VERY SHORT PROCESSING TIMES
HIGH FLEXIBILITY
LOW ENERGY CONSUMPTION
**KREYENBORG** is a leading provider of solutions in the field of **bulk material handling**. More than 60 years ago, we developed the first solutions for the food industry. Nowadays, we put strong emphasis on **food safety**.

We **reduce germs / sterilize, dry, disinsectize, open aromas, roast, toast and coat**. Our daily business is to offer **turn-key solutions** into which we integrate our problem-solving expertise in **mixing, conveying and dosing**.
FoodSafety-IRD ADVANTAGES

★ **Flexible. One machine for all processes.**
The FS-IRD is the suitable equipment for you to reduce germs / sterilize, dry, disinsectize, protect stock, open flavours, coat, roast and toast.

Should there be any changes to your production process or should you need to process any new or different products or encounter any new requirements for your product, the FS-IRD will provide you with a high degree of flexibility.

★ **Always in motion. Thorough mixing.**
The rotation of the drum ensures constant movement of the material. The spiral coils and mixing elements designed for your product ensure an optimum mixing result and a uniform treatment of the material. The risk of clumping is avoided.

★ **Control system.** Recipes and process parameters can be stored using our integrated control system. This helps you in varying products or varying product properties and guarantees reproducible results.

★ **Spraying.** To protect product sensory properties, the particles can be cooled from outside by a measured spray of water.

★ **Protection of the product.** Maximum protection of the optical and sensory properties of the product is ensured.
Continuously. In contrast to many other systems, the FS-IRD works continuously.

Space requirements. Integrable. The FS-IRD’s compact design reduces your footprint significantly as compared to conventional machines and it can be incorporated into almost any product line.

Short residence times. The product remains in the FS-IRD for only a few minutes and is then available for further production steps.

Instant production start. The production process can begin immediately upon start-up of the system. No heating up of the machine is required.

Low energy consumption. The infrared light brings the energy directly into the product and thus achieves high efficiency.

Easy operation and cleaning. Easy and fast access allows fast service and cleaning of the machine.

Low maintenance costs. The FS-IRD convinces with a low amount of wearing parts and easy maintenance.

Turn-key solution. On request, we plan and build up- and downstream equipment in collaboration with you.
1 Material feeding with continuous volumetric feeder.

2 Air supply. Air-Shield protection of the lamps.

3 Drum with built in helix. Continuous feeding, movement and thorough mixing of the material.

4 Temperature measurement. Direct and fast responsive temperature measurement. PID regulation of the infrared heaters.

5 Infrared module. Patented IR module specifically designed for dusty conditions.

6 Exhaust air-fan. Evacuation of humid air and volatiles.

7 Material discharge. After minutes instead of hours, the material leaves the rotary tube continuously and is sent to downstream processes.

8 Sealing system. Special optional sealing system for dusty materials.

9 Spraying. Liquids (such as water, flavouring substances) may be applied during the treatment process for cooling, gentle treatment and flavouring of the product.
★ **Main components.**

Essential components of the FoodSafety-IRD are the radiator module, the horizontal rotary drum, into which a spiral screw has been welded, and the PLC control system.

★ **Inlet.**

The material is fed in continuously by a volumetric metering unit.

★ **Treatment.**

The material is conveyed evenly through the machine by means of the spiral screw at variable turning speed and is at the same time treated with infrared light. If necessary, water can be added to the food during treatment.

★ **Material discharge.**

At the end of the rotating drum, the material enters the discharge hopper and can be transferred directly to the next processing step.

★ **Throughput.**

The FS-IRD is available for a wide range of throughputs. The design is made depending on the specific task, the bulk density and the flow properties of the food to be treated and processed. The machines can be supplemented with many peripheral components and can be easily incorporated into complete systems.
Part of the sunlight. Our source of light and heat, the infrared light, is a natural part of the sunlight. Your product has become big and familiar with this source of light from the very beginning.

From the inside to the outside. The food particles are heated up from the inside by the infrared light. In this way the humidity is driven from inside out due to the heat flow.

Any risk of damage / hornification of the product surface – as it has happened in conventional dryers until now – is excluded.

High grade of efficiency. The energy is instantaneously beamed into the core of the product and heats it directly.

An energized hot air flow, such as convective thermal processes, is not required.

Quality. In addition to food safety, quality is paramount in our business. In contrast to steam-based processes, treatment with the FS-IRD protects the optical and sensory properties of the product. This is an added value that can also quickly become a competitive advantage.

Assessment. The procedure has been classified as „admissible according to food law“ by the Thuringia Office for Consumer Protection and Food Safety and is therefore not subject to any regimentation.
APPLICATIONS

BULK MATERIALS.
Natural food bulk materials such as herbs, spices, tea, nuts, seeds, dried roots, but even dried mushrooms and dried vegetables as well as pharmaceutical substances and other organic raw materials can be treated with the FoodSafety-IRD.

