























STALAM
Radio Frequency Equipment

Food division

	<i>Company Profile</i>	<i>2</i>
	<i>RF Technology</i>	<i>4</i>
	<i>Tempering and Defrosting</i>	<i>6</i>
	<i>Meat</i>	<i>10</i>
	<i>Fish and seafood</i>	<i>12</i>
	<i>Vegetables, fruit and more</i>	<i>14</i>
	<i>Technical data</i>	<i>16</i>
	<i>Applications for industrial bakeries</i>	<i>18</i>
	<i>Post-baking drying</i>	<i>20</i>
	<i>Baking of white-crust bread</i>	<i>24</i>
	<i>Pasteurisation</i>	<i>26</i>
	<i>Technical data</i>	<i>28</i>
	<i>Food safety</i>	<i>30</i>
	<i>Disinfestation and sanitisation of agricultural commodities</i>	<i>32</i>
	<i>Sanitisation of spices, medicinal and aromatic herbs</i>	<i>36</i>
	<i>Pasteurisation of bulk and packaged products</i>	<i>38</i>
	<i>Pasteurisation of liquid products in the tube</i>	<i>40</i>
	<i>Pasteurisation of liquid egg</i>	<i>44</i>
	<i>After-sale services</i>	<i>46</i>
	<i>Test & Demo facilities</i>	<i>48</i>

Company Profile

Established in 1978, STALAM is the world leader in the development, design and manufacture of equipment where capacitive electromagnetic fields at I.S.M. metric frequencies (RF fields) are exploited for a variety of thermal processing and drying applications on raw materials, intermediate and finished industrial products.

As a member of AEI (Italian Electronic and Electro-technical Association) STALAM cooperates actively with prestigious universities and research institutes for the development of the RF technology both as to generation techniques and to technological applications.

STALAM also co-operates with other leading machinery manufacturers for the development of innovative technologies and for the supply of "turn key" automated and integrated processing lines.




Presently, more than 2500 STALAM Radio Frequency machines are in operation in the world, with rated power values ranging from 3 to 450 kW; from the simple, manually operated machine, to the fully automated line complete with computerised control and supervision systems.

Exporting over 90% of its production to the five continents, STALAM provides professional and prompt commercial and technical assistance in all the relevant areas throughout the world.



2500+
machines
in operation



-  *Tempering and Defrosting*
-  *Applications for industrial bakeries*
-  *Food safety*

60+
countries
global presence

STALAM
Radio Frequency Equipment

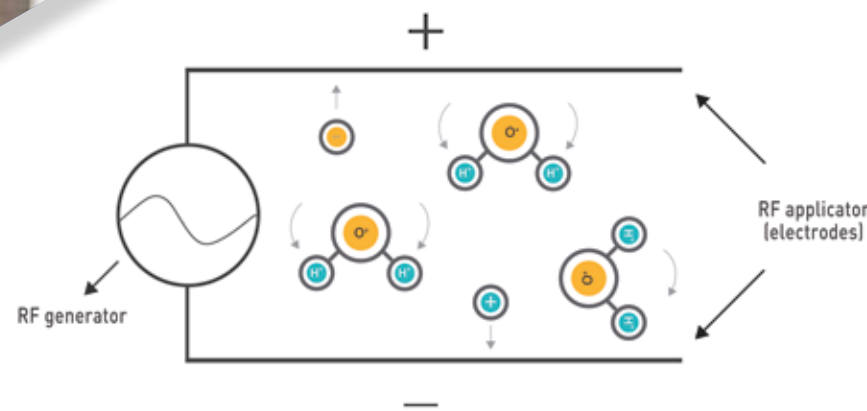
RF Technology



How it works?

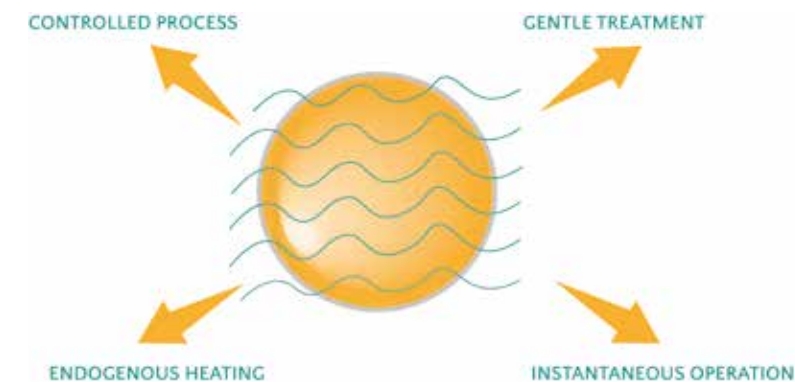
Radio Frequency dielectric heating is a drying and thermal processing technology based on the dissipation of electromagnetic energy within the product. Unlike conventional techniques, where heat is transferred to the product through its surface from an external heat source by conduction, convection or irradiation, a Radio Frequency field generates heat directly inside the entire product mass – that is why the related mechanism is called “endogenous” or “volumetric”. The heat generation is instantaneous and allows a rapid, uniform and perfectly controlled process.

The RF heating mechanism, excluding the materials (like metals) which are good conductors of electric current, is related to the so called “dielectric losses”. Dielectric losses are caused by the vibration and rotation of polar or polarised molecules and by the polarisation and translation movement of ionic particles inside the material, induced by the quick (several million times per second) polarity reversal of the RF field. This can be interpreted as if the electromagnetic field is absorbed and converted into thermal energy by the effect of the rapid movement of polar(ised) molecules and ions.



Water molecules are highly polar, more than all substrates in which water can normally be found, and many ionic species are usually dissolved in water.

Therefore, RF electromagnetic fields can heat up very quickly materials containing water. In particular, Radio Frequency has the ability to evaporate water rapidly, efficiently and selectively from many substrates, which enables their users to obtain the maximum benefits in terms of product quality, reduced operating costs, high flexibility and reliability.



COLDWAVE+ Tempering and Defrosting

Defrost in minutes, improve quality and yield

STALAM has developed COLDWAVE+, a rapid in-line defrosting equipment based on the Radio Frequency technology that allows a significant reduction of drip losses and minimises product deterioration due to bacterial growth. This fast, uniform and controlled method offers great flexibility in production scheduling and is the ideal solution for many tempering, softening and defrosting processes.

How it works?

The product is placed on the machine's conveyor belt and is transferred continuously through the RF unit (tunnel) passing between upper and lower metal plates. These plates (also called electrodes) form an electrical capacitor and the product in between becomes the dielectric element of that capacitor.

The electrode plates are connected to a Radio Frequency generator oscillating at a frequency of 27 million cycles per second.

When the RF generator applies high frequency alternating voltage between the capacitor plates, the dipolar water molecules of the frozen product will vibrate and rotate attempting to align themselves according to the fast changing opposite plates polarities.

