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From farm to fridge

Milk reception – a question of quality

Milk, a valuable foodstuff from time immemorial, is a staple element of the diet in almost every country of the world. But a glance at the entire chain from production to processing to the distribution of finished dairy products shows that there are very different logistical structures in different countries.

GEA Diessel has been expert in professional milk handling on board tankers and at the reception point for more than 50 years.

Centralised industrialised processing of milk still plays a minor role in some countries. In China, for example, only three per cent of the almost 25 million tonnes of milk produced is processed industrially; in other words, practically the country's entire milk production never enters the formal trading system at all, but is processed and sold on a private basis. In New Zealand, by contrast, almost every drop of approximately 15 million tonnes of milk produced is processed into a wide variety of products in large-scale facilities.

It goes without saying that when milk processing is so highly mechanised, everything must be done to guarantee the quality of the product. Recall actions are expensive and damaging to a producer's reputation on the market. The resulting losses are incalculable. Traceability from the end product back to the raw milk, i. e. practically to the production, is by no means merely a bureaucratic fig leaf, but an important practical tool in this sensitive industry. Thanks to its network of specialist companies all over the world, the GEA Group, as an expert in the foodstuffs industry, is in a position to offer its customers complete overall concepts.

Quality begins at the cow – with hygienic conditions

Among the companies of the GEA Group, an important partner for dairy firms is Westfalia Surge. With its wide range of milking, refrigeration, feeding and herd management technology, it lays the foundations for milk to be

sold as a quality product right down at the farm itself. Tuchenhagen Dairy Systems, also a GEA Group company, offers automation concepts that stand for rational and reproducible processes. In addition to controlling the production process itself, the constantly updated representation of the processes and the demonstrable recording of all production parameters are factors that are becoming more and more crucial to food processing companies. The "OTAS Track & Trace" concept, developed by GEA, provides an unbroken record of all process steps and their process

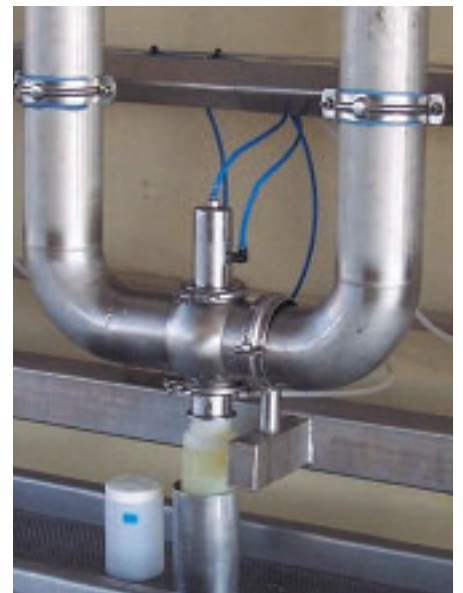


Officially calibrated reception system with flow meter, operator terminal and voucher printer

parameters, in accordance with the principle of "source – route – destination". Laboratory results, for example, are integrated into this concept alongside the process step they are related to. This offers the possibility of tracing individual batches all the way back from the processing plant to their source at any time. With such an integrated and interconnected quality management system, any problems or incidents can be identified in good time, i. e. before the product leaves the premises, and this simplifies the search for the cause, allowing the overall damage to be kept within limits.



Air separator with continuous level measurement



Sampler of type PT with integrated rinsing device

GEA Diessel is a specialist in the reception of milk to the tanker from the refrigeration vessel at the farm. During the subsequent transportation to the dairy and all the way to the monitoring of the discharge or reception of the raw milk there, it is also possible to keep a continuous record of data for the Track & Trace concept. Through the incorporation of all the data collected right up until processing into

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Self-filling reception equipment in the cellar

Samples kept in the refrigerator



the facility's internal logging system, an effective overall solution can be achieved.

Stationary reception equipment

In GEA Diessel systems, important quality parameters such as quantity, temperature, composition of the milk and any extraneous materials that may be present are initially recorded and documented on the spot. In modern facilities, therefore, stationary reception units are used to monitor the discharge of the milk.

Open reception vessels are of course a thing of the past, since particles of dirt that have fallen from the ceiling are the last thing one wants to have in the milk. Completely enclosed pipe systems with air separators, which facilitate the "managed" separation of air and milk, serve at the same time to determine the precise quantity of milk received.

