

## Bäckerei Plücker, Waldeck

**„Especially when buying new ovens, you have to think about heat recovery“, Christian Plücker says confidently. The master baker from North Hesse did not only think about it, he acted on it. In combination with three MIWE roll-in rack ovens and a MIWE thermo-static, he installed the new MIWE eco:nova heat recovery system.**

Three rack ovens were replaced, each of which was almost 20 years old. „They were functioning properly right to the end“, master baker Plücker reminisces. „But from a technological point of view, they were no longer up-to-date“. With that, Christian Plücker is referring to the new MIWE TC (Touch Control) system, a common feature of the four new MIWE baking ovens.

The control system is operated via touchscreen: a seven-inch, touch-sensitive colour screen. „A 15-minute orientation

with the oven staff was more than sufficient to cover all of the operational aspects“, Plücker says emphasising the system's simple operation. During the week, there is just one employee that is responsible for all of the ovens, whereas at the weekend, a total of five employees work on a rotational basis. Following the brief orientation, anyone is able to operate the ovens without experiencing any problems.

At the same time that the new ovens were installed, the operating procedures that had been in place until that time were revised and restructured to improve efficiency. The bakery originally belonged to a mill, though the mill itself was vacated several years ago. At first, the business was limited to conducting sales tours in the rural surrounding areas and making deliveries to retailers. Among other things, the famous Alraft country style bread was supplied all the way into the Ruhr region. In 1989, the Plücker family finally began to open the first of their own branch outlets. →



Christian Plücker in front of the MIWE eco:nova. The three MIWE roll-in rack ovens can be seen in the background.



The eco:nova cleans the flue gases of sulphur dioxide. Christian Braun from MIWE shows us the limestone that is used in the neutralisation process.

Even the operating premises are demonstrative of this continual, natural growth. Little by little and piece by piece, the company building has been extended. „Today it has proven to be an advantage”, Christian Plücker points out, „because each separate part of the building now houses a single business unit”. The precise structuring ensures, for example, that apart from the dough making facility, no other area of the company is exposed to flour dust.

Christian Plücker is one of the two sons of Walter Plücker, the proprietor of the bakery. As master baker and business manager of the artisan bakery, he is responsible for production. His twin brother, Malte, who has a degree in Business Management, is responsible for the commercial side of the business.

In order to structure the consignment process to further enhance its efficiency, a consignment area has been set up opposite the new rack ovens, so that the employees responsible for distribution can take the baked products directly from the rack trolleys. The consignment process is also implemented in the pastry shop and in a separate distribution hall.

Two rack trolleys of baked goods can be baked next to one another in each of the MIWE roll-in ovens. These ovens are primarily used in the production of kaiser rolls and small baked products. The MIWE thermo-static is used mainly for hard rolls and tin bread, with the tunnel oven being used in the production of unmoulded bread. Christian Plücker: „We made a conscious decision to purchase different oven systems to ensure the best baking results for each product.”



A look inside the flue gas scrubber of the MIWE eco:nova.

For Plücker Bakery, the top priority when considering the requirements of a baking oven is, without doubt, that it can provide an excellent baking quality. „However, the baking process should also be as energy-efficient as possible”, explains Christian Braun from MIWE, highlighting a further requirement of the baker. As a graduate in Mechanical Engineering, Braun is Product Manager at MIWE and was heavily involved in the development of the MIWE eco:nova.

Immediately following installation of the new MIWE baking ovens, Plücker Bakery was able to realise a reduction in energy consumption. For example, all baking is now done at a temperature of 30°C lower than previously. This achievement is made possible thanks to the patented MIWE aircontrol system that features a more highly efficient heat exchanger, improved isolation and optimised air conduction. However, at the same time you also have to consider the unused energy that, in the truest sense of the word, „goes up the chimney”.

On the one hand this includes the energy from the flue gas, which exhibits high temperatures, though only a low level of humidity. An even larger energy potential is contained in the steam, since a large amount of energy is required to convert the water into the gaseous state. From a physical point of view, it makes sense to feed the steam and flue gas into the heat recovery system separately. The flue gas from the three rack ovens is therefore fed into a pipe connected directly to the eco:nova. The steam is collected in a separate pipe and conducted to a heat exchanger in the heat recovery system. In addition to the steam from the rack ovens, the steam generated by the MIWE thermo-

static and three additional thermal oil baking ovens is also fed into the system. If the flue gas and steam were to come into contact with one another, the physical properties of the steam to be condensed would change. Above all, the partial pressure and therefore the dew point would be reduced.