This phenomenon causes intermolecular friction, which will in turn generate heat rapidly and uniformly within the whole product mass regardless of its size, weight, shape and thermal conductivity.

The amount of heat generated inside the product and the defrosting time are accurately controlled through the voltage applied on the electrode plates and the speed of the conveyor belt.



Benefits



Defrosting in minutes

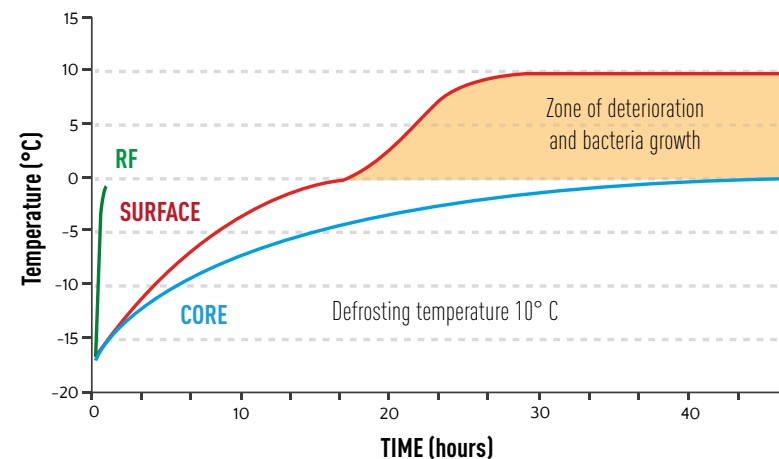
Defrosting is achieved in minutes rather than hours or days, even for large product blocks and, if necessary, directly inside packaging used for storage or retail distribution (carton boxes, polyethylene liner/bags, plastic crates, etc.).

No product degradation

The process speed and uniformity minimise the risk of product degradation (deterioration of sensorial, chemical and physical characteristics, bacteria growth, etc.), thus helping to preserve at its best the product quality.

Higher product yield

Tempering to $-3^{\circ}/-1^{\circ}$ can be achieved with no drip loss, that means eliminating completely the weight losses (up to 8%) caused by conventional defrosting methods. The improved yield brings immediate economic benefits that allow for an RF equipment pay-back period as short as 6 to 12 months.



RF vs. conventional defrosting of a 12 cm thick block of deboned beef meat.

Uniform and controlled treatment

The product can be obtained at the correct temperature needed for the next process. Also, weather and external ambient conditions do not affect the treatment, so that it can be controlled accurately and consistently.

Less floor space, reduced process cost

Radio Frequency equipment requires much less floor space compared to the traditional, large defrosting rooms or equipment; defrosting costs are also reduced drastically, thanks to the absence of energy losses to the ambient.

In-line process

Thanks to the high process speed, Radio Frequency defrosting can be carried out continuously, with significant logistic advantages in product handling and production scheduling. The production can be organised according to "just-in-time" criteria - a great advantage in the case of sudden orders, last-minute changes in the order under processing, etc.

Up to 8% saving in weight



STALAM
Radio Frequency Equipment







Meat



COLDWAVE+ ensures the rapid and uniform tempering of large meat blocks or individual pieces (cuts), improving the product yield by minimising the drip loss.

The product can be obtained at the correct temperature needed for the next process: grinding, cutting, slicing, portioning, forming, dicing, mincing, flaking, tumbling, marinating, deboning, etc.

RF defrosting is highly efficient on all kinds of meat, regardless of its shape, size and fat content.

- 
Individual pieces (cuts) and blocks
- 
Thin and thick products
- 
"Naked" and packaged products (carton boxes, polyethylene liner/bags, plastic crates, etc.)
- 
Bone-in and boneless cuts
- 
Lean and fat meat
- 
Squared and irregular shapes

Beef tongue

Pork cheeks

Pork trimming 20% fat

Bone-in chicken legs

Chicken breast

Pork silverside

Boneless lamb loins

Beef chunks

Beef muscles

Turkey breast

Fish and seafood



Thanks to the rapid and gentle Radio Frequency tempering process, the physical, biological and nutritional integrity of fish and seafood is preserved at best, thus ensuring the product freshness and healthiness.

The product can be obtained at the correct temperature needed for the next process: re-packing, sawing, cutting, portioning, grinding, forming, gutting, cooking, marinating, supermarket chains supply, etc.

It can be applied to all kinds of fish, seafood, shellfish, molluscs etc.

- *IQF and blocks*
- *Whole fish, fillets, portions and minced fish*
- *Flat and round fish*
- *For further processing and for retail*
- *With and without packaging*



Crawfish blocks



Siberian salmon blocks



Pollock fillets blocks



IQF shell-on prawns



Surimi blocks



H&G hake



Cod fillets



PUD shrimps in blocks



Pangasius fillets








Squid blocks

Vegetables, fruit and more



Radio Frequency tempering minimises the drip loss of frozen fruits and vegetables, which therefore retain their texture, flavour and freshness.

The product can be obtained at the correct temperature needed for the next process or immediate use.

- 
All kinds of vegetables, fruits, butter, margarine, liquid egg
- 
Ready meals for catering and retail
- 
Fruit purees, juices and vegetable soups
- 
IQF and blocks
- 
Bulk and packaged products



IQF strawberries



Carrot juice



Pineapple juice



Chives



Margarine blocks



Cooked vegetables mix



Spinach blocks



IQF zucchini dice



Edamame



Ready meals

Technical data



Technical specifications	
Technology	Radio Frequency at 27,12 MHz
IP Protection	IP65 with outer protection boxes of the RF generator made of insulating sandwich-type panels with sheeting and frame in AISI 304 stainless steel
Structure	AISI 304 stainless steel submitted to anti-corrosion treatments (passivation, pickling) and shot-peening finish
Conveyor belt	Certified food-grade rigid polypropylene modules (for packaged products) or solid surface reinforced polyester (for "naked" products)
Washing system	Built-in conveyor belt & tunnel washing facilities (patented) and full internal access for cleaning through the multiple side panel doors
PLC	PLC control system for multiple product recipes

Models available					
RF power (kW)	RF generator cooling system	Dimensions LxWxH (m)	Belt width (m)	Additional module length (m)	Throughput* (kg/h)
3	air	1,1 x 0,8 x 1,6	batch unit	not available	60 – 200
7	air	4,2 x 1,4 x 2,6	0,6	not available	90 – 350
20	air	5,7 x 2,0 x 3,6	1,4	not available	250 – 1000
40	air or water	7,7 x 2,0 x 3,6	1,4	not available	500 – 2000
85	water	9,2 x 2,4 x 3,6	1,8	5,0	1000 – 4000
105	water	9,2 x 2,4 x 3,6	1,8	5,0	1000 – 5000

** Production capacities may vary depending on the type and weight of product to be defrosted and the final temperature required. Multiple modules can be combined to increase the production capacity even at a later stage as production requirements increase with business growth.*



Conveyor belt washing system



Washing system drainage

Applications for industrial bakeries



The oven is the “heart” of any bakery. The baking oven is where the product gets its shape, texture, colour and taste. You could say it is where a basic mixture of ingredients becomes “a product”. Yet, ovens can be used not only to bake, but also to carry out other processes, all related to the supply of a certain quantity of thermal energy to the product.

