

AUTOMATION AND CONTROL OF THE SORTEGEL WASTEWATER TREATMENT PLANT

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Abstract: Food Processing Industries produce large amounts of wastewater with high environmental impact. Due to the high content of suspended matter and inadequate pH value of the wastewater, national laws prohibit direct discharges of the influent to the environment. This work describes the design and operation of a wastewater treatment plant installed in the Sortegel food-processing company located in Sortes, Portugal. This industry uses the water collected from groundwater wells to process raw materials and to wash the equipments, being the volume of wastewater produced season dependent (80 to 300m³/day). Results show that the implemented wastewater treatment plant and the automation solutions generate treated effluents that comply with the Portuguese legislation.

Keywords: Automation, Process control, Programmable logic controllers, Waste treatment, Water pollution.

1. INTRODUCTION

Water contaminated by food processing industries can cause environmental degradation and health problems if not treated adequately before its discharge. Due to environmental and health regulations, wastewater plants together with the automation of the water treatment processes are assuming an important role (Spellman, 2003; Rodgers, *et al.*, 2005).

The effluent quality, i.e. the wastewater after treatment, is defined by physical, chemical, and biological parameters. The first one comprise odor, color, turbidity, solids content, grease, among others. Chemical parameters include biochemical oxygen demand (BOD), chemical oxygen demand (COD), which are associated with organic contents, being the inorganic chemical parameters pH, concentrations of

nitrites and phosphates, among others. Bacteriological parameters include specific pathogens and viruses. According to the environmental Portuguese legislation, the quality of the effluent discharged to the environment must comply with the limits defined in the Law 236/98 (Ministério do Ambiente, 1998). Table 1 shows the upper limits imposed by national legislation that were used to design and control the wastewater treatment plant reported in this work.

Generally, the control of wastewater treatment plants is difficult to tune due to the large range of time constants (minutes to days) of the physical, chemical and biological processes (Ghaniyari-Benis, *et al.*, 2009). Moreover, the influent to treat presents large variations over time in both flow-rate and suspended matter. Several plant designs and control implementations are presented in the literature for