

## CASE STUDY

### Cosmetics industry



**Ultima compressor: Compressed air goes digital for Schwan Cosmetics**

## Flawless compressed air for decorative cosmetics

Family business Schwan Cosmetics has been developing and producing cosmetic pencils since 1927. Today the company, a wholly-owned subsidiary of international family business Schwan-STABILO, is a global market leader and a reliable partner to almost all internationally renowned cosmetic companies. Production of items ranging from wood-cased eyebrow pencils, kohl, and liquid eyeliners, to mechanical lip liners and lipsticks, calls for absolutely pure and dry compressed air for the machines and systems at the 17,000 m<sup>2</sup> production facilities in Heroldsberg near Nuremberg, Germany.

### The application in detail

Production of decorative cosmetics is a sensitive process and as such only oil-free compressors can be used to generate the essential compressed air. In 2017, a decision was made to replace the existing, almost 16-year-old screw compressor for economic and energy optimisation reasons. The list of

### Project overview

- ▶ **User**  
Schwan Cosmetics International GmbH,  
Schwanweg 1, 90562 Heroldsberg, Germany
- ▶ **Application**  
Oil-free compressed air for the production  
of cosmetics
- ▶ **Products used**
  - Oil-free Ultima U160 compressor
  - HOC desiccant dryer
- ▶ **Customer benefits**
  - 100% oil-free compressed air = 100% sterile production guaranteed
  - Efficiency increased by up to 13%
  - Whisper-quiet = max. 69 dB(A)
  - Up to 45% less energy required during idling
  - 37% less space required = potential for expansion in confined equipment room
  - Constant pressure dew point of -40°C without external energy input
  - And much more ...

requirements for the new compressor technology was long: Oil-free (absolutely essential), two-stage compression, water-cooling, high efficiency even under partial load, gearless frequency-controlled direct drive for the airends, compact dimensions and a noise level below 70 dBA.



Schwan Cosmetics International GmbH develops and produces cosmetics ranging from wood-cased eyebrow pencils, kohl, and liquid eyeliners, to mechanical lip liners and lipsticks.

After carefully researching the market, Gerhard Bottner, Head of Mechanical Plant Maintenance, came to the conclusion that only one compressor technology could fulfil these requirements – and that was the Ultima. “When we made the decision to invest in a new compressor to replace the previous 160 kW device, we wanted to take a step forwards. The Ultima from CompAir is the only compressor on the market where the low pressure and high pressure airends are driven and controlled separately without being connected by a gearbox. We see this as a benefit because we can achieve significantly higher efficiency levels in the intermediate and partial load range. The separate drive ensures that both compression airends are always running at optimum speed, even when there are fluctuating load requirements. The limited space in the equipment room posed an additional challenge, but with its compact frame size, the Ultima fits perfectly into the available space, with room to spare for expansion.”

To dry the moist compressed air, a HOC (Heat Of Compression) desiccant dryer (left) is used. This uses nearly all the waste heat from the compressor to regenerate the desiccant.

## Digital gearbox

All this is made possible by a digital gearbox. Conventional two-stage compressors reach the required speeds of up to 22,000 rpm with a heavy-duty high-performance gearbox, driven by a motor. This design is heavier, larger and less efficient in comparison to the Ultima, where each airend is driven directly by a variable-speed motor with up to 16,000 rpm (1st airend) or 22,000 rpm (2nd airend). The Ultima's intelligent control system monitors and continuously adjusts the speeds of both drives, ensuring a high level of efficiency and the required compression ratios. The efficiency of the two high-speed permanent magnet motors even exceeds the requirements of the strictest existing standard, the IE4.

In practice, this combination of highly-efficient motors and a digital gearbox results in a reduction in energy consumption – for identical outputs.

Steffen Schneider, an employee in the mechanical plant maintenance department who is responsible for looking after the compressed air systems, is particularly proud of the stability of the compressed air network, which is supplied with 50 m<sup>3</sup>/min at its peak: “We don't need the usual 8 bar pressure. A stable 7 bar is now sufficient for supplying our systems and controllers. This considerably reduces the compressor's energy consumption, and the new Ultima compressor with frequency-controlled drives, supplies us with exactly the volume flow we need at this pressure level for the varying demand during three-shift operation. Our requirement for 100% “CLASS ZERO” oil-free compressed air according to



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ISO 8573-1 rules out contamination with oil during the Ultima compression process. This was certified by CompAir Gardner Denver following independent testing by TÜV Rheinland for this series."

#### Compressed air treatment

Even oil-free compressors require reliable treatment technology for this type of sensitive production process. To dry the moist compressed air, a HOC (Heat Of Compression) desiccant dryer is used. This uses the waste heat from the compressor to regenerate the desiccant. An efficient solution, easily implemented with the Ultima technology, was developed to reduce the energy consumption of the dryer, except for the power supply for several control valves, to virtually zero: Part of the airflow heated to around 160°C by the compression is used to regenerate the desiccant before re-joining the main flow again.

Gerhard Bottner: "This treatment technology enables us to reach a constant pressure dew point of -40°C without external energy input. This prevents microorganism formation in the branched compressed air network throughout the entire year."

Schwan Cosmetics have always relied on compressor water cooling to ensure optimum heat balance for the compressed air generation. The Ultima features a closed

Despite the limited space in the equipment room, the Ultima's compact dimensions leave enough room for the addition of another Ultima compressor, as planned.



From left to right: Gerhard Bottner and Steffen Schneider, Mechanical Plant Maintenance at Schwan Cosmetics: The Ultima impresses with its low noise level of 69 dBA, low energy consumption and compact size.

water cooling circuit which dissipates heat wherever it arises – on the motors, the inverters and the compressor blocks. The Ultima's clever heat system also transfers the radiant heat from the individual components to the water cooling circuit, so only 2% of the power dissipates into the equipment room as heat, eliminating the need for a supply and exhaust system. This excellent heat balance also means that Ultima machines can be installed close to one another with minimum clearance.

Steffen Schneider: "We have optimised the systems so that the heat energy flows into the regeneration and drying process of the HOC desiccant dryer. The heat exchanger, equipped with modern, energy-saving EC technology on its roof, ensures that the cooling water supply temperature is very low. A speed-regulated pump adjusts the water flow exactly as required. Gerhard Bottner adds: "We believe that compressor water cooling is best for us, since air cooling requires large amounts of fresh air and an extensive airflow system. And despite filtration, you cannot entirely avoid ingress of dirt. Water cooling is the cleanest solution."

#### What's next?

What does Schwan Cosmetics have planned for its compressed air supply? The two old screw compressors are used as redundant machines and a second Ultima will be added in just a few months time.