SIZE ACTUALLY MATTERS FOR LIME KILN PRODUCTION

Selecting the right technology and machine size for fuel conveying, combustion air and air cooling systems to optimize fuel efficiency in the kiln for lime production plants

According to the data available from the USGS (U.S. Geological Survey), in 2018 the quicklime and hydrate lime market value in the Americas exceeds USD $3 Billion and an estimated of 32 million tons were produced in the region from over 120 production plants located from Canada to Argentina. The market growth expectations worldwide are about 7.5% and the Americas expects to reach a constant CAGR of 7% from 2018 to 2022 mainly driven by the need of improved processes in the mining industry, sugar cane market by the increase demand of biofuels and the industrialization for waste water treatment facilities in Latin American Countries. These good market expectations for the near future, require serious processes optimizations in the production facilities to look for the best fuel efficiency in the kiln process. The efficiency in the burning process is closely related to the availability of certain types of fuel and the proper selection of the fuel conveying, combustion air and cooling air technologies that includes low pressure oil free rotary lobe compressors and turbo blowers.

Kiln technologies

Currently in the limestone production processes, there are two main kiln technologies used, vertical kilns and rotary kiln systems. Both technologies required a large amount of low pressure oil free air for fuel conveying and cooling processes to guarantee the proper quality of the calcium oxide, according to an specific research on lime production process in the USA from RTI (Research Triangle Institute). Vertical kilns are the preferred technology for lime producers as they require less capital investment and the fuel efficiency is greater. However, in the U.S., vertical kilns have been largely replaced by rotary kiln systems mainly because they require less labor and have the highest output by reducing the amount of spalls. A summarized analysis of the two technologies is shown in Table 1.

Technology comparison	Vertical kilns	Rotary kiln systems
Capital Investment	Lower	Greater
Size of the rock	Larger	Smaller
Amount of cooling air	Lower	Greater
Fuel Efficiency	Greater	Lower
Amount of spalls in the process	Higher	Lower
Predominant fuels (Depends on country availability)	Natural gas/ Fuel oil	Coal/Pet Coke
Labor demand	Higher	Lower

Table 1. Vertical vs rotary kiln analysis, Aerzen. Source Lime production industry profile, RTI research

Air supply for the kiln

As shown in the Table 1, the amount of air required for both vertical and rotary kiln in the combustion process is large enough to consider it as a critical application for the production process. Aerzen application specialists have identified some common improving opportunities at different plant locations that involve the following main aspects:

- Selection of the machine that supplies the combustion air which leads to a lack of air to efficiently burn the fuel.
- Pipe diameters that supply the air for the cooling lances (Vertical kilns) resulting in a lack of air speed causing the lances to clog.
- Initial investment for the low pressure air compressors without considering the TCO for the project causing the reduction of MTBR and increasing the total operation costs in the midterm.

Figure 1. Aerzen Delta hybrid in a lime plant Source: Aerzen

Application specialists

Aerzen has a rich history of devising solutions that address key performance indicators in different production processes. Application specialists are trained to support end users and OEMs from the application per-spective by doing a technology analysis for blower, hy-brid or high speed turbo blower, always considering the best fit for a specific application, changing the perspective from a simple product offering to a complete solution supplier. To learn more about possible performance up-grades or to get in touch with a specialist who can facilitate a technical analysis of a proposed or existing lime plant, contact Aerzen's application sales team.
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