NEO MAKİNA VE MÜHENDİSLİK A.Ş.



INDUSTRIAL MICROWAVE DRYING SYSTEMS

A compact, economical alternative to freeze drying

Drying and puffing lines using microwave and vacuum technology for fruit, vegetables, herbs, spices, cheese and more.

01
Pre-drying oven

02
Vacuum microwave unit

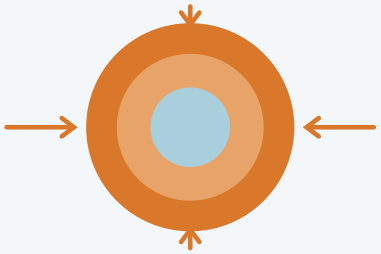
03
Continuous belt microwave line

NEO MAKİNA ve MÜHENDİSLİK A.Ş. · Head office: Adalet mah. Manas blv. No:47 B İç kapı no:3509 Bayraklı/İZMİR
neomakina.com · info@neomakina.com · +90 532 289 43 31

Heat is generated inside the product

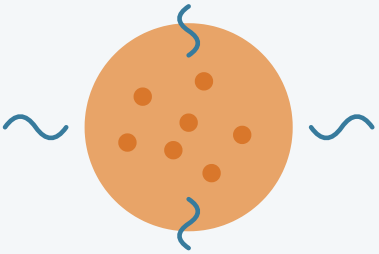
Microwave energy at 2450 MHz makes the water molecules inside the product vibrate. The resulting friction releases heat throughout the product volume, and moisture evaporates from the inside out.

CONVENTIONAL HOT AIR



Heat travels from the surface to the centre. The outer shell dries first while the core heats up late.

MICROWAVE



Heat is generated throughout the volume. Moisture is pushed out from within, which shortens the drying time.

PUFFING UNDER VACUUM

Under vacuum, water evaporates at a lower temperature. The product dries at low heat and keeps its colour and aroma. The evaporating water expands the structure, giving a crisp, porous texture.

CONTINUOUS BELT DRYING

The product travels on a belt through the pre-drying, microwave, stabilisation and cooling zones. The line runs without stopping, and the PLC controls each zone separately.

FAST AND UNIFORM

The product dries evenly and in a short time.

LOW ENERGY

Up to 30% energy savings*

PRODUCT QUALITY

Colour, aroma and nutritional value are preserved.

FOOD SAFETY

AISI 304L stainless steel, hygienic design.

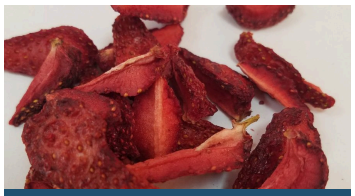
SMART CONTROL

PLC, automatic operation, remote access.

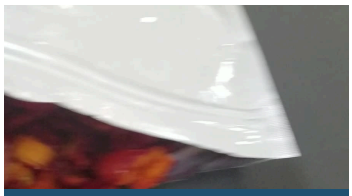
EASY MAINTENANCE

Modular design, fast service.

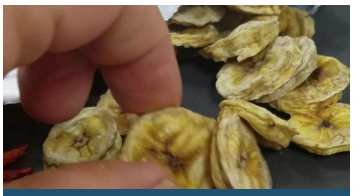
PRODUCTS DRIED WITH MICROWAVE



Strawberry



Red pepper



Banana



Cheese

* Manufacturer's declaration; varies with product, inlet moisture and operating conditions.

Microwave-vacuum vs. freeze drying

Freeze-drying lines need a lot of floor space, high installed power and long cycle times. For the same product group, a microwave-vacuum line delivers more dry product with less floor space and less energy.