How big the air separator should be depends on the desired flow speed during reception. Depending on the capacity of the tanker and the reception logistics, pump throughputs of between 20,000 and 120,000 l/h can be achieved. The piping must of course be adapted to such high flow speeds, so that the fluid dynamics do not impair the quality of the milk unnecessarily. Scientific investigations of

raw milk quality have shown that flow speeds above two m/s must be avoided.

How does an automatic stationary reception unit function?

In order to reduce the turnaround times of the tankers, the reception process must be error-free and fully automated as far as possible.



Reception station for raw milk from tankers

First of all, the driver identifies himself at the reception terminal by his trip number, then he connects up the hose from the vehicle to the reception panel of the discharge station. After that, a start button, for example, can be pressed to indicate that everything is ready for discharge.

In modern vehicle fleets, a cross-sectional sample of the trip has already been taken on the tanker during the process of collecting the milk, for use in the laboratory tests that are necessary before the milk can be released. Thus the risky process of extracting samples manually from the tanker is eliminated.

When the tanker's load has been approved, the operator in the control room selects the target storage tank and starts the discharge process. From now on, everything runs automatically. Reception conditions are most favourable if the milk can initially flow from the tanker to the air separator by gravity. This means, however, that the reception station must have a cellar or a sump. The level control of the air separator then ensures that the milk is conveyed onwards to the direction of the storage tank. As it is the quantity of raw milk that forms the basis for payment, highly accurate measurement is required.

A metering system approved by the weights and measures authorities will include the air separator and GEA Diessel's officially approved IZM flow meter. Detectors in front of the meter also check that the air separator is doing its job properly. Any irregularities are reported, or the unit adapts automatically to changes in circumstances in respect of the quantity of air bubbles detected. Any lack of tightness at the hose and pipe connections is also identified and signalled.

Bubble detectors and automatic plant regulation avoid cavitation effects, thus protecting the system components and the milk. During the regular unloading process, the milk is as a rule free of entrained air. But as the end of the discharge process approaches there

is naturally some turbulence in the compartments, through which air is inevitably entrained into the milk. Even an optimised tank outlet with a vortex breaker cannot completely eliminate this effect. If milk is discharged simultaneously from a number of compartments in parallel, the situation becomes even more complex. It is then particularly important for optimum regulation of the reception process to be achieved, in order to ensure that quantities are correctly recorded.

At the end of the reception process, the continuous level recording in the air separator helps to detect when discharging is completed, and monitors the precise delimitation of quantities as between successive tanker loads. When reception is completely finished, the printing out of a log for the driver can be triggered automatically. Whether or not this is done, the reception data is always transmitted from the terminal to the data server for further processing. Thus the reception station is immediately ready for the unloading of the next tanker.

Naturally, alternative reception concepts are offered to take into account the most diverse local conditions. Milk can of course be received automatically even if there is no cellar or sump.

A variety of standard reception units is available, but individual solutions are also devised in consultation with the customer. For preference, "unit" systems are offered in which all the individual components are mounted on a single frame; these then only need to be set up in the reception area in accordance with the "plug&play" principle and are ready for operation very quickly as soon as some simple electrical and mechanical installation work has been done. In view of specific local factors, many countries require different solutions; in a globalised business, flexibility is more important than ever. In tropical countries, for example, it may be necessary for all pipes that are located in the unprotected outdoor area to be automatically rinsed out after every reception procedure. Although this certainly necessitates more complex control procedures, these do help to ensure the quality of the raw product.

For milk reception stations that have to deal with a very high number of vehicles, GEA offers "on-site truck management" systems. Such systems monitor or direct each individual tanker through the entire time it spends on the premises – arrival, lane allocation, laboratory release, cleansing etc. In particular, cleansing schedules have to be reported and the cleansing procedures used for each individual tanker documented with ever increasing

frequency. In some vehicle fleets, for example, reception of milk is refused if the tanker has not been properly cleaned, or the last cleaning was too long ago.


Batch tracing using representative sampling

It is possible to use stationary sampling to monitor the quality of the milk received. If this is done, it is important that this data too should be integrated into the "OTAS Track&Trace" concept already mentioned. As a consequence it is possible to pinpoint the origin of the problem as having been on the tanker, during the trip or perhaps even at the producing farm. The basic prerequisite for this is once again that proper sampling should take place with minimum possibilities for errors or manipulation.

