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Compressed-air drying with heat recovery

Industry:	Food & Beverage
Customer/Location/Year:	Meggle, Wasserburg (Germany), 2015
Use of compressed air:	Conveyor air, process air
Installed products:	EVERDRY

Large amounts of heat energy accumulate in hot-regenerating adsorption dryers, which use the compression heat (HOC) from compression for desorption of the desiccant. The Meggle Wasserburg GmbH & Co. KG dairy has illustrated how this can be meaningfully utilized for production processes in the foodstuff industry.

Meggle herb butter is a household name for many barbecue fans and there is hardly a hotel guest who has not ever enjoyed the small Meggle butter portions from the breakfast buffet. At the head office in Wasserburg, Bavaria, less than an hour to the East of Munich, the wholesale dairy company concentrates in butter production and butter specialities, convenience products for the end consumer as well as market-oriented products for the catering industry. The product range of the more than 125 year old family managed business therefore comprises the entire range of modern dairy products: From butter to milk by-products up to, and including, cheese, every "gourmeggle" will find something to suit their taste.

What most people may not probably realize is that Meggle is also simultaneously a leading global supplier of lactose for the foodstuff and pharmaceutical industries. Functional dry products for the foodstuff, pharmaceutical and animal feed industries form the



second core element of the company. For example, Meggle pharmaceutical lactose is an indispensable carrier substance for many medicines today. It reacts in the human organism as absolutely neutral and does not cause any unwanted interactions with other substances in the medicine.

Dairy with its own power plant

Milk processing is already recognized as an energy-intensive business, lactose production from whey makes it even more so. Millions and millions of liters of liquid have to be evaporated for this every year. This is where Meggle's power plant come into play, as it provides steam, heat, electric-



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ity and compressed air for the dairy. 24 hours a day, seven days a week, 52 weeks a year, a combined gas and steam power plant comprising, gas turbine, steam generator, steam turbine and compressor operate in order to satisfy the constant demand for energy in production. Its capacity and output could effortlessly supply a whole town with heat and electricity - with an efficiency that a utility company could only dream of. Backup systems and supply routes ensure the greatest possible production safety.

The technical staff at Meggle knows that any gain in efficiency for their energy requirement is immediately reflected in cash terms. Therefore, Meggle has already been relying on combined heat and power generation since the 1950s. The dairy has operated its own, highly efficient combined gas and steam turbine power plant since 2000.

Large compressed air requirement

It goes without saying that compressed air will also be the focus of his attention, as it is by far the most expensive energy source at the location, as he also emphasizes. Considering a demand of more than 40 million m³ per year, it is definitely worth taking a closer look at. The average consumption is between 3,500 and 5,000 m³/h, in peak periods it can also swell up to 6,000 m³/h or 7,000 m³/h. A total of five oil-free compressing compressors with a superordinate, demand-regulated control system provides an energy-optimized operating pressure of 7 bar.

Decisive for the production processes is the quality of the compressed air utilized, because it has direct product contact. Downstream activated carbon filters additionally protect the lactose against contaminants from the intake air to ensure oil-free compression. One other requirement for the compressed air is also absolutely crucial: It has to be dry, and so dry that safe and reliable conveying of the powdered lactose products in silos is possible always. Without sticking, without lump formation and without encrustations in the pipework. The cycle-shuffle conveyors utilized for this operates with an operating overpressure of 6 bar, otherwise at 3 bar. A guaranteed pressure dew point of -20 °C is therefore mandatory.

Efficient compressed-air drying

Up to now, two conventional adsorption dryers with 1,800 and 5,600 m³ respectively have been used for compressed-air drying at Meggle. However, in order to increase the existing energy-saving potential with the compressed-air drying, Meggle decided to invest in a heat-regenerating adsorption dryer of the EVERDRY series after extensive consultation with BEKO TECHNOLOGIES, where not only the compression heat of the compressors is utilized for desorption, rather that heat recovery is also possible.

After an in-depth analysis with regard to the requirements and operating conditions, an EVERDRY HOC-F 8000 C was identified as the ideal solution for the demanding task at Meggle. The heat-regenerating adsorption dryer guarantees a pressure dew point below -25 °C, operates as fully automatic and is designed for continuous operation. The desorption of the saturated desiccant is executed in full flow by utilizing the compression heat. With an inlet volume flow rate of at least 3,000 m³/h and a maximum of 8,000 m³/h, it also provides reserves in terms of the demand that is typical for Meggle.

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Concept for heat recovery

Meggle quickly identified that the heat generated in the drying process can still be meaningfully used even more. BEKO TECHNOLOGIES gladly accepted this suggestion and, in addition to the dryer, developed a heat recovery concept tailor-made for Meggle to additionally increase the efficiency of the plant.

The EVERDRY adsorption dryer was therefore supplemented with an additional cooling water circuit and heat exchanger. Depending on the operating stage and work load of the adsorption dryer, a heat output of up to 400 kW can be made available from the drying process. The energy gained is utilized to preheat the boiler feed water in the desalination plant and for hot water processing

Joint customization during installation

BEKO TECHNOLOGIES was also able to fully exploit its versatility and team spirit during the installation and commissioning. EVERDRY plants are usually completely assembled, fitted with piping and cables and inspected at the factory and then delivered to the customer as a plug-and-play solution. As the EVERDRY adsorption dryer for Meggle could not exceed a certain height for insertion into the power plant building, the technical service of BEKO TECHNOLOGIES assembled the overhead positioned pipework on site. Meggle contributed with an extremely low-lying conveyor framework so that the door of the power plant building could be successfully passed through in joint precision work.

Everything was well thought out for long-term operation right from the start. Meggle factory standards always stipulate very precise standards for electro-technical and mechanical components so that factory maintenance can react quickly in the event of a malfunction and take advantage of their well-stocked spare parts warehouse. This requirement was self-explanatory for BEKO TECHNOLOGIES.

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