The power supply unit does the important work of bringing the 230 VAC supply to the desired voltage of the equipments used.

The step down transformer converts the 230VAC to 12VAC and then is send to the bridge rectifier. The bridge rectifier converts the 12VAC to 12VDC. Then the capacitor present removes the undesired ripples of SC components and then passes the supply to the voltage regulators.

There are two types of voltage regulators 7805 & 7812. Both these regulators are used to bring the voltage to 5V and 12 V respectively. The 5V is used by the LM35 sensor, whereas the 12V is used by the comparator block for level sensing. Also the 78' series is the positive range of voltage regulators, whereas the 79' series is the negative range of voltage regulators. These 12v and 5v are given to the sensors present in the circuit board.

B. Ladder Diagram

This is the first page of the program. In this page we make use of the inputs, memories and output icons for the neat representation of the program. In the first rung we make use of a start button for starting the process and the emergency stop button as normally closed contact, so that in case of emergency we can stop the process directly by just hitting the emergency stop button. In the second rung we have configured connections for the program to be operated in the automatic format. In the third rung, we have configured connections for the program to be operated in the manual mode. In the 4th, 5th, 6th and the 7th rung we have given memory allocation addresses for the four types of sensors we use.In the 8th rung we have given connections for the activation of the heater. Finally in the last two rungs we have given connections for the outputs, which are pump1 and pump2.

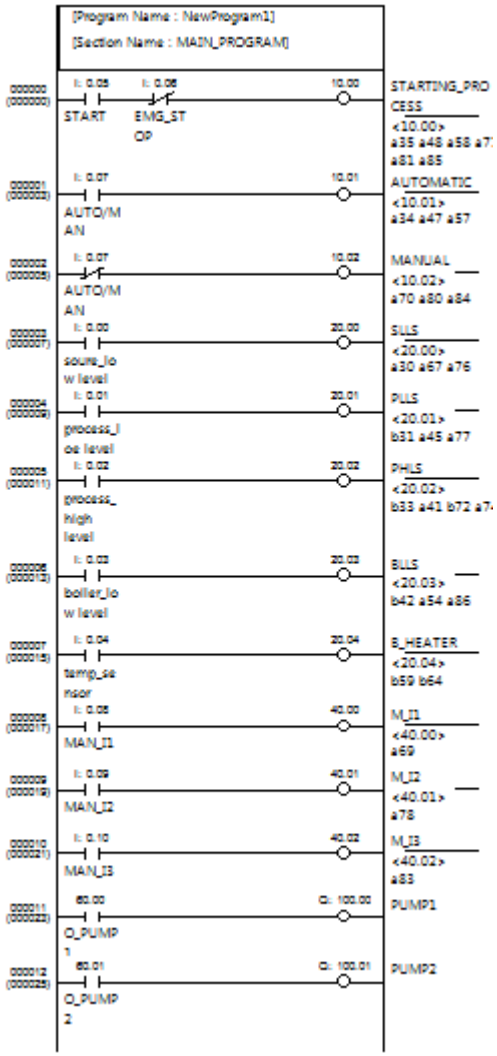

Figure 3: Main Page of Ladder Program

This is the second page of program for the process. This page of program is fully automated. This means that this process does not need any manual attendance, and it operated just with a single start button. Nowhere in the process, there is any activation of switch by an external force.

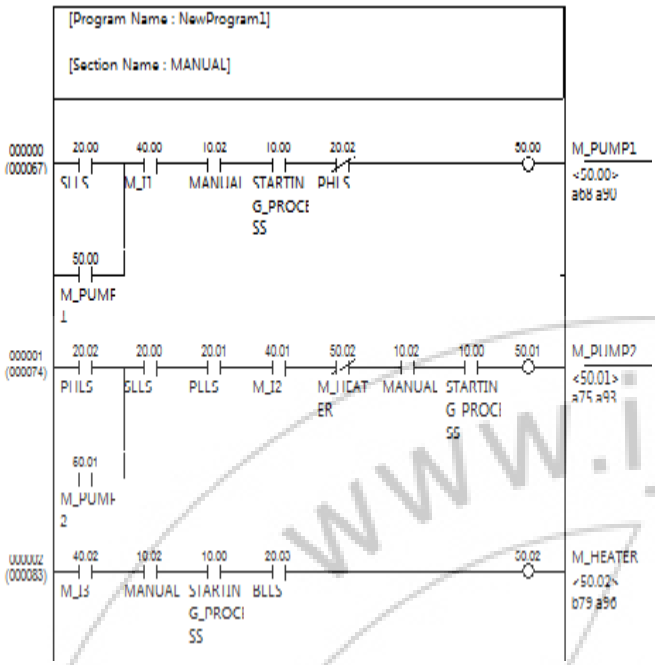

Figure 4: Manual Page Of Ladder Program

This is the third page of the program for the project. In this page, the program is based on manual activation. This program is used just for the purpose of safety. If there is any mal-function in the automatic system, then this manual mode is used.

