

COST-EFFICIENT SPENT GRAIN TRANSPORT

APPLICATION DATA

- Malt spent grain, 78 % moisture content
 - Transport distance: 54 meter
 - 20 meter vertical elevation
 - Conveying capacity: 14 tons per hour
 - 2 parallel brewing lines
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KEY SPECIFICATIONS

- Maintain in Place
- Pump conveying supported by short, controlled air pulses

BACKGROUND

In a large southern Germany brewery, approx. 2 million hectoliters of beer, “liquid gold”, are produced annually. During the brewing process, malt and hop spent grain are produced and the aqueous spent grain is transferred directly from the mash tun to the mash filter. It is brought up to a moisture content of approx. 78 % and then falls from the mash filter into a large funnel where temperatures are around 55 – 65 °C. After being transported 54 meters to a silo 20 meters higher up, the spent grain is then picked up by trucks several times a day to be used as animal feed.

For the transport of the large quantities of spent grain between the hopper and silo, an expeller unit consisting of an integrated screw conveyor with subsequent pneumatic lean phase conveying is used. This PONNDORF system used a continuous supply of compressed air to “blow” the spent grain, resulting in high energy consumption and high energy costs.

TASK

The almost continuous supply of compressed air for the PONNDORF wet spent grain conveying system amounted to 160 Nm³/h and generated costs of almost €13,000 per year. Additionally, the screw conveyor consumed about 4.5 kW of electricity. This energy requirement added up to additional energy costs of €4,100 per year. Thus the brewery had to bear enormous energy costs of more than €17,000 annually – a major cost disadvantage in the highly competitive beer market.

After seeing a press article from the IFAT trade show in Munich, the brewery contacted SEEPEX to learn more about our system solution, Smart Air Injection (SAI). Originally designed to transport dewatered sludge, the energy-efficient and cost-effective SAI system will now also significantly reduce operating costs for spent grain transport in Munich.

SOLUTION

The screw conveyor was replaced by a SEEPEX progressive cavity pump including hopper, which was seamlessly integrated into the existing plant. SAI’s short, compressed air pulses along with its logic for controlled “plug conveying”, fundamentally changed the way the grain was pneumatically conveyed. Unlike with the PONNDORF system, the spent grain is no longer “blown” with compressed air: for SAI the pump first fills the discharge line with plugs of spent grain, which are subsequently transported by means of short compressed air injections. The air valve is only opened around every 4 minutes when an optimum plug length of approx. 35 m is reached. The pressure level in the conveying line remains permanently below 5 bar.

ENERGY SAVINGS

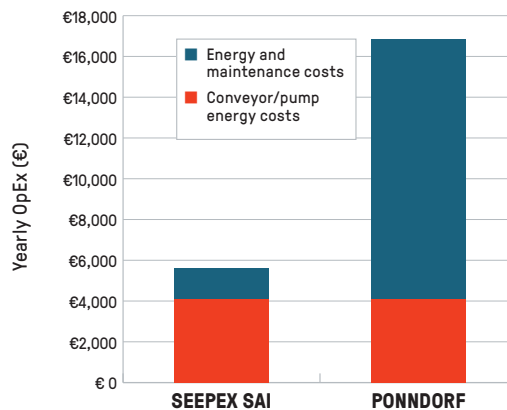
COST SAVINGS

**OPEX SAVINGS OF
€11,000 PER YEAR**

SEEPEX PRODUCTS

Smart Air Injection system:
BTHE 70-6LS (7.5 kW),
SAI controller

The energy costs were reduced sustainably with SAI. Due to the short and targeted use of compressed air, only about 20 Nm³/h is required for pneumatic conveying. With similar energy costs for pump operation, SAI particularly stood out in terms of low compressed air consumption. The brewers from Munich were able to reduce their air and energy consumption by more than €11,000 annually.



Graph shows overall cost savings between SAI and PONNDORF system.

As an additional advantage, the wear in the pipeline has been significantly reduced since the flow velocity is 5 times lower with plug conveyance compared to the PONNDORF conveyance. Finally, even the spent grain process is more stable, as possible fluctuations in the moisture content of the spent grain has no influence on the conveying characteristics of the progressive cavity pump and the times for spent grain removal remain constant – around 35 min for 8 tons of spent grain per brew.

SAI really distinguished itself here and will contribute to Munich's ability to brew tasty and inexpensive beer.



BENEFITS

- Low energy consumption
- Efficient processes due to shorter mash out times
- Increased lifetime of pipeline components