SEVERAL HUNDRED PRODUCTS.
The FoodSafety-IRD has already been used successfully in disinfecting / sterilizing, drying, heating, coating, stock treating and flavour opening, roasting and toasting of several hundred different dried products.
STARTING POSITION.
Food safety has assumed a prominent role in recent years. Whether you are a producer, processor or trader - no one can afford anymore to bring unsafe food onto the market and to exceed admissible limit values. For suppliers, this has serious monetary consequences. Much worse, however, is the damage to reputation associated with a recall. The result is uncertainty about food safety. To counter this uncertainty, more and more producers have opted to use the continuous KREYENBORG FoodSafety-IRD.

PRODUCT SHAPES AND SIZES.
Food in bulk form such as spices, tea, leaves, herbs, dried vegetables and dried mushrooms, nuts, pits, seeds, grain, cereals and cut, chopped and powdered food.

VERIFICATION BY ANALYSES.
Germ reduction could be verified in more than 8,000 individual analyses which have been carried out by independently accredited laboratories.

VALIDATED STERILIZATION.
Validated 5-log reduction of the microbiological charge by independent laboratories.

Certificates: “Salmonella reduction by means of infrared illumination” and “Germ reduction of spices by means of infrared illumination”.

VALIDATED DESTRUCTION OF Salmonellae.
The validation carried out by independent laboratories with the “reference germ” Enterococcus faecium has resulted in a safe destruction of these germs. They were no longer detectable in 25g of material.
Protection of sensors. Maximum protection of the sensory properties of the product, such as color, taste, look, essential oils, odor as well as valuable substances and vitamins.

No steam. Thanks to the lack of steam, no condensate forms on the product which could damage the sensory properties of the material.

Natural process. No use of additives (such as chemicals, gases, ...) in the germ reduction process.

Finished mixtures. With salt and sugar added, finished mixtures are free-flowing and treatable.

Spraying. Water mist is sprayed in during the light treatment. The effect of germ reduction is further strengthened at the very moment of water evaporation on the product surface; the direct re-cooling effect achieved by the evaporation ensures the gentle treatment and protection of the product particles.

Stock protection. Due to the heating of the product, it is safe-storage protected at the same time.

Example: Herbal mixture.

Example: Red pepper granules.

Coating. During the germ reduction process, the product can be coated if required (with water soluble additives such as salt, food dye, flavours, etc).

Residual moisture setting. The product to be treated can be sprayed with water by means of water jets and can be cooled if necessary, thus ensuring its very gentle treatment. Furthermore, this allows regulating the very important residual humidity balance, apart from ensuring the essential disinfection process. This constitutes a unique advantage in the germ reduction process.
The product to be roasted is heated from the inside and additionally treated with heat applied from the outside by the effective principle of the infrared light. The roasting process is thus made gentler. This results in a gradual and homogeneous diffusion of heat, and flavour can develop slowly. The method of burning only from the outside, as with the conventional convective treatment methods, is omitted.

**Perfect Roasting / Toasting.**
Absolutely uniform roasting / toasting is ensured through the continuous thorough mixing of the roasting material.

**Gentle Movement.**
The product is mixed and conveyed gently, continuously and at low speed. Even moderately fragile products, such as cashews, peanuts and almond slices are in this way carefully treated.

**Different Degrees of Roasting and Toasting.**
Various roasting and toasting levels, and thus taste and color variations can be realized by simply setting the temperature and residence / roasting time.

**Flexible. One Machine for All Processes.**
You can use the FoodSafety-IRD not only for roasting and toasting, but also for disinfecting, stock treating and drying. Even with varying tasks and applications, this gives you flexibility. Once you have successfully disinfected a batch of nuts, for instance, you can proceed and roast the next batch without any major retrofitting work being required.
STARTING POSITION.
Many drying processes call for a high amount of energy, long residence times, substantial space requirements and a considerable investment budget. Moreover, they involve the risk of forming material clusters and, thus, of getting a very inhomogeneous product pattern.

PERMANENTLY IN MOTION.
Homogeneous Drying. The continuously working FS-IRD keeps the product in motion and mixes it thoroughly on a permanent basis. The risk of cluster formation is thereby excluded. The final product will be homogeneously dry.

MINUTES INSTEAD OF HOURS.
Saving energy. The infrared light heats up and dries the product within minutes and not hours. It thus ensures considerable energy savings as compared to thermal procedures. The product temperature is measured during the process continuously and the light intensity is regulated automatically as needed.

