

## Bakery Gebert, Gnodstadt

**Gnodstadt. „You can really see how technology has developed“, master baker Hans Gebert says, comparing two different generations of rack ovens. The bakery, located in close proximity to the Lower Franconian wine town of Marktbreit, uses a MIWE roll-in from 2007. The new-generation MIWE roll-in e+ is the latest addition to the business. „The employees are only interested in baking in this oven now“, Gebert explains.**

And he is happy to oblige them, meaning that a lot of the baking is now done in the MIWE roll-in e+. „The baking quality is even better and, more importantly, the energy consumption is lower.“ That this observation holds true can be proved by Gebert’s own consumption measurements. In addition, MIWE has provided technical support in achieving comparative baking results in both ovens and has calculated the exact energy saving.

When planning the new purchase, it did not take Hans Gebert long to realise that the new MIWE roll-in e+ was the product to go for. „We are very pleased with our other

two MIWE ovens. We did, of course, take a good look at the market and compare prices. But the new rack oven from Arnstein still came out as our top choice.“

### Oven technology at Gebert Bakery

MIWE ideal, 2-circuit version with 4 oven decks, triple-width, year of manufacture 1998  
MIWE roll-in, year of manufacture 2007  
MIWE roll-in e+, year of manufacture 2010

Energy consumption was an important criterion during the selection process. In addition to the energy costs, master baker Gebert is also thinking about the environmental aspect. Gebert’s bakery is one of the first in Germany to work with organic grains, something he has been doing since 1974. Today, just like before, the grains are milled by Deme-ter farmers that live in the region. Since that time, a mill has been built above the bakery, together with grain silos and a grain cleaning system. This is where the grain is milled and the whole-grain baked products are prepared.

And so the master baker is also a miller. However, he is also a proficient farmer and continues to cultivate his →



Hans Gebert unloading his „Kipfli“ from the MIWE roll-in e+.



The „Kipfli“ are made completely by hand.

own land. Perhaps this is why Hans Gebert is such a keen innovator? With an allergy to flour dust, he had to consider his options for the future. Instead of giving up, he developed a comprehensive flour dust extraction system in cooperation with the trade association, which he then had installed.

#### **Hans Gebert's philosophy**

The 45-year-old master baker has a clear concept: to provide authentic baked products. This includes, for example, the „Kipfli“, a pastry that, like before, is still shaped by hand. „We make this extra effort to set ourselves apart from the industry“, Gebert says. This is only consistent if no additional dough pieces are bought externally. Gebert refuses to give his baked products fancy names in an effort to avoid them being compared with the fantasy products offered by other baking companies.

But even all of that was not quite enough. Master baker Gebert resolutely tackled the cause of the problem – namely the flour dust – head on. Reimelt took the concept of flour moistening, as developed by the Institut für Getreideverarbeitung (Institute for Cereal Processing) in Bergholz-Rehbrücke, and turned it into a reality. Gebert then put this reality into practice in his bakery.

With the MoisTec system, the flour is moistened with water in a cylinder prior to the actual dough preparation. This prevents dust from forming during kneading. Hans Gebert developed the system even further and came up with the concept of „redried flour“, which can be worked with by hand or used in a machine without forming any dust.

#### **Recovering energy**

„For me, it's not about the technology, it's about the practical convenience for the team“, Hans Gebert explains, demonstrating his passion for the actual baking itself. That brings



The quality of the „Kipfli“ at Gebert Bakery is something to be proud of.

him on to another innovation that can be found in his bakery. The two MIWE roll-ins are connected to a heat exchanger. MIWE developed this system especially for the bakery and it has been ready for serial production for quite some time.

#### **MIWE eco:box**

The MIWE eco:box is a heat recovery system which uses the waste heat from baking oven burners for hot water generation. With this system, 70 percent of the flue gas heat that escapes can be recovered as thermal energy.

For this purpose, the flue gas pipes of the two rack ovens are directed into the MIWE eco:box. The device, which Gebert has installed in his bakery, can accommodate a burner output of up to 170 kW from two ovens. Another design variant that is suitable for use with an oven is also available. MIWE also offers the eco:box with varying levels of power consumption.

„A positive side effect of installing the eco:box is that we save on the costs of a chimney“, Hans Gebert explains. This is because the heat exchanger only features a waste gas pipe. The heat absorption in the MIWE eco:box causes the emerging flue gas to be cooled to below 90° Celsius. However, in order to still achieve a sufficient chimney draught, the technicians at MIWE recommend an effective chimney height of six metres or the installation of a waste gas fan. At the same time, it is important that the steam is discharged separately. If the steam were to mix with the flue gas prior to the latter entering the eco:box, it would significantly reduce the energy potential.

At Gebert Bakery, the MIWE eco:box is situated in a side room. The water that is heated by the device is connected via pipes to the building services system. „We need a lot of warm water, especially for the dishwasher. But we can also

use this energy to support the building heating system”, Hans Gebert says, highlighting the usefulness of the energy acquired by means of heat recovery. The energy is held in large accumulators until it is required.

Using a meter, master baker Gebert is able to read off how much energy has been recovered by the MIWE eco:box. „This means we can see exactly what we are saving.” Based on current oven utilisation, the first projections revealed that approximately 9,000 kWh can be supplied to the building heating system per year. „So after a few years, the eco:box pays for itself”, Gebert reasons. A saving of seven cents per kWh, in terms of the building heating costs, would mean a total annual saving of EUR 630.

