THE CLEANING OF THE MOULDS IN A CHEESE FACTORY

SERVI DORYL
CHEESE MOULDS EXPERT

ACKNOWLEDGEMENTS

This white paper was co-written with **Nicolas Morillon**, OLGA's Cheese Expert and shareholder in FROMAGERIE HAUT ANJOU.

www.fromagerieduhautanjou.fr

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It was produced with the help of the precious testimonies of :

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- The company SASSARO is specialised in the study, design, realisation and maintenance of industrial washing machines.

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SUMMARY

INTRODUCTION

The advent of plastic moulds in cheese making inevitably generates questions about cleaning. For beginners or experienced cheese makers, problems sometimes occur after a long period of use. At other times, a change in the set of moulds calls into question settings that were already well mastered.

The adaptation of detergent products to environmental constraints, manufacturing methods, improvement of yields: all these changes impact the cheese moulds. Sometimes, the knowledge acquired in the field by the cheesemakers, and which is not always written down, disappears at the rate of the departures of our elders towards a deserved retirement.

Mould manufacturers are naturally called upon to help with these questions. This is sometimes done in difficult times, even in "crisis management" mode, when unfortunately an abnormal situation generates product losses. At a time when dairy raw materials are expensive and consumer demand is becoming more complex, adaptations must be rapid. Time is of the essence.

The modest ambition of this white paper is to reiterate the basics, the fundamentals. This is not about solving complex situations, which will require in-depth examination in the workshop, and ad hoc actions. It is a collection of knowledge to help those who are looking for reference points.

To carry out this mission, it seemed important to us to solicit other actors. How can you talk about mould cleaning without mentioning washing machines or detergents? And how could we not submit our idea to a cheese expert?

It was during discussions with **Nicolas Morillon**, a long-time cheese maker, that the idea of a repository on the washing of cheese moulds was born. We quickly mentioned the participation of **Bernard Motard**. We consult him regularly, because of his role as a cheese expert within the Ecolab company. Finally, to talk about washing machines, we wanted to call on a company that is a reference in the field, Sassaro and its general manager, **Gaël Mathé**.

We would like to thank them for their participation, and hope that everyone will find answers to their questions here.

PART 1

GENERAL INFORMATION ON CLEANING

The term « **cleaning** » consists of removing the visible dirt on the surface of the material with the help of a solution, based on water and detergent.

The term « **disinfection** » consists of reducing the number of micro-organisms in order to avoid any contamination of foodstuffs during their production.

Within the cheese productions, it is important to maintain a good microbial balance. The objective of "cleaning" is not to eliminate all germs but to reduce their number. It will be necessary to preserve the flora useful to the production of cheese while getting rid of the flora of alteration and pathogens (bacteria, yeasts, fungi, moulds, viruses...).

We must therefore be careful about the very notion of « **cleanliness** ».

There are 3 types of cleanliness :

1. **Physical cleanliness** : remove visible dirt (curds...)
2. **Bacteriological cleanliness** : remove non-visible contaminants (bacteria, bacteriophages, viruses)
3. **Chemical cleanliness** : rinse and remove traces of used products

To summarise : it is advisable to eliminate the stains deposited on the surface of the material, without, however, freeing itself from all its flora.

There are 4 types of stains :

1. **Fats** : to remove them, use alkaline products, detergents and a temperature higher than 50°C
2. **Proteins** : they must be solubilised with an acid or an alkaline. An oxidising agent or enzymes are used to hydrolyse the proteins
3. **Carbohydrates** : they are sugars, they are soluble at moderate temperatures. Starch can be removed with acid or alkaline detergents or enzymes
4. **Mineral salts** : they are present in food and water. They can be removed with acids or chelating agents

PART 2

THE CHEESE MOULD AND CLEANING

For cheese makers, the cleaning of the moulds is very important both from a **microbiological** standpoint and for the problems related to **sticking** or/and to **draining**.

Drainage problems can be regulated by the cheese maker. Depending on the lactic or rennet character he wants, he will act upstream of the moulding.

The phenomena of sticking are of multiple origins :

- **Mould washing conditions** : temperature of the moulds and of the wetting, adequacy between the mould and the cleaning formula ;
- **Technological drifts and developments** : acidification defects, hygrometry, technical stops generated by breakdowns...

1. PRESENTATION OF THE TYPES OF MOULDS TO BE CLEANED

Two families of moulds are present on the market : **soft cheese moulds** and **pressed cheese moulds**.

The soft cheese moulds

There are different shapes of moulds : square, rectangular, oval, round... but also very specific shapes, in particular for the production of appellation cheeses such as **Neufchâtel**, heart-shaped or **Caprice des Dieux**, calisson-shaped. They can be made of different materials. But today, in order to generate economies of scale by automating and/or robotising, plastic moulds are the most appropriate.

In the case of farmers and small artisan workshops, the moulds can still be individual made of **stainless steel** or of **plastic**. However, in order to reduce handling and improve productivity, plastic moulds assembled in **block-moulds** (4x4, 5x4...) and equipped with **extensions** are increasingly used. They also help to avoid lids on turning.

