

# MICROWAVE HEATING SYSTEMS



[www.kerone.com](http://www.kerone.com)



In Association with SVCH-Technologii, Moscow (Russia)

## *About KERONE*

KERONE now renowned name in serving specialized need of customers with best quality and economical process Heating /cooling and drying products, manufactured in high quality environment by well trained and qualified workforce(special purpose machineries) .

KERONE is pioneer in application and implementation engineering with its vast experience and team of professionals. KERONE is devoted to serve the industry to optimize their operations both economically and environmentally with its specialized heating and drying solutions.

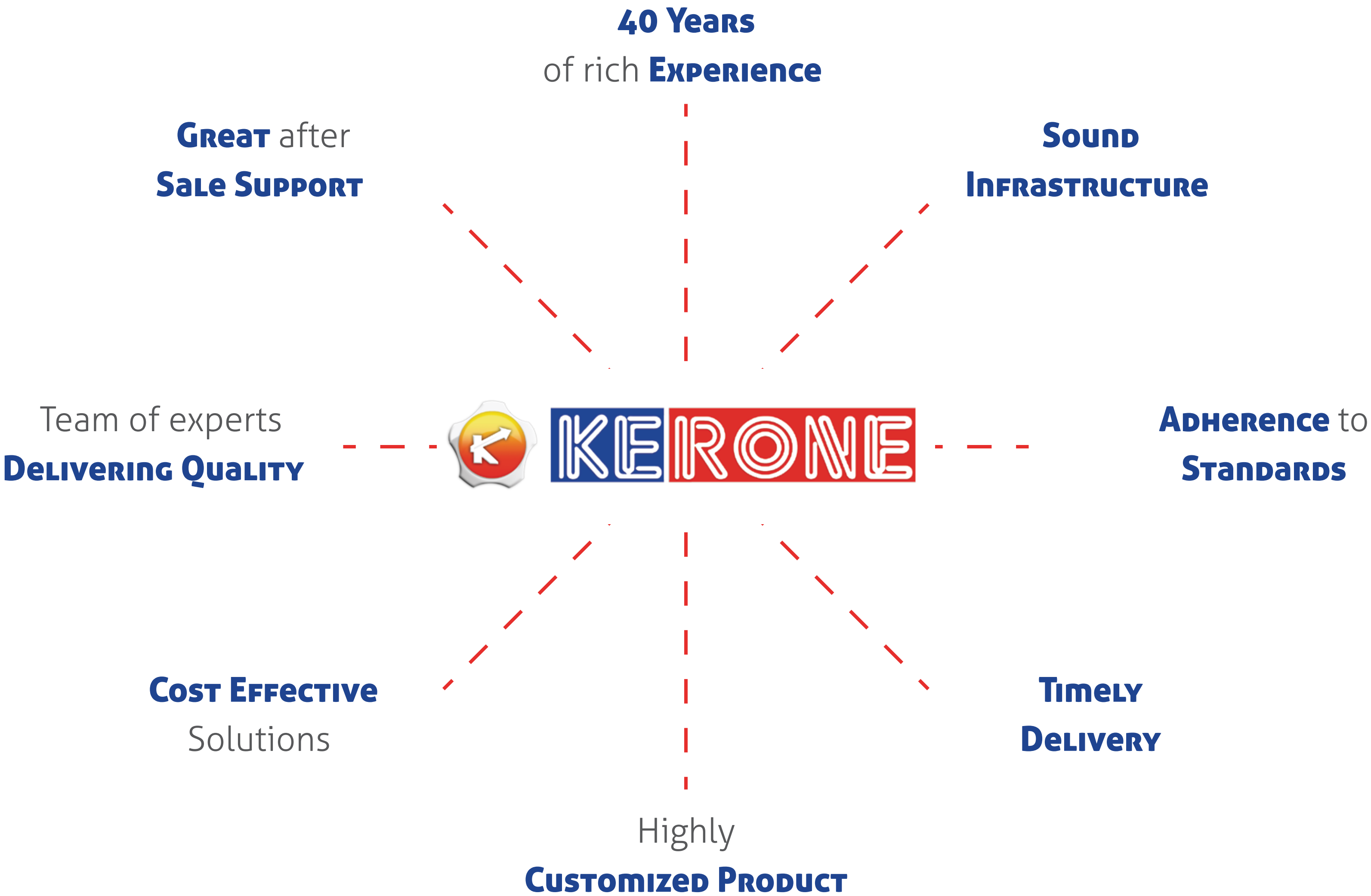
## *Vision*

- Turn into world leader in providing specialized, top-notch quality and ecological industrial heating, cooling and drying solution across the globe.
- To attain global recognition as best of quality and environment friendly engineering solution company.

