













STALAM
Radio Frequency Equipment

Food safety

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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



60+
countries
global presence

STALAM
Radio Frequency Equipment

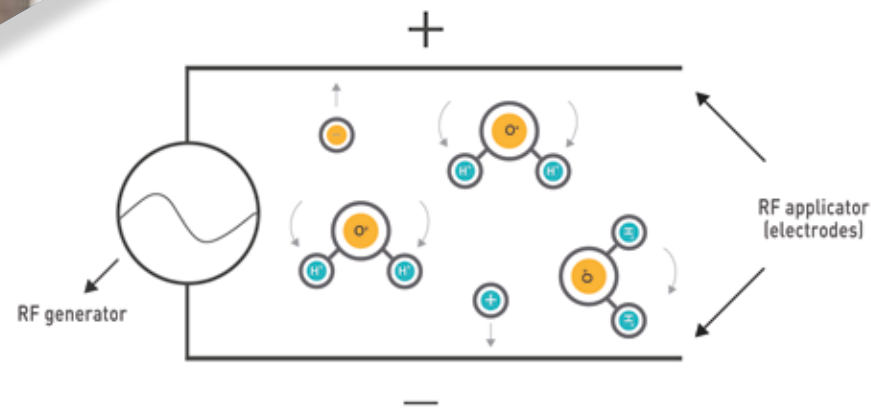
RF Technology



How it works?

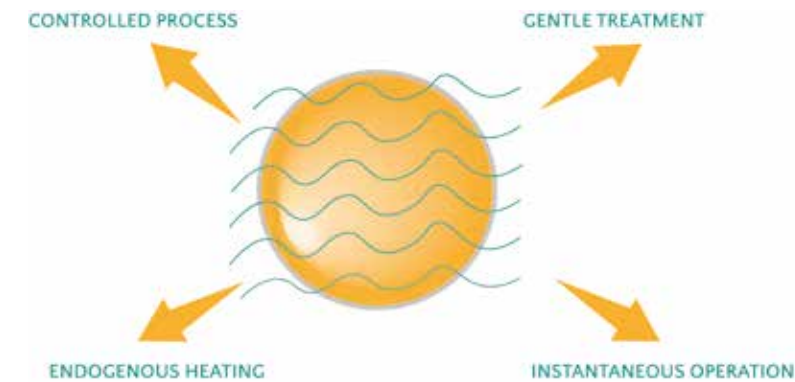
Radio Frequency dielectric heating is a drying and thermal processing technology based on the dissipation of electromagnetic energy within the product. Unlike conventional techniques, where heat is transferred to the product through its surface from an external heat source by conduction, convection or 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.



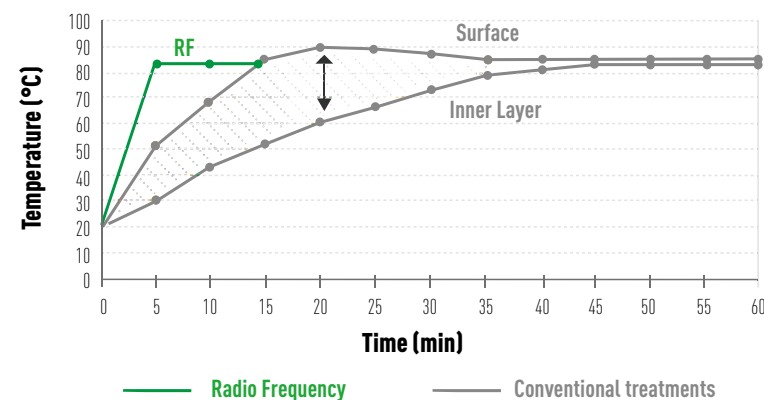
Food Safety



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.