Moulding solutions for soft cheeses can have **two forms** :

1. **An open system** with bottomless moulds, perforated or not, to be placed on mats and draining trays

2. **A bottom or double bottom system** with perforated moulds, which ensure both safe moulding and draining, with the possibility of mould-on-mould stacking

Depending on your automation, it is possible to assemble the moulds and the extensions in block-moulds and block-extensions. The block and extension-mould sets facilitate the **handling at moulding** with the distributors, **conveyors**, **turnovers** and **demoulding**. In addition, compared to individual bulk moulds, the cleaning of the block-moulds appears to be **easier** and **faster**. Indeed, the block-moulds facilitate the **automation of the cleaning in tunnel**. However, block-moulds with bottoms, which replace mats and draining trays, must be designed to be cleaned without dead zones (inaccessible or blind).

Pressed cheeses

For uncooked pressed cheeses and cooked pressed cheeses, there are **very large formats in individual pressing moulds** with individual pressing lids, but with self-service, there are also **small formats in multi-moulds** and multi-pressing lids which are similar to the block-moulds and block-extensions for soft cheese. Of course, the problems are the same as for soft cheese: **bacteriology, sticking and draining.**

Individual pressing mould and pressing lid

Block-moulds and block-lids

Historically, pressed cheese moulds were made in several pieces :

- **The body of moulds** : represented by a wooden, stainless steel or plastic cylinder ;
- **A natural fabric** in flax or cotton ;
- **A pressing lid**.

Today, industrially or to simplify ergonomics and washing, **the plastic mould is more used**.

There were transitions with the **hybrid moulds** still available from Servi Doryl's competitors. They were equipped with thermoformed polypropylene caps that were attached to the body of the mould with an elastic band or clip.

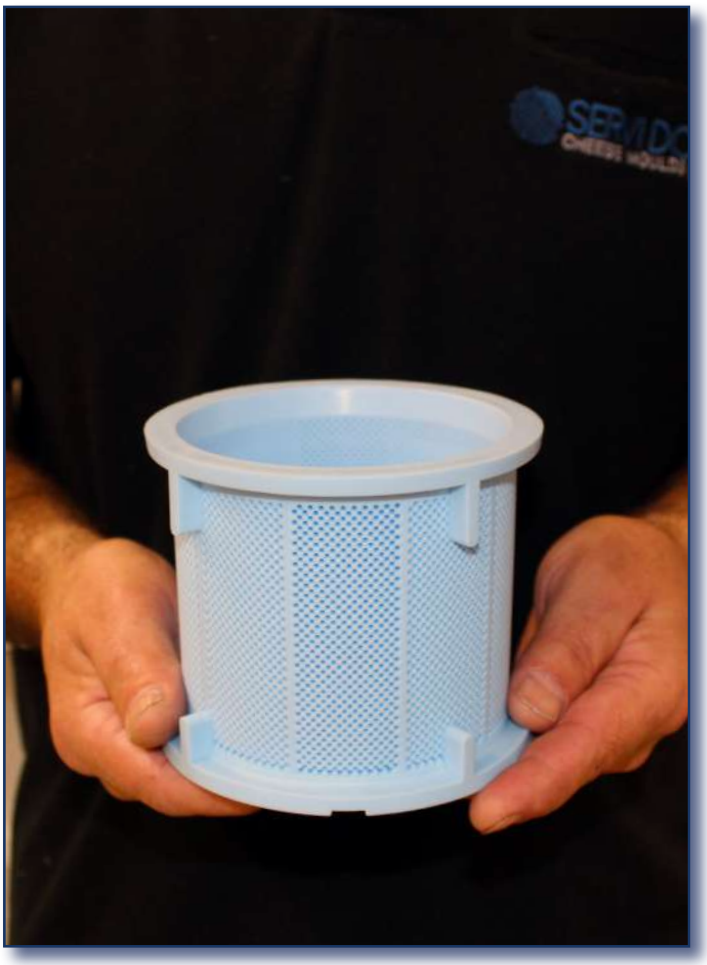
+ the advantage : the wicking effect of the fabric for draining: which created a drain and a surface condition on the cheese rind and facilitated the implantation of the natural smear and the demoulding.

- the disadvantage : cleaning of the fabric: which was very difficult and regularly caused sticking on the small formats as well as an increased risk of folds in the fabrics.

Plastic moulds have replaced hybrid moulds in industrial facilities.

There are 3 families of pressed cheese moulds :

1. **Microperforated injection moulds** made from **injection moulded parts**, **patterned** and **microperforated** have **large perforations** and are not made for heavy pressing. They correspond to soft cheeses and make « bearded » cheeses. If the cheese is pressed too hard, pimples may appear on the cortical area when removed from the mould.