≈ 7×
less energy
per 1 kg of dry product

≈ 8×
less floor space
footprint of a single unit

≈ 3×
more dry product
hourly output

ENERGY PER 1 KG OF DRY PRODUCT

kWh / kg dry product



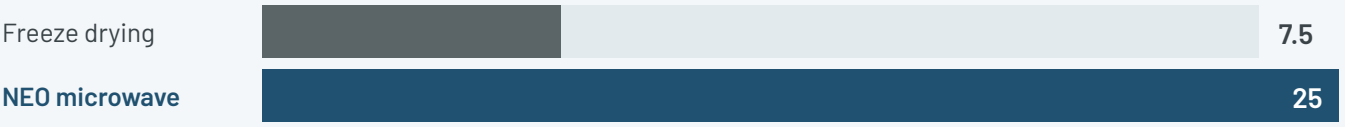
FLOOR AREA

m^2 (single unit, footprint)



DRY PRODUCT PER HOUR

kg / hour



Feature	Freeze drying	NEO microwave-vacuum
Size (L × W × H)	10,000 × 4,000 × 3,000 mm	2,400 × 2,000 × 2,000 mm
Installed power	160 kW	25 kW (pre-drying 50 kW)
Pre-drying	Not required	Required
Wet product per day	1,800 kg	6,000 kg
Dry product per day	180 kg	600 kg
Energy per day	3,840 kWh	1,800 kWh
Product texture	Light, sponge-like	Crisp, puffed

Reference calculation: strawberry, 24 hours/day operation. Microwave values include pre-drying (75 kW in total). Values vary with product type and inlet moisture; exact results are determined by a trial with your product.

Three modules, one process line

Raw material washing · cutting › **Pre-drying oven** › **Vacuum microwave unit** › Sorting inspection › Filling packaging

Example flow for high-moisture fruit and vegetables. The continuous belt line runs as a separate line for products such as herbs, spices and pulses.



01 PRE-DRYING OVEN

Page 7

Prepares high wet-product loads for the main process. Trolley type, 26-tier double-row racks, hot air.

5000 × 3000 × 2460 mm · 312 trays · 36 kW



02 VACUUM MICROWAVE UNIT

Page 8

Works in batches. Dries at low temperature and puffs the product to create a crisp, porous texture. Suitable for products such as strawberries and cheese.

2400 × 2000 × 2000 mm · 25 kg/h · Vacuum, tray-loaded



03 CONTINUOUS BELT MICROWAVE LINE

Pages 5–6

A 16-metre line that runs non-stop. Product is taken from the hopper, passes through the microwave zones and leaves dry.

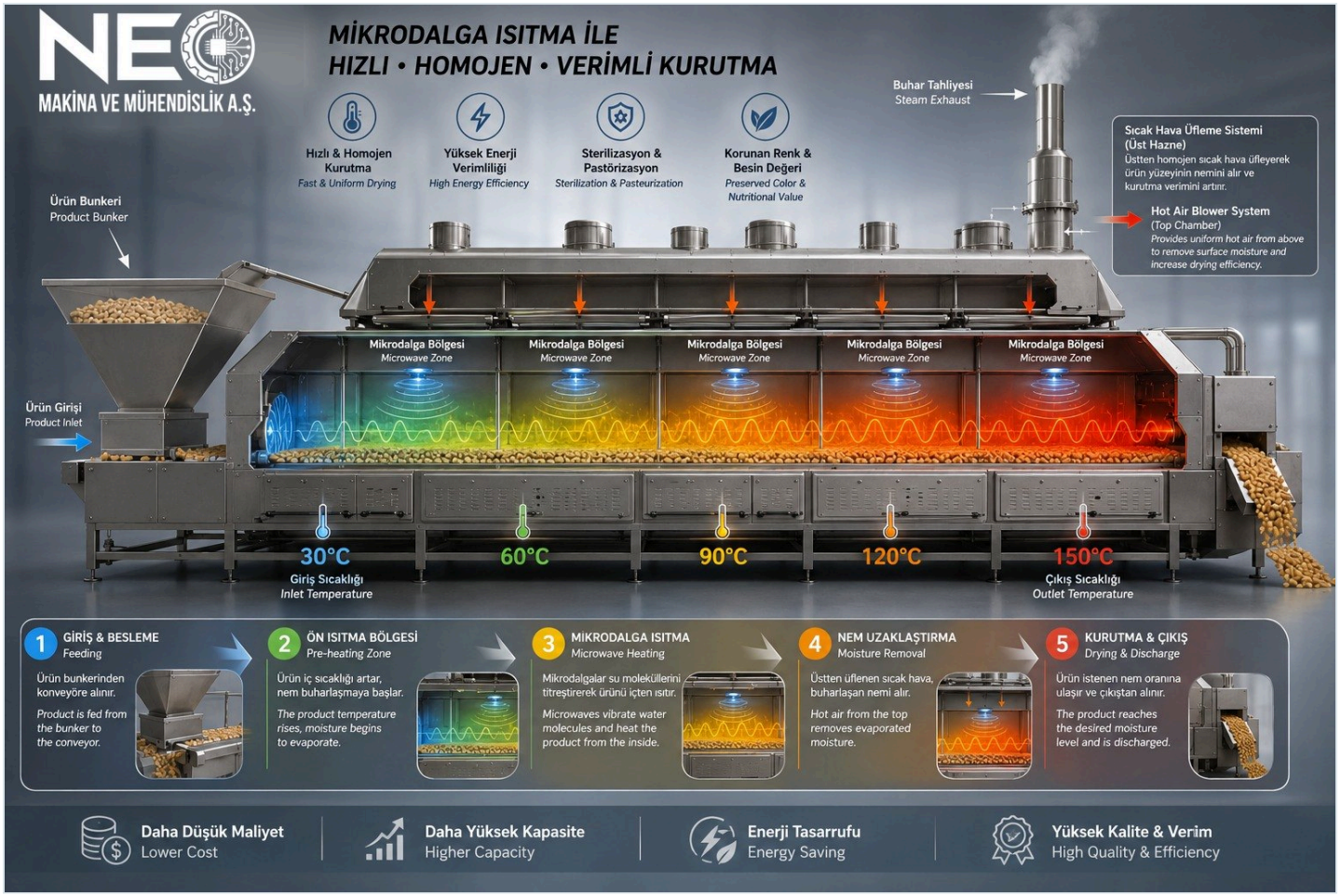
2100 × 16000 mm · 100 magnetrons · 150 kW · 1000 mm belt

