



## Statistical Quality Control with Functional Data. An application to Energy Efficiency

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Functional Data and Big data is a popular term that is used to describe the large, diverse, or longitudinal datasets generated from a variety of instruments or sensors. This term refers not only to the size or volume of data, but also to the variety and the velocity or speed of data accrual. These new data pose new opportunities for researchers in statistical quality control and for innovative solutions in industry.

In this work, we discuss several complex and big data application in statistical quality control. Our goal is to bring the research for complex and big data analysis in energy efficiency. Some suggestions to apply to data quality control in energy efficiency issues will be presented. In this type of control is common to have a large number of sensor data obtained every 5 minutes.

The air quality, thermal comfort and energy efficiency of buildings heating, ventilation, and air conditioning (HVAC) is checked and controlled. Since there are many variables critical to quality (temperatures, humidity, CO<sub>2</sub> concentrations), multivariate control charts were applied to latent variables obtained by partial least squares (PLS) to solve this problem. In addition, new control charts in the framework of functional data analysis, are proposed to control functional variables such as the diary temperature (measured each 5 minutes or each hour) in a room.

**Keywords:** quality control; complex data; energy efficiency; data mining.