Slicing is a key operation

Latest trends and developments in the use of slicing machinery and equipment at IFFA

As the convenience concept continues to spread, the demand for pre-packaged and portioned meat and sausage products that need to be cut to customer satisfaction before packaging is also rising. The machinery and equipment for this field of applications shown by leading manufacturers at this year’s IFFA can be characterised in a few catchwords. Energy efficiency and ergonomics are united in a new, open machine design.

By Wolfram Schnäckel

Against the background of the now predominant marketing of all foods as pre-packaged goods, the question of efficient portioning and cutting processes for finished products has been addressed increasingly intensively in recent decades. From the process engineering aspect, cutting represents a separation process generally using wedge-shaped tools. These operations can be classified on the basis of various criteria, e.g. the nature and manner of fixing the product to be cut, the type of movement of the cutting tools, the properties of the resulting finished product (defined or non-defined form), or the degree of size reduction. This article looks at the concept of cutting related to separation processes that result in products with a defined form (slices, cubes, strips etc.).

At IFFA 2013 this year there were over 40 exhibitors showing their latest developments in the field of cutting machinery and equipment for meat and sausage products. This is roughly the same number as at the last IFFA in 2010.

New hygiene concept through open structure

The firm Weber Maschinenbau GmbH from Breidenbach in Hessen, Germany, has been presenting high-tech slicing and cutting solutions for over 30 years. Not by chance did the well-known journal "Manager Magazin" include the company in its list of the "1000 German World Market Leaders". With the slogan of their own exhibition "World of Slicing", the Weber Group underscored their right to inclusion in the list at this year’s IFFA.

One striking feature in this connection is the new hygiene design, which is expressed in an open structure. Thanks to the modular construction method, all components can be taken apart in a few steps and are thus very readily accessible and easy to clean. The sloping inclination of the machine surfaces contributes to this, allowing cleaning water to run off easily and completely. The new industrial Slicer 906, which can perform up to 2000 cuts per minute at a cross section of 300 mm x 45 mm, impressively combines performance and hygiene. The blades and cutting edges are equipped with a special quick clamping device allowing a 50% saving in product changing times by comparison with predecessor models. The Compact Loader CCA600 and 800 also follow the new hygiene philosophy through their modular structure and the option of continuous UV sterilisation. The new Slicer 405 is able to achieve up to 600 blade revolutions per minute. The cutting shaft width can be adjusted up to 300 mm and products up to 1200 mm long can be processed. The machine is attractive through its automatic portion completion. All installations are also equipped with a novel touch-screen operating console that works in an easily understandable and interactive manner and thus allows simple and efficient operation.

As a member of the Weber Group, the firm Textor Maschinenbau GmbH from Breidenbach, Germany, displays distinct differences in this field of applications shown by leading manufacturers at this year’s IFFA.

In connection with maximum hygiene requirements during cutting, FAM nv from Kontich in Belgium must also be mentioned. Both the structural design and, for example, the highly refined and smooth surfaces (0.8 μm Ra-value) and special seals for separating product and non-product areas contribute to this. All the surfaces are designed in such a way that water can run off safely on its own.

New trends in counter slicers

The range of counter slicers at IFFA 2013 was characterised by exceptional diversity regarding the number of exhibitors. It seems that all providers are endeavouring to present improvements and innovations and they all showed machinery that satisfies high customer demands. It is not possible here to go into all the improvements and innovations on show in detail. Instead a few selected trends are highlighted here. Evidently manufacturers in this field are aiming to provide not only outstanding cutting qualities and sundry additional functions, but above all energy efficiency and equipment ergonomics, allowing easier handling and operation.
The Master Slicing Machine 3020 fixes the food to be sliced safely in position.

