

Representative Online Analysis using TEXAS

The knowledge of material composition of bulk material is of utmost importance in ore or coal preparation plants. Variations in material quality may lead to increased cost of energy, increased consumption of reaction chemicals and may cause yield reduction. Laboratory analysis of material composition may help somewhat; however, the results are not available instantaneously. So the operator can only react on changes with a reasonable delay. At this time conditions may have changed again.

Furthermore, taking manual samples for laboratory analysis may be a challenge, especially if the material is inhomogeneous, large volumes of material need to be analyzed or if the particle size is not small.

Several methods to overcome these problems are established in the market:

- Online analysis devices can measure material composition continuously
- automatic sampling devices offer representative material samples for laboratory analyses
- combination of both system can provide very precise online analysis and reliable laboratory samples simultaneously.

J&C Bachmann has developed the online analysis system TEXAS for elemental analysis which can be supplemented by the moisture meter IOWA HK9 and the hammer sampler SAHARA.

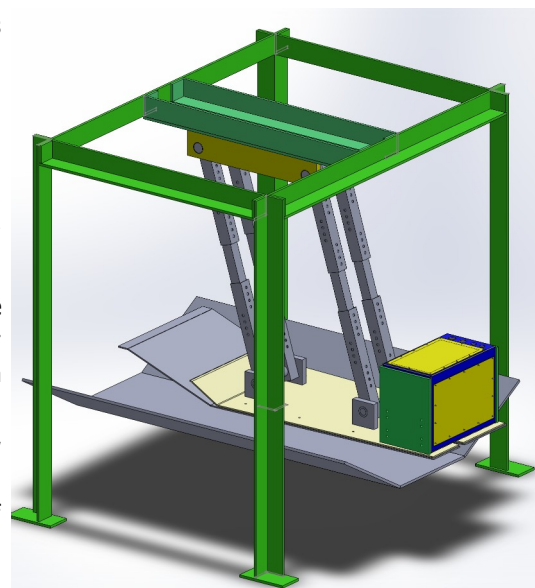
TEXAS

TEXAS 420 is an online X-ray fluorescence device for the elemental analysis of bulk materials without sampling. It can be mounted above main conveyor belts or at other feeding devices and analyzes continuously the elemental composition ($Z > 12$) of the material.

The device is used as a tool for process control. It offers immediate information (24/7) about the process without time consuming sampling and analysis in the laboratory. However, it does not replace the laboratory but serves as a process tool for feed forward or feed back control.

TEXAS is equipped with a rugged X-ray tube and an energy dispersive detector in a stainless steel box. The information acquired with the sensor is processed with the software suite [MONACO](#) by an industrial PC which can be linked to the control system by standard interfaces.

Installations with particle sizes < 10 mm and belt speeds of up to 3 m show a life time of four years for the wear plate; this will vary depending on material type, speed and particle size. The maximal conveyor belt speed of existing TEXAS installations in coal are 5 m/s with particle sizes of up to 120 mm.



TEXAS (Sensor box blue/yellow) on sled above conveyor belt



An important advantage of the use of this measurement technique directly on the conveyor belt is given by the fact that the used radiation does not endanger the personnel at all. Scattered radiation can be measured only directly inside of the belt profile; radiation is zero if the device is switched off. This safety feature does not apply to any devices working with radioactive sources. - If desired then the X-ray tube safety circuit can be linked to the belt stop signal which terminates radiation if belt stops.



TEXAS 420 installation is illustrated in figure 1 schematically; the following figure shows an application on a coal belt.

As a standard the system is prepared for remote access through internet; this option can be used under customer´s control for optimization of settings, calibration or remote support.

Sensor box as well as evaluation unit are made of stainless steel (1.4301). Size of sensor box is 400*300*220 mm³, it is IP67 except the this measurement window below the analyzer which will not withstand the water pressure of a fire hose. Experience show that this has never been a problem. The evaluation unit (IP66) has a height of 800 mm, a width of 600 mm while the depth is 250 mm.

Sensor box and supply unit are linked with a rugged flexible hose which is armed with a stainless steel grid. TEXAS is equipped with a two stage cooling circuit.

TEXAS combined with SAHARA Sampler

If the overall conditions do not allow to install TEXAS directly on the main belt or if laboratory samples need to be obtained anyway then the combination of SAHARA sampling station and TEXAS is the recommended solution. SAHARA sampling station consists of the following components:

- Hammer sampler
 - The hammer sampler provides the primary sample by taking out a cross cut from the main belt. This ensures that a representative fraction of the material stream is taken.
- Crusher
 - Before the material will be measured resp. divided in a second stage the material will be crushed.
- Secondary sampler
 - the secondary sampler is used to obtain a representative laboratory sample
- Reject belt

- all material except the lab sample will be fed back to the main stream on a small slow moving conveyor belt
- Sample carousel
 - the sample carousel can provide up to 8 independent sample; rotation may be time or event based.

The sampler is installed on the main conveyor belt. This sampler automatically, regularly, quantitatively and fully intercepts the material flow on the belt at regular intervals defined by the needs of the application. After each sampling cycle, the sampler automatically returns to the initial position where it waits for the next sampling round; the sampling interval is adjustable to 0.5-999 minutes. The material taken by the sampler enters the first conveyor belt through a chute. A magnetic iron remover on this conveyor belt automatically removes foreign bodies of metal and the sample materials then fall directly into a crusher. Afterwards a secondary sampler (divider) automatically reduces the sample flow by an adjustable ratio.

Measuring the material composition on the sampling belts offers ideal measuring conditions. A well mixed, homogenous and fine crushed material will be presented contactless in constant geometry. These conditions ensure best measurement results – and best correlation between laboratory samples and online analysis.



IOWA

Beside elemental analysis, the knowledge of moisture content is vital in many applications. The moisture content can be derived by combining the microwave based instrument IOWA HK9 (Instantaneous Online Water Analysis HK9) with TEXAS. This through belt moisture measurement can be fully integrated into the TEXAS system; all information will be available using the web based TEXAS UI. While IOWA may be installed on the main belt or at the SAHARA sampling belt, it does not need an additional radioactive measuring path or a belt scale for mass correction.

IOWA HK9 can be also used as a stand alone unit.