

Customer Reference for XRF System in the Coking Plant of the voestalpine Stahl GmbH in Linz, Austria

Histry

voestalpine Stahl GmbH is operating a coking plant in Linz, Austria. The coal used is purchased from several suppliers all over the world and is added to the mixture used.

Essential quality parameters of the coal mixture are monitored every day using daily pooled samples. This is not sufficient for reliable process guidance.

voestalpine Stahl GmbH has, therefore, contacted several companies to see if it is possible to measure the *ash* and *sulfur content* and the *bulk density*, the *elementary composition of ash* and the *volatile components* of the coal mixture online.

Only Indutech was able to measure these parameters, although the suitability of the XRF for determination of volatile components had been called into question at first. Therefore, Indutech carried out tests on 20 samples at first and in a second step on 100 further samples to determine the achievable accuracy.

A model has been developed based on the comparatively large pool of 120 samples to determine the volatile components. The results were convincing, so that Indutech was given the job to set up the online facility.

Purpose of the facility

The online analysis of the coke coal mixture it to be used to determine the contents of ash, sulfur, iron and other elements, and to determine the volatile components and the bulk density of the coke coal mixture on the main conveyor belt with a conveyor capacity of 300 t/h and a maximum grain size of 10 mm.

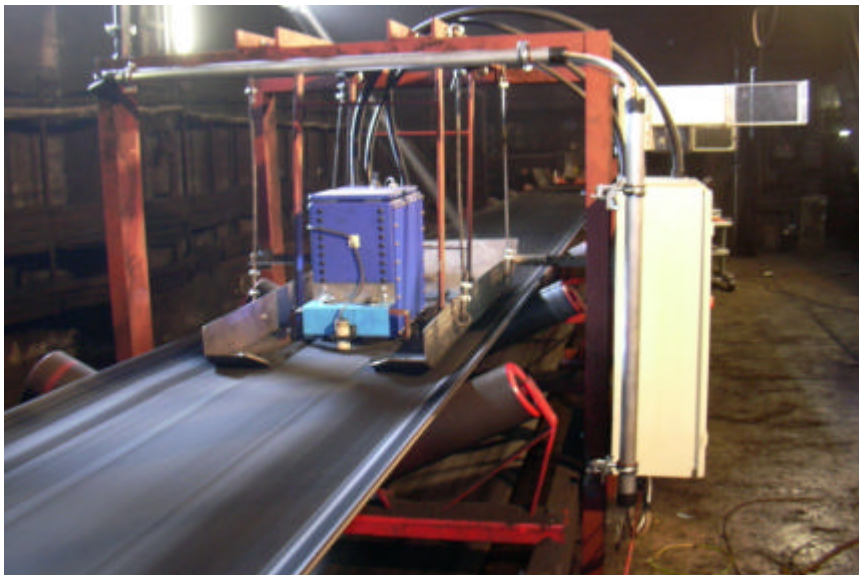
Measurement method

Energy dispersive Roentgen fluorescence (ED RFA).

Demands on the measurement method

Constant distance between the surface of the product being measured and the detector.

Grain size max. 12 mm



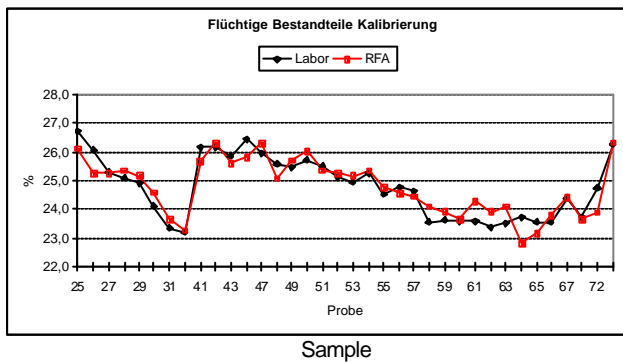
The installation of the measurement box on a skid gliding over the conveyor belt ensures a constant distance.