Microperforated injection moulds are mainly used for :

The **uncooked pressed cheeses**, cheeses that are little pressed (Saint Nectaire, Reblochon, Tomme...) dedicated to a short ripening

from **200g to 5 kg** up to **250 mm**

All types of milk

A **manual** and **industrial use**

A **stackability of the material** if the design of the moulds allows it

- Economic
- Different standard sizes
- Different colours

- Not repairable
- Dimensions fixed by the tooling
- Tooling development required
- Specific low pressure recipes

2. **Microperforated injection moulds** are also designed from **injected patterned** parts. They are perforated in a second stage, after the injection and have **thinner perforations**.

The injected moulds, microperforated after the injection, are mainly used for:

Round cheeses or **ball shape** type **Gouda, Edam...**

200g to **5 kg** in **individual format**

up to **250 mm**

An industrial use **in block-moulds** or sometimes as **a replacement for fabric moulds**

- Complex form
- Possible assembly of block-moulds by polyfusion

- Large series required
- Limited choice of patterns

3. **Microperforated moulds** made from **plastic plates**, **patterned**, **perforated**, **boiler plate made** and **machined to the exact shape and** size : This is the mould that most closely resembles the old designs of the « fabric » cheese moulds. It is equipped with a **customised pattern** according to the needs of the product both on the marketing and process levels. Testing is required to find the right choice of pattern. The advantage of these moulds, with their pressing lids, is the **optimisation of the trimmings**. They can be adjusted « tightly » to have a « lace » of trimmings that will no longer exist after ripening.

Processing steps :

Polyfusion assembly

Cutting of plastic plates → Deletion and perforations → Shaping of the ferrule → Assembly of the pressing lid and the collar → Assembly with stainless steel parts if needed → Block-moulds assembly

The **uncooked to cooked pressed cheese** with any type of pressing (Emmental, Gouda, Comté, Morbier, Raclette...) dedicated to a **short or long ripening**

from **200g to 120 kg**

∅ 80 to 800 mm
200 x 100 to 1000 x 1000 mm

The **moulding**, the **pre-pressing**, the **acidification**

- Small series possible
- Custom design and manufacturing
- Possible repairs

- Higher investment
- Long development time (prototyping)
- Need for an adapted cleaning system

2. HOW DOES MOULD MAKING AFFECT CLEANING ?

2.1 TYPES OF MOULDS

Soft cheese

The surface condition of a mould or/and burrs can generate licks that favour lids during turnings. The dimensions of the moulds, the shapes, the heights of the extensions condition the number of turnings.

The number of holes or draining holes, their shapes and positions influence cleaning but also draining. That is why Servi Doryl has developed and patented a new generation of **HI-PERF®** moulds. Used for the production of soft cheeses, these moulds have specially designed perforations to improve draining, reduce standard deviations and reduce curd losses.

The equipment manufacturer who will provide the automation will ask for plugs, flats (belts...) that may be difficult to clean or sources of flow defects. **There should be no hollow bodies or areas where the curds and whey cling to the cheese**.

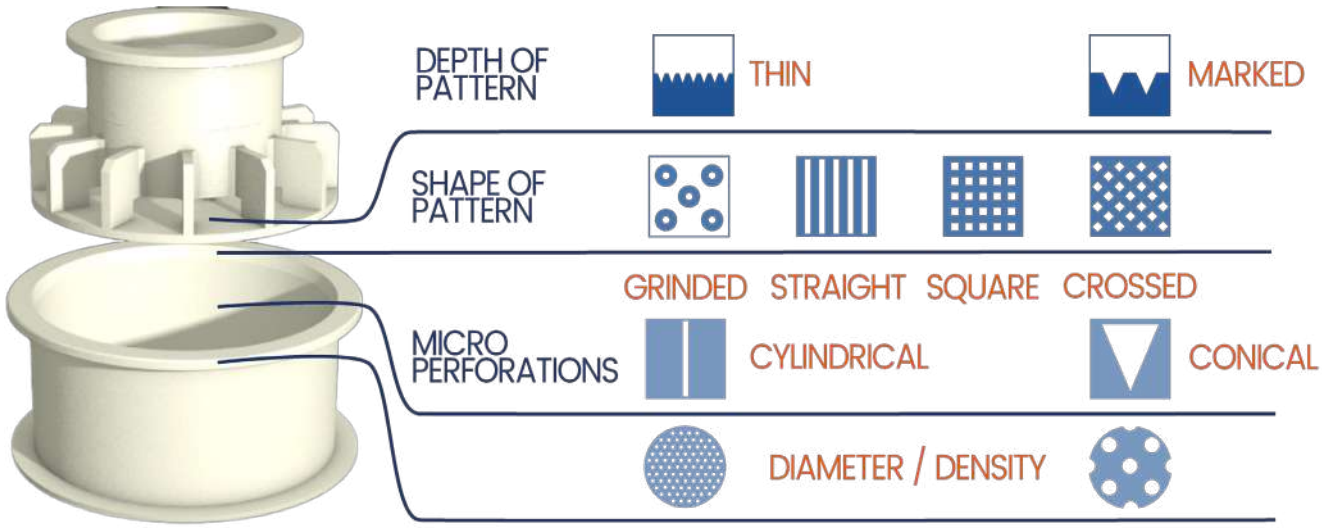
The design of a block-mould is multifactorial. It is therefore important to work as a team and to take into account cleaning, equipment, technology, fixed weight issues for cheeses sold by the piece.

