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TEMPERATURE, HUMIDITY & MOISTURE CONTROL

## A guide to making the right choice

## Spray for success – pages 16-17

**INDUSTRY FOCUS:** Food processing & packaging

# Spray for success

Water plays a vital role in the process industry, so companies are always looking for equipment that can enhance its utilisation and re-use. **Alfa Laval's** Toftejorg tank cleaning systems are designed to do just this

If the drought conditions of the last couple of years have achieved nothing else, they have brought home to everyone just how precious water is. With UK rainfall levels frequently falling below those of Mediterranean countries, the scarcity of water has become a major concern for all sectors of industry.

In general, the process industries have woken up to these new realities pretty quickly. Water plays such a vital part as an ingredient, as a medium for heating and cooling or as a cleaning agent in CIP that efficient water utilisation and re-use are becoming key factors in plant design and operation.

Efficient CIP is central to quality and efficiency particularly when it comes to the tanks and storage vessels on which so many processes depend. Properly planned and executed, tank cleaning does more than simply bring tanks back to their specified hygiene level. It can also improve process performance, slash water, energy and chemical consumption and, consequently, boost profitability.

Alfa Laval's Toftejorg tank cleaning systems are said to be among the most advanced available today, and are in use across the process industries, brewery, food and pharmaceutical sectors.

## Meeting the standard

In the food industry, rotary cleaners remove burnt food residues and biofilm and clean tanks equipped with agitators or baffles. In both the pharmaceutical and personal care markets, Toftejorg products meet the hygienic standards of the FDA, EHEDG and other approval authorities and are suitable for a wide range of viscous, foaming and thixotropic products.

That the systems work irrespective of operating conditions and fouling level is demonstrated by an installation at the Iggesund board plant at Workington in the Lake District. The Iggesund plant is home to the largest folding carton-board making machine in Europe and has the capacity to produce around 235,000 tonnes of board per year, with different grades used for quality packaging of consumer goods and pharmaceuticals, tobacco and cards and media.

Carton board consists of several layers of pulp, bonded together during the board making process. Prior to refining and bleaching, raw round wood pulp, with a solids content of between 3 and 4%, is stored in 64m$^3$ tanks – known in the trade as chests – made of concrete and lined with ceramic tiles. The pulp is frequently held at temperatures of between 60 and 80°C. If it sits too long, bacteria and other spores can grow and create what is known as "dead stock".

## Examining the alternatives

In the past, Iggesund attacked the problem manually. An operative stood at the entrance to the chest and simply blasted away with a high-pressure hose. This was both time-consuming and fairly haphazard. Any of the foreign matter or bacterial build-up that the hose failed to remove could create problems further down the line. So the company examined different ways to carry out the chest cleaning operation.

**Toftejorg products meet the hygienic standards of the FDA, EHEDG and other approval authorities**

"We looked at various alternative methods, including automatic cleaning systems," said John McGibbon, of Iggesund, "and among them was the Alfa Laval Toftejorg equipment. We started off by buying a Toftejorg MultiJet 40 rotary jet head machine that we simply mounted on a pole and connected to a hose and used it to clean a number of the chests. "

Iggesund also used the MultiJet 40 trial system on a chest that they had previously cleaned manually and were astonished by the results; what came out of the supposedly "clean" chest were big, black lumps of solidified matter that the manual cleaning had completely missed. It was that specific experience that convinced them to opt for the Toftejorg system.

Cleaning all 16 chests by hose was originally a two-man operation that took at least 32 man-hours. Now, one man

completes the same task in a fraction of the time. Thanks to the Toftejorg cleaning machines, each bank of four chests is thoroughly cleaned in a 45 minute cycle. More to the point, the computer-designed spray pattern of the Toftejorg equipment ensures that every square centimetre of the chest is thoroughly cleaned, eliminating any risk of dead stock and subsequent production problems in the mill or on the board making machines. Since the cleaning process is performed with pin-point accuracy, water usage is also kept to a minimum.

In complete contrast to the industrial environment of the Iggesund application, the ultra hygienic setting of the dairy sector is where many of the toughest cleaning/sterilising challenges are to be found.