WHICH MODULE FOR WHICH PRODUCT?

Product	Pre-drying	Vacuum unit	Continuous line
Strawberries and soft fruit	●	●	–
Cheese and dairy products	–	●	–
Fruit and vegetable slices	●	●	●
Tea, herbs, spices	–	–	●
Pulses, grains, animal feed	–	–	●

● suitable. General guidance only; the final choice is made with a product trial.

Continuous belt microwave line



Process diagram: product flow from the hopper to the outlet with a typical temperature profile. Zone settings are defined per product.

TECHNICAL SPECIFICATIONS · 16 M LINE WITH 100 MAGNETRONS

Width	2100 mm	**Operating frequency**	2450 MHz
Length	16000 mm	**Microwave power**	100 magnetrons (150 kW)
Inner height	300 mm	**Magnetron type**	Water-cooled
Total height	1750 mm	**Operating voltage**	3-phase 380 V
Belt width	1000 mm	**Control panel**	PLC (Beckhoff or Schneider)
Conveyor belt	Modular PP	**Body (inner)**	AISI 304L stainless steel
Product inlet sensor	Standard	**Body (outer)**	AISI 304L stainless steel

Up to 30% energy savings*	Short processing time, high capacity	Colour, aroma and nutritional value preserved
Low fire risk	Interface with remote access	Modular design, easy service

* Manufacturer's declaration; varies with product and operating conditions.