Pressed cheese

In pressed cheese, the pressing lids can be equipped with springs, the block-moulds can have stainless steel frames to ensure rigidity and automation. All these additional elements create cleaning complexities.

When manufacturing the moulds, the type of pattern and the nature of the microperforations are also elements that should not be neglected.

The different combinations :



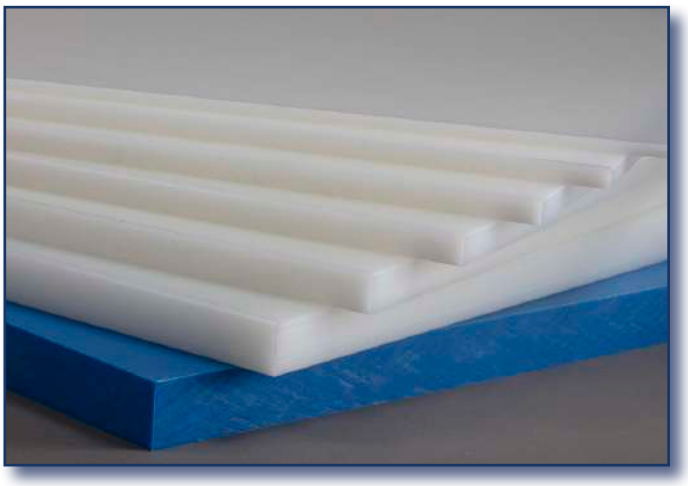
To avoid sticking and clogging of micro-perforations, Servi Doryl will help you choose the **combination of patterns/perforations** and will carry out the necessary tests with you until the most effective solution is implemented.

As with soft cheese, the design of the moulds or block-moulds and pressing lids must be studied with the various partners: the mould designer and manufacturer, the automation manufacturer, the detergent manufacturer, the cheesemaker to take into account the cleaning problems.

2.2 PLASTIC MATERIAL

The plastic materials used in the manufacture of moulds and block-moulds for pressed and soft cheese are mainly **polypropylene** and **polyethylene**. They are suitable for **food contact** and offer a very **great resistance** and substantial **longevity.**

However, plastic is not an inert material, it is a living material which ages with all the solicitations which it undergoes (interactions with the temperature, detergents, hygrometry, fats of the cheese...).



⊕
- Resistant to shocks, temperature variations, detergents, mechanical stress from pressing and humidity
- Easy to clean

⊖
- Sensitive to UVs (pay attention to the storage of the material)

A mould can have a life span of **10 to 20 years** depending on the conditions of use, cleaning and storage.

Sustainability can be improved by choosing :

- A **good daily cleaning** of moulds, block-moulds, pressing lids...;
- A **« soft » automation**.

3. TESTIMONY OF THE CHEESE MAKER ON HIS EXPECTATIONS

Whether for soft or pressed cheese, the design of a mould must guarantee good bacteriological results that correspond to the HACCP standards (Hazard Analysis and Critical Control Points) and not generate problems of sticking during demoulding.

Suppliers of cleaning products, tunnel washers and mould manufacturers have the expertise to help cheese makers. When changing or modifying a set of moulds or launching a new cheese, it is interesting to exchange ideas together in order to design and co-construct « hygienic » block-moulds.

- Nicolas Morillon
Manager of a cheese factory

PART 3

CLEANING DETAILS

1. CLEANING STEPS

Depending on the material : pressed cheese and soft cheese, it will be necessary to use different **pressures**, different **flow rates** and also different **sections**.

However, the **5 sections** to be respected to have a good washing result are the following :

Pre-washing

Pre-washing removes residual materials and thus increases cleaning efficiency.

This pre-washing section is carried out in **closed circuit** with **centrifugal pumps** and a water pressure of about **3/4 bars**.

The temperature should be set between **30°C and 40°C**. If you exceed 45°C, you risk denaturing the serum proteins, which may cause them to stick to the plastic, or cook the stain. However, if the water is too cold, degreasing will be less effective.

Between each zone, the moulds transfer water, so it is important to provide a **drainage zone** large enough to avoid solution displacement from the prewash tank to the wash tank.

Pre-washing is done cold,
with flow and pressure

Washing

Washing is also carried out with a water pressure of around **3/4 bars** with a flow rate of around **75 to 95m³** per hour. However, this may vary depending on the material. For soft cheese block-moulds, it is recommended to work with lower pressures than for pressed cheese moulds. In fact, for pressed cheese, the pressure must be higher in order to optimise cleaning and avoid clogging of conical or cylindrical micro-perforations.

