

Industrial microwave technology

High-performance solutions for your industrial processes



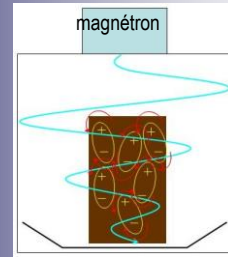
- ▶ High efficiency
- ▶ Ecological
- ▶ Homogeneity
- ▶ Fast process
- ▶ Reliability

- Minerals
- Perfumery
- Cosmetics
- Food
- Pharmacy
- Chemistry
- Petrochemicals
- Nutraceutical
- Environment
- Nuclear ...

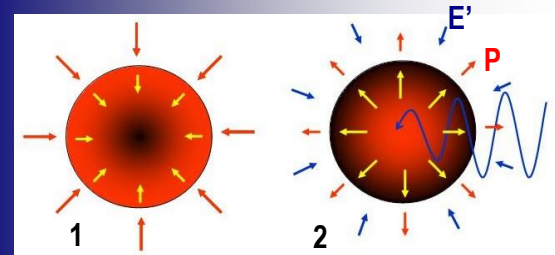
EXTRACTION 	AROMATIZATION (Oils...) 	CHEMICAL REACTOR 	EXPANSION 	DEBACTERIZATION 
RECYCLING 	VITRIFICATION 	INERTING 	TECHNICAL DRYING 	ROASTING 
PYROLYSIS 	STERILIZATION 	CALCINATION 	SELECTIVE DESORPTION 	Batch and continuous processes

Principle

The frequency of a microwave field is 2450MHz (semi-industrial) or 915 MHz (industrial). The heating of a material placed in this field depends on its **permittivity**, which is the material's ability to absorb the microwave..



Unlike a traditional heater (1), the material treated by microwave (2) warms up from the core to the outside. **Only the material is heated!** The environment outside the particles is just heated by conduction, convection and radiation from treated material. Performance can be further optimized by using a **secondary energy E'** (hot air, infrared, steam ...) for compensating heat lost by the material P.



Technologies

IDCO is a leader of industrial technical microwave treatment

IDCO unique technology is the result of more than **10 years of development and know-how** in microwave processing from standard to high temperature: *process optimization, design, choice of materials, performance of products, additives, ...*

Continuous process:

MO power: from 6 to 800 kW

Flow: from 1 kg to 150 tons /h

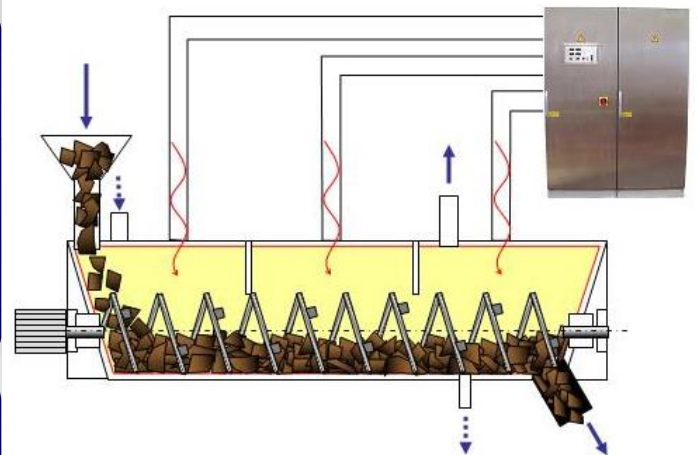
Temperature up to **900°C**

Operating in supervision

Heating time, temperature and flow adjustable

Possible programming levels and ramps

Applications: *extraction, technical drying, pyrolysis, torrefaction, expansion, inerting, ...*



Batch process:

MO power: 2 à 150 kW

Flow: from 1 kg à 1 ton /h

Temperature up to **1300°C**

Optimization of mixing (inclination, speed)

Possibility of *temperature control* (hot or cold) of the cavity and / or rotating tank

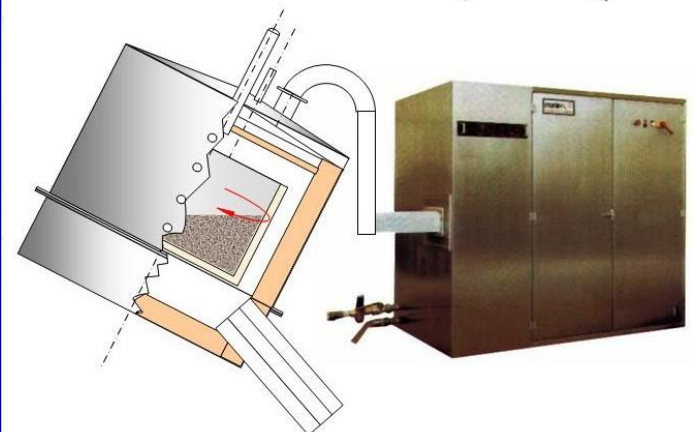
Operating in supervision

Heating time, temperature and flow adjustable

Possible programming levels and ramps

Possibility to operate in a vacuum, under pressure, under nitrogen ...