Installation and calibration of the system

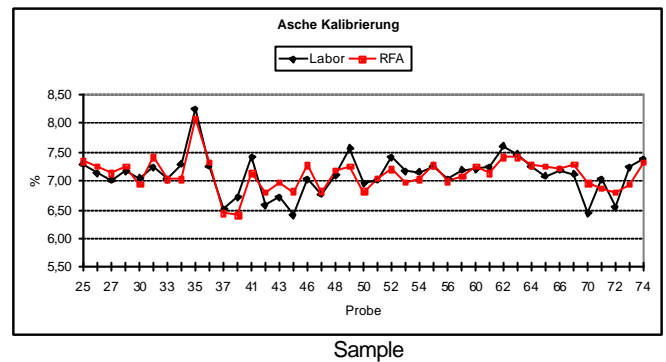
The system was installed in early 2004 and calibrated on the basis of the lab experiments carried out by Indutech GmbH and sampling performed during operation. It turned out that the facility fully came up to expectations. The measurements proved to be accurate and reliable. An adjustment of the model and re-calibration is required, in particular for the volatile components, only after the coal composition has changed (new coal is used). The facility is in operation for more than 2 years now and today it is absolutely indispensable.

Some results:

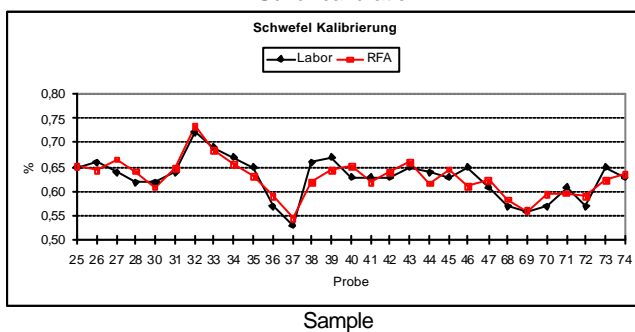
Volatile components calibration



Ash calibration



Sulfur calibration



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Evaluation of the measured values

The measurement signals are sent to a PC. The measurement values are then passed on to the process control system and are used for the heat control of the coke ovens.

Implications of the measuring system

- If we know the volatile components, the heating gas quantity can be calculated and controlled more exactly.
- Measurement and control of the ash and sulfur content and the bulk density serve as basis for monitoring.
- The online elemental analysis of ash allows the immediate identification of foreign matter, e.g. ores or impurities.
- The online quality control allows rapid intervention in the process.

Assessment of the measurement method

The implications mentioned above have positive effects on the coke quality and the economic efficiency of the coking process.

The official approval procedure is simple compared with radiometric measurement methods.

Further projects

Indutech proved to be a reliable and competent partner in carrying out the project and building up the facility.

As a consequence, another, far more complex project was handled by Indutech. In the new project, converter fine dust, which may reach temperatures up to 350°C, is analyzed for zinc, iron and calcium.

The LD Steelworks of the voestalpine Stahl GmbH produces about 70,000 t converter fine dust containing zinc per year. This dust is considered material that can be reused and depending on the Zn content it is used for different applications.

An XRF system *OXEA 3000* by Indutech GmbH, which has recently been completed, is used to determine the Zn content. The XRF system has been installed in a bypass to ensure continuous sampling. The measurement conditions are extremely difficult, due to the high temperatures of the converter dust and working in nitrogen atmosphere for inertization. The experience and results gained during commissioning indicate that successful completion of this project can be expected.

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Measuring system converter dust

In our corporate group, Indutech is involved in further projects which will be tackled in the near future.

Within the Voest-Alpine Stahl GmbH the following persons are responsible for the project:

Due to EU Data Protection (GDPR) all personal data of the people involved in the project have been removed.

Linz, May 5, 2006

Technik/Forschung, BIT

Unternehmensbereich Roheisen

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