To eliminate all bacteria, the company **Sassaro**, manufacturer of industrial washing machines, recommends programming a temperature of about **65-75°C.** However, in order to preserve the plastic materials in the mould, it is recommended that this temperature not be exceeded beyond **2 minutes**.

Depending on the detergent used, it is possible to have different reactions and results. **The temperature is therefore more or less adjustable**.

Some applications may require a lower temperature. For example, if you use acidic products, the temperature should be between 60-75°C.

On the other hand, if you use alkaline products, the washing temperature will be higher and will be between **70-80°C** maximum.

The frequency of washing in the alkaline phase is to be determined according to your results obtained with the acid wash. Generally, it is recommended to use the **alkaline maximum once a week**. Be careful not to overuse these products, as they encourage sticking. If this is the case, it will be necessary, before using your material, to wash it again with acid (**60°C maximum** for chlorinated alkaline).

The washing is done hot, with flow and pressure, acid or soda

Rinsing

Rinsing should be done to remove any residual product. It is carried out in a bath at a temperature **lower than 40°C**, close to that of the curd at the time of moulding.

In this area, the mechanical action is less sought after, the water pressure can be lower (**2 bars**).

Rinsing is done cold, with flow and pressure

Disinfection

Disinfection is the complementary step of the cleaning process. It will eliminate bacteria, yeast, moulds, spores, bacteriophages and any other virus. Here, it is preferable to opt for an **oxidising disinfectant** (with a fast action), such as peracetic acid. It is easy to rinse and has an interesting eco-toxicological profile. Indeed, it is degradable and causes little residue.

The final rinse called « network rinse »

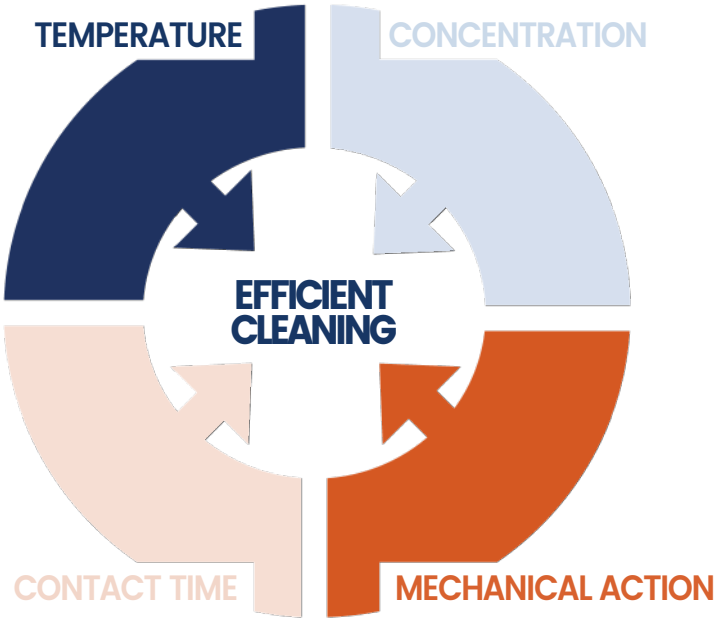
This last rinsing step is necessary to remove the cleaning and disinfecting agents. It will also regenerate the rinse and pre-wash.

The temperature of the final rinse should be adjusted according to the cheese technology in order to limit the sticking phenomena.

***For soft cheese moulds**, it is possible to add another section of cleaning upstream called « de-wheying ». As the material is more fragile, it is important to remove the pieces of curd before the pre-washing area. The de-wheying (pre-washing) can also be done in pressed cheese.*

***For pressed cheese moulds**, it is recommended to do a flow test to validate the cleaning once or twice a year as a routine or as soon as there is a sticking and/or drainage problem.*

2. GENERAL TACT REMINDER



Wash with TACT! This memo-technical means aims at applying the 4 cleaning procedures for an efficient and optimal washing :

1. **TEMPERATURE**
2. **CONTACT TIME**
3. **MECHANICAL ACTION**
4. **CHEMICAL ACTION**

If one factor changes, the others must increase proportionately.

Operating temperature

Its role in detergency is essential.

An adapted temperature will make it possible to :

- Reduce the surface tension of the product (wetting effect) ;
- Accelerate chemical reactions ;
- Eliminate and solubilise certain soils: A high water temperature allows the liquefaction of oils and fats and facilitates the penetration of the detergent ;
- Constitute an effective mode of agitation by convection and boiling movement ;
- Facilitate disinfection.

On the other hand, too high a temperature can cause risks, such as :

- Deterioration of certain machine parts ;
- Burn hazards ;
- Coagulation of certain stains ;
- And the high costs of thermal energy.

Mechanical action

Mechanical action is also a very important factor. It intervenes to create the necessary forces to pull out the dirt and to disperse it in the liquid.

It can be done in several ways, depending on the equipment available to you :

- **Manual cleaning**: with a brush or scraper ;
- **Soak cleaning**: mechanical agitation or bubbling with compressed air ;
- **Cleaning in circuit**: circulation speed in turbulent regime ;
- **Tunnel cleaning**: flow and pressure.