The dew point has to be correlated to the condensation temperature. Christian Braun explains: „The higher the dew point, the higher the condensation temperature. It is exactly this fact that determines how warm the water in the storage tank can be.“ With the eco:nova, the water can reasonably be heated to a temperature of 75–80°C. At temperatures any higher than this, the level of efficiency is reduced and a heat recovery treatment becomes uneconomical. MIWE uses heat exchangers based on the internal bare-tube principle with a condensate drip tray. This affords the system a longer service life and reduces the maintenance requirements.

The water heated in the heat exchanger flows in an individual circuit. When baking during the night-time, two 13,000 litre buffer storage tanks, located on the former meal floor of the building, buffer the energy that has been extracted from waste heat at no cost. When required, this energy will

be reused via the heat exchanger to heat the building and the process water for the dishwasher.

The large pass-through dishwasher used at Plücker Bakery alone usually requires 55 kW of heating power in order to heat the 750 litre water tank. This energy consumption has now been significantly reduced. The heated water from the MIWE eco:nova heat exchangers preheats the water required to operate the dishwasher. It only requires a small amount of additional heating for it to reach a temperature of 75°C, which Plücker Bakery insists on for hygiene reasons. An additional advantage of the high temperature is that the washed items dry quickly.

However, the separate heat exchangers for the flue gas and steam are just one important aspect of the MIWE eco:nova. „We are already saving energy simply because the chimney draught is a lot better now,“ says Christian Plücker, demonstrating his experience. Because it is only necessary to have one exhaust pipe running between the ovens and the eco:nova, measures must be taken to ensure that the chimney draught remains constant. This in turn encourages an even running of the oven burner. →



Two large buffer storage tanks, each of which can hold up to 13,000 litres of hot water, are situated on the former meal floor.



Technology in detail: actuator for the innovative and dynamic draught regulating valve.



The energy consumption required for the industrial washing system has been significantly reduced since the MIWE eco:nova was installed.

This even chimney draught is achieved in each baking oven through the combination of an electronic, frequency-controlled draught fan in the heat recovery system and a new, dynamic draught adjustment feature, for which there is a patent pending. The draught fan controls the vacuum in the exhaust system and the dynamic draught adjustment regulates the draught in each baking oven to the exact Pascal value. The customary application of fresh air or cold air by draft regulating valves is not required. This prevents a cooling of the flue gases and a thinning of the steam.

Although these factors are necessary to ensure the efficient operation of the MIWE eco:nova, they also have an advantageous effect on the baking process. Any potential influencing factors can be controlled. MIWE specialist Christian Braun says that this draught control feature is important in areas such as valleys with varying wind conditions. „The burners run more efficiently, while the ovens bake more evenly.“

Plücker Bakery also gained a further advantage: „We were able to reduce the number of chimneys“, Christian Plücker points out. Even when the time comes to purchase additional rack ovens, it will be possible to connect these to the existing eco:nova pipe system without any problems. The draught adjustment for these new ovens will also be integrated by means of the eco:nova’s control system

An environmental advantage has also been realised. The eco:nova cleans the flue gases of sulphur dioxide. This is achieved by scrubbing the flue gases and neutralising the sulphur substances using limestone. Grease particles and dust are also collected from the steam condensate. „So it is beneficial to the environment in a number of ways“, says Christian Plücker, expressing his enthusiasm for the MIWE eco:nova. „We are saving energy and protecting the climate.“

### Plücker Bakery at a glance

Proprietor: Walter Plücker, master baker  
Zur Rittermühle 8  
34513 Waldeck, Germany

Branch outlets:	27
Mobile sales:	4

### Employees

Production:	32, of which 3 are apprentices
Sales:	120, of which 15 are apprentices
Distribution/logistics:	15
Management:	4

### Turnover distribution

Sales by own branch outlets:	85%
Delivery transactions:	15%

### Price examples:

Kaiser rolls	0,26 EUR
Special rolls	0,36-0,46 EUR
Alraft country style bread 1250 g	2,80 EUR
Special bread 500 g	2,55 EUR