The new Validoline line models from Bizerba GmbH & Co. KG from Balingen, Germany, can be selected as an example of this. They are available as gravity cutters with an ergonomic sloping blade position of 40° (GSC280) and as vertical cutters with a sloping blade position of 10° (VSC280). During development great value was attached to energy efficiency. The new Validoline machines GSC280 and VSC280 do not use any electricity when in stand-by mode, and only about half the power required by the predecessor generation in idling mode. Alongside the engineering and design, which are oriented to maximum hygiene, the new refined surface finish Ceracean helps achieve these goals.

With their Profi, Master, Semi-Automatic and Automatic slicing machines, the firm Gebr. Graef GmbH & Co. KG from Arnsberg, Germany, has been a reliable partner of catering, craft trade and meat production for many years now. With its broad product palette, the company can respond flexibly to all specific customer requirements. The new Cerac 3 coating distinctly improves reliability, hygiene and effective handling. It is a combination of PTFE and fine ceramic particles that guarantees extremely high abrasion resistance and resistance to chemicals. Thanks to a higher coefficient of sliding friction, sticking of the sliced material is ruled out and at the end of the shift cleaning work is reduced.

All the machinery systems are characterised by their ergonomic design. In the area of Semi-Automatic and Automatic slicing machines, the chain frames work reliably with the patented chain links and the patented feed system that ensures safe food fixing right down to the last slice.

The slicers presented by the firm Sirman SPA from Padua in Italy are particularly attractive. They unite new developments in cutting technology in an optically appealing manner with a historical-nostalgic design. This predetermines the equipment for presentations at parties and receptions, or simply for a high-grade nostalgia concept in shop design.

**Automation and integration into lines**

Alongside its claim to high hygiene and energy efficiency, Bizerba believes in the flexibility of its automatic slicing machines. In future the Scaleroline A550 can be linked via a web service with the statistics software “statistics.Brain”. Thanks to the presence of new interfaces, the A400 can be combined with any packaging machine in a system or in a production line. Meat, meat products and sausages can be sliced automatically in precise portions and are deposited in stack or fanned form on a conveyor belt leading up to the packaging machine. Bizerba makes this software available to its customers. In this way production codes can be compiled in real time to produce informative reports. The difference between target and actual values in the delivery quantity is shown in easily understandable form. Gender managers, production managers or other responsible officers can study the latest statistics via the internet from wherever they are, using an additional web service. With the option of connecting further machines and systems, control weighers or even foreign body detectors to the software, process connections can be identified more quickly.

In the Scaleroline A550 that is suitable for automatic slicing, fanning and stacking of nearly all sausage and meat types up to a width of 210 mm, software adjusts the cutting thickness directly after the first slice, guaranteeing packaging precision down to the last gram. The system is over two metres long but only 80 cm wide, allowing simple transport on wheels into other rooms, for example for cleaning.

A flexible modular construction method also allows Schindler und Wagner GmbH & Co KG from Plüderhausen, Germany, to configure specific product lines for slicing sausage products, boiled ham, meat, bacon, raw ham or cheese exactly in accordance with customer needs and wishes. Based on the “all in one” principle, the complete systems are controlled via a central PC and monitor and evaluations are read out centrally. Automatic machine system chains allow high production speeds with minimal labour input. An attractive feature of Schiwa-production lines is their almost 100% yield. Two measuring operations, before and after slicing, make this possible. Before slicing, the subsequent cutting parameters are calculated via a line laser system and a line pre-weighing unit, while after slicing control weighing with the option of subsequent correction and feedback to the control is carried out.

With its FP100 and FPE155 systems, the firm Maja-Maschinenfabrik Hermann Schill GmbH & Co. KG from Kehl-Goldscheuer, Germany, also follows the trend towards offering complete line systems. The machinery manufacturer sets standards with its installations for precision weight portioning and slicing, placing, sorting and conveying fresh meat.

Here model product hygiene, compact design and outstanding weight precision are united with constant slice thickness and clean slice surface.

The volumetric slicing method with frosted meat pieces guarantees a comparatively high degree of equalisation and optimal give-away of the individual slices and of the entire package. A cleanly sliced surface is ensured by using a spiral blade, while a rotating chamber system allows continued...
These slicing machines combine slicing engineering with nostalgic design.

