SEEPEX.
An Ingersoll Rand Business

COST SAVINGS FOR THE KROMBACHER BREWERY

APPLICATION DETAILS

- Spent grain with a 80% moisture content in the brewing process
- 30 meter conveying distance (12 vertical, 18 horizontal)
- Conveying capacity: up to 15 m³/h

KEY SPECIFICATIONS

- Efficient conveying with lower energy consumption
- Almost complete elimination of compressed air supply
- On-site service and monitoring, including cloud connectivity
- Retrofit into existing structures

BACKGROUND

Krombacher Brauerei Bernhard Schadeberg GmbH & Co. KG operates the family-owned Krombacher brewery and brand. The brewery's output amounted to 5,756 million hectoliters of beer in 2022, making Krombacher one of the 10 largest beer producers in Germany.

In the beer manufacturing process, wet spent grain refers to the leftover residue from crushed grains. This spent grain comes directly from the heated lauter tun after the wort has been extracted for further processing. Typically, breweries, including Krombacher, repurpose this spent grain as animal feed.

At Krombacher, a pneumatic conveyor was used to convey the highly viscous spent grain with a moisture content of 80% to a silo located in the building. The system consisted of a screw conveyor inside a hopper that fed the spent grain into a pipeline before being pneumatically conveyed to the silo by continuous injections of compressed air.

TASK

Utilizing compressed air as a medium for pneumatically conveying fluids proves to be particularly expensive due to the inefficiency of compressors. In its brewing lines, Krombacher identified massive potential for energy savings in the pneumatic conveying system that removed spent grain. To address this, the brewery searched for a new system to deliver high energy savings. The primary objective was to minimize air consumption, presenting the challenge of redesigning the existing system. Additionally, plant operators placed a high priority on plant availability for maintenance and service.

COST SAVINGS

OPERATING COSTS OF APPROX. €55,000 REDUCED TO €5,000 = **€50,000 SAVED PER YEAR**

SEEPEX PRODUCTS

- SEEPEX pump system, TVES 70-12E (18.5 KW)
- SEEPEX Pump Monitoring incl. Connected Services
- SEEPEX maintenance and service contract

SOLUTION

Thanks to their contact with SEEPEX, the plant operators were aware of the benefits of the energy-efficient Smart Air Injection (SAI) system and SEEPEX Pump Monitoring. With SAI, the potential for compressed air reduction lies in the discontinuous pumping method. This enables pneumatic dense phase conveying, i.e. pulsed pneumatic conveying of spent grain plugs in the pipeline. Due to the much less frequent and shorter air injections, compressed air consumption can be greatly reduced. After extensive consultation and a comprehensive review of the specific plant conditions, SEEPEX experts set out to develop a solution perfectly tailored to the plant. The focus was on modifying the existing system, along with adding in Pump Monitoring and the associated SEEPEX maintenance services. SEEPEX was awarded the contract for supply and installation. The delivery and installation were completed within 5 months.

The custom pump system was integrated into the existing plant using the installed compressed air system. The original screw conveyor was replaced with a 5 m SEEPEX coupling rod and screw conveyor. The pump elements were mounted on the existing hopper. A TVES 70-12E series pump with 18.5 kW drive power was installed and connected to the existing 30 m pipeline to handle the 15 m³/h of spent grain.


OLD SYSTEM

NEW SYSTEM

Top left: Pneumatic conveyor at Krombacher. *Top right:* Transport to the silo inside the building. *Bottom*: New installation with the SEEPEX system.

The SEEPEX system in action

During operation, it was discovered that the spent grain could be conveyed to the silo in the 30 m long pipeline at approx. 4-5 bar without compressed air. This has completely eliminated the use of compressed air for conveying. Compressed air is now only used for cleaning purposes.

Based on on-site measurements, the air consumption of approximately 1,400 Nm³/h (brewing line 4) was reduced by almost 100% by adjusting the continuous injection of compressed air. This resulted in a 95% reduction in energy costs.

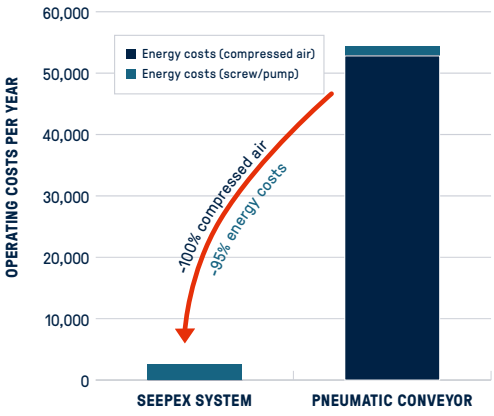
SEEPEX Pump Monitoring

In addition to SAI, SEEPEX Pump Monitoring and SEEPEX Connected Services were installed. The Pump Monitoring system monitors the condition of the pump and tracks capacity, pressure and temperature data through its sensors. With this asset management system, the maintenance manager is always aware of the pump's performance and can take preventive action.

SEEPEX Connected Services is a cloud-based platform for managing all equipment, especially progressive cavity pumps. It serves as the single point of entry for everything related to the SEEPEX pump. The platform offers various modules such as maintenance management, spare parts management, document management and online condition monitoring, all which help to protect the pump components, predict wear and optimize pump operation. For example, safeguarding the pump compoments means preventing a high number of start-stop cycles that can negatively impact performance. The system can also be used to record energy utilization or determine energy consumption.

BENEFITS

- Compressed air savings
- Energy savings
- Retrofit into the existing structures and adaptation to the existing situation on site



Approximate division of annual average operating costs. Electricity prices from the end of 2021.