## *Mission*

- To enhance the value of customer operation through our customer need centric engineering solution.
- We are committed to provide our customers, unique and best in class products in Industrial heating, drying and cooling segment, with strategic tie-up for the technical know-how with renowned leader in the industry specific segment.
- We are company that believes in strong ethics and timely commitment helps to build long term relationship.

*Value Propositions*



## *Introduction of Microwave*

Coating is a very Important process involved in Manufacture of Coated Products

Today we shall review some of these as listed below:-

Microwave heating systems are member of **ELECTROMAGNETIC HEATING FAMILY**

Microwaves has frequency of **2.45GHZ AND 915MHZ**

Microwave is generated from small device known as '**MAGNETRON**'

Microwave heating system has property to **HEAT FROM WITHIN**

Microwave heating systems heats volume of material hence also known as '**VOLUMETRIC HEATING**'

The principles of MICROWAVE HEATING as applied to industrial processing are outlined and the basic design of applicators for material processing is described. Industrial applications range from FOOD TEMPERING to RUBBER VULCANIZATION and from VACUUM DRYING to SINTERING OF CERAMICS. Established applications to date are summarized.

Microwave heating is a process within a family of electroheat techniques, such as

- *Induction*
- *Radio Frequency*
- *Direct Resistance or Infra-Red Heating*

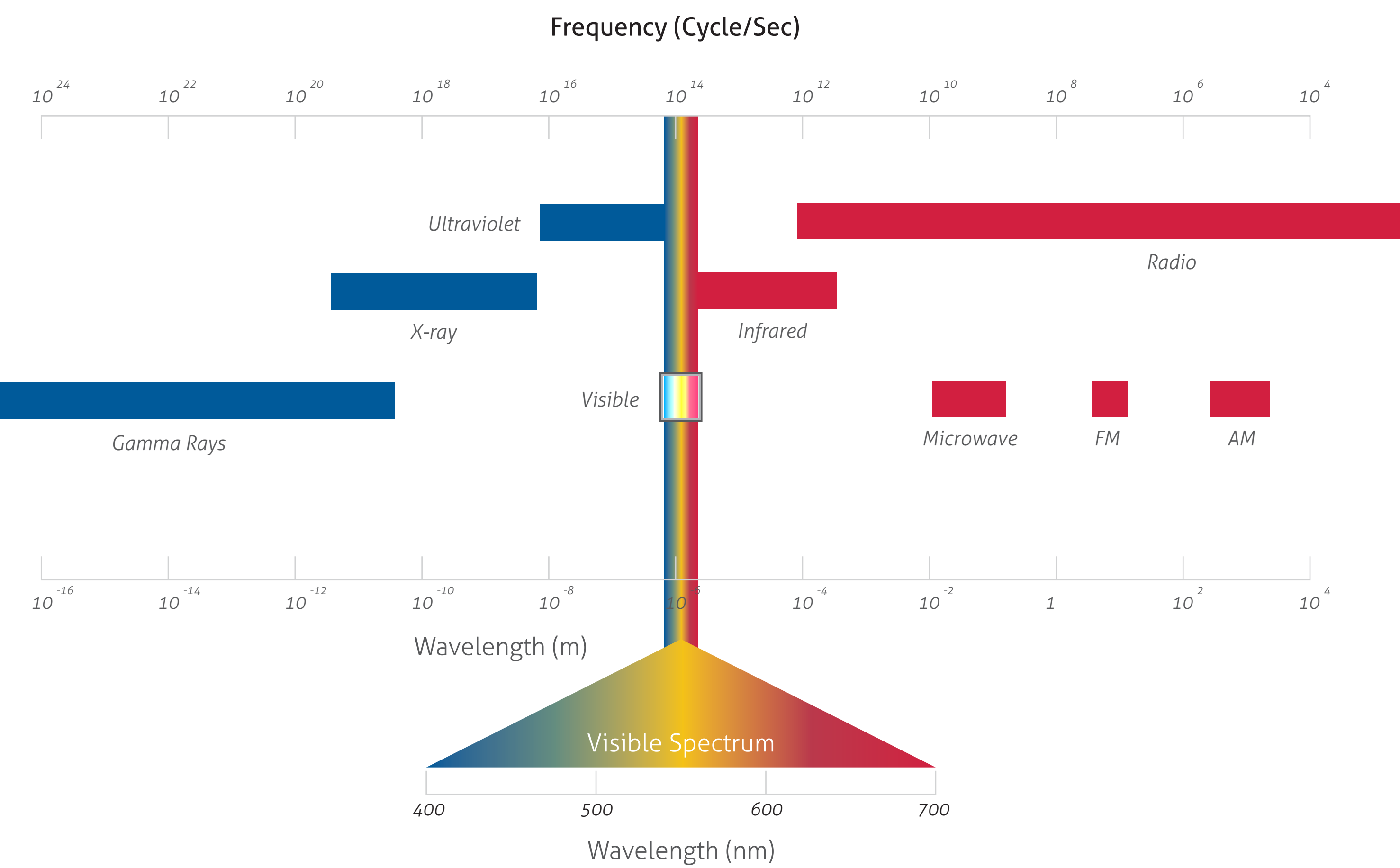
all of which utilize specific parts of the electromagnetic spectrum.

