Chick processing and automation within the hatchery

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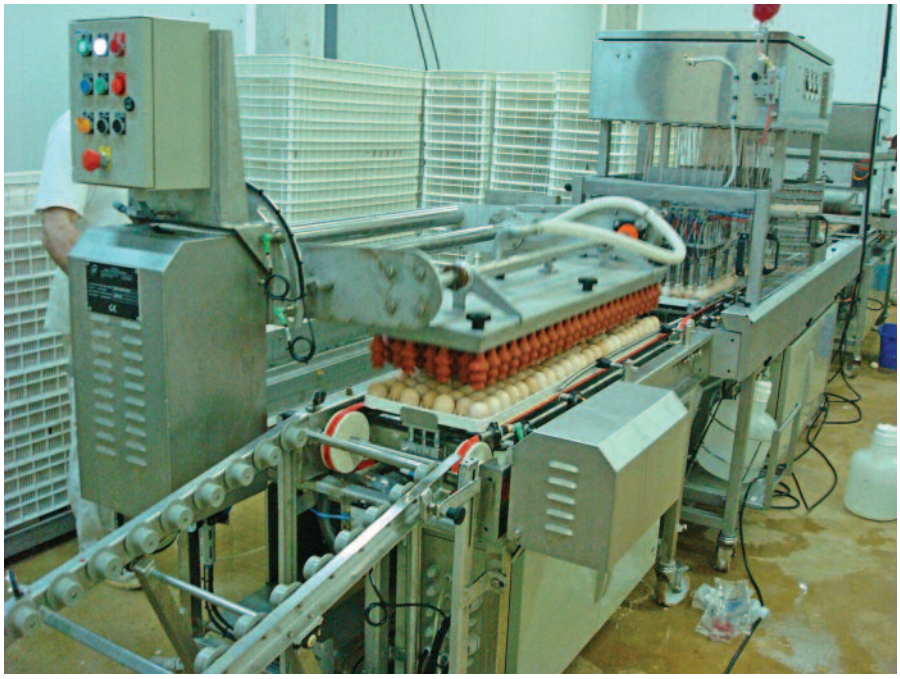
Chick processing automation within the hatchery field started with the use of tables. The counting of chicks was done directly by the operator from the hatcher baskets into the chick boxes, until the first automated systems consisting of grading lines, waste screw augers under hopper, sexing and vaccinating carousels and later chick counters appeared on the market.

Chick processing automation can be divided into two major parts:

- The first part is the 'transfer room' where eggs from 17-19 days are removed from the setter trays to the hatcher baskets. At this time all the eggs can be candled in order to remove the clear eggs or dead embryos, while the live eggs are transferred manually or automatically to the hatcher baskets.
- The second part is the actual chick processing, which starts two or three days after the eggs have been transferred.



Transfer line from setter to hatcher trays.

Reducing labour inputs

At the end of the 1980s and beginning of the 1990s hatchery automation became important, especially for the broiler sector, because of increasing volumes, but also due to higher labour costs and the reduced labour available.

Then, production levels started to rise without the need to hire more people and the automated chick processing system became a rule within the hatchery sector.

Complete production lines, including hatcher tray stackers and destackers, chick/shell separators and chick counting machines became very useful, cost effective and time saving tools for the hatcheries, allowing a faster chick despatch to farms.

This then became more important as the distances between the hatchery and the farms started to increase. For hatcheries producing more than one million chicks per week, the heavy work done by the operator got reduced and started to be partly replaced by machines, such as stackers and destackers.

The role of the operator then changed as he just had to infeed the hatcher tray dollies into the destacker and set chick box stacks onto the buggies. No manual operations are now done during the chick process operation.

Only one or two people are then required to realise a manual culling to control and remove bad chicks. Therefore, a process that used to require 10-20 people in the past would now require just 3-5 people.

Economies of scale

Hatchery automation in chick processing lines presents many advantages enabling the sector to reduce labour costs, and get a better flow rate without modifying the accuracy of the process. This is one of the major economical aspects of such changes.

Another important economical aspect is the need to build bigger hatcheries instead of having various small ones. This is in order to cut down on the fixed costs and concentrate the running costs at the same place.

The automated equipment installed within the chick room depends on the size of the hatchery, the type of production (broiler, layer or breeder hatchery) and the economical situation of the country. The most common standard equipment within the chick processing line is the chick take off line with or without sexing carrousel, the tray tipper (manual or automatic), the vaccinating carrousel, the chick counting line and the tray washer.

However, mainly in Europe, more and more hatcheries produce different types of chicks to be processed on the same line. It is more and more common to find the production of standard feather sex broilers, free range and/or organic chicks on the same site.

In addition, the slaughterhouses require improved flock uniformity as well as sexed chicks, so automation has to adapt to such changes in the production process and be more flexible. This means new sexing lines have to be incorporated into the production line during a daily chick process.

The full automation equipment with destacker and grading line has to be connected and fitted to a new network of chick conveyors with chick by-pass in order to

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integrate or not the sexing line, taking into account that hatched chicks can go directly to two different chick counters or be diverted with a by-pass conveyor, towards a sexing line. The sexed chicks are then carried onto the chick counting line. One counter line is used for females and the second one is used for males. Different flocks mean a tracking system to record daily chick data too.

The chick quality within the chick rooms has become one of the main concerns especially for non integrated hatcheries. Chick quality has improved globally due to automation, mainly because chick handling is taking less time than manually.

However, if the hatchery decides to use an automated chick/shell separation system, in order to get an optimum quality of birds it is highly recommended to candle and remove the clear eggs before by means of an automated egg candling at 18 days with removal of clear eggs and early dead embryos' eggs.