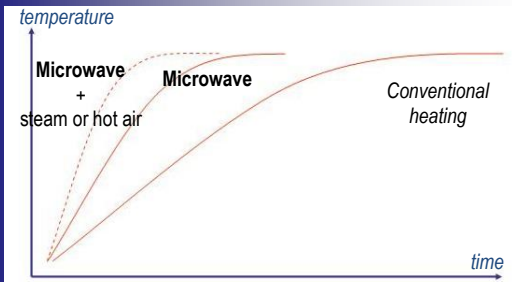
Applications: *extraction, chemical reactor, calcination, expansion, technical drying, pyrolysis, torrefaction, expansion, inerting, ...*



Advantages

Fast processing

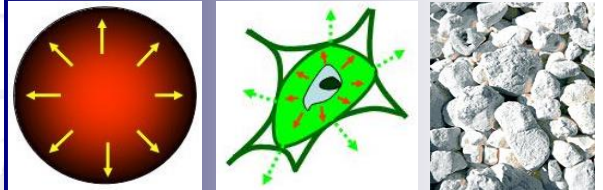
Microwaves heat from the core to the outside, that is **much faster** than conventional heating.
 For some applications, **several hours can be reduced to a few minutes!**



Efficiency

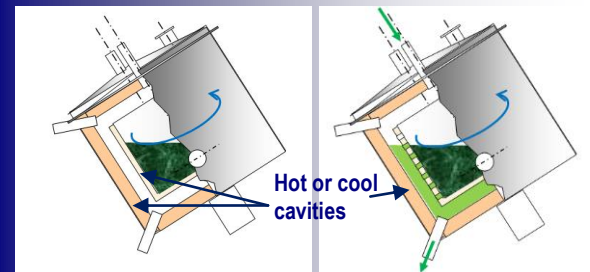
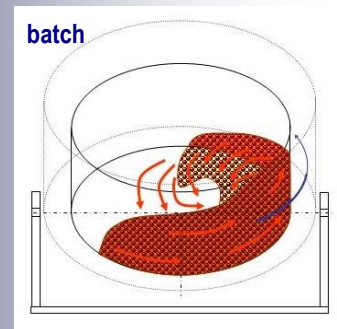
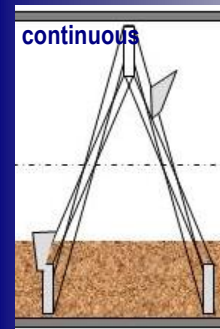
Heating from the core to the outside allows **exceptional efficiency!**

- **Internal overpressure** ⇒ high efficiency *extraction and drying* due to “spin” phenomenon
- **Higher temperature in the heart** ⇒ high efficiency *treatment and selective heating*



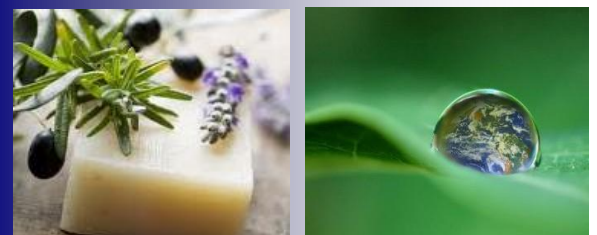
Consistency and accuracy

Mixing systems are especially designed and optimized depending on the product (size, geometry, density, bonding, ...).
 In association with infrared radiations generated by heat exchange, this mixing device provides **unmatched consistency of heating** for an **exceptional precision** to the degree, the watt and the second!
 Heating or cooling circuits in cavity and rotary tank allow to obtain very high efficiency (**extraction**)



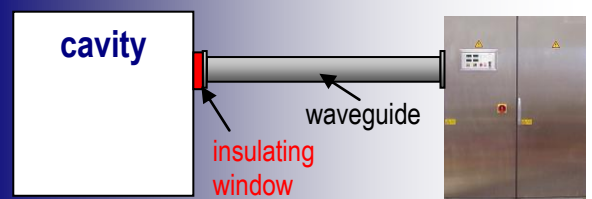
Product quality and ecology

No gas combustion (burner) **improves quality and hygiene** and minimizes **GHG emissions**



Controlled atmosphere

Microwaves are issued by energy lossless **waveguide**. Microwave generator can be set up as far as needed to the cavity.
 A **window, insulating** and transparent to microwaves, provides operation under **controlled atmosphere: pressure or depression, lack of air, nitrogen ...**
 ► **Ideally suited to active ingredient extraction and treatment in confined environments** (nuclear, ...)



Other advantages: quick start, easy maintenance, modularity ...

Services

From feasibility study to the industrial unit

Up to 50% of deductible expenses

Feasibility Study

- ▶ **Laboratory** with 2kW/2450MHz equipment allowing **unit and batch tests up to 500g**.
Simulation of heating in opened or closed rotating cavity. Possibility of adding hot or cold air.



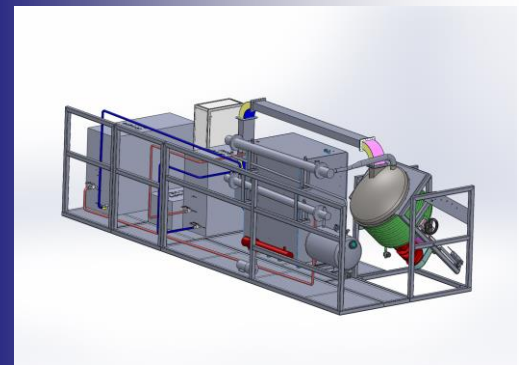
Study on semi-industrial plant

- ▶ **Testing platform** with 6kW/2450MHz cavity 20L allowing up to **20kg per batch tests**.
Heating parameters identification and validation, final products validation of, heat balance estimation, sample production.
Possibility of testing under controlled atmosphere and ultrasonic coupling



Turnkey industrial unit

- ▶ Pre-study of industrial unit
- ▶ Design, manufacturing, delivery and commissioning

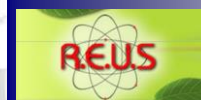


Our values

AVAILABILITY & ADAPTABILITY allowing rapid implementation resources needed
REACTIVITY & EFFICIENCY based on know-how and recognized expertise
FLEXIBILITY of services

Partners

- ▶ **REUS** : ultrasonic extraction for plant
- ▶ **BERTIN Technologies** : turnkey industrial plant



References



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