INPUT MOISTURE.
An economic drying process starts at an input moisture of less than 35%. The final product can be dried to less than 1% within an extremely short time.

BOOSTER EFFECT.
Increase of capacities. Other substantial advantages are the low space requirement and the possibility of easy integration of the FS-IRD. In this way, existing drying facilities can be extended quite easily, while benefitting from the advantages of the FS-IRD. Expansion of capacities is possible without any expensive replacement investment.
STARTING POSITION.
Cereal pests such as cereal beetles or weevils (polyphaga) attack the grains, e.g. wheat, rye, oats, barley, maize (corn), millet, rice, noodle, buckwheat, flour, bran, grist, almonds, peanuts, peas, beans, soy.

This means that they cause huge financial loss every year.

SECONDARY EFFECT.
If a germ reduction process is carried out on a product by means of the FoodSafety-IRD, insects, larvae and egg depositions will at the same time be destroyed reliably.

INSECTS. LARVAE. EGG DEPOSITION.
A targeted and uniform heat-up process allows destroying insects, larvae and egg depositions reliably in the FS-IRD.

Any pesticide load is thereby omitted! Development of resistance or physiological adaptions of the insects can be excluded.
FoodSafety-Cooling solutions after the thermal treatment to prevent reiterated germ formation.

**FOODSAFETY - COOLING DRUM.**

- Suitable for sensitive products such as nuts, grains, mixtures etc.
- The product is mixed and conveyed by a slow and gentle rotary movement. Consequently, the mechanical stress on the product is insignificant.
- The product is cooled by a targeted inflow.
- The cooling air can be regulated.
- The heated air is sucked off.
- The cooling path can be used, optionally, as a coating path for the product; this method facilitates the introduction of salt, flavours, dyes etc. into product.

**FOODSAFETY - COOLING SCREW.**

- Suitable for less sensitive products such as powder, finely cut herbs etc.
- The product is mixed and conveyed by means of a screw inside a cooled trough.
- The product is cooled by the trough and the screw.
- The cooling water can be regulated.
- The heated air is sucked off.
Based on its many years of experience in plant engineering, KREYENBORG also offers individual complete solutions including the FS-IRD as a core element. Apart from the peripheral components, KREYENBORG offers the entire planning installation and after-sales support.

**FROM AN INDIVIDUAL COMPONENT TO A COMPLETE SYSTEM.**

1. **Metering.** Infeed of the material into the process. If required, Big-Bag discharge station, conveyor belts and screws or pneumatic conveying units can be incorporated.

2. **FoodSafety-IRD.**

3. **Filter / Cyclone** for the exhaust air flow of the FoodSafety-IRD and the FoodSafety-Cooling Drum.

4. **Conveying.** Designs as conveyor belts or conveyor screws are available.
**5 FoodSafety-Cooling Drum.** Cooling of the material. Alternatively also available as a FoodSafety-Cooling Screw.

**6 Conveying** of the product into the next production step or for filling of a big bag. Designs as conveyor belts or conveyor screws are available.

**7 Central control system.** Control and monitoring of the entire FoodSafety-IRD process is facilitated by the central PLC control unit.
FULLY AUTOMATIC CONTROL CONCEPT

★ Innovative automation easy to operate.
★ Different modes available to cover typical applications.
★ Recipe management for various products.
★ Online-Service via incorporated Modem.
★ Individual IR radiator control.
★ Up to 5 temperature zones available.

LOW MAINTENANCE.

★ Low maintenance costs.
★ No compressed air or cooling water necessary.
★ Separately extractable infrared module for speediest service times.
★ Comfortable and easy access to all components ensures quick cleaning and servicing times of the machine.

Easy cleaning and maintenance.
TRY US!
At our trial centre in Senden, Germany, we can carry out continuous or discontinuous trials for the food industry. We can provide the following services:

★ Germ reduction / sterilizing
★ Disinsectization / stock protection
★ Drying
★ Roasting and toasting
★ Coating / flavouring

Our partner.
Our development and distribution partner, the company PS: perfect solutions GmbH, has assisted and supported us with its more than 30 years of experience in the food industry.

1st step: Discontinuous trial.
In the first step, we test a small quantity of your material in a discontinuous trial. Subsequently, the product to be treated and processed is sent to an external and independent laboratory for the microbiological analysis.

2nd step: Continuous trial.
If all results found in the first trial should meet your requirements, we will be pleased to perform a continuous trial process under real production conditions with a larger quantity of material. This also involves the possibility to have a microbiological investigation carried out by an external laboratory subsequently.
FOOD SAFETY - IRD
FOOD SAFETY - COOLING
DRYERS
SILOS
MIXERS
DOSING EQUIP.
CONVEYING EQUIP.
BIG-BAG-STATIONS
TURN-KEY SOLUTIONS

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