

AUTOMATIC EB DG SWITCHING OPERATION USING PLC AND HMI

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Abstract –We know that at present days, growth is dependent upon the industries both in developed and under developed countries. All industries in developed and under developed countries require uninterrupted power supply round the clock for process making, mass production etc. The aim of our project is to supply uninterruptable power to the industries by automatic change over control system through PLC and HMI, which means, when the supply from the transformer is cut-off, then the backup supply will be turned ON i.e., diesel generator gets started by getting a command signal from PLC and continuity of supply is maintained. When the supply is restored to the transformer, then PLC will give a command signal to the diesel generator to stop. Then the auto transfer switch (ATS) will be shifted from source-II to the source-I i.e., transformer and backup generator will shut down. In this way continuity of supply is maintained without much time delay. All the above results are presented in this paper.

Key Words: Auto Transfer Switch; PLC; HMI; SMPS; Contactor; Relay

1. INTRODUCTION

Presently, the DG sets are manually switched on in the event of main failure. Once the main power restores, the electricians on duty must switch off the DG at once to avoid fuel wastage. Most of the time, this is not happening. Hence, the need of an Auto Transfer Switch (ATS) for implementation. This project ensures the removal of stress on manual switching of generator when the main supply failure. Now a days, the rapid growth of technology has brought powerful changes in the automation system which makes the system reliable, comfort and increase in the efficiency of the system operation. Due to the technology of automation, uninterrupted power supply is maintained to the industries, man power is reduced and it has become fully automatic system. One minute interruption of power failure leads to lakhs of rupees loss and reduction in production especially in pharmacy medical practices power outage leads to mismatch of chemical reaction which leads to over dosage or under dosage of medicines. So, to overcome this situation, uninterrupted power supply is maintained. So, with this system uninterrupted power supply can be maintained.

2. SYSTEM OVERVIEW

In this project, the continuity of power supply is from the transformer and diesel generator (DG). When the power failure to the transformer, the PLC will give a command signal to start the diesel generator (DG) set, when diesel generator set starts building up of voltage the diesel generator contactor gets energized and COS is switched to the diesel generator (DG) and supply is fed to the loads.

When supply is restored to the transformer, the diesel generator contactor gets de-energized by getting a command signal from PLC to diesel generator (DG) set to stop and now ATS terminal position will be on transformer side. When this PLC is not working properly, HMI comes into picture and by using this human machine interface (HMI), we can turn on transformer or diesel generator set depending upon the availability of supply. HMI is also called as virtual key pad.

For meeting this requirement, an auto transfer switch (ATS) arrangement is required for automatically changing over from utility supply to diesel generator (DG) supply in the event of utility supply failure.

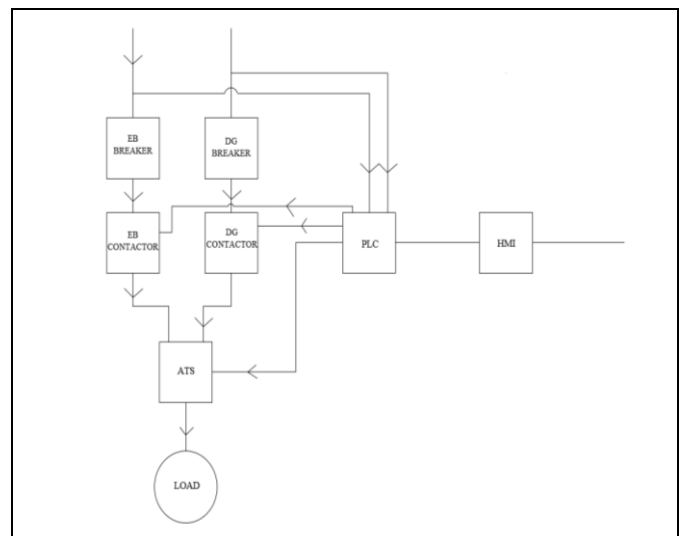


Figure -1: Block Diagram

3. SIMULATION RESULTS

The simulation model was designed using micro win (SIEMENS) Software. The Auto Transfer Switch (ATS) operation is done by using PLC and HMI.

