Newsletter

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In Focus

From the efficient energy concept with CHP and heat recovery steam boiler at Edeka Südwest Fleisch through the impressive boiler house at Bionorica right up to the new energy center with CHP unit for Ritter Sport – Bosch offers suitable solutions for every application. Learn more about this and all Bosch Industrial highlights at the ISH Energy in our latest issue. We hope you enjoy reading all about them.

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Multi-storey boiler house in the pharmaceutical industry
Efficient process heat for herbal medicines

Bionorica's rapid growth in the recent years, along with the integration of new production lines, has caused a significant increase in the process heat demand at its site in Neumarkt in the Upper Palatinate (Germany). The company attributes its success in Germany and in more than 50 international pharmaceutical markets, increasing year on year, to its unique research and production philosophy. The complex programme under the name "Phytoneering" involves worldwide scientific research, conducted with a high financial outlay: This comprises the development of own varieties of medicinal plants, patented production methods and accredited clinical studies of the efficacy and safety of the drugs. Numerous processes involved in the production of herbal medicines require process heat in the form of steam. The extraction of natural raw materials, concentration and drying, as well as the preparation of cleaning agents, for example, are all energy-intensive processes. The existing system, built in 1993 with a total of 4 t/h of steam capacity, was no longer able to cover the increased demand. Important requirements for the new system are extremely high energy efficiency and the maximum recovery of process-related waste heat.

Impressive boiler house at Bionorica: The new boilers were sited on the ground floor. They deliver up to 10 t/h of steam in a highly-efficient and low-emission way.

Bionorica produces herbal medicines on 42,000 square metres of space at the Neumarkt site.
© Bionorica SE/Matthias Breindl

The project

With due consideration for the company's environmental philosophy, the engineering consultancy Farmbauer planned a completely new steam supply. One major challenge was how to realize the new boiler house: Because of the building situation at the Neumarkt site, the amount of floor space available for construction was limited. Therefore the responsible plant construction company Petry installed the modules for water treatment and the downstream flue gas heat exchangers on a second level, directly below of the boiler house roof. The two UL-S steam boilers were sited on the ground floor. Together, these boilers deliver up to 10 t/h of steam in a highly-efficient and resource-friendly way – very much in the spirit of Bionorica.

To get the most out of the flue gas heat produced by the boilers and hence minimise fuel consumption and emissions, it was decided that two flue gas heat exchangers would be used. First, the flue gas flows through the integrated Economiser and the feed water is pre-heated. As a result, less fuel is needed to generate the steam. To meet the continuously high demand for warm water

The water service module (WSM) is installed on the second level in the boiler house and provides the boilers with thermally-treated feed water.

for the leach/acid station in the production of Bionorica, it made sense to integrate an additional condensing heat exchanger downstream. The flue gas is cooled down further in this heat exchanger. The energy recovered in the process increases the temperature of the water from 10 °C coming from the line to approx. 55 °C. The investment in the condensing heat exchanger will have been amortised after just two years. Moreover, the boilers are equipped with combustion controls to further enhance their efficiency and reduce flue gas losses. It works similar as the Lambda controls in a passenger car.

In addition, an installed vapour heat exchanger uses the thermal energy from the exhaust vapours to heat make-up water for the thermal deaeration: The water service module (WSM) is used for the deaeration process. The module heats the make-up water to 103 °C in order to remove harmful, corrosive components such as carbon dioxide and oxygen. As the temperature increases, the dissolved gases escape through the roof together with the so-called exhaust vapours. A further significant saving is achieved by the installed condensate module. It recovers accumulated condensate from the consumers, thus the demand for make-up water decreases. Since the condensate is already at a high temperature, the energy consumption within the thermal deaeration process drops even further.

To ensure the well-being of its employees and neighbours, Bionorica goes for low-noise operation. The speed-controlled combustion air fan of the natural gas burners achieve a major effect here. They flexibly adapt the speed to the actual boiler load, thereby considerably reducing the noise emission from the air damper and the fan. Additionally, the natural combustion noises that resonate through the flue gas system and chimney are minimised by flue gas silencers.

The result

With their extremely high efficiency of almost 103 percent, the steam boilers sustainably conserve resources and ensure an economic steam supply. The heat recovery measures help reduce consumptions and CO_2 emissions. And what's more, Bionorica benefits from an improved mode of operation thanks to the system's high degree of automation. All processes, from desalting to the condensate technology to the adaptive changing of master and slave boiler, are automated via the integrated BCO and SCO controls from Bosch.