The integration of a “Hygienic Robot Cell” in the further course of the line makes it possible to insert the slices of fresh meat in the right position in the respective packaging trays. This equipment leads to altogether greater hygiene and product safety at high cost-efficiency and short pay-back periods.

The new slicer generation presented by Treif Maschinenbau GmbH from Oberlahr, Germany, from its starter model Divider orbital right through to the high-performance slicer Divider 880 with automatic loading, covers the entire customer bandwidth, from craft trades and medium-sized companies to major industrial applications.

Thanks to the cutting and transport system SAT, the slicer and inserter of the Divider 880 are optimally tuned to each other. SAT stands for “Slice and Transport”, so that the finished packages can be safely removed while the next package to be cut is forked up directly beneath the blade. The Divider 880 can be combined with a control weighing unit, or a simple smart feeder or can be combined with an automatic feeder line with shunting function, reinforcing its claim to flexibility coupled with the possibility of creating complete lines. An innovation at the trade fair was the portioning cutter Falcon hybrid for boneless or bony fresh meat products. The combination of a 4-D camera system with modern image processing technology makes yield-optimised cutting possible. Four cameras measure the product prior to cutting and guarantee cutting processes with a high yield. It is possible to combine this with various other further processing modules.

With its Portio 1 and Portio 3 systems in a number of different variations, the Belgian firm Marelec Food Technologies from Nieuwport sets standards for developing modern cutting technology. The systems are characterised by program-controlled cutting at high cutting speeds. They are built up on a modular system and allow high cutting precision. This is made possible by using one (for flat products) or three (for bulky products) 400 Hz cameras. The presence of a CIP cleaning system ensures high hygiene standards. The cutting angle can be selected between 0°, 30° and 45°. Thanks to the company’s own MBE software it is easily possible to integrate the machine, for example, into a packaging line.

Another innovation at the fair was launched by Nock Maschinenbau GmbH from Friesenheim in Germany – the round blade slicing machine Quattro Slicer 380. The round blade cutting machines guarantee a clean, smooth cut without any prior frosting at very smooth running of the system and extremely high service lives of the blades by comparison with other cutting machines.

With its product family IC and ICC, the firm MHS Schneidtechnik GmbH from Abstatt, Germany, was well placed in the field of slicer machinery at this year IFFA. For example in the ICC2010, the software allows free programming of the cuts. The scanning unit en-
sures precision portioning by weight of both bony and boneless products. This is achieved by determining the volume of the respective products. Clear symbol icons allow very easy operation.

The firm Food Technology Thielemann from Heidenheim with its BBS1 and BBS2 systems has specialised in cutting poultry breast filets. The machine was developed specially for double, connected breast filets. The equipment is designed as inline machinery upstream of portioning systems. Oscillating knives guarantee optimal cutting qualities.

The slicing machines produced by Grote from Columbus, Ohio, in the USA, are characterised by their large range of applications and flexibility. The patented Accu-Band cutting system makes it possible to slice products with different cross sections. Machine sizes are available for both small firms and large industrial applications. The new Log End Slicer from this company was an innovation at IFFA. It allows large-volume slicing operations to recover additional usable slices from every sausage ("meat log") sliced. This cutting system produces usable slices of high quality from end pieces that otherwise would have to be re-worked, placed in storage or sliced manually. The Log End Slicer can take up and process end pieces from two or more high-speed slicing machines. It can be set in such a way that it slices the complete end pieces or automatically ejects the respective sausage tip. An easily removable conveyor carries each slice away from the slicer so that it can be deposited in a large storage container or bag provided by the customer.

**Knives and blades are essential for new slicer and cutter machinery**

Without suitable blades or cutting tools, neither the enormously high cutting speeds nor the good cutting quality of the products could be achieved. Some of the leading slicer manufacturers use their own and specially developed blades. Other machine manufacturers trust tools from leading blade producers. For example, Weber uses blades from their own in-house production. Their new Durablade slicer blades require very low re-sharpening frequencies. The blades operate without any coating. A new RFID-Chip system in each blade is connected with the Weber sharpening system so that sharpening is possible specifically depending on the respective degree of wear.

