Bakery Bolten, Duisburg, Germany

"To prepare for the future, you have to think about heat recovery", says Ralf Bolten, Managing Director of Duisburg-based Bäckerei Bolten. He did just that when expanding the production facilities. New rooms for the pastry department, new refrigeration technology for roll production and a re-organisation of production lines were implemented, and some the ovens were modernised. This also involved the first ever investment in heat recovery.

The investment was not only intended to increase the capacity. "Of course, we also wanted to increase the efficiency and quality of the baked products", recalls Bolten. The sales network has now grown to 41 branch outlets. There is more than enough competition. "For that reason in particular we have to take every opportunity to work economically and produce high-quality goods", explains Bolten. Together with his colleagues, Thomas Wichert, Rolf Krause and Tim Schenkel, the project was planned with a structured approach.

Impressive tests

They did not take the decision to buy replacement rack ovens lightly. To come straight to the point: Bolten now runs MIWE roll-in e+ units. But they also tested other rack ovens beforehand. Both the baking result and the energy consumption were examined in detail. Rolf Krause knows the criteria for evaluating the actual energy consumption of an oven correctly.

That allowed them to calculate exactly the amount of energy used for baking one kilo of baked products. "Only then can we really compare all ovens with each other", adds Bolten. To compare them, they baked different products in two test ovens. The gas and electricity consumption were measured, and the baking losses were also documented.

The MIWE roll-in e+ did come out on top for every product. But overall it proved itself to be 'probably the most economical rack oven in the world' as MIWE aptly states. And the baking results also impressed the production team. One →

Two MIWE ideal e+ units are used primarily for bread. Right next to them is the MIWE eco:nova, which is also fed from the waste heat from central heating boiler.

The name says it all: MIWE ideal bakes all types of bread equally well – ideal, simple and energy-saving.

A wide range of products is baked in the MIWE roll-in e+. That makes the bakery very flexible.

of many advantages is that the roll-in e+ can be used for more than small baked products.

The MIWE rack oven even offers a good baking atmosphere for bread. In particular, that is thanks to the MIWE aircontrol air volume control, which allows you to influence the baking result significantly, by defining the air quantity in every baking step (eight available per programme) precisely. Ralf Bolten: "These units can be used to produce baked goods with a fine or thick crust." His bakery uses the system to achieve a specific ideal baking result for every product.

For Ralf Bolten, the range of baking options is also an important reason for choosing the MIWE roll-in e+: "You never know what tomorrow's market for baked products will demand. With this oven, we are equipped for virtually all requirements."

Bäckerei Bolten followed this line of thinking with the hearth-type ovens. As part of the reconstruction, two triple-width MIWE ideal ovens with five decks each were purchased. They stand back-to-back with the rack ovens. There is also space for more deck ovens beside this. Even an automatic loading system – for example the athlete from MIWE's range – can be retrofitted upstream.

However, the company currently uses a tunnel oven. "Of course, it is not exactly flexible", Operations Manager Thomas Wichert and Rolf Krause are well aware of the weaknesses of the oven. That is why the medium-term plan is to replace it entirely with deck ovens to increase production flexibility. A loading system can also make working outside the oven easier.

Heat recovery

However, the company is currently still using a tunnel oven. It runs on thermal oil, which is heated in a central heating boiler. By contrast, the deck ovens and rack ovens each use their own gas burner. Accordingly, every oven should need its own chimney. But that is not the case at Bolten.

This is because the flue gas is routed via the MIWE eco:nova heat recovery system. It has the only chimney protruding from the roof of the production hall. Additional ovens can be connected plug & play-style, easily and without cutting a new roof penetration for new chimneys.

However, the most important aspect for Bäckerei Bolten was the idea of saving energy. "For years, we have been thinking about how to save energy in our operations", reports Ralf Bolten. It formed the 'Lower Rhine Energy Efficiency Network' Working Group with 15 other companies from a wide range of industries. Its members discuss and share information about new energy-efficient technologies. They also speak about state subsidy options.

At Bäckerei Bolten, the MIWE eco:nova heat recovery system is a key part of the energy saving concept. It is part of a complete combined heating system concept, which was drawn up in full by MIWE with a contractually guaranteed heat recovery performance. As part of the planning, an energy analysis was performed on the basis of Bäckerei Bolten's baking calendar. It recorded verifiable energy values, which could be recovered from the flue gas and steam.

At Bolten the amount recoverable exceeds 335 kWh. For this purpose, flue gas and steam are routed separately from the

ovens – including the tunnel oven not supplied by MIWE – through the eco:nova to its heat exchangers. There, much of the energy is recovered, stored in water, which is collected in buffer storage tanks as an energy medium.

The MIWE eco:nova is located at the head of the row of ovens, where it collects this excess energy. MIWE was involved in planning and delivering the piping for the entire chimney and steam extraction system. "A single source is always better than multiple suppliers", explains Ralf Bolten. Having one source gave us a specific contact for questions, and allowed us to eliminate problems in advance.

MIWE's scope of delivery also included the buffer storage tanks: two of these with 8,000 litres each and a storage tank for 4,500 litres are supplemented with three fresh water modules. From here, the energy is passed on to the heating system for production, the heating for the administrative offices and drinking water heating. "Of course we have excess capacity in the summer, when we primarily use the hot water for the dish washer", points out Ralf Bolten.

The scope of the installed heat recovery system described above sounds simple. However, it requires monitoring and regulation of many parameters and control functions. That is why MIWE eco:control, the actual combined heating system controller, was developed. It monitors the energy flows and controls them on this basis. Integrated heat volume meters ensure transparency and show whether there is excess energy or a supply shortfall. It also clearly shows how much energy has been recovered and how much has been saved on energy costs.

A heat volume meter is also fitted to the building heating boiler, which shows when and how much energy has to be produced. This and the other data from the combined heating system can be accessed and displayed via a touch panel or via the company's network of PCs.

Flue gas and steam from the rack ovens on one side and from the MIWE ideal units on the other side are routed to the MIWE eco:nova heat recovery system (foreground). From there, just one chimney leads to the roof.

MIWE calls this energy monitoring, and the approach goes far beyond hoping for the best and seeing what we can recover. Instead, the user can record consumption flows quantitatively and reveal sources of error. For example, the different rise and fall rates of the temperature sensors in buffer storage tanks permit conclusions about the energy volumes fed-in and consumed.

In the words of Ralf Bolten:
"For a new investment, the options should be considered factually and without prejudice. Every oven model has its →

Thanks to 3D planning, MIWE was able to replace the ovens and commission the new energy saving units in record time

The MIWE eco : nova feeds the recovered energy to the buffer storage tank. From there, it is fed into the building services equipment.

Batch-after-batch baking is no problem with the MIWE roll-in e+.

Perfect baking results.

advantages and disadvantages. The buyer must analyse how an oven can implement the company-specific requirements. Heat recovery must always be weighed against the possible heat consumers, or else it is not worthwhile."

A brief overview of bakkery Bolten GmbH	
Owner: Ralf Bolten Am Handwerkshof 20 47269 Duisburg, Germany	
Branch outlets:	41
Employees	
Production:	51, of whom 4 are apprentices
Sales:	280
Shipping department/logistics:	14
Administration:	15
Sample prices:	
Hard roll	0,30 Euro
Rye-and-wheat bread 1,000 g	2,95 Euro
Special breads 750 g	3,25 Euro
Danish-style pastries	1,30 Euro

Stand: 0515