

Hot raw meal sampling

Client: Lafarge Cement, a. s., Čížkovice
Realization: August - September 2009

Z 5009



Prime condition



New condition

Customer's requirement

To design and manufacture a device taking samples of raw meal automatically.
The device is to substitute present technology, which is a manual sampling.

Task, final formulation of the design

- Shovel / sampling bowl should scoop in one step approx. 50 g. Of course, the shovel should work as short time as possible and we must take its knocking into account in extending and discharging.
- This amount should be discharged to a vessel / bin that would be under the discharging place.
- The device works with sampling in the area where temperatures of material are around 800 to 900 °C.
- Sampling should be 5-6 times per hour (it would be good if number and times of sampling could be changed). After this period of time the device will inform that the process is finished and it should not continue sampling until it is confirmed.
- The total material amount after sampling series should be approx. 300 g.
- The equipment must allow safety maintenance (exchange of parts).
- The sample is homogenized already in sampling in a common collecting vessel.
After the last sampling, homogenizing must continue for 5 min.



Description of the final design discussed and approved by the customer

The sampling station of hot raw meal is a single-purpose machine and it is used for automatic sampling of hot, fine ground, powdered material up to the maximum size of grains 1 mm. Maximum admissible temperature of environment of the material sampled is 1000 °C.

The sampling station capacity is to take 5-6 partial samples in 1 hour, samples are continuously homogenized and cooled and the final sample of approx. 300 g is ready to be taken in a portable vessel of the sample.

The sampling station consists of a piston sampling device with a linear electric drive and vibrator, knife closure with a pneumatic drive, chute telescopic piping, homogenizer with a vessel of samples taken, stool for adjustment of the homogenizer and control unit in an el. switchboard Siemens Simatic S7-313C (The system will be completed with a communication card with an interface PROFIBUS for communication with a superior control system.).

The knife closure separates the air area of the sampling device from a hot area of a preheater. As the sampling tube moves up and down due to heat dilatation, the sampling device is firmly anchored on a tube and it is suspended on a sampling piping. The sampler is a main part of the sampling device that consists of a sampling tip and tube shovel. The sampling tip serves both to perforate a crust that is formed on the sampling opening and to size the volume of a partial sample taken by the shovel and finally to discharge the partial sample from the shovel and to clean the shovel. The whole device moves in a housing of the sampling device formed by a tube. The device is via rods connected with a parallel linear drive.

To connect it with the homogenizer a telescopic chute allowing flexible reaction to change mutual positions of the sampling device and homogenizer both in height and angle is used.

The homogenizer is firmly anchored through a stool on a walkway. Homogenizing is provided by a rotating agitator in a whole section of a homogenizing vessel. The portable vessel for the sample positioned under the homogenizer is separated by an integrated closure. After the sampling cycle is finished the vessel with the sample can have a temperature of max. 65 °C.