So, ovens can also be “drying ovens”, “pasteurising ovens”, etc. In many cases, depending on the characteristics of the product and on the specific goals of the thermal process, providing the required energy by means of an electromagnetic field instead of a conventional system based on heat conduction, convection or radiation, may bring various technical, technological and economic benefits.

Sometimes, heating by electromagnetic waves may even deliver results that cannot be achieved under any circumstances with a traditional oven. Based on the above considerations, over the years STALAM has developed a range of specific Radio Frequency ovens to complement or even replace conventional ovens normally used in industrial bakeries.



WAVEDRY+ Post-baking drying



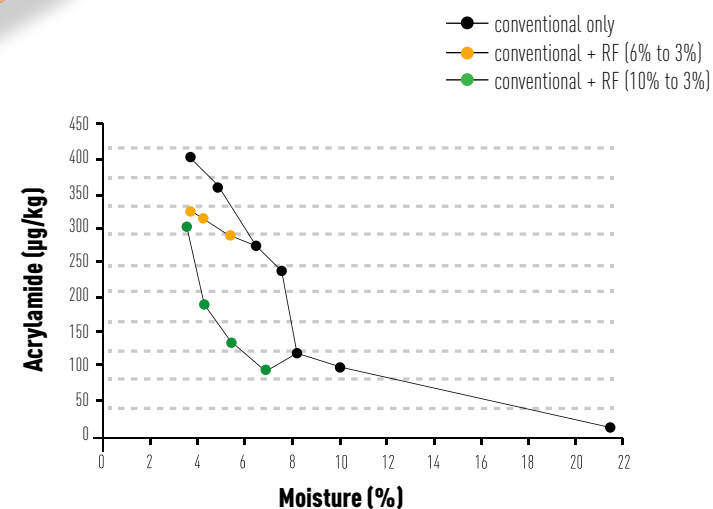
Reduce Acrylamide, enhance flavour and crispness

Radio Frequency post baking drying allows to eliminate the excess moisture from the product rapidly and efficiently, without causing over-baking (excessive browning) of the surface, with added benefits to productivity and quality.

How it works?

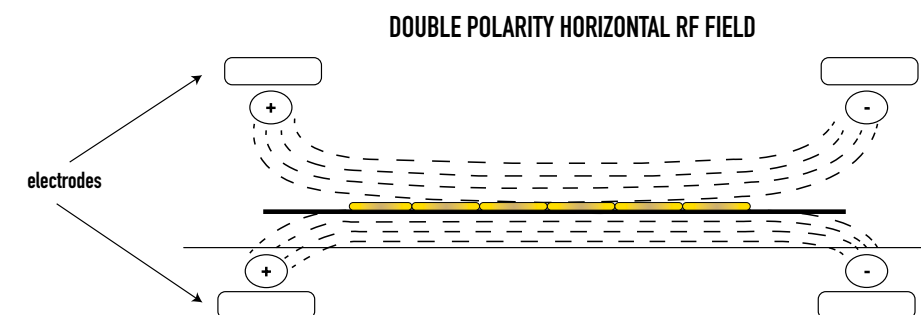
Removing the final excess moisture from a baked product is a challenging task: the conventional oven finds it hard to transfer heat to the centre without the risk of over-colouring, Acrylamide formation and cracks that appear in the product even without any mechanical solicitation.

The RF electromagnetic field, due to its ability to transfer energy to the product volumetrically and selectively according to the moisture location, will overcome the low thermal conductivity and the crust heat barrier and will directly dry the (wetter) centre of the product without affecting the desired colour.



Double polarity electrode

This special patented electrode is designed to apply a highly-concentrated electric field to thin or very thin products (such as biscuits, cookies, cereals etc..) even when fed with low RF voltages.



- | | |
|-------------------|----------------------|
| Appetiser Snacks | Cracker Biscuits |
| Baby Cookies | Crispbread |
| Bagel Chips | Custard Cream Shells |
| Biscotte | Matzo |
| Bread Croutons | Meringues |
| Bread Sticks | Oat Flake Cookies |
| Breakfast Cereals | Pretzels |
| Butter Cookies | Puff Pastry |
| Cheese Thins | Rusk Biscuit |
| Chocolate Cookies | Shortbread |
| Choux / Éclairs | Sponge products |
| Coconut Rings | Wafers |

Benefits



Moisture reduction and leveling

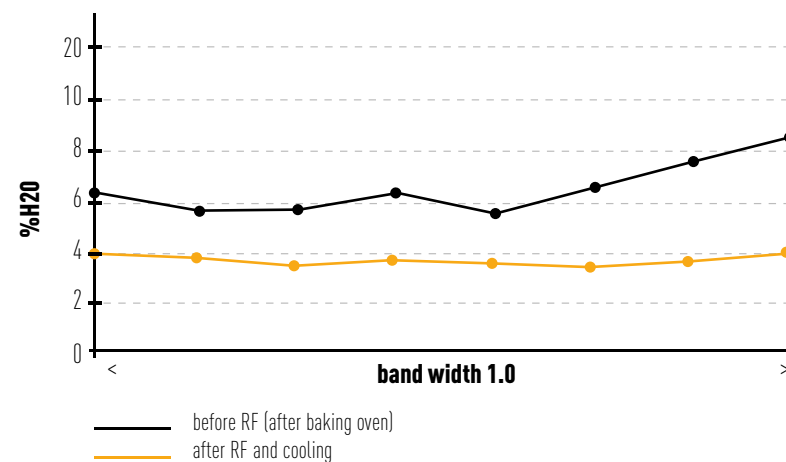
RF drying allows to achieve an accurate moisture level inside the product and to reduce cross-band moisture differential at the exit of the baking oven.
The process control is instantaneous.

Enhanced flavour and crispness

The RF treatment improves flavour retention, colour control, crispness and shelf-life. It also reduces checking problems.

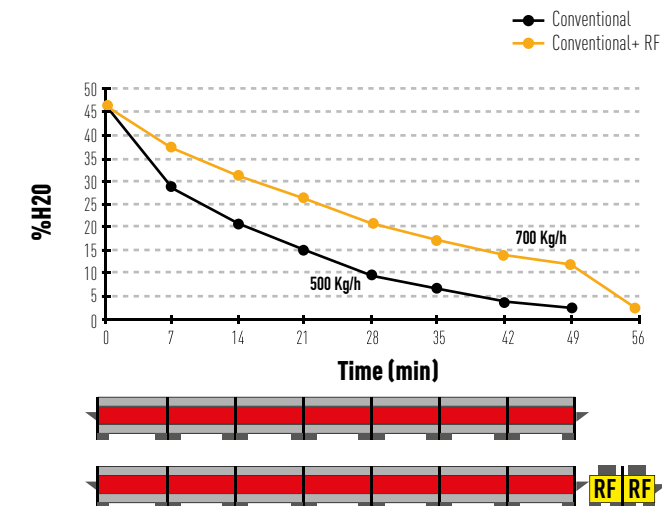
Reduced Acrylamide formation

Final drying by RF allows to reduce surface browning and Acrylamide formation.



