masosine
Process Pumps

White paper on Certa pumps improving cheese production

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Introduction

There are a number of key benefits associated with using low-shear Sine pump technology to add value and reduce process costs when handling delicate or highly viscous products. Primary among the advantages is the ability of Sine pumps to reduce the quantity of fines produced during the transfer of cheese curd and whey, a capability that results in considerable savings of more than 20%. What's more, the remarkable clean-in-place (CIP) ability of Sine pumps, along with EHEDG Type EL Aseptic Class I certification, keep manufacturing uptime high and reduce the risk of product contamination.

Executive summary

This white paper sets out to show that MasoSine Certa pumps using Sine technology are offering significant benefits compared with other rotary positive displacement working principles, such as lobe pumps. The Certa pump series, which is proven by 3A design, EHEDG Type EL Class I, and even EHEDG Type EL Aseptic Class I, demonstrates both gentle product handling and ease-of-cleaning.

This will be explained and supported by independent testimony, as well as a growing number of case study examples worldwide.

The challenge

To remain competitive, producers in the cost-sensitive dairy sector are being driven by the need to maintain yield and increase output.

In cheese production it is essential to keep product integrity high and avoid waste.

To achieve these goals, careful handling of the curds and whey is one area that savings can be made. It is essential to reduce the amount of fines and retain the fat content of the cheese curd, so avoiding any transfer into the whey.

The solutions

System:

In addition to the choice of pump, the pipe diameter, length and bends, plus the number of valves in the system, all influence the handling of cheese curds. System pressure and velocity also have an effect, so a whole system approach should be taken.

The higher the system pressure, the more the cheese curd will be exposed to mechanical stress and product shear will rise. In general, pipework should be as short as possible, with a minimum number of valves and bends. Also the pipe diameter should be appropriate for the application to keep the system pressure low to avoid product damage by mechanical stress.

Pump:

The gentlest way of cheese curd processing is by manual handling or by gravity, but this is only feasible for smaller dairies that manufacture handcrafted cheese.

High volume cheese dairies employ pumps to handle the curds and whey. To keep quality and profitability high, it is important that those pumps operate with a minimum of degradation to the curds. Furthermore the pump is usually one of the more complex parts of the production process to clean. So a hygienic pump design is essential to reduce cleaning of the entire system, and importantly, reduce the amount of cleaning agents needed.

Pumps easily cleaned by CIP/SIP, help reduce the risk of product contamination. Those with 3A and EHEDG certification have been assessed by an independent third party, offering the end user security that they can easily be cleaned to a high standard.

Sine pump design

A single sinusoidal rotor creates four evenly sized chambers. As each chamber rotates, it gently conveys the fluid from the inlet port to the outlet port. At the same time, the opposite chamber opens to draw in more fluid, resulting in a smooth flow with virtually no pulsation. A gate stops fluid flow from the higher pressure outlet to the low pressure inlet.

“Maintenance of Sine pumps can be done within minutes in line without breaking the flanges”

Sine pumps versus competition

MasoSine Certa pumps have many advantages in cheese production, compared with alternative pumps of similar capacity.

Reduced fines:

In comparison with a lobe pump, the use of Certa can reduce cheese fines by more than 20%. In cheese manufacturing terms, yield is increased by approximately 900g per ton using Certa. For high-volume cheese plants, 900g per ton soon amounts to a significant saving, whereby ROI (return-on-investment) is typically achieved inside six months. This figure compares extremely favorably to most other typical efficiency projects, which entail technology investment with ROI of 18 months or more.

Gentle product handling:

Using low-shear Sine pump technology helps to reduce the amount of fines and keeps the fat within the cheese curds; an important aspect of retaining product integrity.

This results in improved yield due to increased amount of cheese manufactured from the same amount of milk. Furthermore, product quality increases due to the gentle handling and can command an increased price for a higher quality product.

Proven hygienic:

The design of Certa pumps is proven by 3A design, EHEDG Type EL Class I and even EHEDG Type EL Aseptic Class I.

The Certa pump is one of few pumps in the world which is certified by EHEDG Type EL Aseptic Class I. The aseptic certification confirms the bacteria-tight design when using a double mechanical seal. In addition, it proves that the pump can be steam sterilized.

Simple design:

MasoSine pumps have just one shaft and therefore only one seal system. Lobe and twin screw pumps, for instance, have two shafts and therefore two sealing systems. As a result, the risk of a seal failure is twice as high, with the consequential downtime and possible product contamination that would involve.

Furthermore, competitive technologies have to use a complex timing gear, which makes maintenance more complicated.

Spare parts of Sine pumps are interchangeable for pumps of same type and size, which helps reduce spares inventory.

The maintenance of Sine pumps can be done within minutes, in-line, without breaking the flanges. This avoids the need to have an additional back-up pump in stock.

With all these advantages, MasoSine Certa pumps are the perfect solution for handling cheese curds and whey.

Case study

A major Scandinavian dairy producer with a throughput of around 70,000 litre/hour of cheese curd and whey, and an annual output of approximately 70,000 tons of cheese, achieved an average fines reduction of 900g per ton of manufactured cheese, by replacing the existing lobe pump with a Sine pump.

The amount of 900g per ton of cheese does not sound a great deal, but simply by multiplying the annual output of 70,000 tons by 900g per ton, the additional yield is 63 tons of cheese each year.

Decreased fines results in higher quality cheese and therefore higher market prices. The price difference is as much as $1.37 per lb, a significantly increased profit of $86,600 per annum. So the ROI for the pump is six months assuming an installation cost of $43,300.

Savings in manufacturing process using MasoSine technology

Produced cheese (tons/year)	**70.000 tons**
Average fines reduction (grams) per produced ton of cheese	**900gm**
Increased yield of cheese (tons/year)	**138.9lb**
Average price advantage in USD for cheese compared to products made out of fines per lb product	**$1.37**
Increased productivity per year from the same amount of milk	**$86,200**
Cost of pumps	**$40,000**
Return on investment	**6 months**

Conclusion

Using MasoSine Certa pumps for cheese curds and whey reduces the amount of fines, while retaining the fat in the cheese, therefore increasing product quality and profitability. Furthermore, MasoSine Certa pumps reduce the cleaning cycle time and contribute to the reduction of required cleaning agents.

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Watson-Marlow Fluid Technology Solutions

37 Upton Technology Park
Wilmington, MA 01887

Phone: 800-282-8823
Email: info@wmfts.us

www.wmfts.com

WATSON MARLOW Fluid Technology Solutions

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