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Energy-efficient sewage sludge drying at Innsbruck with HUBER Belt Dryer BT



Fig. 1: HUBER Belt Dryer BT 16 with condensation stage, two-temperature zone dryer with 90 °C and 140 °C supply temperature

Innsbrucker Kommunalbetriebe AG (IKB) invest into a HUBER Belt Dryer BT 16. With its strategy “ **from sewage works to power plant**”, IKB’s wastewater treatment plant Innsbruck sustainably produces energy and intelligently integrates it into its existing system. The aim is to further increase the efficiency of the complete sewage treatment works and make it one of the most modern plants in Europe.

With its about 130,000 inhabitants, Innsbruck, the capital of Tyrol, is the fifth largest city of Austria and produces 50,000 m³ wastewater a day (peak: 145,000 m³) together with its 14 neighbouring municipalities. This wastewater is treated on the modern sewage treatment works. Two HUBER Belt Thickener DrainBelt 2.0 units produce approximately 320 m³ thin sludge with 6% to 7% DR per day. Approximately 70 m³ biowaste a day are mixed into the generated thin sludge. The biogas yield of the digesters on the STW increases through co-fermentation. The digesters produce on average approximately 9,000 m³ gas a day. Most part of the gas is used to produce electricity in two block heat and power plants. The exhaust heat generated by motor cooling with a supply temperature of 90 °C is utilised in the medium-temperature range operation of the belt dryer. The rest of the biogas is used in a 1,800 kW hot water boiler for heat production with a temperature level of 140 °C. HUBER implemented in this project a tailor-made two-temperature zone dryer that is operated with both medium-temperature energy from the block heat and power plants and high-temperature energy from the hot water boiler.

Modified dryer design for limited available space

HUBER modified its belt dryer so that it could be integrated into the existing former sludge dewatering structure: A height reduction of the standard size dryer ensured that the headroom requirements for passage above the dryer were met. The given dimensions of the structure also limited the dryer length. The thermal energy inside the belt dryer therefore had to be distributed to ensure a water evaporation of 2,000 kg/h despite the reduced dryer length.

Customised heat concept

HUBER planned and designed for IKB a dryer that is tailored to their needs and requirements on this WWTP. In addition to the 330 kW exhaust heat from their existing block heat and power plants, the biogas is efficiently utilised for the production of thermal energy in a high-temperature boiler. Reliable operation of the drying plant even during maintenance and inspection of the block heat and power



Figure 2: Condensation stage with heat extraction for the on-site heating system and external heat supply

plants is guaranteed as the dryer is equipped with an additional heat exchanger that makes it possible to transfer the high temperature heat to the medium temperature range operation. In the event of failures or when maintenance and inspection work is carried out on the block heat and power plants, the dryer changes fully automatically to pure high-temperature operation. This further increases the dryer's operating hours and ensures that the sludge volume to be dried is processed reliably.

The positive energy balance of this IKB's sewage treatment works is further improved with the operation of the HUBER Belt Dryer BT 16. An additional finned heat exchanger upstream of the condensation stage extracts more than 400 kW thermal power on a temperature level of 70 °C and feeds it to the on-site heating system. The excess heat is fed to a district heating grid to which the indoor swimming pool of the former Olympic Village and a nearby lake restaurant are connected. A cleaning system developed by HUBER is used to periodically clean the heat exchanger fully automatically and during active operation to permanently guarantee the extracted thermal energy.

Intelligent HUBER throughput control

The feed pump of the belt dryer is fed by six HUBER Screw Press units with a constant inlet DR of 25%. The screw presses, sludge pump and belt dryer form one process unit on this STW. The control systems of these components communicate via direct connection. The intelligent HUBER throughput control system is able to detect even minor variations in the outlet DR of the screw presses already before dryer feeding, for example seasonal variations due to the biowaste. The throughput control system balances even differences as small as $\pm 0.5\%$ DR by DR-dependent reduction or increase of the dryer throughput. This ensures a constant water evaporation and thus constantly maximum plant efficiency.

Of course, the dryer can optionally be operated with a lower throughput according to the volume of sludge generated in the sewage treatment process. The dryer fully automatically reacts flexibly and efficiently to varying requirements.

Maximum energy efficiency



Fig. 3: HUBER pelletiser for a uniform sludge feed, covered by a roller blind for exhaust air reduction

The HUBER Belt Dryer BT 16 at Innsbruck positively contributes to achieving climate protection goals. Both thermal and electrical energy supply are achieved by means of regenerative energy in the form of biogas from co-fermentation. Additionally, approximately 400 t CO₂ a year can be saved due to 450 fewer truck transports that were necessary before. Convincing is the remarkably low energy consumption of the Belt Dryer BT 16 with a maximum thermal energy consumption of 0.8 kWh per kg water evaporation and an electrical energy consumption of below 0.0375 kWh per kg water evaporation. These values set new standards in the field of belt dryers.

Time management and project schedule

We were faced with a tight schedule at any time during this project. The contract was signed at the end of 2016, the installation work on site started already in mid May 2017, and commissioning took place at the beginning of August. The dryer with its many innovations was planned, built, installed and commissioned within eight months (from the date of order placement). After a successful test operation phase with a convincing performance test, the plant was handed over to IKB in December 2017.

Facts and figures:

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|---------------------------|---|
| Site: | Innsbruck, Austria |
| Size: | HUBER Belt Dryer BT 16 with two temperature zones |
| Dryer length: | 19 m |
| Water evaporation: | 2000 kg/h |
| Throughput: | 21,176 t/a (2,647 kg/h) |
| Operating time: | 8,000 h/a |
| Drying efficiency: | from 22% DR to 90% DR |
| Heat sources: | medium temperature source: biogas block heat and power plant with 90 °C high temperature source: biogas block heat and power plant with 140 °C |

Related Products:

- [HUBER Belt Dryer BT](#)

Related Solutions:

■ **Medium-Temperature Belt Dryers**

HUBER CS spol. s r.o.

Sídlo společnosti
Cihlářská 19
602 00 Brno
Česká Republika

Tel.: 532 191 545
Fax: 532 191 575

Email: info@hubercs.cz
Internet: www.hubercs.cz

Member of the HUBER group:
www.huber.de