Higher oven throughput

Final RF drying increases conventional oven throughput and reduces bakery floor space requirements and energy consumption.



Up to
35% less
Acrylamide



STALAM
Radio Frequency Equipment

WAVEBAKE+

Baking of white-crust bread



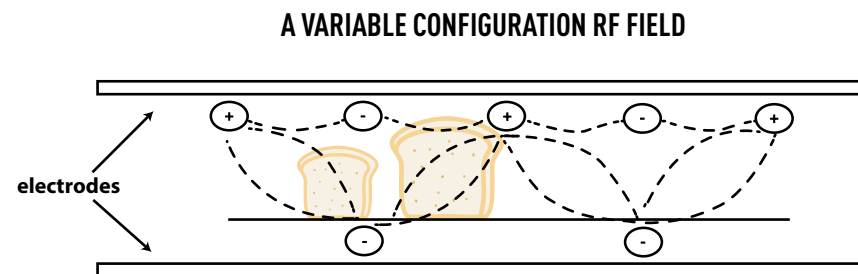
Baking fast with no crust

STALAM has developed WAVEBAKE+, a revolutionary oven based on the RF technology that ensures a perfectly even and controlled baking process with virtually no crust formation.

How it works?

The possibility of using electromagnetic waves for a full baking process without conventional heat depends on the ability of the equipment to deliver and spread uniformly the energy onto the dough pieces.

STALAM has designed a special "variable configuration" electrode (patented), which is capable of delivering controlled quantities of RF energy in different positions between the electrodes where the product is still "developing" (ie. changing its volume), as required by the baking process. Moreover, STALAM Radio Frequency ovens are equipped with an extremely accurate system to control the energy transmitted to the electrodes from the RF generators, through variable capacitors fitted in independent and consecutive oven "modules".



WAVEBAKE+ is a real breakthrough in the baking technology worldwide. The equipment's basic configuration is extremely flexible and can be adapted to small or large production capacities (say from 250 kg/h to 2,500 kg/h of dough), different type and size products (ie. not only bread loaves), to be fully baked or par-baked, etc. paving the way to the possibility of developing totally new products, not existing in the market, yet.

Reduced baking time

Drastically reduced baking time, from three to five times shorter than traditional ovens.

Shorter baking oven

Shorter baking oven, with considerable floor space savings for a given production capacity.

Energy - saving process

Energy saving process, thanks to the high efficiency of the direct heating system.

Economical and flexible system

More economical and flexible system, to produce normal crusted bread, par-baked or fully baked white-crust bread, without compromising on the production capacity.



WAVESAN+ Pasteurisation

Pasteurise in minutes, achieve long shelf-life

STALAM is the first company in the world having developed industrial pasteurisation equipment by Radio Frequency for packaged products such as bread loaves, fresh pasta, gnocchi, etc.

High reduction of the microbial load (molds, yeasts and pathogens) can be achieved in a very short time, thanks to the fast and uniform heating process throughout the product and its packaging which does not rely on (slow) heat transmission, typical of conventional methods: the required microbial kill level is attained in a few minutes rather than one hour or more.

Rapid and uniform treatment

Thanks to the ability of Radio Frequency to rapidly generate heat volumetrically within the product, the heating process is fast, uniform and controlled, thus eliminating all the drawbacks of conventional pasteurisation methods.

No product degradation

The process speed and uniformity minimise the risk of product degradation, thus helping to preserve at best the product quality and freshness.



In-line process

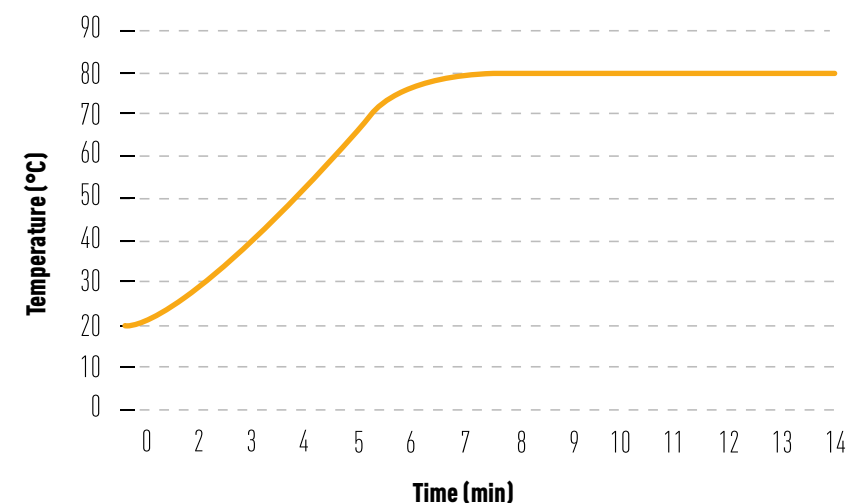
Thanks to the high process speed, Radio Frequency pasteurisation can be carried out continuously, with significant logistic advantages in product handling and production scheduling.

Energy saving technology

Considerable energy savings can be achieved, thanks to the fast and selective heating process carried out by the RF field, which transfers the energy directly into the product without losses in the surrounding ambient.

Less floor space required

The RF equipment requires less floor space compared to the traditional systems, for the same production output.



Typical RF pasteurisation process followed by a temperature holding section

Benefits

Technical data



WAVEDRY+

RF power [kW]	RF generator cooling system	Dimensions LxWxH [m]	Low moisture content range * [kg(H ₂ O)/h]	Mid moisture content range ** [kg(H ₂ O)/h]	High moisture content range *** [kg(H ₂ O)/h]
7	Air	5,0 x 1,2 x 2,8	4 – 6	6 – 8	8 – 10
15	Air	6,0 x 1,8 x 3,2	8 – 12	12 – 16	16 – 20
30	Water or Air	7,5 x 2,0 x 3,4	18 – 27	27 – 33	33 – 39
40	Water or Air	7,5 x 2,0 x 3,4	24 – 36	36 – 44	44 – 52
60	Water or Air	8,0 x 2,4 x 3,4	36 – 54	54 – 66	66 – 78
85	Water	8,5 x 2,4 x 3,4	51 – 72	72 – 93	93 – 110

* Evaporation rate based on LOW (2% – 10%) in/out moisture content products: 0,6 – 0,9 [kg(H₂O)/kW(RF)h]

** Evaporation rate based on MID (5% – 20%) in/out moisture content products: 0,9 – 1,1 [kg(H₂O)/kW(RF)h]

*** Evaporation rate based on HIGH (15% – 35%) in/out moisture content products: 1,1 – 1,3 [kg(H₂O)/kW(RF)h]

Note(1): all machines can be customised according to specific customer requirements and/or production line characteristics.

