

Combination Cooking for Increased Productivity and Efficiency

Cooking meat products has reached a new technological age with a combination of systems now being used to achieve the optimum result.

Further processed cooked meat products are entering a whole new technological age.

Where once cooking lines were inflexible, single product, single function systems, now processors and machinery manufacturers are building in multifunction capacity to systems so that they can cook a variety of products in a variety of different ways.

In the UK, at Snowbird Foods, a manufacturer of a variety of cooked products such as sausages, meatballs and faggots for the retail, foodservice and further processing industries, the introduction of a new flexible cooking line has increased production and increased the speed of the line.

The new cooking line—the company's third line—fits in alongside two traditional frying systems.

However, the new line gives the company the flexibility to traditionally roast, steam cook and fry.

Installed as part of a refit of the fac-

tory in north London, the new cooking system forms and cooks in a variety of ways completely automatically and requires just one operator at the start of the line and one at the end to pack the cooked product.

Ground meat mixture is loaded into the former at the start of the line and the forming machine automatically makes

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the meatballs or other shaped products. The former punches out cylindrical shapes that are then rolled on wheels to create the meatball.

The Wire Belt conveyor then transfers the formed product to the first part of the combi-oven, which delivers dry heat onto the Teflon belt searing the bottom of the meatball. The oven also cooks the product with steam as it moves along the line.

Gentler Cooking

“The injection of steam keeps the temperature down and the moisture level up so that you get more gentle cooking,” said Snowbird chairman John Drage.

“Because of the characteristics of steam, the heat is transferred more effectively.

“You don't have to cook at 200°C to get the heat transfer to the product.

“It allows you to have the product just cooked through and then browned.”

At the end of the first stage of cooking, the meatballs tumble off the belt onto another conveyor, turning them and allowing the other side of the product to be seared in the second stage of cooking. The second oven also cooks through the belt and can cook with steam as well as having a turbo fan to cook the products through convection.

Mr Drage said that by cooking the product on the belt, browning it, it achieves a more handmade, homemade appearance that is more appealing to the consumer.

At the end of the second combination oven, the product is then transferred either directly to a new gyro freezer or it can pass through a fryer to give the product an all-over brown cooked appearance.

Quality control is carried out by one man at the start of the line and another at the end of the cooking process.

“The raison d'être of Snowbird Foods is to be a cooked product company and we want to be at the front of that market,” Mr Drage said.

“The new cooker allows Snowbird to roast, smoke, use dry heat, steam and fry.

“The bulk of the product we produce has traditionally been fried. We wanted a difference. The facilities we have developed are based on the concept of an in-line process from a batch process.

“What was a 1000 kg batch process is now 1200 kg to 1500 kg per hour in-line in a combi-oven.”

Pay Back

The combi-oven system cost Snowbird £1.2 million, which Mr Drage said will be amortised over a 10 year



Managing Director John Drage (right) samples the cooked meatballs at Snowbird Foods.

period. He said that to get the full pay back on the system, there has to be a range of products going through the oven, but the main saving has been in terms of efficiency. The whole refit of the plant, which included installing positive air flow in the factory from high risk to low risk areas, cost about £1.9 million and follows a recent upgrade costing £3.5 million. The new line, however, has increased production capacity by about a third.

The system produces 4,000 kg of product per hour and the oven produces 300 million calories of heat per hour going through the product ensuring that its temperature rises swiftly from 2°C to 78°C at the core.

The belt speed and the cooking temperature and oven functions are controlled and pre-set on a touch screen at the start of the cooking line and every aspect of the heat transfer can be monitored on the screen.

By using the new systems of cooking on the belt and dry cooking and steam, Snowbird has also reduced the need to fry every product and this has reduced the fat levels in products.

"It is a highly efficient line producing a consistent product automatically," Mr Drage said.

While the in-line combi-cooker is used for meatballs at Snowbird, the company is also looking at the possibility of producing cooked burgers. However, Mr Drage said that too great a diversity of product can be counter-productive and the company tends to concentrate on high quality known product ranges.

The two other lines in the plant are used to produce mainly fried sausage products, with a Laska grinder and bowl cutter used to mix the initial emulsion or ground meat mix and Handtmann stuffers used for the sausage production and occasionally for

meatball manufacture. The company also cooks and smokes products in a batch system in a Bastra steamer and smoker.

Spiral Technology

While the new line at Snowbird Foods provides an in-line solution that has used a mix of technologies to provide the best methods of heat transfer to particular products at particular stages of cooking, the technologists, engineers in the development team at FMC FoodTech have been working on mixing their own technologies and finding new solutions to provide other forms of cooking meat products on the line.

The development, which is to be installed in FMC FoodTech's Sandusky, Ohio technical centre in the USA uses condensation, convection and impingement cooking in a spiral oven.

The spiral oven with condensation and forced convection does the cooking while the impingement oven gives the final colour.

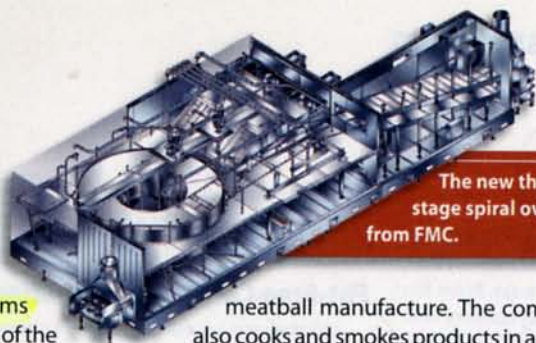
The mix of technologies sees a marriage of linear and spiral technology that is designed to help give flavour and texture to the cooked product.

"Cooking is not just heat transfer, it is a question of how you transfer the heat," said Jogesh Chandran, project engineer at FMC.

He said that in condensation cooking, steam condenses on the product and the aim is to try to enhance the energy in the steam.

"You want to make the optimum use of the heat," Mr Chandran added.

He said the object of the steam section of the oven was to harness the latent energy of the steam to cook the product through and also, through the humidity in the oven, prevent the product drying out,



The new three stage spiral oven from FMC.



Product feeds into the new oven line at Snowbird Foods.

"Cooking is not just heat transfer, it is a question of how you transfer the heat."



Cooked meatballs from Snowbird Foods.



Cooked koftas from Snowbird Foods.



The new combination oven at Snowbird Foods.

losing weight and yield.

Following the steam phase of the oven, the forced convection phase completes the cooking of the product. Moving the air around the product improves the transfer of the heat into the product, Mr Chandran said.

The final phase in the impingement oven browns the product and gives it visual appeal.

The three phase cooking method relies on a continual belt running through the oven and the free flow of steam and air around the product at the different stages means that product is cooked on all sides and through to the centre. The single belt avoids having to turn the product with the potential for lost and spoiled product.

"There are different technologies that are used to get a different taste profile. It is a question of getting the right process at the right time," said Mr Chandran.

"The key thing is to get the different technologies at the right time and right place."