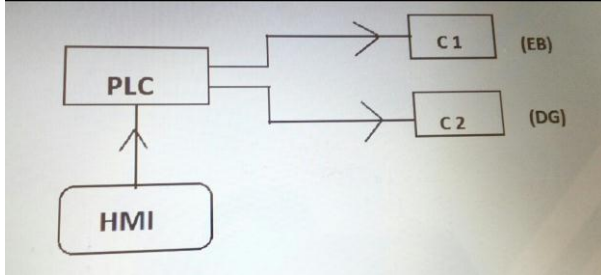


Figure -2: Single line Diagram contains components like PLC, HMI, Electric Board (EB) Contactor, Diesel generator (DG) Contactor.

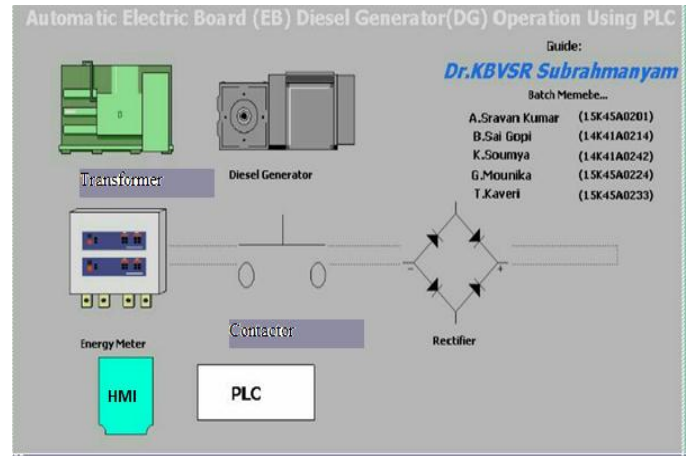


Figure-5: Total components used in EB DG project designed by using Micro win SEIMANS software.

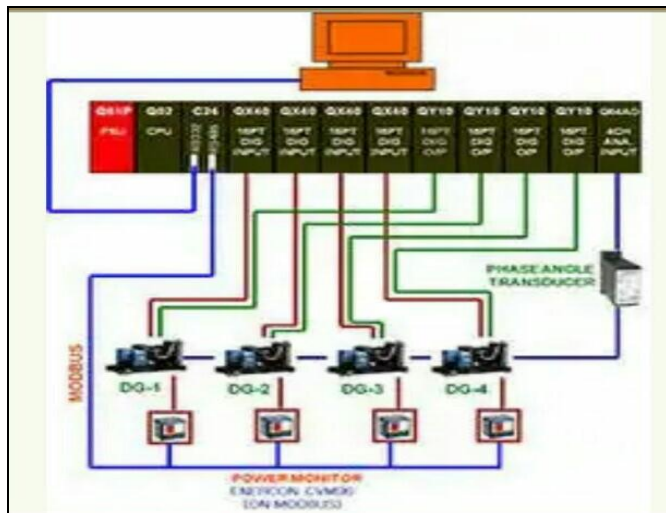


Figure -3: Wiring diagram of an EB DG system by computerized circuit.

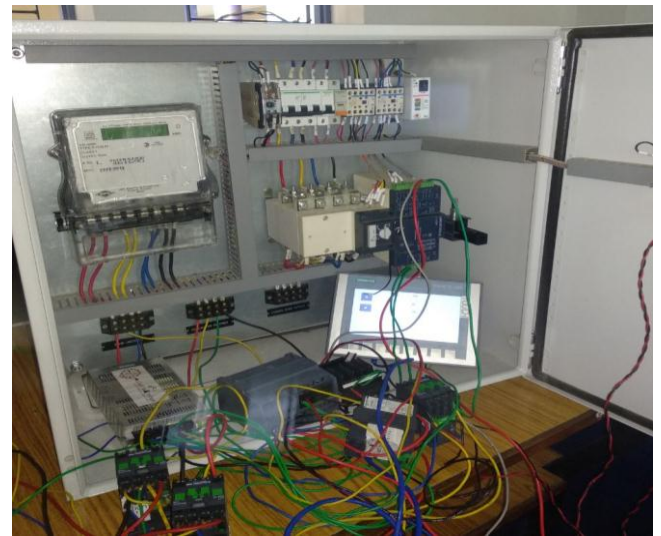


Figure-6: Proto type project in laboratory and testing.

