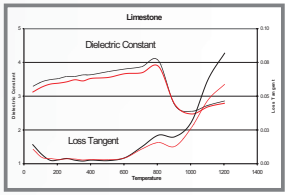
Services and Maintenance

Dielectric Property Measurement

The decision on whether to use microwaves or RF for a specific process is largely determined by the product's dielectric properties (permittivity).

We have facilities to measure the dielectric constant and dielectric loss factor or resistivity of materials at all the allocated RF and microwave heating frequencies. Since the dielectric properties of materials vary over temperature,



Lab Testing

Delphius has facilities to test product samples for compatibility with microwave or RF heating. We do heating trials for clients wishing to investigate the use of microwave or radio frequency ovens for new or replacement processes.

Experimental parameters may be varied to find suitable processing conditions.

Based on these measurements and other considerations, e.g. material shape and volume, we can recommend the best solution, be it MW, RF or a combination with hot air, etc.

Fault Finding and Equipment Upgrades

This RF generator was originally a free running oscillator, but was upgraded to a fixed frequency of 13.56MHz at 50kW RF power into a 50Ω load.

Upgrades included
- Replacing electro-mechanical control with PLC control;
- Replacing obsolete components with commercially available ones;
- Frequency stability; Improved efficiency.

Maintenance and Support

Delphius' support of the equipment that we supply, includes regular (preventative) maintenance, adjustment and calibration of the equipment, replacement of magnetrons etc. and the stocking of critical spares.

We have an extensive range of equipment for testing and trouble shooting of industrial microwave and RF equipment. We also provide microwave power and frequency spectrum measurements, testing for RF leakage and impedance matching of applicators to ensure low reflected power.

Delphius Commercial and Industrial Technologies

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delphius

Commercial and Industrial Technologies

Microwave and Radio Frequency Processing

- Quality Improvement
- Process Speed-up
- Energy and Cost Saving
- Unique Products
- Feasibility Testing
- Design and Manufacture
- Installation
- Maintenance

Contact:
+27 12 345 3882
www.delphius.co.za

Food Processing

Microwave Pasteurisation of Eggs

Delphius developed and produces microwave equipment for the pasteurisation of shell eggs. The process was developed in partnership with the CSIR, University of Pretoria and Safe Eggs (Pty) Ltd and is patented internationally. Pasteurised eggs are currently available in South Africa and international sales of the machines are due to start in 2009.

Capacity	-	8000 eggs / hour
Footprint	-	15 x 10m
Microwave	-	30kW, 915MHz

Drying and Modification of Starches

This microwave oven is used to dry and treat starches using 6kW of microwave power. The applicator employs a fluidised bed of hot process air to provide mixing of the product and to move it through the vessel.

Roasting and Precooking

This system is used to pre-cook maize. Samp is loaded into the system at the top. It is then cooked and extracted through a valve at the bottom of the system. The maize is stirred continuously by a ribbon blender to ensure even cooking. The system uses two variable power 3kW magnetrons to heat the material. These magnetrons operate at 2.45GHz and are water cooled. A 19" sub rack trolley houses the power supplies for the magnetrons and the switch gear for the motor.

Equipment and Components

Microwave Generators

Delphius supplies microwave generators with outputs ranging from 1kW to 100kW at the ISM frequencies of 915MHz, 2.45GHz and 5.8GHz

RF Generators

We design and manufacture RF generators, with 50Ω output and automatic matching boxes. These generators have a fixed frequency, with power levels ranging from 1kW to 300kW.

300kW Generator Control Panel

2kW, Variable Power,
Solid State RF Generator

RF and High Voltage Components

We supply RF and vacuum capacitors, magnetrons, RF tubes and high voltage components for microwave and RF generators.

Commercial Microwave and RF Ovens

SAIREM:
Food tempering, Sterilisation

Radio Frequency Inc:
RF Post Baking Ovens

Richardson Electronics:
High Voltage and RF components, Microwave Generators

IBF Electronics:
Microwave Generators and Pulsed Microwave Generators

RF Survey Meters and Monitoring Systems

We supply safety and leakage equipment to detect dangerous levels of microwave and RF emissions.

Hand held Survey Meters
- Walk around, testing for leaks.

Fixed mount Monitoring Systems
- Permanently installed;
- Digital output will switch off generator in case of excessive MW or RF leakage;
- 4-20mA outputs for monitoring by the plant PLC;
- Will prevent operation of the equipment if e.g. the access ports are open.

Manufacturing

Recycling of Plastics

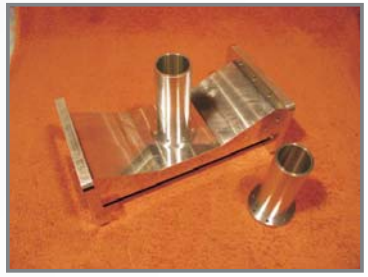
This microwave process for the recycling of Perspex has been in continuous use for the past 6 years. It is the only feasible alternative to the conventional process, employing molten lead. It is a clean technology, with no lead bearing waste and high product yield and purity.

Composite Wood Block Manufacture

This microwave moulding machine produces composite wood blocks. Due to the volumetric heating characteristics of the microwaves, the blocks are uniformly heated and the resin cured within 1 minute inside the press.

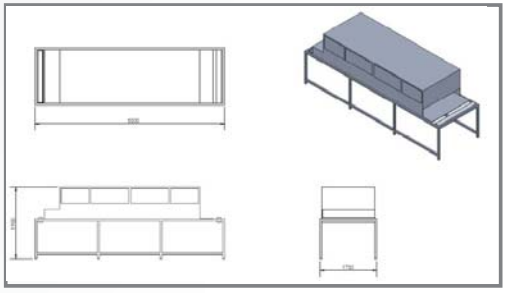
Plasma

Delphius supplies microwave and RF plasma generators, in pulsed and continuous wave output, as well as automatic impedance matching units and downstream plasma sources.



Microwave Drying

Granular and insulating materials can be dried efficiently with microwave energy. Our microwave & hot air hybrid drying systems have optional heat recovery systems to minimize energy usage.



Minerals and Ceramics

Microwave Assisted Roasting of Minerals

These continuous flow microwave roasting systems are faster and more energy efficient than conventional processes.

Microwave Assisted Drying and Sintering of Ceramics

Delphius designs and manufactures microwave sintering ovens, suitable for microwave power levels from 1kW to 100kW.

Main benefits of the microwave technology are a reduction in drying times and up to 5 fold speed-up of the sintering process without inducing cracking.

Radio Frequency Drying

This drying tunnel has a 500mm wide conveyor, with a 1.5m heating zone. Infrared sensors monitor the temperature of the product entering and exiting the tunnel. Two, 10kW RF generators supply the RF power to the two electrode systems, each with its automatic impedance matching unit. This allows accurate moisture profiling to be done.

RF drying tunnels with power levels from 10kW to 300kW per section are available.