Efficiency and safety all down the line with high pressure processing

The high pressure treatment of packaged food is generally recognised as one of the most promising technologies to reduce harmful bacteria in meat and poultry products and other foodstuffs.

Thanks to several technical innovations which have been submitted for patent, Multivac has now succeeded in integrating high pressure treatment into automated packaging lines and in increasing the economic efficiency of this technology.

While advocates of consumer protection demand a high level of food safety, consumers tend to choose natural products with the least amount of chemical preservatives possible. For these requirements, high pressure treatment (high pressure processing = HPP) of packed foodstuffs is the technology to choose.

It deactivates micro-organisms, such as salmonella or listeria, without losing the natural nutritional value or the taste of the product. At the same time, less preservatives are required in most cases.

The machine manufacturer Multivac has now succeeded in integrating HPP systems on a modular basis in automated packaging lines.

"The automatic loading and unloading of the HPP system means we can achieve maximum throughput and continuous product flow. It significantly reduces the processing costs per pack," Tobias Richter, product manager at Multivac, told International Meat Topics.

Furthermore, integrating downstream and upstream modules for the automated quality inspection and labelling the packs reduces production costs and optimises processing and product safety.

HPP systems usually consist of a pressure chamber, a loading system with so-called loading trays, high-pressure pumps, a water circuit and a control system. The products to be treated are placed in the loading tray with a handling module, such as the one from Multivac. This is then inserted into the pressure chamber. The chamber is then sealed and filled with water. A pressure of about 600 million pascal (6,000 bar) is generated in the chamber by the pumps.

After the specified holding time has elapsed – which can vary from 40 seconds to three minutes – the pressure chamber is depressurised and emptied and the loading tray withdrawn from the chamber. This completes the cycle.

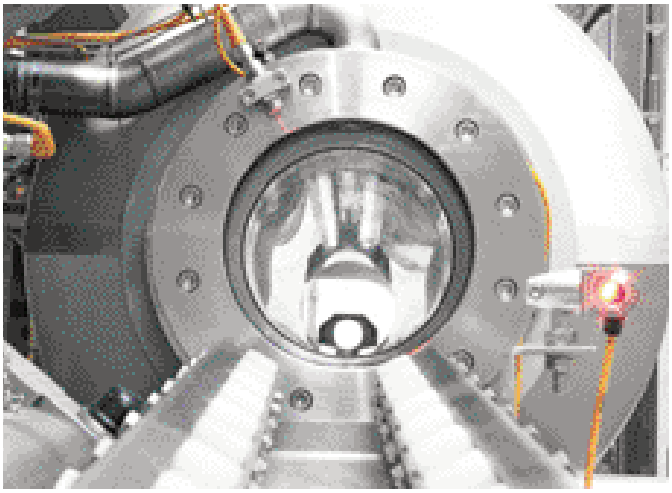
Optimum stability

The pressure chamber and the loading trays are cylindrical in shape to withstand the high pressure.

"With this shape, high pressure is distributed evenly along the surface. Nature uses this rounded principle, for example seen in chicken eggs, which are not damaged despite their thin shells," added Tobias.

For high pressure systems to be practicably integrated in automated packaging lines, the loading trays need to be specially designed for automatic loading and unloading.

Most containers currently available only have a small opening at the top,



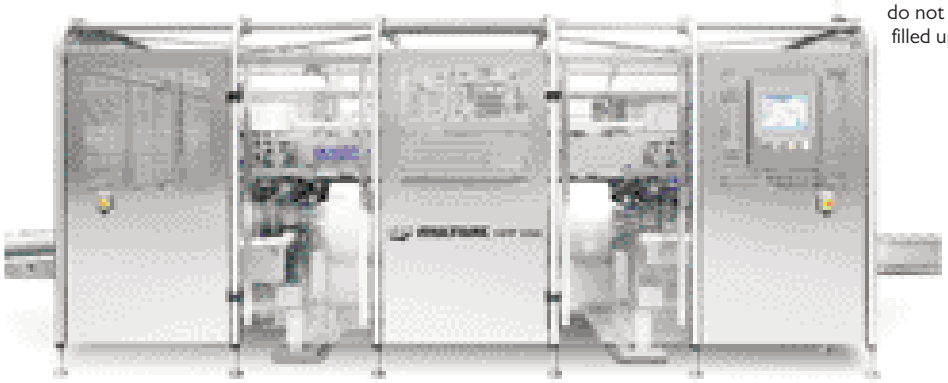
in which the robotic gripper is not able to reach effectively enough.

This is why the packs could never be automatically extracted after treatment. So, Multivac developed a new, groundbreaking design for the transport container, which has also been registered for a patent.

The Multivac transport containers are also cylindrical. They can be unfolded and closed in two halves automatically, making them far more accessible for the automated handling modules and very easy to load and unload.

The filling level of the loading tray and the pressure chamber is crucial for the throughput of the HPP system. In turn, this also depends on the shape of the packs.

For example, for rigid film packets with corners, the cylindrical transport containers do not get filled up 100%.



To optimise the loading quantity of the pressure chamber, Multivac defined pack-specific loading models.

Here it is specified which packaging is placed in the loading tray and by which type of automated handling module, in order to treat as many packs as possible in one cycle.

The loading models can be saved in the machine control. This ensures the pressure chamber is loaded to the maximum for each product.

In addition, the innovative loading trays are designed with special inserts to minimise the volume of round containers that are unfilled.

