SEPARATION

# A PERFECT MATCH FOR SAVING ENERGY

## SLUDGE TREATMENT FOR CEMENT FACTORIES

ANDRITZ

ENGINEERED SUCCESS

# Commercial and environmental benefits

Incineration of sewage sludge in cement factories is gaining interest worldwide. In addition to the fact that municipalities can solve the problem of how to dispose of dewatered or dried sewage sludge, cement factories offer the perfect facility for the required sewage sludge treatment.

The dried sludge can be used as fuel and, depending on its content, it can replace a significant part of costly fossil fuels, such as coal. After being dried to >90% dry solids, sewage sludge normally shows calorific values of 10 to 12 MJ/kg.

The benefit of combining a sewage sludge drying installation and a cement factory is the perfect environment that a cement process offers for the sewage sludge drying line. Cement processes normally generate a lot of waste heat that can be used to operate the sewage sludge drying line. Hence, the sewage sludge drying installation does not require external heating sources, thus minimizing the thermal energy costs, which form the largest share of the operating costs for the drying lines installed in municipal WWTPs, for example. By using an ANDRITZ Gouda paddle dryer for the sludge drying line, the off-gas volumes are so small that they can easily be treated thermally in the cement process itself, eliminating any biological or other multi-stage filter for treating the off-gas. The condensate produced should either be discharged into the sewage system or it can be treated locally.

## INSTALLATION FEATURES

One essential requirement for treating sewage sludge in a cement factory is the flexibility of the sewage sludge drying system to cope with many different kinds of sewage sludge. Typically, cement factories take sludge from various stations, where the sludges may also have undergone different forms of pre-treatment. In other words, the sludge consistency at the intake of a cement factory varies much more than the sludge at only one wastewater treatment plant. Nevertheless, the sludge received by a cement factory is normally dewatered by means of a decanter, centrifuge, or belt filter press. After dewatering, the sludge typically has a dry solids content of approximately 18-25%, and sometimes up to 35% if lime stabilization has been applied, which is all very suitable for thermal treatment in an ANDRITZ Gouda paddle dryer. More and more sludges are digested before dewatering to generate biogas as a renewable energy. Even though the behavior of digested and undigested sludge can vary a lot, a sludge drying installation at a cement factory must be able to handle all types and mixes.

## NATURAL COMBINATION

By using heat exchangers, the waste heat from the cement factory is used to provide thermal oil with a temperature of 200 to 230 °C, which flows continuously through the jacket, the hollow shafts, and the paddles. Basically, there are two points from which the heat can be generated: outlet gas from the clinker cooler or outlet gas from the pre-heat column. The clinker cooler offers

Sludge drying

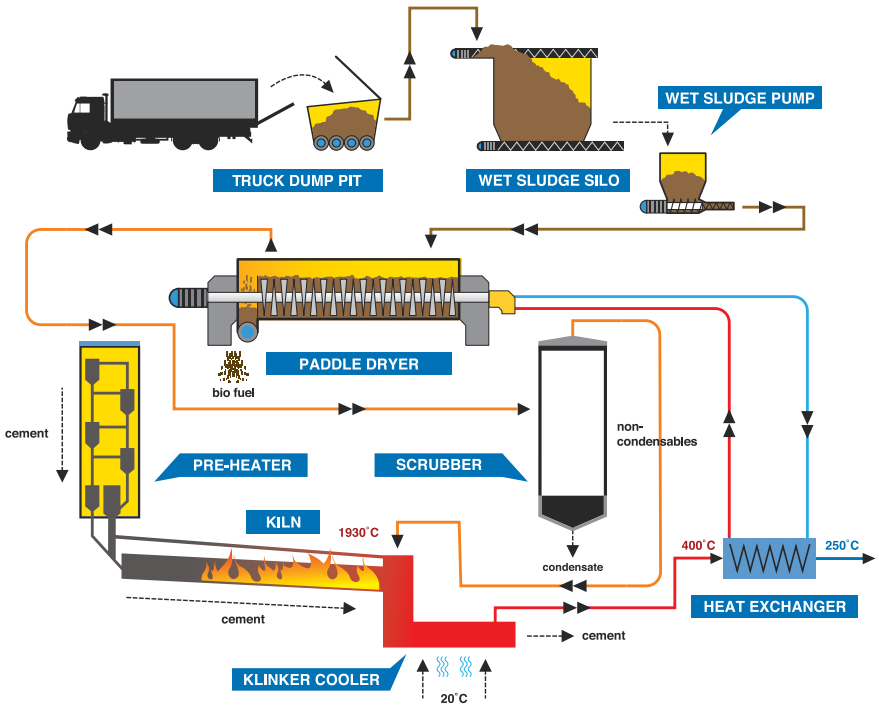
the benefit of an inert dust in the gas flow, while the outlet gas of the pre-heat column has the advantage of higher gas temperatures and greater heat availability, but the dust received will contain some fresh, "green" material. Systems to prevent the heat exchangers from fouling are available to deal with this situation.

Due to the indirect ("contact") concept of drying the sludge, the exhaust from the drying installation mainly consists of vapor and a very small amount of non-condensable gases. The vapor is normally condensed in a direct (spray-type) or indirect condenser (heat exchanger), and the condensate must be discharged back into the sewage or treated beforehand if necessary. The remaining non-condensables leave the condenser at the top and must be treated to prevent unpleasant odors. Due to the very small amount involved, they can easily be treated thermally in the cement process. Again, there are several options for injecting the non-condensables, for example at the cement kiln directly or at the calciner.

## THE HEART OF THE PROCESS

The heart of the installation is the ANDRITZ Gouda paddle dryer. It consists of a trough containing two counter-rotating shafts, arrayed with paddles. The sludge is fed in at one side and flows through the dryer while being agitated/mixed by the paddles on the shafts. The heat is transferred from the thermal oil/steam inside the trough jacket, the shafts, and the paddles through the metal wall into the sludge. This indirect heat transfer avoids air flows, while the fully enclosed operation enables safe treatment of the sludge due to the absence of oxygen.

The ANDRITZ Gouda paddle dryer does not require back-mixing to overcome the possible plastic phase of the sludge, occurring typically between 45 and 55% dry solids. Hence, the equipment needed to dry the sludge from 20% to >90% dry solids remains simple and is reduced to a minimum.




Sludge cement drying process

### YOUR BENEFITS

- Compact, safe, and simple
- Closed loop implementation
- No off-gasses to be treated
- Most flexible for all different sewage sludges
- Cost-efficient

## WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**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