There are two main mould cleaning systems: **tunnels or washing cabinets** for automated installations and the **soaking system**.

The washing tunnel adds a favourable mechanical action to the effectiveness of the cleaning and disinfecting products.

In some cases, regular tunnel washing may not be sufficient. In this case, the material may require, in addition, a specific washing protocol (in tunnel or by soaking).

⇨ **To wash these facilities**, we talk about **CIP** (cleaning in place). This process makes it possible to launch the 5 previously described sections of cleaning which will take place in an automatic way. Mechanical action is very important, therefore, it is important to control the velocity, flow rate and flow to generate pull-out forces.

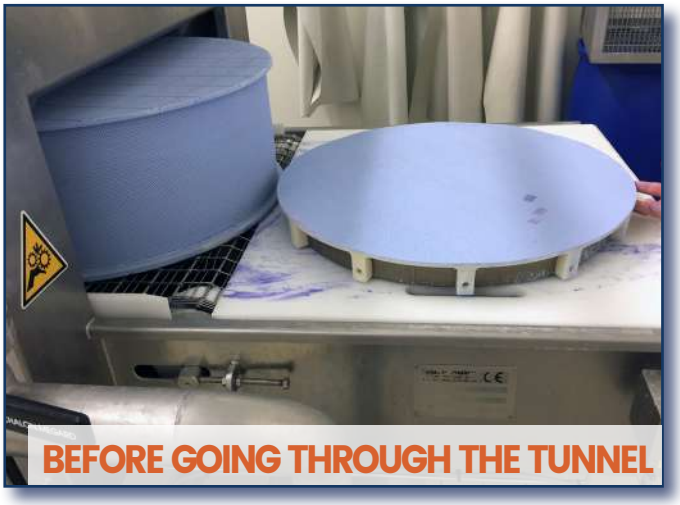

Cheese factory tunnel

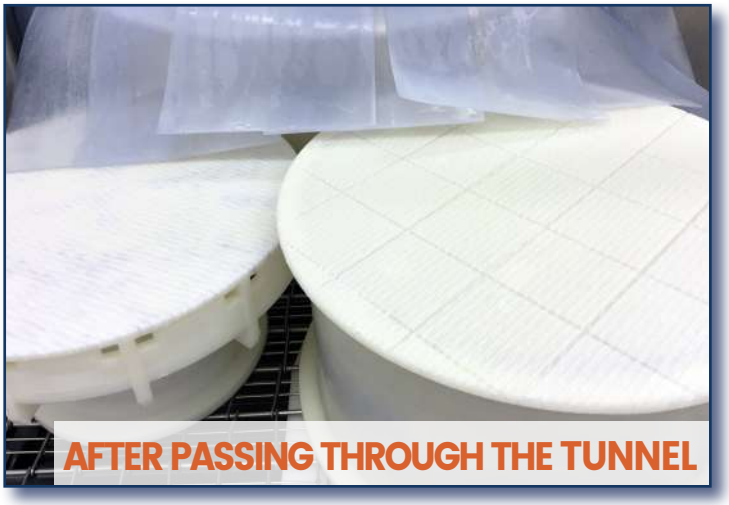
SOFT CHEESE


PRESSED CHEESE

In order to validate the proper operation of a washing tunnel, tests ***can be carried out to measure the mechanical action (Aquanta Blue - Ecolab).*** *A blue « coating » (coloured kaolin) is applied to the moulds, which are then passed through the different sections of the tunnel. Areas where the coating has not been removed indicate a lack of mechanical efficiency.*

This test allows us to make recommendations (corrective actions...).


BEFORE GOING THROUGH THE TUNNEL


AFTER PASSING THROUGH THE TUNNEL

Soaking equipment

When using **soaking cleaning**, it is recommended to stir the solution. In order to preserve the plastic materials of the moulds, soaking conditions should be limited to **60°C maximum for 15 to 20 minutes**. To prevent your moulds from looking greasy, the washing temperature is very important and **should not be lower than 45°C**. In this practice, it is necessary to be very vigilant on the renewal of the water and the maintaining of its temperature.

Concentration of the chemical

The most common problem in cheese and dairy production is generally compliance with the **concentration of detergents during the washing process rather than its determination. Indeed, a correct dosage of the product is necessary according to the quantity of soils to eliminate, the material, the method of washing and the hardness of the water.**

It is therefore recommended that you perform tests with your supplier beforehand and be aware of any changes in your application parameters.

If the **product concentration is too high**, you risk :

- Loss of active ingredient ;
- More difficult rinsing ;
- Discharge issues ;
- Additional phenomena such as foam, corrosion or allergies ;
- Potential residual traces ;
- Results that no longer increase and may fall.

On the other hand, if the **concentration is too low**, you will get :

- Poor cleaning with remaining dirt (lack of active ingredients).

Chemicals

Chemicals refer to the detergent or disinfectant solution, which is a mixture of a small amount of product with a large amount of water. Therefore, it is necessary to choose the right product and the right dosage (between 1 and 3% in general).