Note(2): all machines are modular and can be doubled or tripled to cope with higher evaporation capacity (ie. higher production capacity) requirements.

WAVESAN+

RF power [kW]	RF generator cooling system	Dimensions* LxWxH [m]	Throughput ** [Kg/h]
15	Air	6,0 x 1,8 x 3,2	200 – 300
40	Water or Air	7,5 x 2,0 x 3,4	600 – 800
60	Water or Air	8,0 x 2,4 x 3,4	900 – 1200
80	Water or Air	11,0 x 2,0 x 3,4	1200 – 1600
120	Water or Air	12,0 x 2,4 x 3,4	1800 – 2400

* RF heating equipment only – hot air holding sections excluded. When directly connected to purposely designed hot air holding sections, the RF equipment length can be shortened by 1,0 m.

** Based on packaged bread loaves (sliced toast bread).

WAVEBAKE+

RF power [kW]	RF generator cooling system	Dimensions LxWxH [m]	Conveyor belt width * [m]	Dough throughput ** [Kg/h]
40	Air	13 x 1,6 x 3,4	0,8	320
80	Air	13 x 2,4 x 3,4	1,6	640
160	Water	22 x 2,4 x 3,4	1,6	1280
250	Water	31 x 2,4 x 3,4	1,6	1920
340	Water	40 x 2,4 x 3,4	1,6	2560

* Suitable to place 1 or 2 mold-sets in parallel, each composed of 4 individual bread molds.

** Based on white-crust bread loaves: approx. size 280x130x125mm – approx. weight 650–700g (final baked bread).



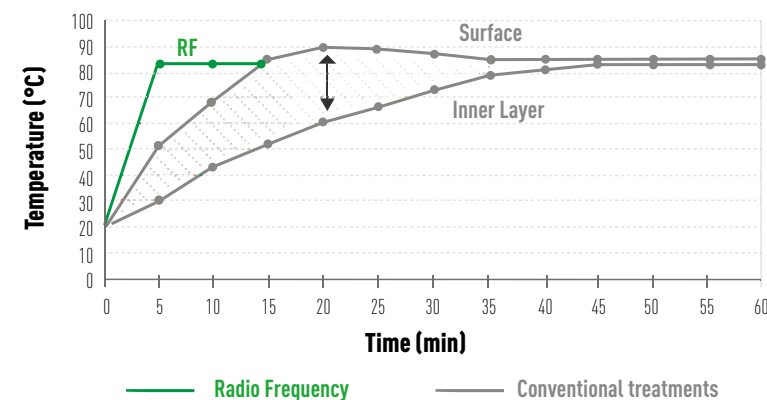
Food Safety



The market demand for natural yet microbiologically safe products and the requirements of modern food distribution logistics have prompted the industry to investigate and develop new processes for the inactivation of pests, molds, yeasts, enzymes and microorganisms in general.

Over the past decades STALAM has successfully introduced the Radio Frequency technology to many industrial drying and thermal processes and is the first company in the world having developed continuous RF disinfection, sanitisation, pasteurisation and sterilisation equipment for solid products - either packaged or in bulk - and for liquids in the tube.

The use of RF heating to sanitise food products combines the technical and economic advantages that brought to success this technology in other industrial applications.



The ability of Radio Frequency to heat volumetrically does not rely on the thermal conductivity of the substrate to transfer heat throughout its mass. Since the required process temperatures are reached rapidly and accurately, degradation of the product is reduced to a minimum.

The RF equipment requires less space compared to other machines based on conventional technologies that need long heating times and require large product volumes under processing at any given time.

Because no energy is wasted to the environment, the RF process is more efficient, economic and environmentally friendly, providing significant reduction in the factory carbon footprint.

In other words, STALAM Radio Frequency equipment apply the so called "minimal thermal process" principle for sanitising food products and can be considered the only real, technically proven and economically viable industrial alternative to conventional technologies presently available in the market for the same purpose.



SANOCROP+

Disinfestation and sanitisation of agricultural commodities



Perform an organic process, retain the natural properties

STALAM developed and patented SANOCROP+, an innovative chemical-free solution for the organic disinfestation and sanitisation of dry agricultural commodities, based on the Radio Frequency technology. Thanks to the mild heat treatment performed by the RF electromagnetic field, all physical, chemical, nutritional and sensorial characteristics of the substrate are preserved at their best.

How it works?

In the SANOCROP+ sanitisation system, the product is fed by means of an in-built volumetric hopper feeder, that guarantees the load consistency and the desired thickness; it is then conveyed through the treatment tunnel by a food-grade conveyor belt. In the treatment tunnel the product is submitted to the electromagnetic field.

The Radio Frequency energy supply is adjusted to ensure a perfectly controlled process on a wide range of medium to low moisture content products. The PLC ensures a reliable, repeatable and safe process control and allows to manage easily the operating parameters to achieve the desired process targets.



In a few minutes the product leaves the treatment tunnel and is gently transferred to the conveyor system which will take it to the subsequent processing steps or storage.



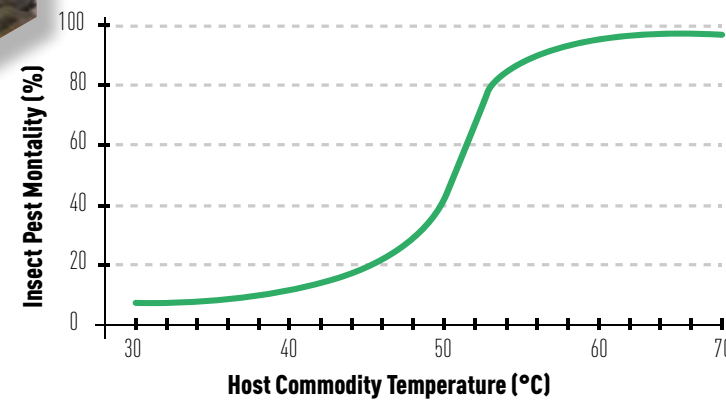
MODELS AVAILABLE					
RF power (kW)	RF generator cooling system	Dimensions LxWxH (m)	Throughput (Kg/h)*		
			ΔT40° C	ΔT60° C	ΔT80° C
7	air	5,5 x 1,2 x 2,8	200	140	100
15	air	6,5 x 1,8 x 3,2	450	300	230
40	air on water	8,0 x 2,0 x 3,4	1200	800	600
85	water	9,0 x 2,4 x 3,4	2600	1750	1300
105	water	9,5 x 2,4 x 3,6	3200	2150	1600

** Production capacities may vary depending on the product type.
Multiple modules can be combined to increase the production capacity even at a later stage.*

Benefits

Fast and effective treatment

The process is 3 to 10 times faster compared to conventional heat treatments: 3÷5 minutes are sufficient to heat the substrate from room temperature up to 55÷65°C (for disinfestation) and 7÷10 minutes up to 80÷100°C (for sanitisation). One or two minutes temperature holding time is sufficient to ensure 100% mortality of even the most heat resistant pest species in all their development stages or to achieve 2 to 3 log reduction of the t.b.c. within the commodity.



