

Sampling station of alternative fuels (SAF)

Client: Českomoravský cement, a. s.
a succesor company of the Mokrá

Realization: August - September 2009



Z 4953



New condition

Customer's requirement

The cement plant starts using SAF (solid alternative fuels) in a greater extent as alternative fuel. It builds new silos for fuel for burners and for fuel for calciners. Silos will be filled by a system of chain bulk conveyors from the discharge of trucks. There is a need to inspect quality of these supplies and evaluate them in different periods monthly, quarterly, and yearly.

The customer required supply and assembly of machinery-technological equipment for sampling of alternative fuels. According to a protocol determining the environment, the equipment will not be positioned in any zone dangerous with explosion. Dust resistance, temperature scope 20 to +40 °C is required. Good noise elimination is also required.

The customer will provide a control system, electric wiring and control software in a self-help way.

Task, final formulation of the design

The transfer from the first onto the second bulk conveyor should be used as a sampling place where samples will be taken. The transfer is approx. 2,3 m high above the floor level. Conveyor axes are perpendicular to each other and area behind the transfer is free where necessary sampling technology can be positioned and it is roofed.

No. of trucks: 3 trucks per hour (approx. 30 per day) = 3 final samples per hour.

The number of partial samples taken during the discharge is min. 3 and max. according to needs regarding a homogenizer filling. Sampling of a truck will be started at the command from a superior system.

Requirements for a sample: a final sample volume of max. 1 liter should be done of each truck.

Material sampled: sorted municipal waste, crushed so called solid alternative fuels (SAF). The grain size distribution varies according to a supplier. The material does not form clusters, it separates at the transfer it can be taken by a shovel sampling device of an appropriate shovel size.

Dimensions of partial elements in classification 1D 80-120 mm; 2D - 35x35 mm.

Moisture: 5-15 %; average 9 %

Bulk density: 0,06-0,25 kg/dm³



Description of the final design discussed and approved by the customer

The automatic sampling line (sampling device) guarantees with its arrangement and design a regular sampling of partial samples of material for a representative sample that is an average of partial samples. Taking partial samples incl. further processing is done automatically without interventions.

The sample is taken by a shovel sampling device LO-950x150 from the transfer of the intake station on a bulk conveyor R110. A sampling bowl intersects the sampled material flow in a straight line and takes a partial sample to a chute. The device is driven by a linear electric motor. The sampling device is fixed on the side wall of the transfer in the axis against the material movement. It is started after a signal from the control room is given according to the conveyor run and SAF sampled.

The rest position of the bowl is in an inserted position in the sampling device. When the shovel is inserted, the sample is automatically swept off the shovel to a chute onto an oblique conveyor DL300. This chute serves also as an intermediate bin of partial samples taken. Taking of partial samples is repeated according to a set number of takings and length of breaks between sampling. After each partial sampling, the system checks the chute filling by a level indicator, if a sufficient amount of material is taken for further processing. The required amount is 6 l.

After a required amount of sample is taken, the sample is conveyed by the oblique conveyor DL300 on a belt dosing device D200x850. The permanent magnet at the belt dosing device transfer separates metal pieces from the sample and material is sampled secondary by a shovel sampling device LO-400x150.

After each partial sampling is done, the system checks filling of a carousel vessel with a level indicator if a necessary amount is taken for further processing. The required amount is 1 liter. In case it is, taking of other samples is stopped regardless of the number of samples set.

The rest of a sample collected (waste) which is not used and metal pieces separated magnetically fall through a waste chute back to the technology on the conveyor of SAF and the final sample is stored in the vessel of the carousel bin.

If the sample exists, the system will label the position of the vessel on the carousel filled and if the carousel has an empty vessel for samples, the vessel on the filling position is automatically exchanged for the empty one. The system turns the position with the vessel, about which it knows it is empty, under the sample hopper and then it must lower the stand cover. It verifies with the level indicator that the vessel set is empty. If it is not empty, it labels it full and the vessel is re-arranged again for an empty one. If the vessel is empty, a sensor of the barcode will read a number of the vessel set and the system is ready to process further sample.

If there is the last empty vessel in the carousel stand, the signal sends a report to the superior system.

If there is no empty vessel at the disposal, the system reports a failure to the superior system that all positions are occupied with a sample.

For the whole period of sample processing, start of drives of the oblique conveyor DL300 and cleaning brush is blocked.

Chutes, piping, supporting structures are parts of the sampling station. Components of the sampling device are conductively connected and connected to a grounding system.