These processes supplement, and in specific cases totally replace, conventional heating or drying systems used in industry. This is because some conventional systems are very bulky, not easy to operate, can pollute the environment due to harmful omissions and above all can be very inefficient.

The major advantages of using microwaves for industrial processing are rapid heat transfer, volumetric and selective heating, compactness of equipment, speed of switching on and off and pollution-free environment as there are no products of combustion. Microwave leakage can certainly be kept well below government recommended levels.

Microwaves Heating System  
Classification

Microwave Frequency	Heater Type
915 Mhz	Batch
2450 Mhz	Continuous
	Hybrid



*Microwave Heating System Vs Conventional Heating System*

Microwave Heating System	Conventional Heating System
<ul style="list-style-type: none"><li>• Microwave heating system is generates the heat very fast within material</li></ul>	<ul style="list-style-type: none"><li>• Conventional heating system have slow hating rate, heat is transferred via means of air</li></ul>
<ul style="list-style-type: none"><li>• Heating of materials are due to molecule movements hence no chamber warm up time is required</li></ul>	<ul style="list-style-type: none"><li>• Instance heating does not takes place, it requires warm-up of surrounding</li></ul>
<ul style="list-style-type: none"><li>• Environmental friendly and green heating solution, no carbon emission</li></ul>	<ul style="list-style-type: none"><li>• Produces carbon or toxic gases hence not much environmental friendly heating solutions</li></ul>
<ul style="list-style-type: none"><li>• 100% energy utilization, as heating takes place within the material</li></ul>	<ul style="list-style-type: none"><li>• 100% energy utilization is not possible, as material is heated by surrounding hot air</li></ul>
<ul style="list-style-type: none"><li>• Better floor utilization index as it doesn't require chamber area</li></ul>	<ul style="list-style-type: none"><li>• Poor floor utilization index as it require bigger chamber area for material to rotate</li></ul>
<ul style="list-style-type: none"><li>• No Temperature loss in surrounding, ambient workplace</li></ul>	<ul style="list-style-type: none"><li>• Surrounding air temperature rises with rise in heater temperature</li></ul>

*Microwave Heating System Vs Infrared Heating System*

Microwave Heating System	Infrared Heating System
<ul style="list-style-type: none"><li>• Microwave heating systems utilizes electromagnetic system uses wavelength of about 1 centimeters</li></ul>	<ul style="list-style-type: none"><li>• IR heating systems utilizes electromagnetic system uses wavelength of about 0.01 centimeters</li></ul>
<ul style="list-style-type: none"><li>• Microwave heating systems does not require larges space hence offers better floor utilization index</li></ul>	<ul style="list-style-type: none"><li>• Compact system providing better floor utilization index</li></ul>
<ul style="list-style-type: none"><li>• Microwave heating systems are not substitute the conventional heaters</li></ul>	<ul style="list-style-type: none"><li>• Infrared heating systems are better substitution of traditional convention heaters</li></ul>
<ul style="list-style-type: none"><li>• Depth of heat penetration is higher in Microwave heaters</li></ul>	<ul style="list-style-type: none"><li>• Depth of heat penetration is lower in infrared heaters as it heats from surface</li></ul>
<ul style="list-style-type: none"><li>• Rate of heating depends on the moisture content within the material</li></ul>	<ul style="list-style-type: none"><li>• Rate of heating depends on the surface characteristics of material</li></ul>
<ul style="list-style-type: none"><li>• Heats the objects from within the object</li></ul>	<ul style="list-style-type: none"><li>• Heats the object from surface of object</li></ul>

