

Building for baking

A MODERN BAKERY BEGINS WITH ITS PLANNING AND IMPLEMENTATION. IN THIS RESPECT THERE ARE PARALLELS WITH OTHER SECTORS OF THE FOOD INDUSTRY, BUT THERE ARE ALSO PARTICULAR SPECIAL FEATURES



++ figure 1

Harald Jakob (l.), Division Manager Operational Planning, and Matthias Wilhelm, Managing Director (r.)

+ The efficient operation of a large-scale bakery and confectionery starts with the design concept of an optimally suited production building. At any rate this is the belief held by the IE Engineering Group AG, which has been planning, designing and constructing industrial and commercial buildings in Germany and Switzerland for nearly 50 years. One of the big orders currently on IE's books is the construction of the new building which the Swiss Coop Group started this year in Schafisheim in the Canton of Aargau. The foundation stone was laid on 27th June 2013 for a complex of buildings that will accommodate the new Coop industrial bakery and confectionery together with a frozen food warehouse and a logistics center. The total amount invested is around CHF 600m (approx. EUR 487m). The timetable is ambitious: the plan is for the new logistics center to start operations in the fall of 2015, then the bakery and confectionery progressively in early 2016.

The project is being looked after from design concept to handover of keys by IE Food Engineering, the IE Group's most important corporate division with more than 60% of

its total turnover. IE's facility in Zurich is responsible for it. The group also maintains branches in Geneva, Munich and Frankfurt. A glance at the list of references from other food production sectors that the company can present gives an indication of the reason why the IE Group was awarded the contract for the Coop bakery. IE Food Engineering has planned and constructed at least twenty food production facilities of every order of magnitude in Germany and Switzerland in the past ten years alone. The main areas were milk and cheese processing, infant foods, convenience foods, coffee roasting and coffee capsule production, the processing of fresh vegetables and spices, catering, the milling industry and logistics centers, high-bay warehouses and refrigerated high-bay warehouses.

The objective at which the IE Engineering Group aims in all the building projects it looks after is the implementation of a planning philosophy which Dipl.-Ing. Matthias Wilhelm, Architect und General Manager at IE Food Engineering Munich, describes as a 'holistic approach': "For us the starting point for a building are always the processes and manufacturing

procedures that need to be portrayed.” The aim is to achieve this functionality as rationally and cost-effectively as possible. The 49-year-old explains that “At the same time we try to incorporate all the important aspects, from optimizing the production processes, and the material flows and opportunities for expansion already anticipated in advance, to questions of energy efficiency and hygiene.”

One thing is clear: the same basic principles apply to a large bakery as to any other modern food manufacturer. However, he says the company’s experience shows that the baking sector still reveals a few potential improvement areas in this respect. For example process optimization by a systematic linear arrangement of consecutive process steps, or aiming at individual modules each with the same requirements, is a principle that in Wilhelm’s experience could still be applied much more consistently in many – even large – baking businesses. He is amazed at the thought that “Situations still sometimes arise in which there is a need to pass through a courtyard. Most of these are companies with structures that have grown organically.”

Flour as a special feature of a bakery building

However, as well as the general characteristics, there are also specific requirements applying to bakery buildings. Flour, the main raw material, on its own already creates special

features that otherwise occur mainly in the case of mills. Because flour dust is an explosion hazard, the design of the process should already contribute to avoiding it. Harald Jakob, who as a Project Manager with IE for many years has already planned and executed numerous projects, explains that “In controlling the material flows we attempt at the same time – wherever it has a beneficial effect on the process – to include the gravity factor in the planning as well.” Of course as a trained electrical engineer he knows that the costs are increased considerably through the designation of large explosion risk areas. He points out that “It is absolutely essential to avoid this,” and among other things he draws attention to the fact that IE Food Engineering has a large amount of experience in the dry substances handling area from the animal feed, spices or pasta sectors of industry.

The topic of energy is another essential aspect for bakery buildings – just as it is for other food producers with complex manufacturing processes: the use of primary energy remains comparatively high in a bakery – even when using energy-saving technologies for baking and cooling. Thus the potential for energy recovery is also correspondingly great. The use of the recovered energy then becomes the crucial point. Matthias Wilhelm explains that “Depending on the process requirements, the entire energy track is sometimes complex in bakery buildings, but we create a comprehensive energy concept ▶

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++ figure 2

++ figure 2
The construction site of Coop in Schafisheim

for every building we construct, which fits like a tailor-made suit.” Harald Jakob adds that: “A large amount of surplus heat is gained from the baking process. However, day-to-day operation also needs considerable amounts of electricity and cooling. Therefore our holistic approach is directed towards considering the total energy demands of the process.” For Wilhelm, a key question that must always be taken into account when building a modern bakery is: “Where can excess energy that cannot be used in the production building itself be exported to?” He says that for this reason it is always an advantage if buildings or parts of buildings with energy-intensive functions that are used for other purposes, e.g. other production buildings with offices/amenities rooms, are situated at the site of the bakery or near to it.

