Glues, dyes and fragrances

Words: Anne-Katrin Wehrmann | Pictures: Andreas Burmann, Follmann Chemie

Tags/Keywords

Follmann Chemie is probably not a familiar name to many people, and yet almost everybody is likely to have come into contact with one product or another made by the family business in Minden. Every third serviette in Europe is printed with inks made by Follmann and innumerable items of furniture are held together by the glue produced here. Follmann's sister company Triflex also produces sealants for protecting rooves, balconies and multistorey car parks, and contributes to greater safety on the roads with its marking systems. All of that requires energy – part of which is now supplied by two combined heat and power plants supplied by MTU Onsite Energy.

It all started from small beginnings when Heinrich Follmann and his son Dr. Rainer Follmann established what remains a proprietor-led company at the northern edge of eastern Westphalia initially specializing in products for the building industry. Today the Follmann Group comprising the parent company, Follmann Chemie, and the two development and sales subsidiaries, Follmann and Triflex, employs a total of 600 people worldwide, of whom 460 work at the Minden facility. Be it printing inks for serviettes, plastisols for wallpaper compositions or wood and paper adhesives, Follmann's core skill is in special

chemicals for decorative and functional design of surfaces and joints. In the six product groups of printing inks, wallpaper coatings, functional coatings, micro-encapsulation, adhesives and contract production, the chemical specialist now works with a total of 5,500 different formulations which are constantly enhanced and optimized.

The factory site extending to nearly 100,000 sq m in total and located directly adjacent to the Minden river port right by the Mittelland Canal and the River Weser has undergone various expansion phases since it was first established. In recent years, for example, the rapid growth of the company has given rise to the construction of a new warehouse and logistics center and the inauguration of a new research and communications center. Overall output has continually increased and reached a provisional peak in 2014 of 60,000 t. Higher output demands more energy. Short and sweet, that is the essential reason why the company ultimately opted for combined heat, cooling and power generation. "Our demand for steam, which we need for heating in certain production processes, has grown," explains Ralf Lücke, Technology Department Manager. "Added to that was the rise in energy prices – so we decided to cover some of our basic demand for steam, electricity, heat and cooling by generating our own." The result is a shiny new energy station centered around two natural-gas fueled, heat-led combined heat and power (CHP) modules supplied by MTU Onsite Energy using Series 400 engines.

Fragrantly scented micro-capsules

On a tour of the site it is noticeable that the smell in the air is remarkably neutral for a chemical facility. Outside there is almost no discernible odor and even inside the production buildings only a very understated aroma. In one of the units, it even smells very pleasantly of washing powder. This is where fragrances and other active ingredients are "packed" in microscopic capsules. Such micro-encapsulation is one of Follmann's high-tech specializations – measuring only 6 to 8 micrometers across, the micro-capsules are designed to make advertisements, mail shots or packaging smell nice in order to increase the sales of the products promoted. The active ingredients are released by physical action such as friction or pressure by the consumer. The capsules are also used in detergents, cleaners and cosmetics as well as in technical applications.

Not far away in Units 42 to 44, a total of 47 different adhesives and binding agents are produced in what is known as the polymerization process. This is where the largest part of the steam produced by the CHP modules is used. To initiate the chemical reaction for polymerization, the raw materials first have to be heated by means of steam. In the case of adhesives, for instance, the production process starts with the creation of a preparatory solution consisting of water, defoamer and polyvinyl alcohol in a stainless steel container. When ready, the preparatory solution is pumped into a double-walled reactor where it is heated to the specified starting temperature before the additives and raw materials required for the reaction are introduced. Essentially, it is a case of turning monomers (small, highly reactive molecules)

into polymers, i.e. long-chain compounds that ultimately form the basis for the adhesive. The reaction itself is exothermic, which means it releases energy. Therefore, the end product has to be cooled again afterwards, which is where the cooling function of the energy plant comes in. All in all, it takes around five to eight hours from the start of the process to completion of polymerization.

Europe's biggest washing machine

The new high-pressure steam boiler system installed in the energy station directly adjacent to the two MTU CHP modules, and supplied partly by recovered heat from their exhausts, can produce up to 3,500 kg of steam an hour. A smaller boiler system with a capacity of 1,000 kg/h is on standby for backup in an emergency. The old and now decommissioned steam generator managed only 2,000 kg/h – too little for present production at Follmann, which now demands 2,500 kg/h at peak periods. The second steam consumer alongside the polymerization reactors is a cleaning plant – "the biggest washing machine in Europe" according to Ralf Lücke. Here the steam is used to heat a 3-m high washer drum that restores the used production containers and receptacles to gleaming cleanliness using a cleaning solution. "The two heat and power plants help to ensure that the steam we need is always available," recounts Lücke, who has been with the company since 1996. "The new system allows us to produce better-quality steam, which ultimately increases the efficiency of the production processes."

While the recovered heat from the CHP module exhausts is used to make steam, the heat from the engines is used to produce hot water for heating some of the buildings and industrial units on the factory site. The slightly larger of the two CHP modules has an electrical output of 357 kW and produces 288 kW of thermal energy just from the engine's cooling system (making of total of 529 kW together with the recovered heat from the exhaust), resulting in an overall efficiency of 89.8%. The other MTU energy plant generates 240 kW of electricity, has a thermal output of 220 kW from the engine's cooling system (making of total of 370 kW together with the recovered heat from the exhaust) and an overall efficiency of 91.1%. All of the electricity and heat is used for the chemical plant's own requirements. The peak electricity demand at Follmann is 1.8 MW, which means that at certain times two thirds of the requirements have to be supplied from the mains power grid. And where steam and water for heating are concerned as well, only a proportion of the overall demand is supplied by the two CHP modules. "We have retained separate supplementary natural gas firing," explains Lücke. So the steam boiler system is designed as a five-channel boiler in which two channels are fed by the exhaust from the two CHP modules and the other three are fired by natural gas.

Building block for the future

From the earliest beginnings of the company, environmental awareness in their actions and responsible use of natural resources have been high on its list of priorities. And the construction of the energy plant fits perfectly with that philosophy. The installation reduces carbon dioxide emission by 40% and is seen as another building block in the process of future-proofing the Follmann Group. The purpose-built generator block measuring roughly 30 m in length and 15 m across houses not only the CHP modules and steam boiler systems but also two thermal stores (one for heat and one for cold) and an absorption chiller. The latter uses thermal energy to create process chilling capacity for cooling the polymerization reactors. As the heat generated by the modular CHP plants can be completely utilized, the energy station is highly efficient and achieves an overall efficiency of more than 80%.

"The two CHP modules are an important part of our sustainability strategy," emphasizes Ralf Lücke.The 43-year-old process engineering graduate is grateful that MTU Onsite Energy was able to complete the installation very quickly. From the time construction work started on the energy station in March 2014 there were only a few months in which to complete the CHP plants in time before Germany's new Renewable Energy Act (EEG) came into force on August 1, 2014. The challenge was successfully overcome, meaning that the electricity produced for the chemical facility's own requirements is now exempt from the renewable energy duty under the new legislation. The energy station finally started service as a complete system in December 2014. "Both initial and final commissioning went without a

hitch," Lücke recounts. "From our experience of operation to date, I can say that we are really very pleased with the heat and power modules."

Contact
Gerhard Klink
Tel.: +49 20 3450 0431
Email gerhard.klink@mtu-online.com