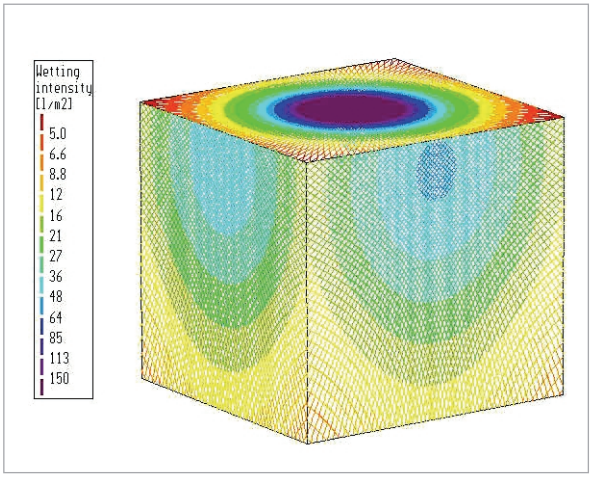
Alfa Laval's Toftejorg Sani-Mega rotary spray-heads are suitable for the vital job of CIP (Cleaning in place) silos and other dairy storage vessels. Toftejorg installations in Europe and in the UK have produced savings of 50% or more in pre-rinse flow rates when used to clean raw milk silos; sufficient to pay back the initial capital investment in 12 months or less. These savings are based on dairies with a typical throughput of several million litres of milk every week which, previously, had used conventional means such as high pressure, high speed, rotary spray-balls to clean their raw milk silos.

## Common configuration

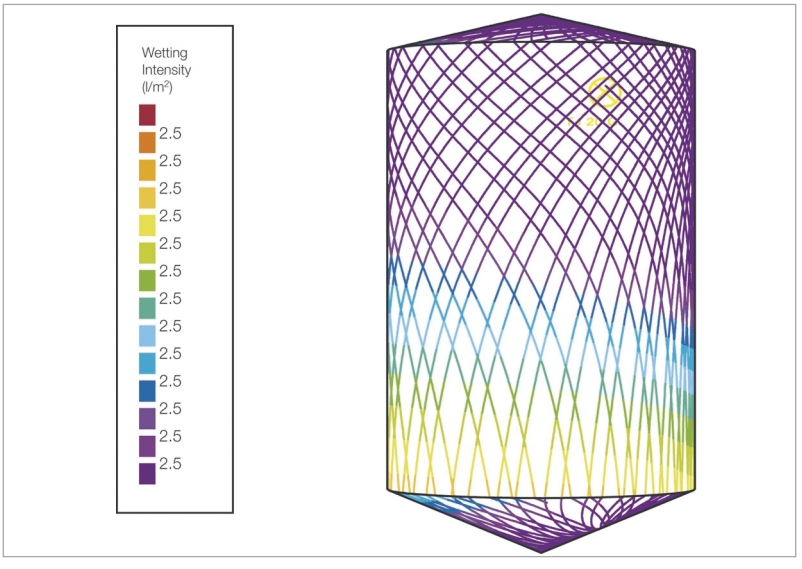
Although the configuration of these spray-balls varies from dairy to dairy and tank to tank, one of the most common arrangement involves two fixed spray-balls in the top dish of the tank with a third located near the bottom-mounted agitators. This kind of installation operates at high speeds (250 rpm) under applied water pressure and deluges the interior of the silo with water. If a dairy performs 25 CIP operations every week on raw milk silos and uses approximately 16000 litres of fresh water for each operation, its total water consumption is close to 400,000 litres per week. This could add up to an annual water effluent charge of £50,000 or more, depending on the location and the local environmental regulations.

*'Properly planned and executed, tank cleaning does more than simply bring tanks back to their specified hygiene level. It can also improve process performance, slash water, energy and chemical consumption, and consequently, boost profitability'*

In stark contrast with the deluging action of the high-speed spray-balls, the Sani-Mega is a gear driven unit that operates at very low speeds (5rpm) and cleans through impingement and high levels of turbulence. It scrubs the silo's sides with fan shaped jets that cascade down the walls to produce a vortex action once they reach the silo bottom and outlet. An internal turbine and gear system enable the cleaning process to be controlled with great accuracy while the option of a feedback system enables the whole process to be recorded and repeated indefinitely.




**Software from Alfa Laval can simulate actual tank conditions and the performance of the machine in terms of detergent distribution and wetting intensity (above and below)**




While a typical spray-ball would use 5,500 litres per hour of fresh water for each CIP cycle, the Sani-Mega spray-head cuts the required volume almost exactly in half, to around 2700 lph. It also does the same with energy costs. For optimum CIP efficiency, the silo walls must be heated to 70°C. The distinctive fan shaped spray provided by the Sani-Mega transfers heat to the internal skin more rapidly. Consequently, even though water usage is reduced by 50% the silo attains optimum temperature just as quickly as with a spray-ball and, often, even quicker.

## Pay-back time

Based on such cost and efficiency gains, it is reasonably easy to calculate the pay-back time needed for the capital cost of replacing spray-balls with Toftejorg spray-heads. On average, this works out at 10-12 months, depending on the number of silos involved and the local environmental legislation governing white water disposal.

You do not even have to install a rotary cleaning machine to see if it will work on your application. Alfa Laval has developed a software programme called TRAX that simulates actual tank conditions and the performance of the machine in terms of detergent distribution and wetting intensity. Consequently, the optimum configuration can be determined before the equipment is actually installed to save time, money and that ever–more precious commodity, water.

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