The choice of detergent will depend on several factors: **environmental and economic constraints, your cheese technologies** (soft or pressed cheeses), **your equipment** (washing tunnel or cleaning by soaking) and **your historical background** (problems to be solved, sticking...).

1. Acidic detergents

The purpose of acid products is to **dissolve mineral materials**.

The two main sources of acidity are **phosphoric acid** and **nitric acid**. However, their use is increasingly restricted for environmental reasons, especially in Europe.

This is why many cheese dairies and dairy productions wish to limit the use of this product, which in combination do however give good results. To replace them, detergent companies offer alternative solutions without nitric acid and phosphoric acid.

• PHOSPHORIC ACID

Phosphoric acid is the historical detergent in cheese making. It has a **strong solubilising power** and suitable **demineralising power**.

> *We recommend maintaining a regular shock treatment with phosphoric acid (once a week if possible).*

Phosphoric acid

Acid without phosphorus

• NITRIC ACID

The nitric acid has a **strong demineralising power**, but a **poor solubilising power** (small detergent power). Indeed, it will make it possible to eliminate the minerals but does not dissolve the proteins.

Moreover, nitric acid is an oxidising agent and can cause **oxidation reactions** and therefore **colouring of plastics**. It also tends to « burn » the plastic and harden it over time. Care should be taken with long exposure times, especially when soaking.

Nitric acid also tends to dry out surfaces and can therefore increase sticking.

• OTHER ACIDS

Hydrochloric acid is not used because it is too corrosive. **Sulfuric acid** can be used in small doses. **Sulfamic acid** is not very effective. **Citric acid** can help to limit sticking a little.

> *For the washing of moulds (pressed and soft cheese), the use of acids is absolutely necessary to « polarise » the moulds and avoid problems of sticking.*
>
> *Phosphoric acid seems to be the best, because it is a bit more fatty.*
>
> *Nitric acid and sulfuric acid dry out, so it is not recommended to use them, especially in soft cheeses, with technologies that are more sensitive to sticking.*

2. Alkaline detergents

Cleaning with alkaline products is sometimes necessary, in addition to acid cleaning, to solubilise organic matter (good cleaning efficiency). There are **sequestering alkali** , which in addition to **solubilising organic matter**, have **a demineralising action**.

Sources of alkalinity can be **caustic soda, potash, trisodium phosphate, sodium and potassium carbonates, silicates**...

⇨ Caustic soda is a **good solubiliser for removing organic matter**. However, its concentration must be limited to avoid depolarisation of the moulds. It is therefore advisable to use a complete product (soda + wetting and sequestering additives) to reduce the concentration of soda.

Complexing alkali

The use of alkaline solutions often involves the sticking of cheeses in the moulds. Chlorinated alkali may be a better alternative, but it must be used on clean moulds.

In soft cheese, **the chlorinated alkali** can be used in **punctual action** to maintain good cleanliness of the moulds. It is recommended to use it on « clean » moulds. On dirty moulds (from demoulding), chlorine is consumed on the material. The only thing left is the alkali which can cause sticking. On the other hand, it is important not **to exceed 55/60°C, as this may cause the stainless steel to break**.

Alkaline products are also more **difficult to rinse** than acidic products. It is therefore necessary to be very careful with the concentration used and proper rinsing in order to avoid scaling on the cheese (brown-black areas). For this purpose, it is possible to **check the pH of the water** on the mould at the tunnel exit. A quick method is the **phenol test**. On contact with it, poorly cleansed areas turn pink.

In most cases, it is necessary, after an alkaline washing, to rewash with acid before moulding the cheeses.

3. Disinfectants

Disinfectants are used to **eliminate micro-organisms (bacteria...)**. The most commonly used product is **peracetic acid**.

Peracetic acid is an **oxidising disinfectant** and **is easy to rinse**.

During the cleaning phases in alkaline or chlorinated alkali, it is preferable to avoid peracetic acid, which entails risks of neutralisation by the alkali and formation of chlorinated gas (extremely toxic with chlorine).

Peracetic acid

4. Formulated detergents

Cleaning product manufacturers formulate detergents to suit each application. These allow **a reduction of water, energy, time, effluents and corrosion**.

However, some small artisanal cheese dairies continue to order the basic raw materials (soda, nitric acid...), but the use of these unformulated products has **several disadvantages: lower efficiency, increased risk of corrosion...**

The development of a formulated detergent is complex and highly regulated: there are European regulations. In France, there is also the positive list, which includes all the components authorised for food contact. A detergent developed in Germany, for example, may not be authorised in France.

