

ACERINOX EUROPE S.A.U.

Award: Safety
Category: Workplace Improvement

Legionella and cooling towers; Control 4.0.

Challenge

To avoid a dangerous occupational disease such as Legionellosis in high risk installations like cooling towers systems at the mill.

Action

Total control and management of the main operative parameters of the water cooling system for cooling towers, in real time. Legionellosis is a collection of infections caused by Legionella Pneumophila and related Legionella bacteria. The severity of Legionellosis varies from mild febrile illness (Pontiac fever) to a potentially fatal form of pneumonia (Legionnaires' disease) that can affect anyone, but principally affects those who are susceptible due to age, illness, immunosuppression or other risk factors, such as smoking. Infection is acquired through breathing in aerosols (very fine droplets of water) which contain the bacteria. Aerosols are produced in cooling towers and the bacteria could be in all system: machinery, tanks, valves, pipes, trays, etc.

Main parameters we must control and



Cooling tower

manage are: temperature, pH, concentration of biocide, turbidity and conductivity. Temperatures between 25-50 °C are optimal for Legionella growth (temperature of water in these systems is kept between 28 °C and 45 °C. High pH favours legionella proliferation (recommended 7.5 -8.0). Biocide content like Hypochlorous Acid must be kept between 150 -250 ppm (Cl content), conductivity 2000 µS/cm (recommended), in a future we will control turbidity <15 UNF for this new system. Equipment and programs (software) has been developed to do that.

Methodology of control:

1. Supervision: 24 hours / 365 days/year, which will ensure an exhaustive control, while minimizing the time necessary to detect and to correct any possible deviation of the main parameters. Provide graphical reports in which it could be appreciated immediately the operation indicators and provide alarms and tips in order to correct the deviations if occurred.
2. Action: the equipment makes checks and measurements needed to maintain an optimal quality of the water in the cooling tower



Parameters control system

ACERINOX EUROPE S.A.U.

Award: Safety
Category: Workplace Improvement

Legionella and cooling towers; Control 4.0.

system.

3. Risk prevention: when the equipment detects a deviation, send immediately an alarm by wi-fi, alerting to our technicians by e-mail and SMS messages. Then our technicians will proceed to evaluate and to act, before the cooling tower system will be in a not acceptable status (parameters out of range). With the communication software, technicians can act in remote, even from a laptop, table, smartphone, etc. For instance:
 - Changing the aiming and modifying the doses.
 - Adding additives.
 - Purging the systems.
 - Stopping the installation if necessary.

Outcome

First and foremost, ACERINOX EUROPA S.A.U. wants to ensure the health of all workers, visitors even neighbourhood near factory in order to avoid the appearance of the bacteria, taking information in real time of the main parameters that permit to take the proper decisions.



Detail of control panel

Don't forget that if the Legionella appears, even causing an outbreak of disease, not only consequence for the workers, visitors and neighbourhood affected, but for the installation, as follows: it's necessary to stop installations for disinfection (meaning stop the production); bad image of the company, etc.

In addition:

- This project tries to protect the cooling tower installation systems, maximizing the lifetime and reducing the maintenance. This decreases the workload of the maintenance workers and the risks of accidents too.
- Increase saving, minimizing the use of resources, water energy and additives
- Integrate the Occupational Risk Prevention with the Industry 4.0 model, introducing what has been called the "smart factory," in which cyber-physical systems monitor the physical processes of the factory and make decentralized decisions. The physical systems become Internet of Things, communicating and cooperating both with each other and with humans in real time via the wireless

ACERINOX EUROPE S.A.U.

Award: Safety
Category: Workplace Improvement

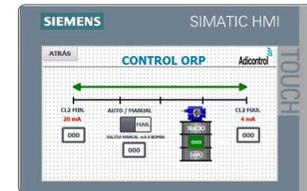
Legionella and cooling towers; Control 4.0.

web. There is an interoperability — machines, devices, sensors and people that connect and communicate with one another.

- In the future this project will be installed in another high risks installations for Legionella, like domestic hot water for changing rooms and shower areas for the workers and evaporative coolers used in workshops and bays.
- An APP for IOS and Android is been developed, in order to control easily from smartphone, and access the system from anywhere.



Main screen



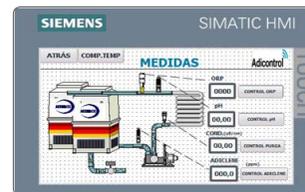
Screen with chlorine control



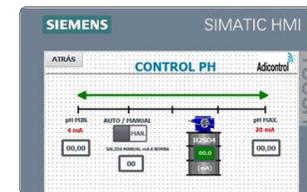
Screen for pH control



Screen for alarms, link status etc.



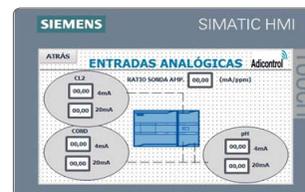
Screen with measures of different parameters



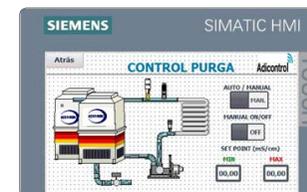
Screen with pH control



Screen for Chlorine control



Screen with analog inputs



Screen with purge control



Screen for pump of biocide control