The condensing heat exchangers use the remaining flue gas heat from steam generation to heat up the water used in production.

Reconstruction of the Ritter Sport energy center with innovative CHP technology from Bosch
Environmentally friendly energy for famous chocolate

The family-run company Alfred Ritter GmbH & Co. KG operates its chocolate factory at the Waldenbuch site (Germany). Sustainability and the environment-friendly use of resources have a high priority in the production concept. Engineering consultancy Midiplan GmbH & Co. KG was assigned to plan the new energy center.

At its heart is a Bosch CHP with an electrical output of 1.3 MW. The generated power is used to operate the production plants while the provided heat can be used in a flexible way: 700 kW high-temperature flue gas heat is recovered into a hot water circuit at 175 °C. It can be used for heating or in a 2-stage absorption chiller to generate cold temperatures for refrigeration. This increases the annual operating time of the combined heat and power plant to approx. 8,200 hours, thereby enhancing efficiency. The result is impressive: The on-site power generation is now 10 million kWh per year. Compared to the electric power from the German grid, CO_2 emissions are cut by 2,900 tonnes. This is equivalent to avoiding the amount of CO_2 produced by 1,850 medium-sized cars per year.

The Bosch CHP system has an electrical output of 1,280 kW and achieves an overall efficiency of up to 91 %.

Benefits

- 30 % of the power demand covered with own, eco-friendly power generation
- 80 % of the heat demand provided by engine waste heat
- CO_2 emissions reduced by around 2,900 tonnes per year

ISH Energy 2017 in Frankfurt – hall 8.0, stand B31

Largest boiler from Bosch as highlight at the trade fair

Energy efficiency and connectivity for all output ranges

At the ISH Energy, the world's leading trade fair for sanitary, building, energy, air conditioning technology and renewable energies, Bosch Industrial presents the largest product of its portfolio: The double-flame tube boiler has an impressive height of six meters. It reaches an output of up to 55,000 kg/h of steam and weighs up to 120 tons. Due to its constant efficiency in all operating points, this steam boiler is especially used by energy suppliers and large industrial companies. The boiler is part of the Bosch trade fair stand – visitors can enter its inside and the VIP lounge on its upper floor.

Also for smaller output ranges, Bosch presents several innovations at the ISH Energy, for example, the compressed air and heat system (CHP-CA). While conventional compressors are driven by electric motors and need expensive electric power for this, the CHP-CA from Bosch generates the compressed air with a biogas or natural gas motor in a more cost-effective and

Bosch Industrial at the ISH Energy 2017: Hall 8.0, Stand B31

environmentally friendly way. In addition, the free waste heat of the motor and the compressor can be used in the heating circuit.

Controls and connectivity

Another major topic at the Bosch trade fair stand are the new high-tech controls for professional solutions, used in industrial boilers and combined heat and power plants (CHP). Here, Bosch presents the Control 8000, an innovative control device for heating boilers with intuitive touch control and large colour display. With this control device, advanced technology from the industrial sector enters the market of heat technology at an appealing price-performance ratio. A wide variety of components can easily be integrated in a modular way. At the same time the latest standards of connectivity are used. The remote maintenance system MEC Remote is available for the new device Control 8000 and also for all other Bosch boiler and CHP controls. Whether state-of-the-art control technology protocols, local networks, internet-based, wired or wireless – MEC Remote from Bosch provides a safe and comfortable access via internet-connected devices. In the past, this service offered access for the Bosch service experts only. But now with MEC Remote also operators can access their boiler or CHP controls from a distance conveniently. Furthermore, operators are informed automatically about important status reports via email or text message. A certified safety concept protects against unauthorised access. Last but not least: You can experience all control devices and remote access opportunities at the Bosch trade fair stand interactively.

Energy efficiency in the focus

With the slogan “Our efficiency is your profit”, Bosch highlights the topic of saving energy costs with interactive multimedia simulators. At different points at the stand, operators can configure their individual plant. By using their specific load profile and energy prices, they can precisely calculate which technical measures are profitable and which are not. Furthermore, operators of older plants receive individual information: Would it make sense to switch from oil to gas or to retrofit heat recovery measures? And if so, how soon will this pay off?

Experience virtual boiler houses

An innovative highlight at the stand is the 360-degree virtual reality station. Visitors can virtually experience in detail real boiler houses with their individual modules and components – this is just as if you were really on site.