Classic detergent composition :

- **Surfactants :** they allow to decrease the surface tension to increase the wetting effect ;
- **Sources of alkalinity :** caustic soda, potash, trisodium phosphate, sodium and potassium carbonates, silicates ;
- **Sources of acidity :** phosphoric acid, nitric acid, other organic acid ;
- **Enzymes :** protease, lipase, amylase - to be used for specific actions. They help eliminate biofilms. As the enzyme is biological, it requires precise conditions in terms of Ph, temperatures and contact time. You must be careful to deactivate them at the end of the treatment ;
- **Anti-foam :** they may be necessary in some cases ;
- **Complexing agents :** polyacrylate phosphates, organic phosphates, EDTA, sodium gluconates... They allow calcium and magnesium to be trapped ;
- **Oxidising agents :** to boost the effects of an alkaline detergent (hydrogen peroxide).

The choice of the detergent depends on a certain **number of parameters** :

⇨ **On the soiling to be removed** ;
⇨ **On the type of material** ;
⇨ **On the method used** : for example, when cleaning by soaking, you can use a high-foaming detergent, which will not be suitable for tunnel cleaning (pump unpriming, solution overflow, etc).
⇨ **On the water quality** : For example, a scaling water requires the presence of complexing agents, an aggressive water will limit the choice of products to use.

Contact time

The product/dirt contact time is to be determined according to your **washing equipment**. In a tunnel, it is defined by the speed of the conveyor. In a cabinet, it is defined as cycle time.

In a tunnel, the contact time is the sum of the different wash sections. If the block-mould passes through the tunnel too quickly, the result will be of poorer quality.

In a tunnel, the wash rate determines the transfer speed. It is recommended to have a contact time around ***25 to 30 seconds for each mould****, i.e.* ***30 seconds of prewash****,* ***30 seconds of wash*** *and* ***30 seconds of rinse****. The process is fast, so pressure is key. Thus, pumps of 15kW per section allow for good washing efficiency.*

The proper positioning of the nozzles is also very important.

Washing tunnel - SASSARO

PART 4

EXAMPLE OF CLEANING OF A SOFT CHEESE BLOCK-MOULD IN WASHING TUNNEL

STEP	PRODUCT	DOSE	TEMPERATURE	DURATION
Pre-wash	Water		Ambient or warm	
Washing	Acid detergent	1.8% +/-0.1	75°C	1 min
Final rinse	Water from the network		Ambient	

PUNCTUALLY ⇨

STEP	PRODUCT	DOSE	TEMPERATURE	DURATION
Soaking tank	Alkaline	1.5% +/-0.5	60-65°C	20 min

PART 5

EXAMPLE OF CLEANING OF A SMALL FORMAT PRESSED CHEESE MOULD

STEP	PRODUCT	DOSE	TEMPERATURE	DURATION
Soaking	Alkaline liquid	1.38%	78°C	15 min
Washing tunnel	Non-foaming acidic liquid	threshold 2	78°C	
Disinfection	Bactericidal disinfectant	0.1 to 0.2%	Ambient	

PART 6

GOOD STORAGE AND REUSE PRACTICES AFTER PROLONGED STORAGE

1. GOOD STORAGE PRACTICES

Plastic materials can be stored after **washed** and properly **rinsed**.

In the storage phase, it is advisable to :

- Keep equipment **in a dry** and **frost free** building ;
- avoid **exposure to UVs** ;
- avoid **blows** on the material during operations, especially when putting it into storage.

⇨ Increased vigilance is required in the storage of **individual moulds** and possible **pressing lids**.

The appearance over time of yellow or orange colours is common for polyolefins (polyethylene, polypropylene, ...). In addition to the oxidants mentioned above, these stains can be promoted by darkness, certain gases such as nitrogen dioxide, or contact with cardboard or kraft paper. They do not affect the functionality of the products.

> *When only a part of the set of moulds is used, it is preferable to alternate the moulds in stock and the moulds in use, in order to guarantee a homogeneous evolution of the whole pool.*

2. FIRST-TIME USE OR PROLONGED STORAGE

Before first use, or after prolonged storage, in order to avoid sticking problems, it is recommended to :

- **Place the material 1 to 2 days in a high humidity environment** of 95% minimum. Beyond 2 days, there would be a risk of development of flora such as mould, bacteria, or yeast ;
- Conduct at least **5 acid phase cleaning cycles**.

> *Whether with soft or pressed cheese, a mould with its extension or its pressing lid that is well maintained, well stored, well handled and especially well washed, even after prolonged stoppage, can last for decades.*

ANY QUESTIONS ?

Through this white paper, we hope to have provided you with the necessary information or solutions to optimise the cleaning of your cheese making equipment.

If you have more specific questions, we would be happy to answer them.

contact us !

ABOUT SERVI DORYL

Since 1972, Servi Doryl has been exclusively dedicated to **designing and manufacturing moulds and specific products for cheese production**. It is by specialising in this way that Servi Doryl fully understands the constraints and requirements of its cheese-making customers, to **provide adapted and innovative answers.**

PRESSED CHEESE **SOFT CHEESE** **RIPENING**

Servi Doryl moulds in a few figures :

+ MORE THAN 10 M
CHEESES/DAY

+ MORE THAN 3,000
CUSTOMERS

66
COUNTRIES

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