



Whitepaper

## **Reliable Energy Supply: Efficient Conveying, Storage and Dosing of alternative Fuels for Cement and Lime Plants**

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Cement manufacturing is particularly energy-intensive. In order to reduce the use of expensive primary fuels like coal and oil, cement plant operators focus increasingly on Alternative Fuels and Raw materials (AFR).

For political reasons, Arab countries reduced their oil production, which caused oil prices to skyrocket. This was a very precarious situation, because crude oil was an important energy source, also for the cement industry to operate their rotary kilns. With this first oil crisis, plant operators started to shift towards using cost-effective fuels and raw materials.



The alternative fuels are conveyed from the storage to the main burner, low in noise and dust-proof. (Picture: ©Beumer Group GmbH & Co. KG)

Besides mineral waste that can be used as alternative raw material, the market primarily employs the use of fuel alternatives, because approx. 30 % of production costs are spent on energy. In addition to fluid alternative fuels, such as used oil or solvents, the majority of solid fuels consist of complete or shredded scrap tyres, scrap wood, or mixtures of plastic, paper, composite materials or textiles. After they have been treated and quality-controlled, they show calorific values similar to brown coal. The calorific value of scrap tyres is even comparable

to that of stone coal. When producing cement, it is also necessary to ensure that the quality of the ash residues matches the quality of the end product. As all material components are completely incorporated into the clinker and mineralised. Their use makes for an economic production process. In addition, primary raw and fuel supplies are conserved and landfill volume is reduced. Pre-treated secondary fuels are mostly supplied from external vendors, ready for incineration. [\*\*Beumer Group\*\*](#) now offers tailor-made AFR systems to lime and cement plants for the safe transport and storage of solid materials. Based on wide-ranging experiences and the customer's requirements, the systems comprise the entire chain, from receiving and unloading the delivery vehicle, up to storing, sampling, conveying and dosing solid alternative fuels. Beumer Group, provider of intralogistics, supplies its customers worldwide now with three systems, from one single source.

### **Tailored to every Application**





By using alternative fuels, the production process becomes more economical, and primary raw materials and fuels are conserved and landfill volume reduced.

Beumer Group's program includes the starter system that is used at the main burner. In the cement and limestone industry, primary fuels are usually ground to grain sizes of less than 100  $\mu$  and fed via the burner. At the end of the rotary kiln,

the burner heats up to 2000 °C, the temperature that is needed for limestone, sand, clay and ore to react and become clinker as an intermediate product. In order to use solid secondary fuels in the clinkering zone burner, they should deliver a calorific value that is at least similar to brown coal (ca.  $22 \pm 2$  MJ/kg), have grain sizes of less than 30 mm and burn out while being fed. The oven-ready material is usually delivered in moving-floor trailers. Beumer Group provides a docking station that also serves as storage on site. Once the trailer is emptied, it is completely replaced or refilled in the large tent using a wheel loader. The material is metered volumetrically and conveyed to the clinkering zone burner. This solution is deliberately designed as a test system. This way, the operator can test their suppliers, the quality of the fuels and their furnace behaviour.

### **Solution for the Calciner**



Fill level measuring probes and other measuring technology monitor the automated processes.

With the second system, the calciner can be fed with more coarse alternative fuels, such as tyre derived fuel or the fuels described above, but in a more coarse state. They are generally less processed, contain three-dimensional particles and therefore require more time to burn out than for example the more intensively



processed, exclusively two-dimensional secondary fuels for the main burner. The coarse calciner fuel is delivered in moving-floor trailers or tippers. The secondary fuels are quickly unloaded and stored temporarily in a dust-proof way. Another storage serves as a flow buffer, which can hold the overall capacity of 900 m<sup>3</sup> of the preceding bunker. From here, the pipe conveyor transports the material to the calciner in the preheater tower. Here, the secondary fuel is weighed and dosed. During the feed towards the hearth in the calciner, there is often the risk that the material or the conveying system can catch fire due to thermal radiation or pulsations. For this reason, the valveless special feed was developed, so the material can be safely fed to the calciner. In order to ensure safe and automatic fuel supply after successful testing, Beumer Group provides systems for permanent operation with high thermal substitution rates. The systems consist of the receiving area and a storage system, where the crane system can store material of different quality into different storage zones and boxes. Experiences so far have shown that one always has to calculate with disruptives or quality deficits in the fuel. This is why the entire storage and conveying technology in the hall can be provided with equipment that is able to separate metal, wet and three-dimensional disruptives from the fuel for the main burner and keep disrupting oversized grains from the calciner fuel. Equipped with the necessary sensor technology, the operation runs automatically. The crane can be used independently for homogenisation, in order to minimise quality variations or feed the lines towards the main burner and the calciner.

### **Pipe Conveyor stands the Test**

Schwenk Zement AG's product diversity and production capacity make their plant in Bernburg one of the largest and most efficient cement plants in Germany. In order to reduce energy costs, the cement plant is increasingly using secondary fuels that are engineered in external processing plants into high-quality fuels with defined product parameters. Until now, the manufacturer had been using drag chain conveyors. After almost a decade of use and numerous modifications however, more and more maintenance was required. The fuel quality also improved over time, so that, due to its density of 0.2 t/m<sup>3</sup>, the existing technology was no longer sufficient to convey the required quantities towards the main burner. This created the need for a reliable, eco-friendly and low-maintenance solution. In addition, the new conveyor needed to be optimally adapted to the curved routing in the plant. Schwenk Zement KG opted for the Beumer AFR system with its pipe Conveyor to feed the main burner with alternative fuels. The system works almost completely automatically, from receiving to the feeding system of the rotary kiln. Cranes pick up the engineered

secondary fuels in the storehouse and fill them into the discharge bunkers with their discharge equipment. From there, a chain belt conveyor transports the fuel continuously towards the pipe conveyor, which conveys it to the weigh feeders before the main burner. The curved pipe conveyor at the core of the system requires little maintenance and its enclosed design and quiet operation protect against emissions and the wind-blown dispersal of the fuel. It is able to connect long distances without interruption and navigate tight curve radii that adapt to the individual conditions of the plant.

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