It's all about the meat: High-efficiency energy concept for eco food production at Edeka Südwest

Edeka Südwest Fleisch GmbH, headquartered in Rheinstetten near Karlsruhe (Germany), employs around 700 workers to produce meat and meat products – precisely 375 tonnes per day. The highest possible quality and responsible behaviour when it comes to energy and the environment are paramount. The production involves numerous energy-intensive processes. Most of the steam and hot water is used for boiling and cooking meat products as well as for cleaning purposes. In addition, a large amount of electric power is required for operating the production plants and for cooling in the refrigerated warehouse. For ecological and economic reasons, Edeka Südwest Fleisch decided to invest in a highly-advanced energy concept.

At the very heart of the energy supply is a CHP with a 2,000 PS 12-cylinder engine. Its waste heat supports the hot water generation and the heating network. This module delivers eleven million kilowatt hours per year – equivalent to the power consumed by some 2,750 households. The flue gas from the natural gas-powered CHP engine still contains valuable energy. To ensure highly-economical use of this energy, Edeka decided for a Bosch heat recovery steam boiler (HRSB). The boiler can utilise almost eight tonnes of flue gas with temperatures of up to 550 °C. Unlike conventional heat exchangers that generate hot water, it converts the waste heat into saturated steam at high temperatures of over 180 °C. This makes the used waste heat much more valuable. Afterwards the flue gas is cooled down even further in a downstream flue gas heat exchanger for maximum waste heat utilisation.

To minimise operating effort, the heat recovery steam boiler is equipped with various automation devices, such as automatic desalting and blow-down functions, and also feed water regulation modules to achieve a constant water level in the boiler. These devices ensure more consistent operation with lower material stress, while increasing efficiency at the same time. The integrated BCO boiler control records, for example, the flue gas temperature upstream and downstream of the boiler, provides data in case of inefficient operation and generates maintenance reports. If steam is not needed, the heat recovery steam boiler can be circumvented by the flue gas bypass on the flue gas side. This ensures continuous operation of the CHP, regardless of the steam demand. The BCO controls the flue gas flaps via an automated process.

The HRSB covers the base load with nearly 900 kg/h of steam. It supports the two existing UL-S peak load boilers, each of which delivers up to 5,000 kg/h of steam and which have provided a reliable service for many years. The modular, compact design allows the heat recovery steam boiler to be effectively integrated into the existing steam network. The existing water service module now supplies all three boilers with thermally deaerated feed water. All operating data, including for all boilers and modules, are transmitted to Edeka's central control via a Profibus connection.

The complete system, involving the installation of around seven kilometres of piping and power lines, was realised by the plant engineering company Jörke & Weber Haustechnik. The company also installed the complex expansion to the refrigeration system by an absorption refrigerator, which converts waste heat into cold air. Thanks to optimum interaction between all energy generators, Edeka Südwest Fleisch was able to cut its energy costs by some 15 %. The high investment will have been returned in approx. four years. In addition, the environment is being relieved of roughly 900 tonnes of CO_2 per year, thereby significantly improving the ecological footprint of meat and meat products.

High-efficiency and resource-saving: The HRSB uses the waste heat from the CHP engine to generate steam.

High steam quality and reliable supply at Danæg

No matter whether organic or free-range eggs, a scrambled egg mix or pasteurised egg – Danæg A/S from Denmark produces a highly-diverse range of egg products for end consumers, commercial kitchens, restaurants and foodstuff producers. New production plants and a steadily increasing production volume have raised the demand for process heat in recent years. Key criteria for the conceptual design of the new steam system were a reliable supply in order to comply with the strict guidelines for foodstuff safety, as well as a constantly high steam quality. Danæg requires the steam for various processes, such as pasteurising or cleaning.

The locally-based Bosch company in Denmark offered the optimum steam boiler system and supported the planner Alectica A/S and plant engineering company Vagn Hansen A/S with implementation. The new system from the Bosch factory in Gunzenhausen (Germany) is solidly built. It comprises a steam boiler with natural gas burner and integrated flue gas heat recovery, as well as water treatment, control and automation. The UL-S three-pass boiler has worked reliably from the start and delivers up to 2.5 t/h of high quality steam – even with a dynamic load profile. The optimally matched burner features a convincingly high modulation range and significantly reduces the power consumption in the partial-load range via the speed-controlled fan. Furthermore, the integrated economiser makes waste heat usable in order to reduce the amount of fuel required for steam generation. The used BCO boiler control provides high supply reliability. It helps the operator to ensure efficiency, automatic desalting and continuous water level regulation. It also comprises safety logics, which protect against mal-operation. The industrial Ethernet connection provides the Danæg employees with important operating data via the company network.

UL-S steam boiler at Danæg