Master Thesis proposition

Title

Bringing the analysis of cement to the next level: Calibration of XRF by the use of chemometric methods.

Description

Within the cement industry X-Ray Fluorescence is the standard for quantitative analysis of both raw materials, intermediate and final products. The first step in quantifying the components is a peak detection. However XRF suffers from overlapping peaks, to correct for this a number of different more or less complex methods exists. The peak detection is then followed by a calibration. Traditionally the instruments are calibrated using univariate methods, however, a number of interferences are affecting the result, e.g., sample preparation, material type, mineralogical effects, etc. making it necessary to have calibration for each new material.

It is well known that other types of spectroscopy like Near Infrared and fluorescence spectroscopy have similar problems and benefit from multivariate techniques like PLS, PCA a.o. However, very little is published about XRF in combination with chemometrics.

This project will make a literature study; establish calibrations for a number of standard materials; investigate if the effect of the sample preparation (grinding) can be compensated; investigate the possibility of having global calibrations across geographic regions and materials.

You will work as a full part of the automation team, at FLSmidth in Valby, thus being able to participate in the benefits of FLS employees like a lunch scheme, for which you’ll have to pay a small monthly fee, being able to freely choose between the two canteens and the possibility of ordering take-away food.

During your project FLS will pay you an allowance. Furthermore as part of the project you might be collecting sample material at a site somewhere in the world; it might be Russia, the Middle-east, Indonesia, or Europe.

Skills: Chemometrics, Chemistry, Spectroscopy.

Contact:

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About FLS

FLSmidth is a leading supplier of equipment and services to the global cement and minerals industries. FLSmidth supplies everything from single machinery to complete cement plants and minerals processing facilities including services before, during and after the construction.