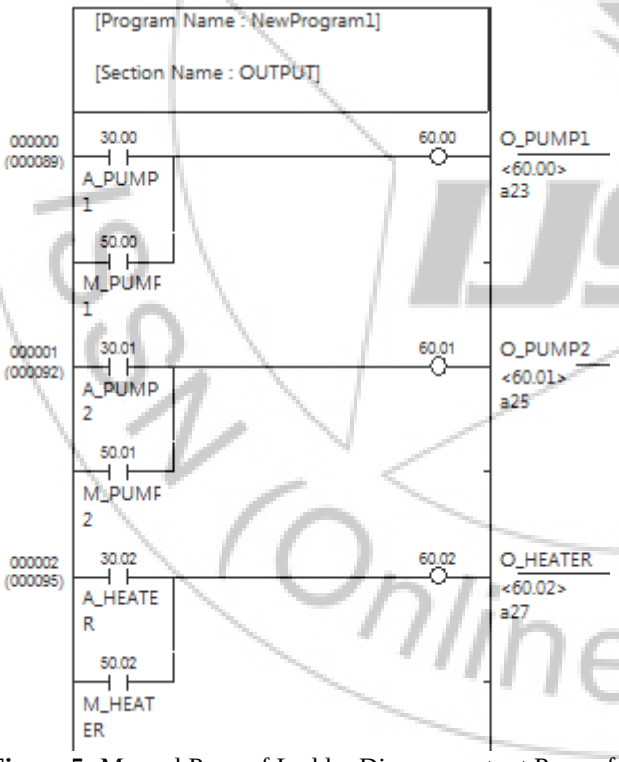

Figure 5: Manual Page of Ladder Diagram output Page of Ladder Diagram

This forms the fourth page of the program of the project. This page consists of an output which gets activated by the switching actions taking place in the 1st, 2nd and the 3rd pages of program.

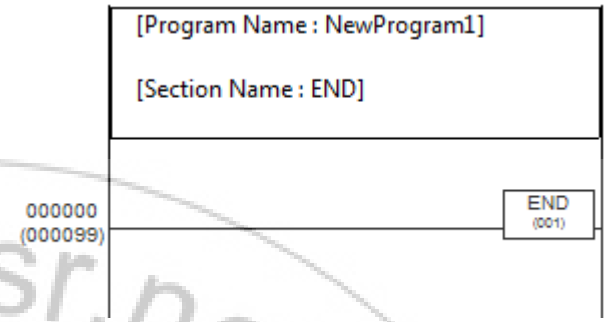

Figure 6: End Page of Ladder Diagram

This page is the last and the final page of the program. This page marks the end of the program. The PLC scans the program and when it comes across the "END" statement it stops scanning further.

4. Result

The result of the process done in the above programs can be showed in the form of SCADA representation. The above process starts with manual feeding of water into the source tank. Then the low level sensor in the source tank is in the on the state. The low level sensor of the process tank is also in the "on" state. This causes the pump1 to turn "on", thus causing the water from the source tank to move into the process tank. This increases the level of water in the process tank causing it to activate the high level sensor present in the process tank. Now, when the high level sensor gets activated, the pump1 turns "off", causing an interruption in the flow of water from the source tank to the process tank.