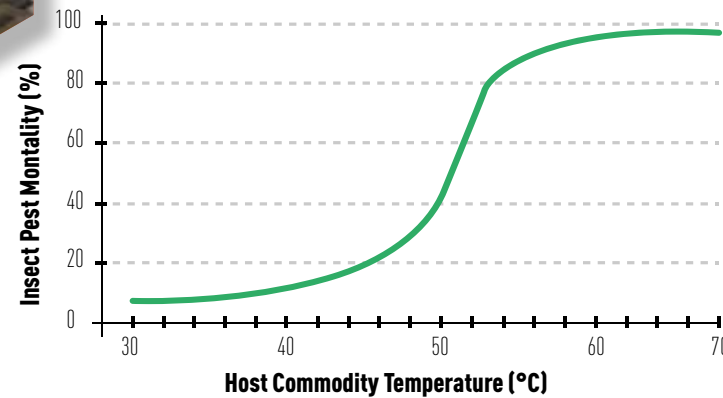
MODELS AVAILABLE					
RF power (kW)	RF generator cooling system	Dimensions LxWxH (m)	Throughput (Kg/h)*		
			ΔT40° C	ΔT60° C	ΔT80° C
7	air	5,5 x 1,2 x 2,8	200	140	100
15	air	6,5 x 1,8 x 3,2	450	300	230
40	air on water	8,0 x 2,0 x 3,4	1200	800	600
85	water	9,0 x 2,4 x 3,4	2600	1750	1300
105	water	9,5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

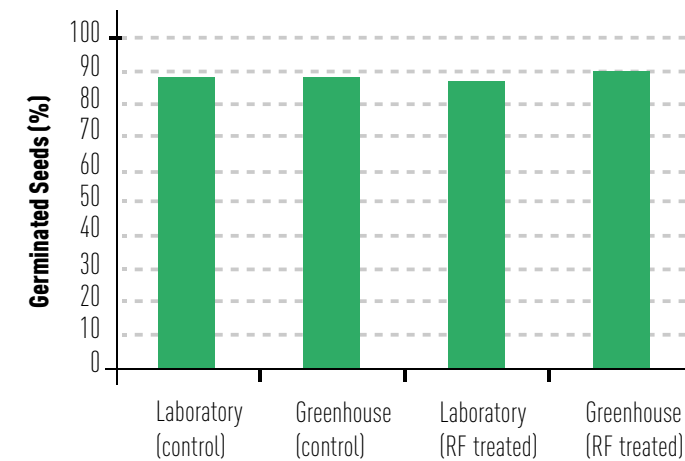
The physical, chemical, sensorial and nutritional properties are preserved at best thanks to the mild heat treatment, so that a healthy and safe product can be obtained without using fumigants, anoxic atmosphere or other chemical treatments.

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.

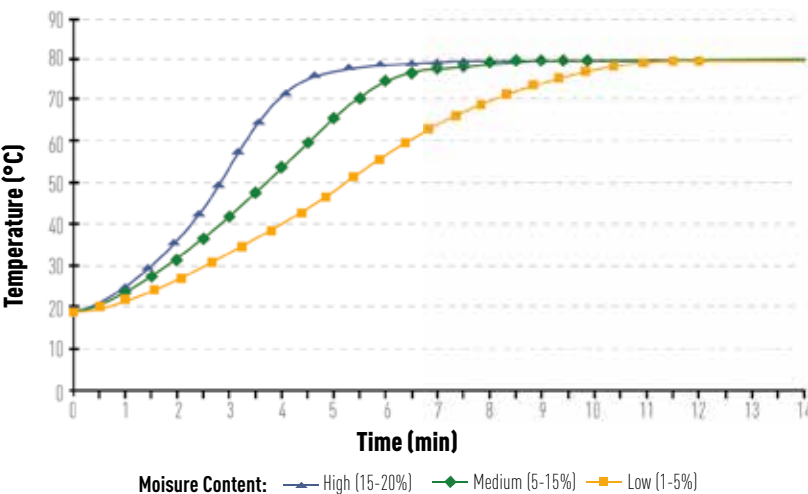
How it works?

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.