Line images and technical drawing



Continuous belt microwave drying line · inlet and first zones

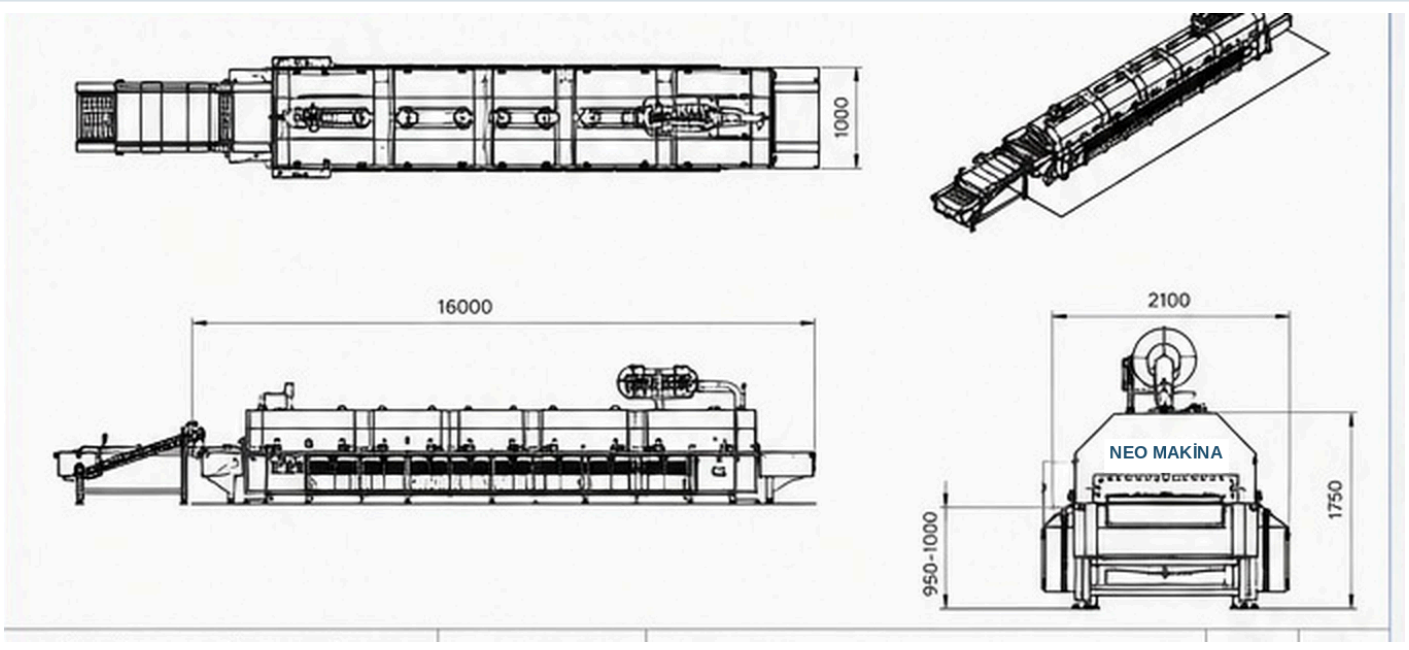


Modular body structure



View along the line

TECHNICAL DRAWING · PLAN, PERSPECTIVE, SIDE AND FRONT VIEWS



Pre-drying oven



Pre-drying oven · plant view

The pre-drying unit prepares high wet-product loads for the main process. Product is spread on trays, trays are loaded onto trolleys, and most of the moisture is removed with hot air.

TECHNICAL SPECIFICATIONS

Oven dimensions	5000 × 3000 × 2460 mm
Number of trolleys	6 pcs · 800 × 1200 × 2200 mm
Rack layout	26 tiers, double row
Total trays	312 pcs
Total spreading area	149.76 m^2
Heating element power	36 kW
Fan motor power	14 kW
Wet product load	1000 kg / process
Process time*	12 hours
Daily wet throughput*	2000 kg/day
Control	PLC (software + hardware)
Oven type	Trolley type

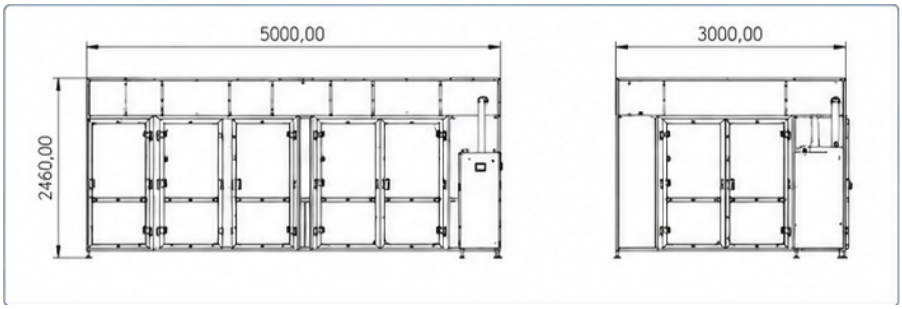
DRYING CRATE

Height 120 mm
Width 800 mm
Length 600 mm
Weight 1350 g



* Capacity values are given for the olive process (12 hours). Time and capacity differ for other products.