The GEA Diessel sampler of type KS-P is a simple but in most cases adequate sampler that takes a cross-sectional sample during the discharge of the milk from the tanker. For cases in which entrainment effects need to be reduced and contamination avoided, GEA Diessel offers the PT type sampler: with this type, all sampling areas are rinsed out automatically, and the device itself is installed in a cooled housing, guaranteeing that the milk sample itself will be of high quality. In this way, possible false conclusions from the assessment of quality-relevant process parameters are avoided.

To ensure that the data of the sample taken is assigned to the correct trip, vehicle etc., its identification, e. g. by barcode or RFID tag, is integrated into the "Track&Trace" concept.

Summary

Thanks to the technological networking of its companies and its global coverage, the GEA Group is in a position to fulfil market requirements for unbroken traceability in the dairy industry. GEA Diessel, with its mobile and stationary reception systems, represents the logistical link in this chain between producers and processors. Thanks to its many years of activity all over the world, it has an enormous wealth of experience in this technology, enabling it to react flexibly and innovatively to customers' particular requirements. The objective is to ensure that quality-relevant data from peripheral procedures on the tanker and during stationary reception are incorporated into the overall "Track&Trace" concept, in order to guarantee effective traceability. 

High performance in a small area

For whole cheeses, Multivac's new B 400 conveyor belt machine is a flexible and economic solution for packaging bulky products in pouches, using the smallest possible area. The B 400 conveyor belt machine, "a vacuum chamber machine with automatic feed conveyor", is suitable for packaging products of different sizes in pouches. "The machine is designed for medium-sized and industrial users, who have to pack some very bulky items, but must be economical with their production space", says



Bernd Jokele, Head of the Chamber Machine Business Unit at Multivac. "With the B 400, customers can make the best use of their limited space without compromising on quality, performance or hygiene." The B 400 also saves on personnel costs, as only one person is required to operate the machine and handle infeed and outfeed.

The filled pouches are taken automatically along the conveyor belt into the chamber, where they are evacuated and sealed on two 1,020 mm sealing bars. The pouch excess can be separated and extracted if required. The B 400 can carry out up to two cycles per minute, depending on the product and the level of vacuum that must be achieved.

Crease-free airtight seal seam

Multivac machines come with several quality features: the construction of the stainless steel side-frames, for example, is highly robust and user-friendly, and the machine is designed for easy cleaning and hygiene. The housing of the chamber lid guarantees maximum safety during operation. On the B 400, a 5-mm wide seal bands together with a precise impulse seal and water-cooled sealing bars to provide a fully airtight and durable seal seam. The B 400 has optional manual seal height settings.

The B 400 completes the Multivac conveyor belt machine range, which also includes the B 500. Maximum performance and pack size are main features of this second model. With 2 x 1,320 mm seal lengths and two to three cycles per minute, the B 500 is designed for very high pack performance and for packaging large items. Automatic seal height setting at various levels is an additional optional feature, which makes the machine particularly user-friendly. □

Inline robot grouping

Simplicity, flexibility, maximum future-proof investment – these are the features offered by the new inline robot grouping, according to KHS. The particularly gentle handling of finished packaging is another challenge, which compensates for the ever thinner walls of the bottle or can packages or cartons and pouches used.

The KHS inline robot grouping is designed for the handling of a wide variety of finished packaging. All packs are conveyed synchronously to the Innopal RK4 four-axis robot. Pack manipulation elements like turning stations and gap splitters are not needed. Reconfiguration work for new formation needs is just as unnecessary as investment in additional manipulation elements. The robot's gripper elements are coated with plastic and



The KHS inline robot grouping is predestined for the handling of a wide variety of finished packaging (photo: KHS)

flexibility results from the head of the Innopal RK4, which can be adjusted between 120 mm and 400 mm. The use of servo motors enable fully automatic changeover. PC-based robot controls offer a number of advantages like online help or online transmission of new programmes from the KHS headquarters. Reprogramming on site is also feasible with the KHS inline robot grouping. The user specifies new package dimensions, a programme calculates different possibilities for formation setup. □