This reduces the cycle time as well as the processing costs, as only the minimum volume of water for the pressure needs to be filled. On the other hand, this also stabilises the various packaging layers in the loading tray.

Four tons per hour

For integrating the HPP systems in automated packaging lines, Multivac adjusts the production cycle output of the packaging machines optimally with cycle output of the HPP systems.

The HPP systems are available in various scalings for this: alongside the single chamber system with volumes of 55, 160 and 350L, the pack-

Continued on page 30

Continued from page 29

aging specialist from Allgäu developed a tandem system with a capacity of 700L (each with 350L) in cooperation with Uhde High Pressure Technologies, the high pressure specialists.

Depending on the product and the filling level of the chamber, this achieves an output of up to four tons of packaged goods every hour and is therefore unique on the market.

For the tandem system, as well as the160 and 350 litre systems, the filling level is optimised by using chambers with a large diameter of 380mm, which maximises the output of the packaging line. While one chamber is being loaded and unloaded, the high pressure treatment of the packs is carried out in the other chamber.

By using an intelligent optimised cycle for both pressure chambers, the system provides very short cycle times and the highest throughput on the market at the moment.

Both chambers are supplied by the same pressure generator, thereby optimising the cost/performance ratio further.

Integrated lines

As paper packaging labels do not often withstand high pressure treatment due to the use of water as the pressure medium, Multivac implemented a solution for subsequent HPP treatment labelling.

First, the packs pass through the integrated drying tunnel by Multivac. A continuous quality check can also be performed in the packaging line using inspection systems.

Multivac also offers solutions for the automated loading of secondary packages and palletising them.

With the integration of the individual line components, Multivac is able to demonstrate the complete packaging and HPP process up to palletising the final packaging.

All components correspond to the Multivac quality standard. Multivac and Uhde High Pressure Technologies meet the highest safety standards and fulfil the ASME/ISO certifications for high pressure treatment systems.

Advice service is critical

The Multivac global service organisation with over 60 branches, has the required spare parts and wearing parts available and can be on site quickly if needed.

This ensures minimal response times and maximum machine operation time for the customer. For high pressure treatment, it is advisable to devise an optimum packaging design for each product.

In addition, many Multivac customers also want to be able to check the extension of the shelf-life and the taste of their products that were under high pressure.

Multivac and Uhde High Pressure Technologies have set up testing capacities to do this and can advise customers on an individual basis, due to their many years of experience and wide-ranging know-how.

Such advice from the provider of packaging solutions is particularly important in the area of high pressure treatment, since the right selection of parameters within the packaging line is critical to the production line being run with optimum efficiency. ■

MEAT MICROBIOLOGY

10 – Hygiene swabbing – how valid is it?

Have you ever stopped to ask how meaningful environmental or hygiene swabbing really is? It certainly is not scientifically accurate, but it can be a very good management tool to identify areas that have been inadequately cleaned.

This being the case, why pay more for an 'accurate' count when a simple 'Yes/No' or 'Dirty/Clean' result is all you need?

In other words, why not use the same spend to take two or three or even four times as many swabs or do the same number of swabs and save money?

Colony forming units count

Most laboratories give a count of cfus (colony forming units) per swab because to try and relate the count obtained to per cm^2 of surface is totally meaningless and misleading. This is for two reasons.

Firstly, the laboratory has no control over how accurately or thoroughly the area to be swabbed (usually 16 or 25cm^2) was swabbed and, secondly, the proportion of the bacterial population removed from a surface depends on the nature of the surface swabbed and the amount of pressure used to apply the swab to the surface.

At the end of the day, bearing in mind how quickly bacteria can multiply, all we need to know is whether an area swabbed was 'bacterially clean' or 'bacterially dirty'.

This being the case, what is the point of swabbing an area that is 'visibly dirty' because it will invariably be 'microbiologically dirty'!

Thus, before we even worry about hygiene swabbing we need to satisfy ourselves that our cleaning team are getting things 'visibly clean'. Then it all comes down to psychology. To get staff co-operation and to ensure the QA staff seek out dirty areas we need to develop a culture based on improving our hygiene or positivity and not one based on punishment or negativity if bad results are found.

Psychology comes into play when you are planning your swabbing schedule because if your cleaners know which areas you are going to test it is in their best interests to ensure those areas are thoroughly cleaned. This is often done at the expense of other areas!

I always remember going into a food plant in the 1990s where the new QA manager, who had just recently graduated, took great pleasure in showing me her swabbing schedule for the next month which she had put on the noticeboard in the staff canteen. It precisely defined where each swab was to be taken! She was proud that since she had started swabbing the results had been excellent! We do not want excellent swab results – we want results that will pinpoint shortfalls in the cleaning programme and process so we can improve the situation.

To do this there is one key word and that word is random.

- Where we test should be random (but concentrating on food contact areas).
- The day on which we test should be random.
- The time we test should be random (for example day and night shifts).

In essence, we need to have an approach under which testing can occur at any time and test anything. If we do this, then we should see an improving hygiene picture!

It is human nature to relax after having been examined. This also occurs with cleaning teams. So, why not test unannounced on two consecutive days or shifts? Often the second results are poorer!

Educate and motivate

Results are not state secrets! Use them to educate and motivate your cleaning, production and maintenance staff. Why not find a way of depicting your results graphically so everyone can see how things are progressing over time?

This can easily be done by giving each swab's results a numerical value and then calculating the mean. This can then be shown in a graph on which horizontal lines have been placed that represent 'good' and 'unacceptable' levels.

Obviously, much of what has been said here is just as applicable to ATP swabs. ■