The way the subject of hygiene needs to be treated in the case of bakeries also differs from that for many other sectors of the food industry: Wilhelm explains that “The specific aspect is that a baking operation contains both dry and wet zones, which in turn have differing hygiene requirements. That also occurs in other food sectors, e.g. dairies, with their significantly higher hygiene standards.” In this respect he estimates that the hygiene demands in classical bakery operations are not extremely high: “We needed to implement much stricter regulations when we were building for an infant food manufacturer.” Bread is either baked or frozen, and thus ultimately “hygienized”. Hygiene in bakery buildings must also not be put at the very top of the list from financial points of view. According to Jakob, the motto is: “The more fresh and wet zones there are, with ‘open’ product handling,

the more expensive it is.” The challenge is to harmonize the different hygiene requirements with the different stages of the production process. On this topic Wilhelm says: “We rely on zoning concepts for employees and materials, in which ideally any necessary airlocks are integrated into the production workflow.” That sounds simple but can become complex if fresh dough products for freezing and semi-baked products are also manufactured. The baking process is then partly replaced by a packing process, and the aspects of air quality and air flow control also come into play before the final packing: “For fresh dough I need room cooling and a more frequent air exchange; therefore a smaller room volume is advantageous. Wherever baking takes place and a large amount of heat is formed, precautions should be taken to avoid the spread of heat, and instead one should ensure that the waste heat is rendered usable.”

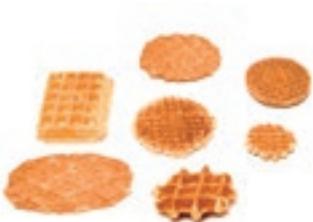
This may be summarized as follows: the installation and design of bakery buildings are generally no more complex than those of other production buildings in the food industry. Specific particular features are due to flour, the main raw material, and the different hygiene requirements of consecutive dry and wet zones. The main challenge in modern bakery building is the handling of the energy – its primary deployment and its secondary utilization after being recovered. Total construction costs are more or less in the middle of the range compared to other food industry sectors. Wilhelm assesses this as follows: “Most bakery buildings can even be built more economically than those for the majority of food businesses.” +++

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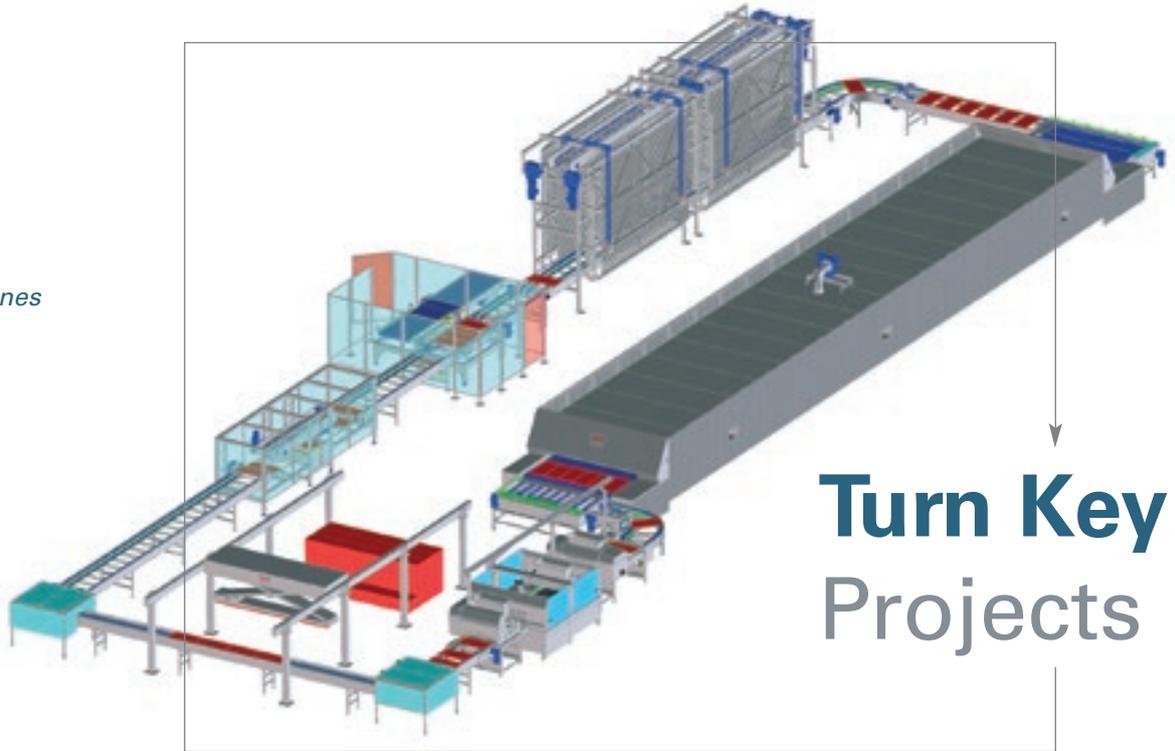
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