Example: Medicinal Plants Disinfection



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

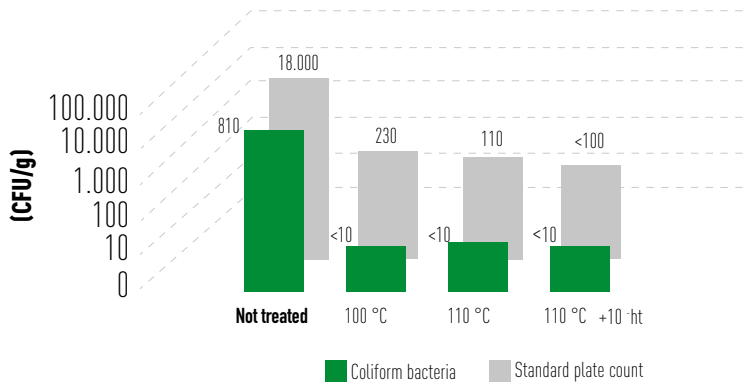
High energy efficiency, low electrical power consumption. Automatic setting of process cycles by means of PLC with remote access, fiber optic probes for real time temperature monitoring and feedback.



Benefits



Example: Dry Herbs Pasteurisation



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

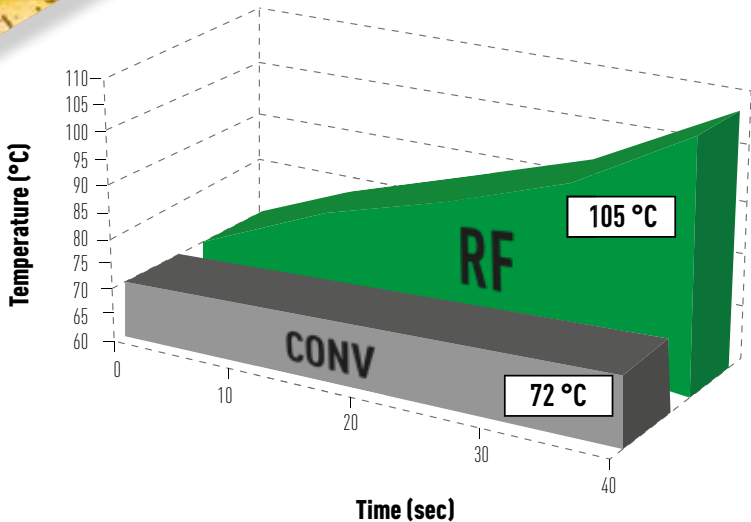


Fast treatment, utmost freshness

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.

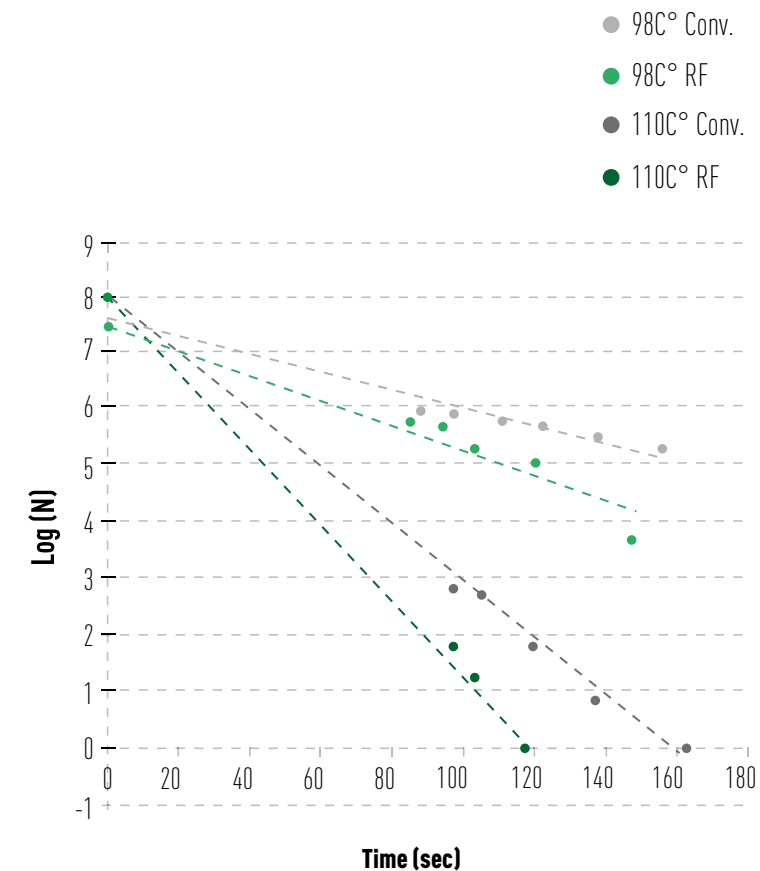


Floor space saving modular system

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.