Organic and chemicals-free process

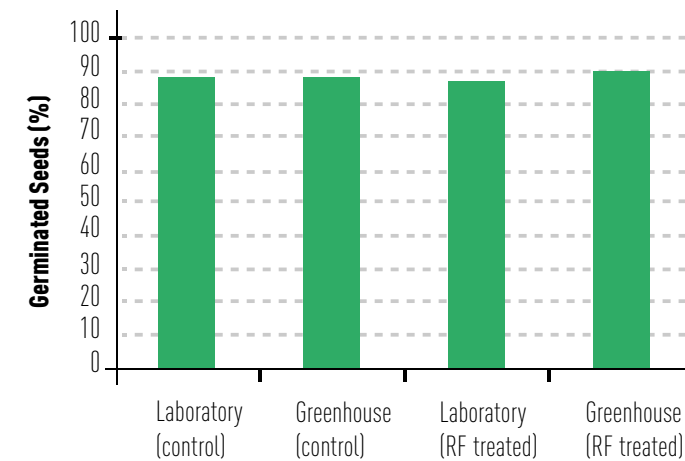
The physical, chemical, sensorial and nutritional properties are preserved at best thanks to the mild heat treatment, so that a healthy and safe product can be obtained without using fumigants, anoxic atmosphere or other chemical treatments.

Energy efficient and environmentally friendly technology

Approx. 25 kWh are required to disinfest about 1 ton of product (about the double for a thorough sanitisation process), which translates into a cost of 2÷4 EUR/ton, competitive with the conventional technologies.

No effect on the germination of seeds

The RF disinfestation does not affect the germination of seeds thanks to the relatively low treatment temperatures and the short process time.



Up to 10x
faster than
conventional
treatments

STALAM
Radio Frequency Equipment

SANOLEAF+
Sanitisation
of spices,
medicinal and
aromatic herbs



**Eco-friendly process,
healthy product**

Food and Pharma industries are nowadays dealing with the increasing attention of consumers to natural taste, flavour and functional properties preservation, together with ever stricter food safety and hygiene regulations imposed by local and international authorities.

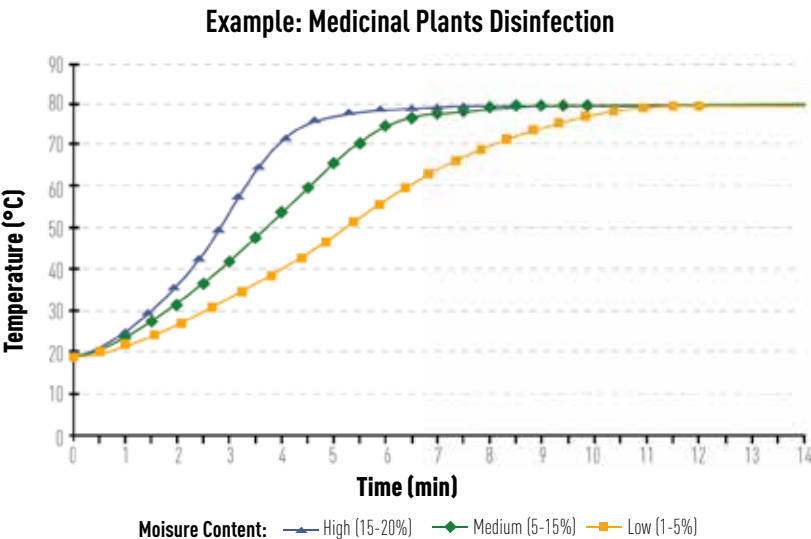
With the purpose of serving the needs of these industries, STALAM has developed the SANOLEAF+ series equipment for the batch sanitisation of spices, aromatic herbs and medicinal plants.

How it works?

The treatment consists in a rapid exposure of the product to a RF electromagnetic field inside a temperature-controlled process chamber.

The chamber temperature, the RF power between electrodes and the treatment time are the process parameters to be set according to the contaminating species and the inactivation level required.

The treatment ensures that the product is brought quickly and uniformly to the target temperature which is generally low enough to avoid alterations of its physical, chemical and sensorial characteristics.



Organic process

Environmentally friendly process fully compatible with organic farming produce due to no need of ionizing radiations, fumigants, chemicals nor modified atmosphere packaging or cold storage.

Enhanced quality and shelf-life

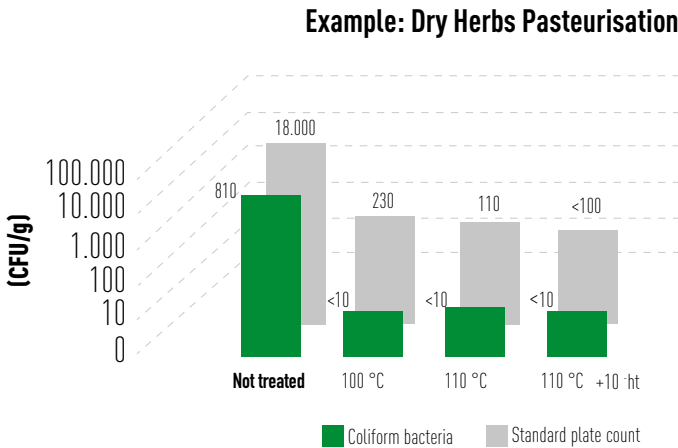
Short process time (minutes), ensuring better preservation of the product's chemical, physical and sensorial properties. Significant count reduction of contaminating species, granting extended shelf life.

Cost-efficient technology

High energy efficiency, low electrical power consumption. Automatic setting of process cycles by means of PLC with remote access, fiber optic probes for real time temperature monitoring and feedback.



Benefits



SANOBULK+

Pasteurisation of products in bulk

Pasteurise gently, retain flavour and natural properties

With the SANOBULK+ and SANOPACK+ series equipment, food products compatible with the RF technology can be pasteurised in minutes in bulk or directly inside their commercial packaging.

High reduction of the microbial load (molds, yeasts and pathogens) can be achieved in a very short time, thanks to the fast and uniform heating process throughout the product and its packaging (if any) which does not rely on (slow) heat transmission, typical of conventional methods: the required microbial kill level is attained in a few minutes rather than one hour or more.

SANOPACK+

Pasteurisation of packaged products



Rapid and uniform treatment

Thanks to the ability of Radio Frequency to rapidly generate heat volumetrically within the product, the heating process is fast, uniform and controlled, thus eliminating all the drawbacks of conventional pasteurisation methods.