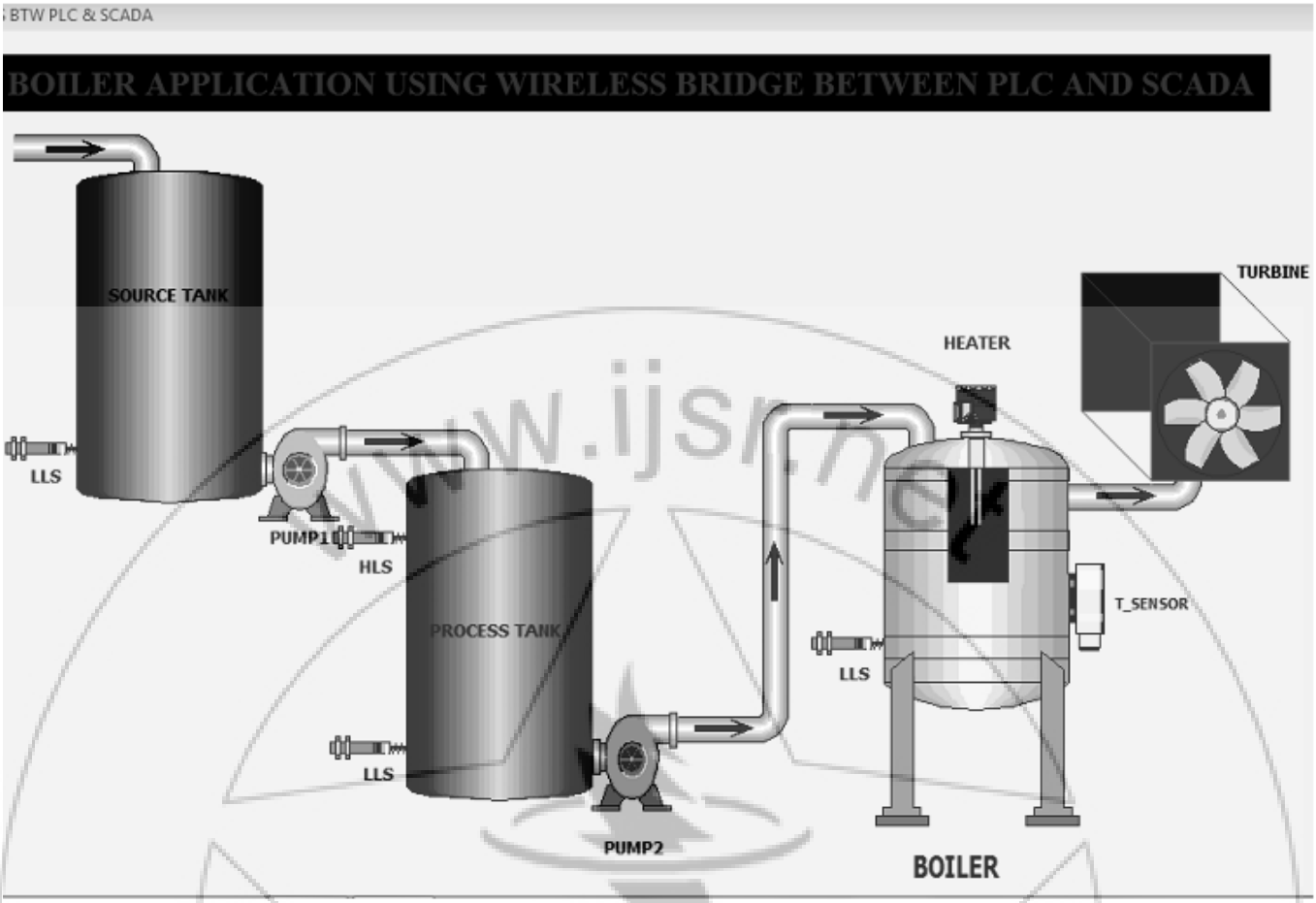

Figure 7: SCADA Display of the Whole Process

Also the low level sensor in the steamer is in "on" state. Now, when the high level sensor of the process tank and the low level sensor of the steamer are in "on" state, the pump2 automatically turns "on". This causes the flow of water from the process tank to the steamer. Also the water flow from the process tank to the steamer is interrupted after the boiler reaches a particular set point defined by the user/operator. Once the water level in the steamer reaches the defined set point, the pump2 turns "off". This prevents the flow of water from the process tank to the steamer to get interrupted. The boiler when reaches the user defined set point the heater switches "on" and the pump2 switches "off". This causes the water to get and convert into steam, thus driving the turbine. Hence the production of steam is directly proportional to the speed of the turbine.

5. Conclusion

The process of controlling boiler application, water level using cables and wire are found commonly in many industries. The wired communication is used in the industries have some disadvantages, such as:1)Cost of laying down of cables and wires for long distance is high.2) cost of maintaining the cables is also high.3) loss of data in the wire transmission due to attenuation. To overcome these limitations we use wireless communication for the process. In this medium of communication, we use wireless medium for communication and also prevent the above limitations from occurring along with the below advantages;1) Since it is wireless, it is possible to connect more than 1 field devices and operate them simultaneously.2) Also the loss of data can be prevented. With the above advantages and the limitations, we prefer the use of wireless communication over wire communication.

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