For many years now the firm Astor Schneidwerkzeuge GmbH from Storkow, Germany, has been a reliable and proven service provider for machine manufacturers in the field of cutting technology and for final users. Their slicer blades stand for high accuracy of run-out (+/- one tenth) and contour precision (0.5 to 1.0 mm). The "Astral" blades offered by this company are characterised by distinctly improved service lives. The blades are available in different surface finishes, e.g. hard chrome-plated, anti-adhesion coated or corrosion-resistant and uncoated. The blades offered match the machines of a large number of well-known manufacturers.

The firm BE Maschinenmesser GmbH & Co. KG from Sprennhausen, Germany, was also present at this year's IFFA with a series of innovations and new developments. The main focus evidently lies on
distinctly higher service lives of the blades. By using special steels (Perm Edge), a triple service life of the blades between the individual re-grinding operations is ensured. The knives, made from combination materials, excel not only with comparatively long service lives but also through a reduction in total weight, which leads to a reduction in energy outlay – especially during starting up and slowing down of the blade. The company is working on developing blades from ceramic materials in order to increase the service lives even more.

The manufacturer Grund & Bunse Maschinenmesserfabrik GmbH from Remscheid, Germany, offers high-precision blades with pronouncedly long service lives and lasting stability. This is based on a special hardening process. The cutters excel through high precision during slicing and low friction with the product. This in turn allows comparatively low energy consumption levels.

A well-known manufacturer of slicer and other blades is the firm GW Steffens GmbH from Remscheid, Germany. Steffens blades are characterised by a special elliptical cutting section that allows particularly high slicing speeds for fresh meat and sausage, as well as cheese. The blades are offered with different surface properties tailored to the specific products (with or without various coatings).

**Development trends in modern cutting machinery**

IFFA 2013 once again shows the high performance capability and enormous potential for innovation in the butchers’ and food machinery manufacturing industry. The following essential trends and developments can be identified in the field of slicing machinery:

- Leading manufacturers are focusing on a new hygiene philosophy in designing their machines. This is evident for example from the open construction design of machines and systems, with special, extremely smooth surfaces or the use of new materials.
- Industrial cutting machines are usually no longer designed as individual installations, but instead can easily be integrated into complete line systems, starting from product infeed, through the actual slicing operation, to packaging, labelling and even joining up of complete shipping packages.
- Energy efficiency is a key aspect in cutting machinery too. This is achieved by using modern servomotors, optimising cutting tools as regards form and surface condition, or intelligent controls.
- Ergonomics and industrial safety as well as user-kindness play a major role in the design of cutting machinery. This applies for both industrial cutting equipment and counter slicers. It is demonstrated, for instance, by the use of modern touch-screen operating elements or via the presence of additional protection devices.
- Precision, performance capability and flexibility are the fundamental requirements made of slicing machinery. They are achieved above all by using modern scanner systems, connected with corresponding evaluation, control and instrumentation technology.

In the field of blade and cutting tool development, all manufacturers display a distinct trend towards higher service lives. This is attained by special hardening methods and the use of novel materials and/or coatings.

**Acknowledgements**

Thanks to all company representatives for the interesting discussions conducted at IFFA and the provision of photos. Without them the article would not have been possible in this form.

**Wolfram Schnäckel,**

Prof. Dr. Ing. Dr. h.c., is Professor of Food Technology, especially for products of animal origin, in the Department of Agriculture, Ecotrophology and Landscape Development, Anhalt University. His field of research comprises especially size reduction, in particular chopping and mincing of foods.

**Author’s address**

Wolfram Schnäckel, Anhalt University, Department “Agriculture, Ecotrophology and Landscape Development”, Strenzfelder Allee 28, 06406 Bernburg, Germany