No product degradation

The process speed and uniformity minimise the risk of product degradation, thus helping to preserve at best the product quality and freshness.

In-line process

Thanks to the high process speed, Radio Frequency pasteurisation can be carried out continuously, with significant logistic advantages in product handling and production scheduling.

Energy saving technology

Considerable energy savings can be achieved, thanks to the fast and selective heating process carried out by the RF field, which transfers the energy directly into the product without losses in the surrounding ambient.

Less floor space required

The RF equipment requires less floor space compared to the traditional systems, for the same production output.



Benefits

SANOFLUID+

Pasteurisation of liquid products in the tube

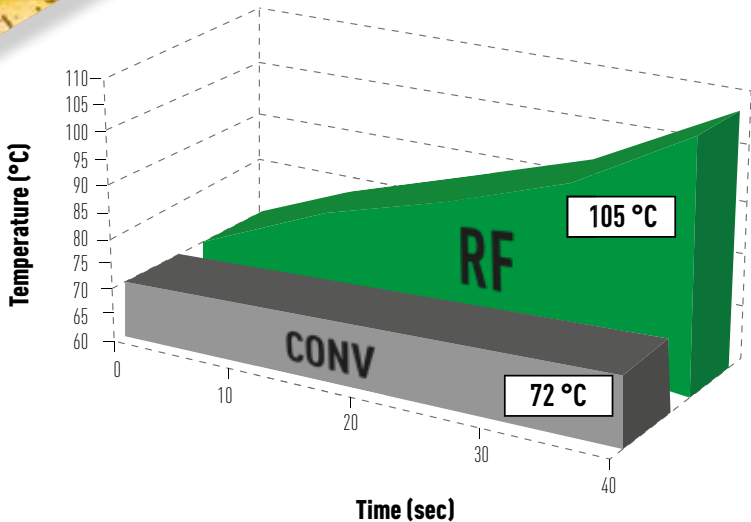


Fast treatment, utmost freshness

SANOFLUID+ has been specifically designed for the continuous pasteurisation and sterilisation in the tube of liquids and other fluidised (i.e. pumpable) products, even with suspended solids.

This system ensures high productivity and energy efficiency, outstanding product quality, full guarantee of inactivation of microorganisms with the minimum possible modification of the product's physical, chemical and sensorial characteristics.

Several production lines incorporating the SANOFLUID+ technology are in operation worldwide, with a typical throughput of 2,000 kg/h or more.



How it works?

The fluid substrate is continuously pumped through one or more tubes made of a food-grade, RF-transparent material, having a suitable diameter according to the specific product. The tubes are placed between especially designed electrodes, powered with relatively low RF voltages, that amplify and concentrate the electric field on a small volume, yet with no energy losses or risk of arcing. The intensity of the electromagnetic field and the consequent heating rate are controlled by means of a variable capacity coupling circuit. Heating rates from 1-2°C/sec (for highly viscous liquids containing suspended solids) up to 50-100°C/sec (for low-viscosity liquids with no particulates) are possible. The temperature set point required for pasteurisation or full sterilisation can be reached and controlled with an accuracy of +/-0.5°C.



MODELS AVAILABLE					
RF power (kW)	Tubes in the applicator	ΔT 20°C	ΔT 40°C	ΔT 60°C	ΔT 80°C
40	2	1500 kg/h	750 kg/h	500 kg/h	350 kg/h
85	4	3300 kg/h	1650 kg/h	1100 kg/h	800 kg/h
150	6	5800 kg/h	2900 kg/h	1950 kg/h	1450 kg/h

Production capacities may vary depending on the product type.
Multiple modules can be combined to increase the production capacity even at a later stage.

Benefits

Minimal thermal treatment, better quality, safer product

The rapid and uniform temperature increase within the product, also in the suspended solids of any size, eliminates the risk of under- or over-processing. The microbial inactivation is performed at lower temperatures and in a shorter time compared to conventional thermal processes. Moreover, a better preservation of the physical, chemical and sensorial characteristics of the product is achieved, with reduced use of additives such as colours, flavours, thickeners, etc. normally used to compensate for product degradations caused by conventional thermal processes.

Fast and flexible process

SANOFLUID+ allows an instantaneous heat input, an accurate process control and a high operational flexibility. The equipment can be fitted with a CIP system and with a PIC system for in-line change and recovery of the product, making it very suitable also for small and medium size product batches. The equipment sterility can also be easily maintained in stand-by conditions.

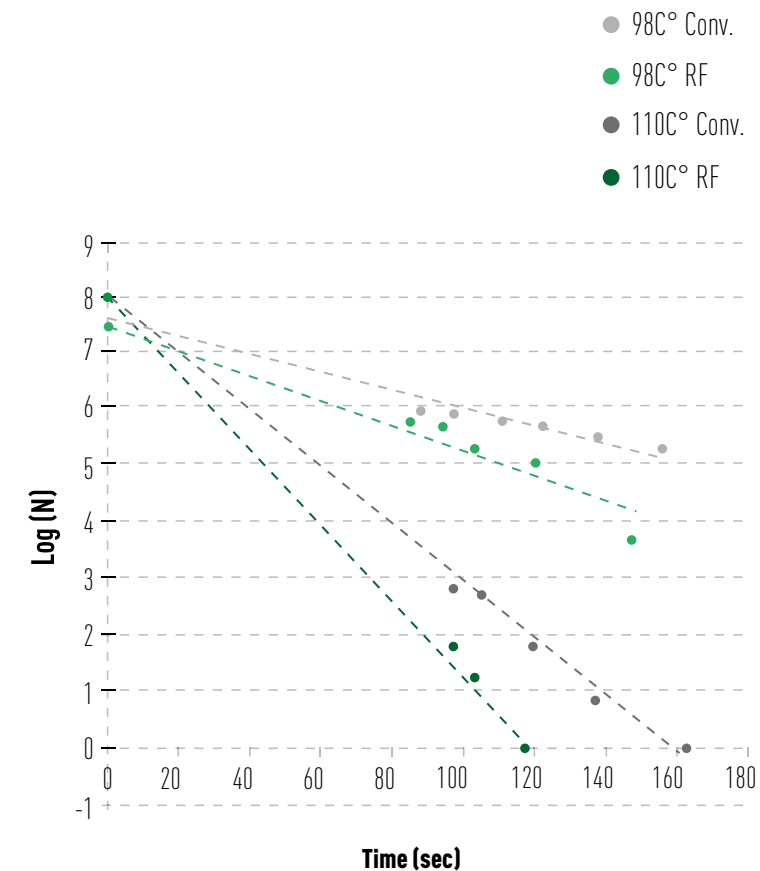


Floor space saving modular system

Multiple SANOFLUID+ units can be installed in-line to achieve a higher production capacity. A limited factory floor space is required thanks to the small size of each unit.

