

OPTIMIZING SLUDGE DEWATERING

Problem

Polymer dosing in the sludge dewatering process had been adjusted manually, leading to unstable dry solids (DS) content in the sludge feeding the CAMBI process, and an elevated polymer and antifoam consumption.

Solution

A real time control system was used to optimize the sludge dewatering process adapting the polymer dosing to the changing DS content of the incoming sludge.

Benefits

The system delivered dewatered sludge with a constant DS content. The polymer dosing was lowered by 40 %, the antifoam use was reduced by 75 %.

Initial situation / Background

At Bran Sands on Teesside, Northumbrian Water's site houses a regional sludge treatment centre and effluent treatment works. It is one of Northumbrian Water's largest sites, treating the majority of sludge in the North East – with drying and digestion capabilities. The sludge is processed using the CAMBI thermal hydrolysis digestion process.

The plant processes 40,000 tonnes of dry solids of indigenous and imported sewage sludge per year, and has a generating capacity of up to 4.7MW. Besides a reduction of carbon emissions, the process leads to huge reductions in consumption of biogas and imported electricity (90 % and 50 % respectively) and thus significantly saves on operating costs.

Upstream of the CAMBI process, the incoming sludge has to be dewatered to increase the DS content from ~ 2 % to 18 %. Sludge dewatering requires mixing the incoming sludge with a polymer solution prior to the actual dewatering step in a decanter centrifuge.

Adjusting the polymer dose had been done manually in the past, leading to high polymer consumption and subsequently a high anti-foam consumption to reduce the foam formation caused by an excess of polymer.

Hence the objective of the sludge dewatering optimization was to keep the DS content at the desired 18 % and to reduce the polymer consumption.



Fig 1: Bran Sands Wastewater Treatment

Site / Plant

- 1.0 Mio PE
- 40,000 t / a dewatered sludge

Benefits

- Constant DS content at desired 18 %
- Polymer dosing lowered by 40 %
- Reduction of antifoam use by 75 %
- Annual savings of £150k

Solution

Optimizing sludge dewatering requires the installation of a sensor measuring the DS content of the incoming sludge. The installed Solitax sc probe connected to a SC1000 controller provides the measurement value for the sludge dewatering real time controller (RTC-SD) which in turn controls the polymer pump. The RTC-SD module adjusts the polymer dose according to the DS content of the incoming sludge.

Improvements

The previous unstable DS content is now stable at the desired 18 % while at the same time reducing the polymer and antifoam usage by 40 % and 75 % respectively.

The achieved reduction in raw material consumption led to annual savings of more than £150k leading to a payback period of less than two months for the investment.

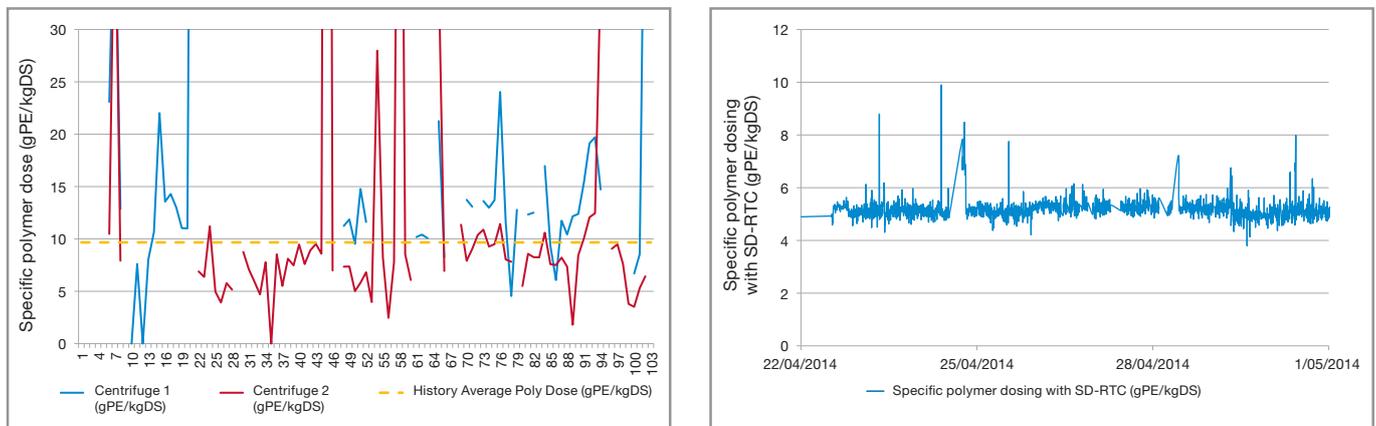


Fig. 2: Left diagram, before optimization: Very large variations in polymer dose rates leading to unsatisfactory cake quality (under dosing) and antifoam requirement due to overdosing. Right diagram, after optimization: Very stable polymer dose rates – Average 5.2 g polymer / kg DS.