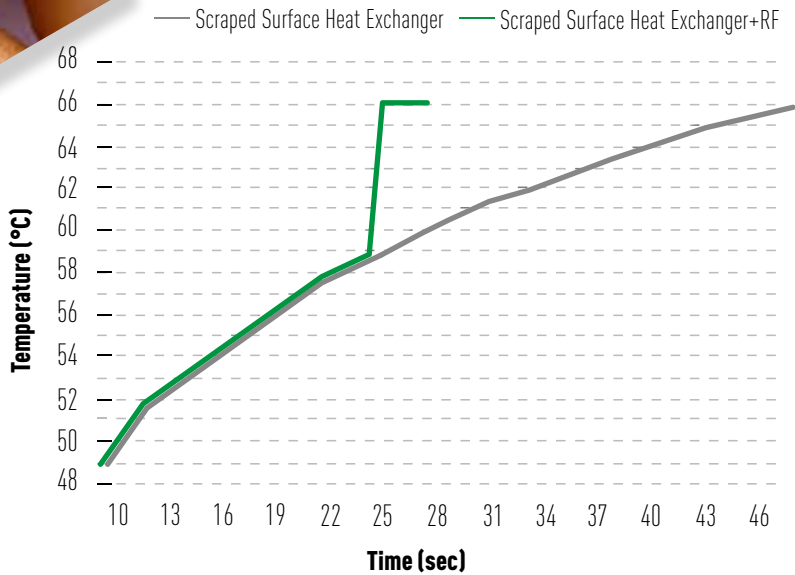
SANOEGG+ Pasteurisation of liquid egg



Longer shelf-life, better flavour, enhanced whipping

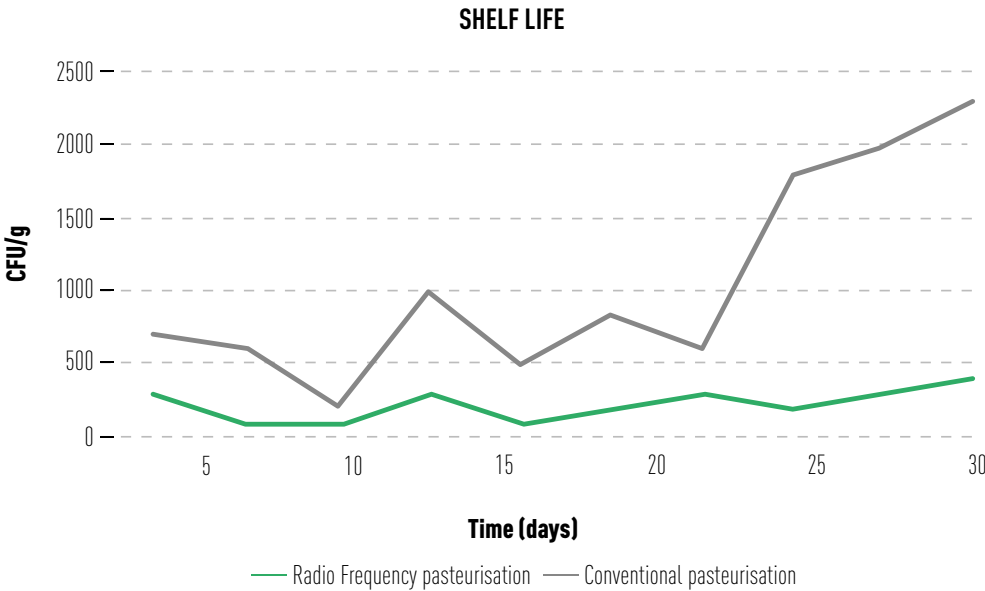
In collaboration with Innovo Solutions, STALAM has developed SANOEGG+, a specific Radio Frequency equipment for the pasteurisation of liquid egg at low temperatures, which ensures both the required microbial inactivation and the preservation of the sensorial properties of the product.

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

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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