Minimum maintenance required

Easy cleaning, no crusting (fouling) effect thanks to no contact with any heating element, and low maintenance costs.



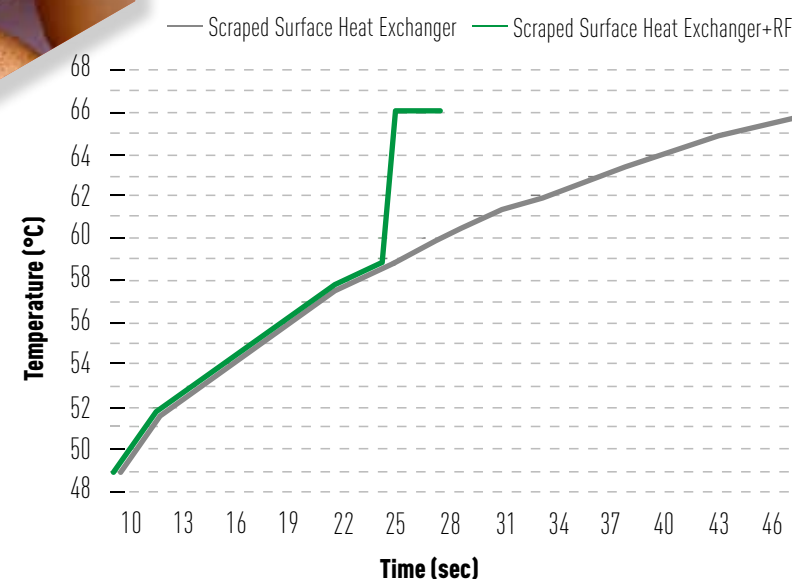
SANOEGG+ Pasteurisation of liquid egg



Longer shelf-life, better flavour, enhanced whipping

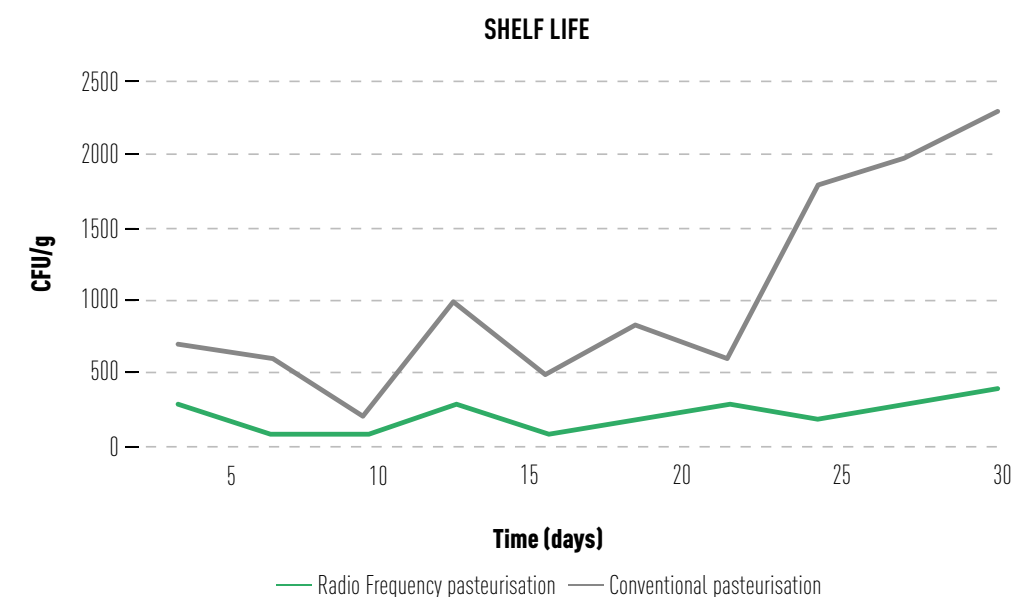
In collaboration with Innovo Solutions, STALAM has developed SANOEGG+, a specific Radio Frequency equipment for the pasteurisation of liquid egg at low temperatures, which ensures both the required microbial inactivation and the preservation of the sensorial properties of the product.

The treatment can be performed on whole egg, yolk and white and improves the taste of final products such as cream puffs, sponge cakes, creams, mayonnaise etc. where egg freshness and flavour play a crucial role in determining the quality perceived by the consumer. The RF treatment is also beneficial for the egg functionalities: whipping is enhanced, thus increasing the final product yield by 5% approx.



Moreover, frequent washing of the pasteurisation plant is not necessary thanks to the low temperature treatment and no contact with any heating element: this allows savings of up to 15-20% in costs (around 1,5-2 eurocent /kg). SANOEGG+ can be easily installed in any existing production plant.

- Total inactivation of *Salmonella*
- Drastic reduction of T.B.C.
- Longer shelf-life (over 60 days)
- No preservatives required
- Healthier and tastier product



60+ days
shelf-life

STALAM
Radio Frequency Equipment

After-sale services



Supplying and successfully installing a Radio Frequency equipment is, at the same time, the result and the starting point of several pre- and after-sale activities. STALAM strives to establish strong, trustworthy, mutually rewarding and long-term business relationships with its prospect and existing customers by providing them the best possible technical assistance, aimed first to prove the outstanding benefits of the RF technology and then to make sure that the equipment provided will maintain its performance and profitability in the years to come.

Spare parts available in stock

Availability in stock of at least 80% of standard mechanical and electrical components of the RF equipment manufactured in the last 20 years.

Fast shipping

Shipment of spare parts available in stock at the latest within 24 hours from the order (generally, orders confirmed before h. 12:00 noon time are dispatched through selected courier services on the same day before h. 16:00). Spare parts not available in stock are manufactured in-house or procured in the shortest possible time.

On-call assistance

On-call assistance through a dedicated phone line, or via fax / E-mail, by an English speaking trouble-shooting engineer available full time during office working hours.

Prompt on-site assistance

On-site mechanical, electrical & software assistance by servicing engineers departing from STALAM or its overseas servicing centres within 12-48 hours for interventions within Europe and 48-72 hours for interventions outside Europe.



Test & Demo facilities



The STALAM testing lab is an integral part of our R&D and engineering departments. Through testing and analysis of the results, our experts can study in details the characteristics and behaviour of a product submitted to the Radio Frequency field, thus assessing the technical and economic feasibility of drying and thermal processes on specific substrates, based on customers' requirements. In the same way, our engineers can identify the best process parameters and the technical specifications of the most suitable RF equipment to perform such processes.

STALAM's R&D lab is equipped with a wide range of pilot machines available for product testing and demos. Such tests and demos can be performed in our company or at our customers' facilities as appropriate. Some of these machines are also available for rental for product and process development purposes or systematic testing sessions. Our highly qualified technical team will assist customers to develop better, more profitable and innovative process solutions.



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STALAM
Radio Frequency Equipment



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