### Saving energy

„However, I much prefer only having to supply the oven with the minimum amount of energy possible in the first place”, Hans Gebert reasons. Like MIWE, he wants to utilise the smallest amount of energy possible for the baking process. In the second step, energy can be recovered – as with the MIWE eco:box.

However, it is difficult to say whether an oven needs a small amount or a large amount of energy. Standardised comparative figures, such as those for vehicle fuel consumption or the energy efficiency classes of electrical appliances, do not yet exist for baking industry ovens. „You really have to rely quite heavily on the specifications of the oven manufacturer”, Hans Gebert says, frowning.



MIWE employee performing the waste gas measurement in accordance with DIN 8766.

### Comparative baking

For this reason, he also carried out his own measurements. „It’s relatively easy with oil. Positioning an oil meter upstream of the burner is sufficient”, Gebert explains. Conclusions on energy consumption can then only be drawn when the same product is baked in different ovens using the same baking parameters.

The specialists at MIWE measured this even more accurately in Gebert’s bakery. Three rack trolleys of „Kipfli” were baked in each of the two MIWE roll-in ovens. Taking the baking loss into consideration, an average energy saving of 15.6 percent was determined for the MIWE roll-in e+.

Performance indicator	roll-in e+	roll-in 1.1
Oil consumption per batch [litres]	1.68	1.99
Energy consumption [kWh]	17.8	21.1
Baking loss [%]	18.8	18.6
Energy consumption [kWh/kg of dough]	0.51	0.58

### Measuring energy consumption

MIWE takes this a lot further, however. „We want defined standards for the measurement of energy consumption in ovens. The baker should be able to identify and compare at a glance”, Andreas Weißenberger explains, emphasising MIWE’s goals. The graduate engineer (Dipl. Ing.) is the project leader at MIWE. MIWE has also developed a →



The waste gas pipes of the two rack ovens are directed into the MIWE eco:box in a side room.

multipart test schedule that can be used to determine not only the energy consumption at similar baking losses, but also the waste gas loss, the energy requirement necessary for heating and the surface loss.

Even the waste gas measurement, performed in accordance with DIN 8766, demonstrates clear differences between the two ovens at Gebert Bakery. Andreas Weißenberger: „With the roll-in 1.1, we measured a combustion efficiency of 87.1 percent. With the roll-in e+ on the other hand, we measured an efficiency of 93.3 percent.“

Even more noticeable are the huge differences in waste gas temperature. If, in the case of the previous model, this temperature is 250° Celsius, in the case of the MIWE roll-in e+ it is only around 170° Celsius. The reason for this is simple: once the flue gas has flowed through the heat exchanger, it is still used to heat the steam device. This improves the combustion efficiency substantially. For the baker, however, it is even more important – even with batch-after-batch baking – that there is always enough saturated steam available.

#### Projection

Based on previous oil consumption, an annual oil consumption of 14,000 litres can be calculated for the 2 rack ovens at Gebert Bakery. If the MIWE roll-in e+ is used, a saving of 15.7 percent and a heating oil price of EUR 0.60 per litre allow for an approximate annual saving of EUR 1,318 in comparison to the previous model.

The next measurement trial determines the surface loss of the oven. This involves heating the rack ovens in accordance with defined test parameters. „The new roll-in heats up faster“, Hans Gebert says, demonstrating his practical experience. The measurement also supports his statement. The new oven is almost five minutes faster. At the same time, this allows for 1/3 of the heating oil to be saved.

Once the oven has been heated to 250° Celsius, this temperature is maintained for three hours. According to graduate engineer (Dipl. Ing.) Weißenberger, this is necessary to ensure that the oven is heated all the way through, thus achieving a thermal equilibrium. Subsequently, the oven is maintained at 250° Celsius for an additional hour. The surface loss, that is the amount of energy that is needed to maintain the oven at temperature, is then determined.

#### Conclusions

The MIWE roll-in e+ control system has been put into practice for Hans Gebert und his employees. „There is a huge step between the fixed program control and the TC control system“, the master baker says happily. Even the air volume control – referred to by MIWE as aircontrol – can be defined here.

For the hand-rolled Kipfli rolls at Gebert Bakery, the aircontrol was put on a low setting. „The crusts of the rolls were too hard, especially in the evening“, Hans Gebert reminisces. Now he is pleased with the crusts. The wholegrain rolls, on the other hand, are baked with intensive convection. „We were deliberately trying to achieve stronger crusts, not only in that case but also for the crusty rolls and pretzels. The aircontrol feature allows us to control this exactly.“

„We have tried out several different things and played around a bit too. Always with the goal of producing high-quality products“, Hans Gebert explains, highlighting the efforts he goes to when baking. Rather than following any trends, Gebert wants to use his bakery to produce traditional baked products of the very highest quality for his customers. MIWE lends a helping hand by providing state-of-the-art and innovative baking technology. Technology that even manages to use energy reasonably and efficiently.

#### Data and Facts Bakery Gebert

Proprietor: Hans Gebert  
Weetgasse 6  
97340 Gnodstadt, Germany

Branch outlets: 5

Mobile Sales: 1

#### Employees

Production: 7

Sales: 20, including 1 apprentice