Otherwise, on old flocks, soft shells of unhatched eggs may break during the chick/shell automated separation process and the egg liquid would soil the chicks.

In cases where no removal of clear eggs and early dead embryos is done before separation, chick/shell separation will have to be done manually to preserve the chick quality with old flocks.

The chick counter's accuracy is also very important. Before, a considerable number of operators were needed to count the chicks manually. Consequently, the counting result and the average speed was not very good. Now, chick counting needs to follow the constant flow of an automatic chick take off line and an 0.5% counting error is not acceptable.

The accuracy of the chick number in each box is also very important. More controls are done on arrival of the chicks at the growing farms since the income of the farmer is dependent on the quantity of chicks received. A new generation of chick counters offers accurate precision for the counting of chicks and also an individual tracking system which can be connected to the hatchery's main network system.

The collection of the daily production data is then available as well as the possibility to compare the collected information with the data generated at egg transfer.

Bird health care has also become a concern with hatchery automation and manufacturers have started to design equipment to suit the welfare needs of the chicks. Most of the large retailers do audits of hatcheries to check that live birds are being well treated during processing. For example, all junctions between two chick conveyors or two different levels during chick production have to be significantly reduced.

Automation needs to respect new rules in term of design and speed of conveyors and chick counters. In addition, the unwanted chicks must be culled shortly after hatch with limited suffering. Therefore, hatcheries are now adding a parallel line to the main chick processing line to bring these chicks to a cockerel killer or any other device approved by the authorities, in order to kill them without suffering

Waste elimination

The other important point in using automated equipment in the chick processing line is the treatment of waste within the hatchery. The normal way is to collect all the waste from the egg room, transfer room, hatcher room and chick room at one point and to store it in a big tank.

In an automated environment, the waste is removed by means of a vacuum network system which can be directly connected to the candling and clear egg removal unit for the egg liquid and shell separation or to the automated chick and shell separating module. The waste is then usually treated by incineration. Nevertheless, as the cost per ton to treat such waste is very high, hatcheries are currently looking for new solutions to get rid of the waste at reasonable costs.

One economical solution permitted by automation is to separate the waste into different categories (such as shells or egg liquid) and eliminate it via various technologies.

Some of the waste (such as clear eggs) can be recovered and used by other industries. On the other hand, separation of waste also

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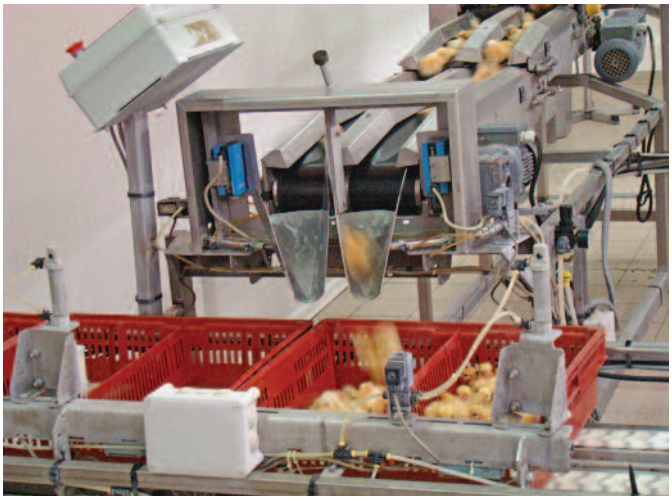
Chick/shell tipper and separator.



Chick counting machine.

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improves the efficiency of some waste treatment technologies such as composting.

Four different categories of waste can be considered – clear egg liquid, dry egg shell, dead chicks and other wastes (coming from hatchers, wet wastes).

The clear egg liquid can be sold or given for free to a third party, dry shells can be treated at low cost, while the other waste can be incinerated or treated differently, depending on the legislation applied in the country. In such cases the hatchery does not have to carry the high costs for getting rid of the waste.

Another important aspect is sanitation. The use of industrial washers, even in countries with low labour costs, presents many valuable advantages for the hatcheries. It allows a good washing quality and a good sanitation result, better than manually.

The efficiency of such an automated washing process is considered profitable for the hatchery regardless of the number of trolleys, egg trays, chick baskets or boxes to be washed. Also, the hot water can be maintained at a constant temperature for a better quality of washing.

Benefits of automation

Another advantage of such equipment is the water savings due to the water recycling system by means of a recycling tank. The equipment can also be sanitised straight away. In addition, having less people operating in a hatchery producing several hundreds or thousands of chicks per week, also reduces the contamination related to the people working on site. Last but not least, the automated chick process in the hatchery has greatly reduced injuries related to repetitive movements or back problems in relation to people lifting heavy weights.

ECAT as a global hatchery automation company offers a wide range of automated and semi-automated systems, for small and large hatcheries, with benefits combining speed, labour savings, animal welfare, better sanitation, general chick quality and also automated vaccination systems for chicks.

In conclusion, the automation process, due to its various benefits, is reaching more and more hatcheries all over the world even in countries where the labour costs are still relatively low. The first stage of automation within the hatchery will be the purchase of a grading line and washing equipment, and then step by step the hatchery will integrate a chick counting line, a waste disposal system and a transfer line including automated egg candling with an egg removal system and an egg transfer unit.

The automation process has changed the way of working in a hatchery, but various steps are still to be made in the near future in order to adapt automation to the new requirements of today's hatcheries.

Hatchery automation will evolve in the near future in order to adapt to the new requirements of chick processing systems. ■