and control valve Limit switch interlocks were checked and tested successfully. The logic tested is ready for field implementation. DCS implementation has provided a clear advantage over the earlier Relay Logic System.

REFERENCES

1. Dobrivoje Popovic and Vijay P Bhatar-Distributed Automation-Marcel Dekker.
2. Distributed Control and Filtering for Industrial Systems; Magadi S. Mahmoud.
3. www.yokogawa Centum VP/ Architecture.
4. www.KMML.com



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