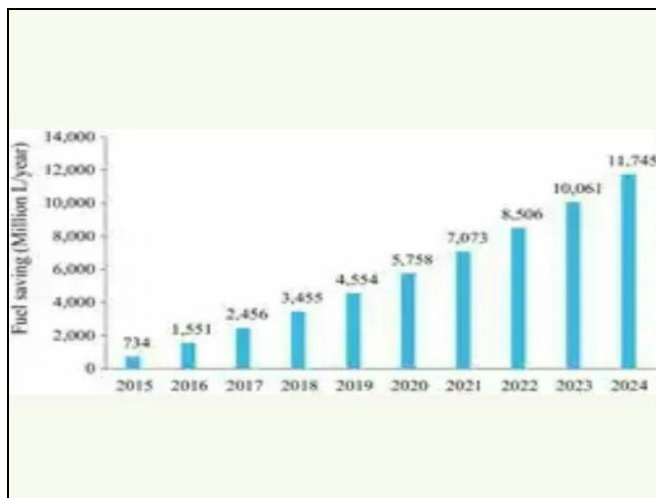


Figure -4: Bar Graph of fuel saving in Diesel Generator

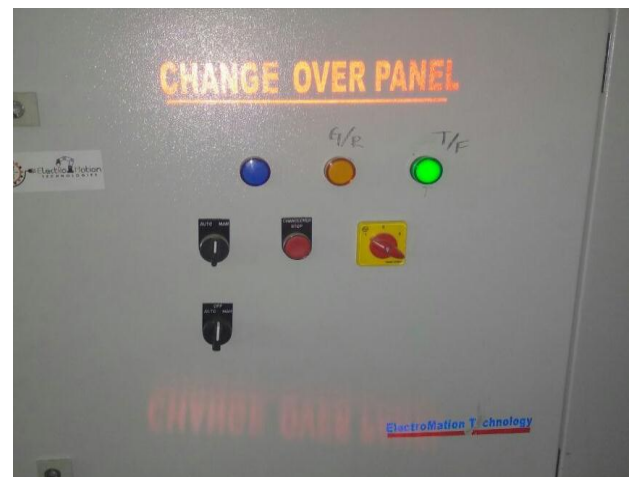


Figure-7: When transformer supply is live, then green light turn-on in the changeover panel.



Figure-8: When transformer supply is interrupted, ATS will shift its position from transformer to diesel generator through PLC command and then turn off green light and on orange light in the panel which we can identify which supply is feeding to the load.

RESULTS:

The continuity of power supply is from transformer and diesel generator (DG). When there is a power failure to the transformer, the PLC will give a command signal to start DG set, and when DG set starts build up of voltage, it takes 20seconds to buildup of voltage. When voltage is build up by DG set, the DG contactor gets energized and ATS is shifted to DG and supply is fed to loads. When the supply is restored to the transformer ATS then, DG set turns off and uninterrupted power supply is maintained.

If in a span of 10 minutes, if main power is on and off more than 3 times, then the supply is permanently shifted to diesel generator until user press reset on HMI. During turning off of DG generator, it takes 400 seconds to shut down. So, again to turn on DG set, we have to wait till 400 seconds and to buildup voltage in generator, it takes 20 seconds.

Table-1: Conditions for EB DG

TIME	EB	DG
Start condition(10:00 am)	On	Off
10:10 am	Off	On
10:20 am	On	Off
10:20 am	Off	On

Under above conditions, DG set is permanently turned ON and EB is OFF until it gets a set command from PLC.

Table-2: Indication of the sources

PARAMETERS	ON	OFF
EB	Green Light	Orange Light
DG	Orange Light	Green Light

The above table indicates which source is on or off.

CONCLUSION:

Using the above system, we can monitor main power and start DG. Automatically when main power fails and starts DG set. Automatically when main power restores to the transformer, DG set turn off using PLC & HMI. So we can reduce power outage to the industries where continuous production is necessary like large scale industries such as Pharmacy industries, Chemical plants and also for banking sector, Hospitals, etc.

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