## *Advantages of Microwave Heating Systems*

**Uniform Heating** occurs throughout the material  
Process speed is increased ●

**Desirable** chemical and physical  
**Effects** are produced ●

**Floor Space** requirements are **Decreased** ●

Better and more **Rapid Process**  
control is achieved ●

**Purity** in final product ●

**High Efficiency** of Heating ●



● **Process speed is increased**

● **Selective Heating**  
i.e. heating selectively  
one reaction component

● **Reduction in unwanted side**  
reaction (reaction Quenching)

● **Improve reproducibility**

● Environmental heat loss is save,  
**Reduce wastage** of heat

## *Microwave heating systems in Pharmaceutical Industries*

Microwave based heating systems has very significant role in various process in Pharmaceutical industrial processing, some are mentioned below



- ★ *Assists Drug Extraction*
- ★ *Drying and Powder Making*
- ★ *Microwave Digestion*
- ★ *Thawing*
- ★ *Chemistry Synthesis*
- ★ *Cancer Therapy*
- ★ *Sterilization*

## *Microwave heating systems in Plastic and Rubber Industries*

Plastic and Rubber has increased its application in various application, so the demand. Below are few important applications those require heating



- ★ *Pyrolysis Of Plastic*
- ★ *Extrusion Curing*
- ★ *Plastic Welding*
- ★ *Rubber Coating*
- ★ *Plastic Thermoforming*
- ★ *Post Curing*
- ★ *Vulcanization Of Rubber*
- ★ *Pre Heating Of Solid Rubber Tyres*
- ★ *Preheating Of Rubber*

## *Microwave heating systems in Food Industry*

The Food and Packed Food industry has multiple application that require microwave heating are as follows

- ★ *Blanching*
- ★ *Drying / Dehydrating*
- ★ *Cooking*
- ★ *Tempering of Frozen Products*
- ★ *Thawing*
- ★ *Baking*
- ★ *Pasteurization and Sterilization*



## *Microwave heating systems in Ceramics*

Glass and Ceramics find multiple applications those require Microwave heaters



- ★ *Plasma Processing*
- ★ *Liquid State Processing*
- ★ *Solid State Processing*

## *Microwave Dryer - Continuous Type*

Can add to the performance of the machine by choosing from various additional optional features like Temperature control, Pulsating power, Hot air assisted RF / MW system, Heater temp control, Air assisted RF/MW system, Air velocity control, Vacuum assisted RF/MW system, Vacuum / pressure control, Alarm system after RF OFF, PLC base control system, Data logger with computer interface.



- ★ *Microwave Magnetron*
- ★ *Variable Frequency*
- ★ *PID Indicator / Controller*
- ★ *Variable Power output*
- ★ *Stainless Steel Chamber*
- ★ *Electrical & Thermal Safety Features*
- ★ *RF / MW Choke / Timer Provision*

## *Microwave Dryer - Batch Type*

Completely Stainless Steel chambered - Batch Type Dryers have Microwave Magnetron from leading Brands with some more unique features like Temperature Indicator, Provision for RF/MW Choking, Provision for Timer, Power Control ranging from 10% to 100%, and has all required electrical & Thermal safety features for RF/MW generator. Above all, this can be designed completely custom and sized as per the end users requirement specifications.



### Additional Features - Optional

- ★ *Temperature Control*
- ★ *Air Velocity Control*
- ★ *Pulsating Power*
- ★ *Vacuum Assisted Rf / Mw System*
- ★ *Heater Temp Control*
- ★ *Vacuum / Pressure Control*
- ★ *Air Assisted Rf / Mw System*
- ★ *Alarm System After Rf Off*
- ★ *Plc Base Control System*
- ★ *Data Logger With Computer Interface*

## *Microwave Batch Oven*

Our MICROWAVE BATCH OVEN are available in different shapes and sizes as per customer's requirements. For industry aluminium ovens are used and steel ovens are useful in food industry. The most important specialty of these ovens is uniform heating throughout

It is immaterial which industry you belong to, because our microwave batch ovens are useful in every industry, in pathology laboratories, industrial laboratories, hospital laboratories and so on.



★ *Food Industry*

★ *Production Laboratory*

★ *Pharmacy Laboratory*

★ *Medical Laboratory*

★ *R&D Laboratory / Quality Control Laboratory*

Trusted Partner



## Our Clients

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