CEMENT KILN OPERATION WITH SMART CONTROL: CHALLENGES AND OPPORTUNITIES

P. Theleriti, P. Georgakis, L. Lanchas Fuentes, M. Sofianos, N. Pistofidis*, Em. Haniotakis
TITAN Cement Co S.A., Athens, Greece
*(*n.pistofidis@titancement.com*)

ABSTRACT

The heart of the cement factory is the kiln, where the pyro-processing of the raw materials takes place, and the clinker is formed. The kiln operation not only defines the quality of the final product but also its cost and its environmental impact, since almost 1/3 of the CO_2 emitted from the cement factory is the result of the fuels used in pyro-processing [1]. Consequently, the optimization of its performance is critical.

To this direction, there is a huge potential from the application of Advanced Process Control (APC) systems based on Deep Learning algorithms [2]. These systems do not replace the basic automation, such as interlocks or PID controllers. They allow the accurate prediction of the critical parameters which constrain the kiln operation and based on these predictions they select the optimum values of the kiln control variables, such as the fresh feed, the fuel feed, and the air flow. However, the complexity of the pyro-process is high and there are several challenges to overcome, not only during the development but also when a similar system goes live.

In the present paper an intelligent system is presented, which was developed based on advanced analysis of the historical data of kiln operation. The analysis underlines the main problems which were encountered, along with proposed solutions. After the application of this system, the kiln throughput was increased by about 3 to 5%, the specific heat consumption (kcal/kg clinker) was reduced by the same amount and the overall operation of the pyro-line was smoother.

KEYWORDS: Clinker, Artificial Intelligence, Kiln, Pyro-processing

REFERENCES

[1] Schorcht F., Kourti I., Scalet B.-M., Roudier S., Delgado Sancho L. (2013). Best Available Techniques (BAT) Reference Document for the Production of Cement, Lime and Magnesium Oxide, JRC Reference Report.

[2] Walther T. (2018). Digital Transformation of the Global Cement Industry, IEEE-IAS/PCA Cement Industry Conference (IAS/PCA).