



CASE STUDY

INDUSTRIAL SHIELDS



TOTALLY INTEGRATED AUTOMATION OF BOILERS

In this case, you will see how to implement the control of a boiler process, in which we are using the Industrial Shields Arduino based PLCs with WiFi and a PC Panel to monitor the SCADA system.

The incorporation of the equipment with WiFi gives you the possibility to monitor and act on the system remotely. (IoT System).

SUMMARY

To achieve this, a viable option is the use of mobile applications and the Internet Of Things that allow communication between the automated process and the user, which, when implemented in industry, give rise to the Industrial Revolution 4.0. This system will include a database and an mobile application that implements security alerts and emergency equipment shutdown. In this case we are working with a pyrotubular boiler but you can implement all types of boilers using the same system.

The automation of this process has considerably improved the benefits of the boiler control, mainly in the speed of response and the good operation in a 100% safe state. If the proposed control levels or an element do not behave as desired, the Arduino based PLC could send a local alert in the control zone through the PC Panel, but in case no one is available, the alert would have to be sent remotely.



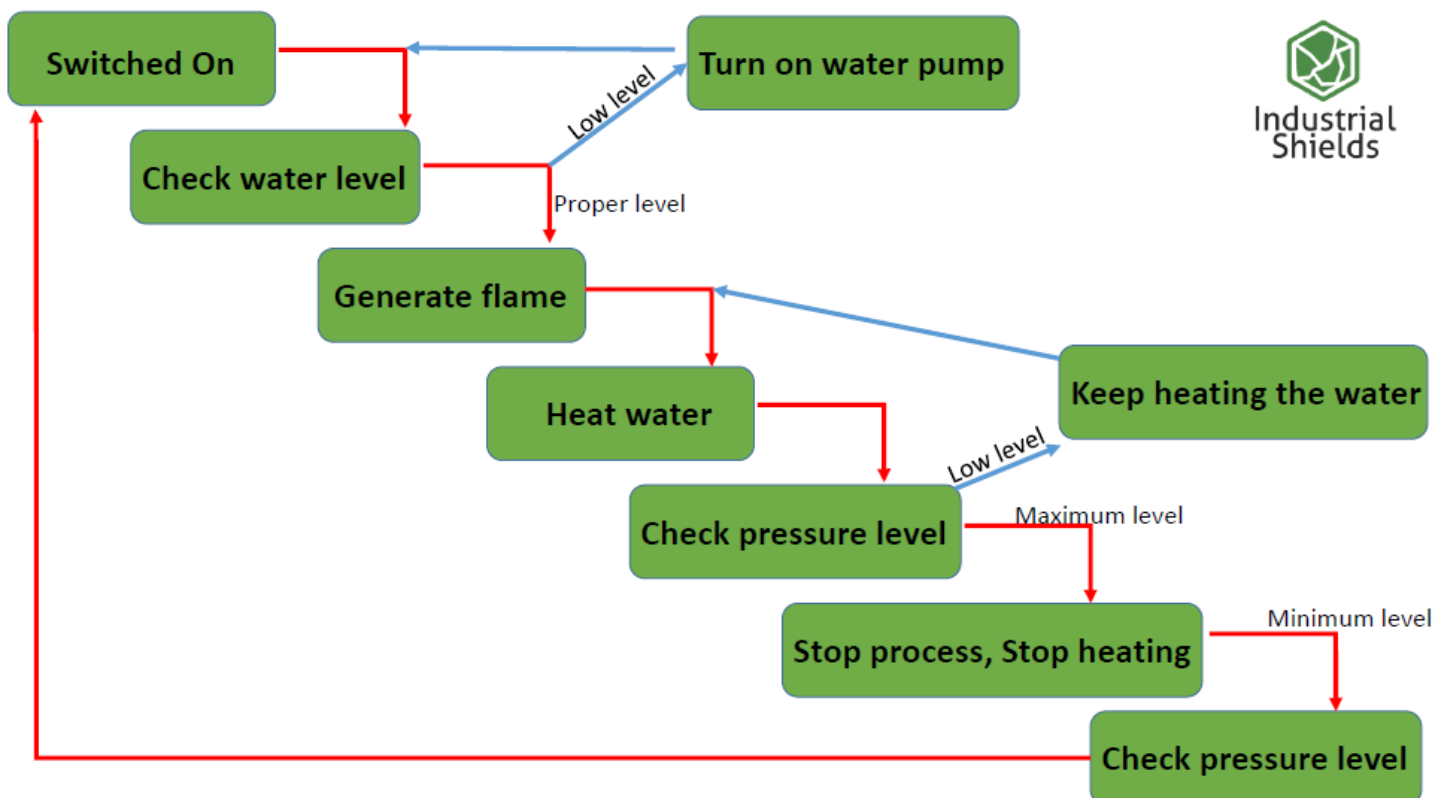
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IMPLEMENTATION

For the correct and safe operation of the steam generation process in the boiler, certain steps must be followed:

- The first one consists of checking the existence of water using the concentrated level sensor as a digital input; if there is not enough water, the pump is turned on until the desired level is reached, after which the combustion gases are swept for a defined time.
- When the sweep is completed, it begins the ignition consisting of activating the transformer (spark burner) and opening the solenoid valve allowing gas to pass; if there is flame, it is detected by the sensor and in case of no flame, the ignition is repeated three times. If this happens a fourth time, another sweep is performed and the ignition is aborted.
- If a flame is detected, the process does not stop and continues to record the amount of pressure in the boiler until reaching 2 bar. When this happens, the burner is switched off until the pressure drop to 1 bar, then the system starts again in a continuous cycle until the user stop it.

You can see the flow diagram to understand better the process:



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CONNECTION LAYOUT

Basically, in this system there are a series of actuators that work with 220V (Pump, fan, transformer and solenoid valve) so we recommend the PLC with relay and WiFi outputs, in addition to the sensor (pressure, level and flame sensor) and two buttons to control the boiler: On/Off and Emergency Stop.

The PC panel is connected to the PLC through Ethernet and you can control the different actuators manually and see the parameters in real time, as you can see in the web server where you are sending all the information through WiFi.

As you can see, it is very easy and low cost to implement this kind of system with Industrial Shields equipment due to the few elements that are involved and the ease to program it using the Open Source Arduino IDE platform. This particular system can be replicated in several boilers with an Arduino based PLC and all connected to the PC Panel and the web server in order to create a network and control it from a single point.