TECHNICAL DRAWING · FRONT AND SIDE VIEWS



Vacuum microwave unit



Vacuum microwave unit · 2400 × 2000 × 2000 mm

The batch unit dries and puffs the product under vacuum at low temperature. Product spread on polyethylene trays enters the vacuum chamber, where microwave energy and vacuum work together.

TECHNICAL SPECIFICATIONS

System	Batch, vacuum
Tray	Polyethylene
Size (L × W × H)	2400 × 2000 × 2000 mm
Product input (pre-dried)	30 kg/h
Dry product capacity	25 kg/h
Dry product per day	600 kg/day (24 hours)
Microwave power	25 kW
Pre-drying power	50 kW

Values are given for strawberry, for pre-dried product. Capacity varies with product type and moisture.

OPERATING STEPS

1. **Loading.** Pre-dried product is spread on trays and moved into the chamber.
2. **Vacuum and microwave.** The chamber is evacuated and microwaves heat the product from within.
3. **Puffing.** Evaporating water expands the product, creating a crisp texture.
4. **Final holding.** The product rests in the vacuum chamber while moisture equalises.

> Capacity grows by adding units; each unit works independently.

VACUUM SYSTEM

2000 l vacuum tank
7.5 HP vacuum pump

FINAL HOLDING CHAMBER

Vacuum
2370 × 1200 × 2120 mm

STEAM DISCHARGE

Galvanised exhaust stacks
Up to 10 m distance



Cheese · raw cubes and puffed product



Strawberry · dried slices

Which products can be dried?

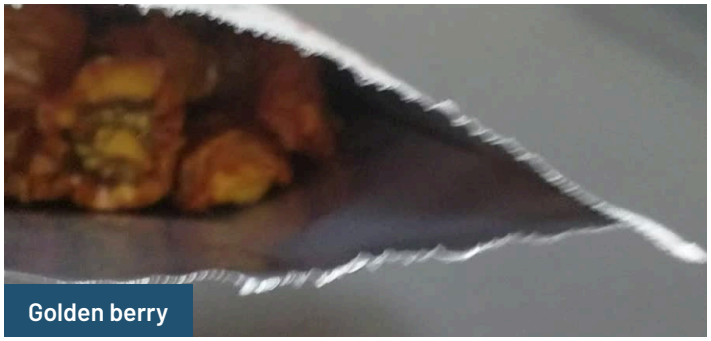
Microwave and vacuum drying gives crisp or hard-textured products that keep their colour and shape. The images below come from product trial samples.


Strawberry · tray outlet


Strawberry · whole and sliced


Red pepper


Banana slices


Golden berry


Meat product


Cheese · puffed


Strawberry · close-up

APPLICATION AREAS

Tea and herbs	Fruit and vegetables	Pulses and grains	Spice products
Animal feed and food	Nuts and seeds	Dairy products	Other dry products

Plant scope and contact

In addition to the drying modules, a complete production plant can be built with sorting, quality control, filling and cold-storage equipment. The scope is defined by your product and capacity.

PREPARATION AND HANDLING

- Sorting and inspection conveyor, AISI 304L
- Feed and transfer hopper
- Tray scraping table, product collection hopper
- Transfer conveyor
- Work benches, AISI 304

QUALITY AND PACKAGING

- Check weigher, digital weight control
- Metal detector
- Doypack filling machine from reel
- Case sealing machine
- Laboratory, physical and chemical analysis

HYGIENE AND STORAGE

- Hygiene station: disinfectant, turnstile, mat
- Cold room –18 °C
- Cold room +2 °C, pre-cooling



Let's run a trial with your product

Request a quote and a trial for your product, capacity and target moisture.

+90 532 289 43 31
info@neomakina.com
neomakina.com

HEAD OFFICE · İZMIR, TÜRKIYE

Adalet mah. Manas blv. No:47 B İç kapı no:3509 Bayraklı/ İZMİR

R&D AND INNOVATION CENTRE · ANKARA

Selçuklu Caddesi No: 135 Alt

EGYPT OFFICE · CAIRO

Ahmet Kasim Gouda Str. 41/1 Nasr City, Cairo, Egypt

LONDON OFFICE · UNITED KINGDOM

55 Stoke Newington High Street, N16 8EL London, UK