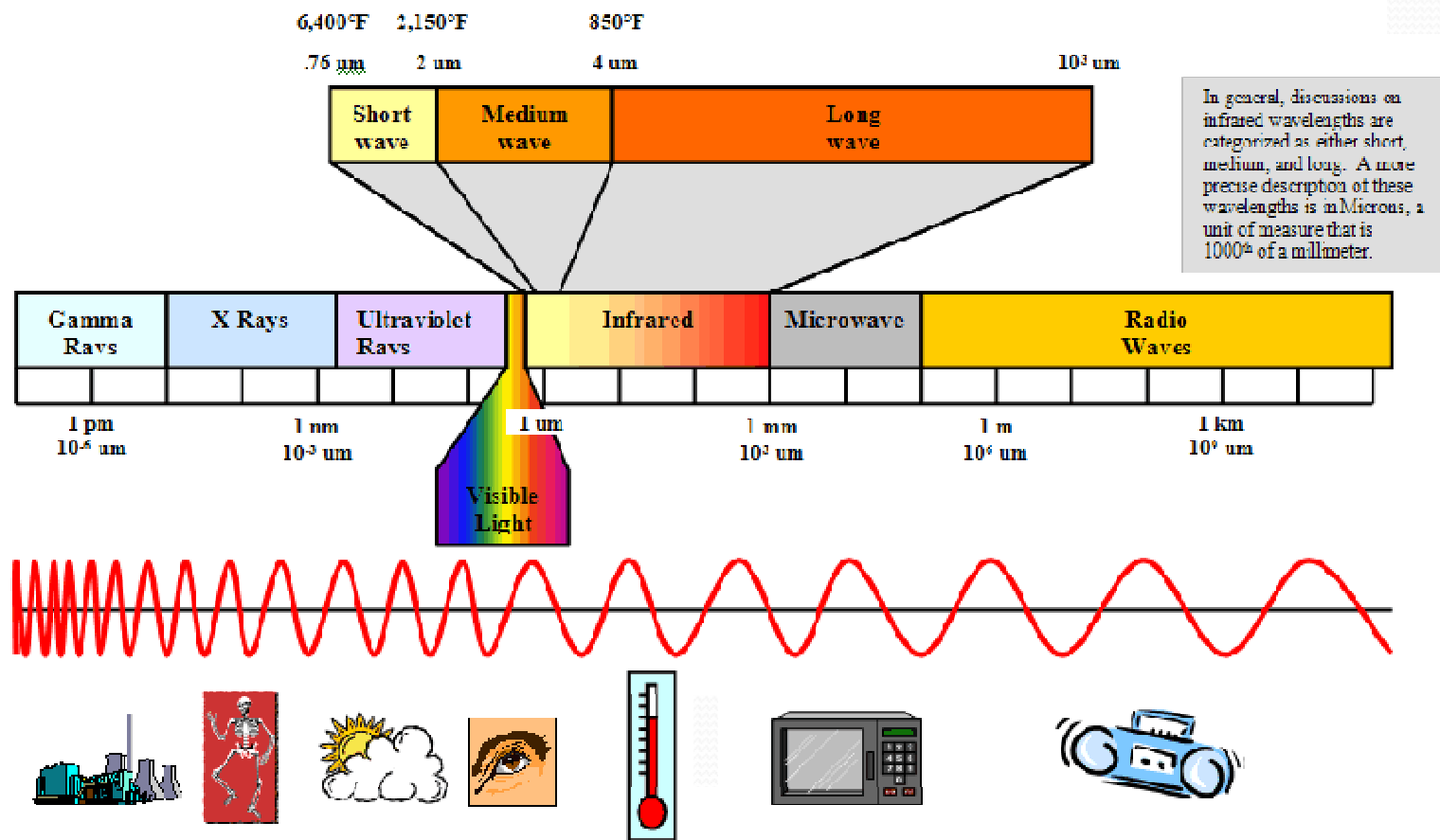


# ELECTRICAL INFRARED HEATING SYSTEM

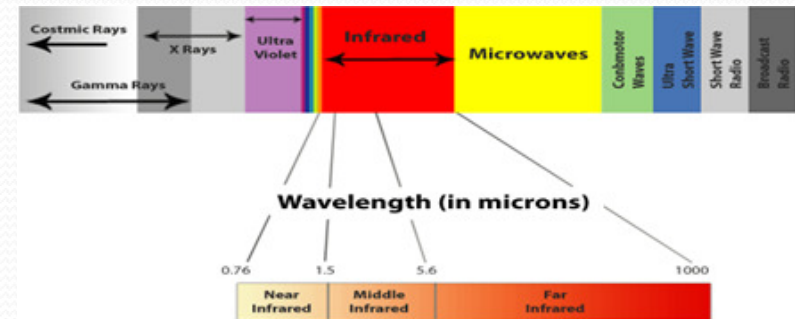
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# LIGHT SPECTRUM



# BASICS OF INFRARED

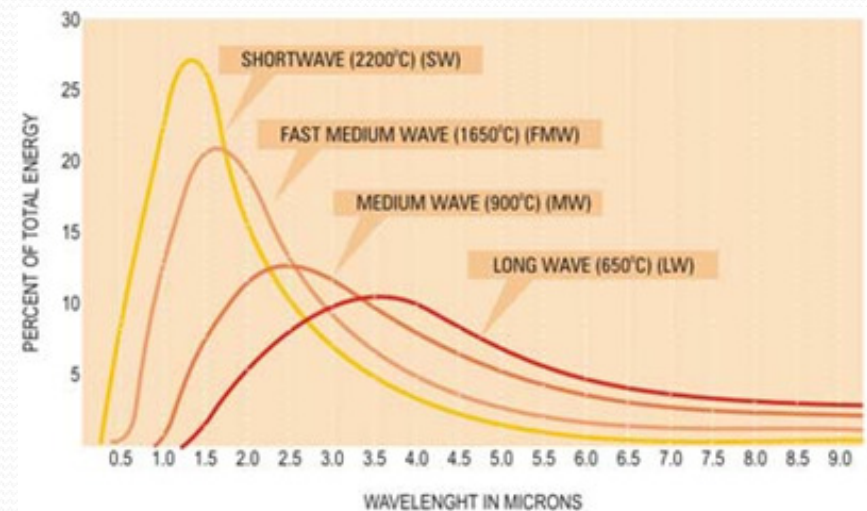
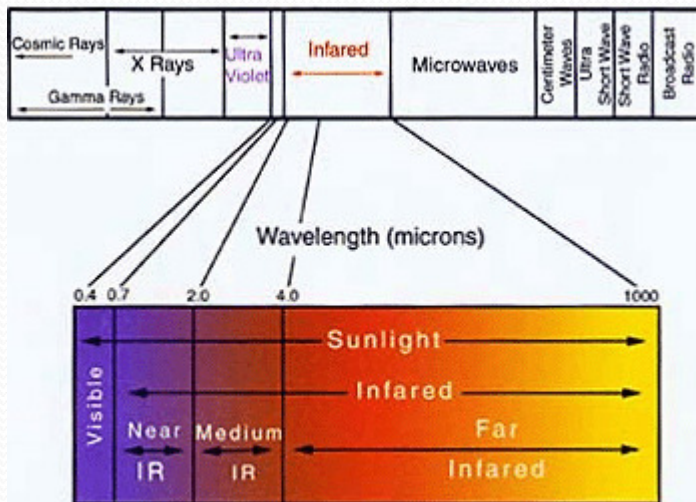
1. IR is a part of Electromagnetic Spectrum
2. Some wavelengths are Invisible
3. Travels at the speed of light
4. Can be directed
5. Can travels in Vacuum
6. No medium like Air is required to heat a substance
7. Industrial heating: wavelength begins at  $0.7\mu$  up to  $10\mu$





# SPECTRAL DISTRIBUTION OF ENERGY FOR VARIOUS OF IR SOURCES

INFRARED WAVE TYPES	TEMPERATURE RANGE
SHORT WAVE (SW)	1800 – 2200 °C
FAST MEDIUM WAVE (FMW)	1200 – 1800 °C
MEDIUM WAVE (MW)	750 – 1200 °C
LONG WAVE (LW)	up to 650 °C



# BASIC LAWS OF RADIATION

## WIEN'S LAW

The peak wavelength of Emission of an Infrared Heater can be calculated by Wien's Law.

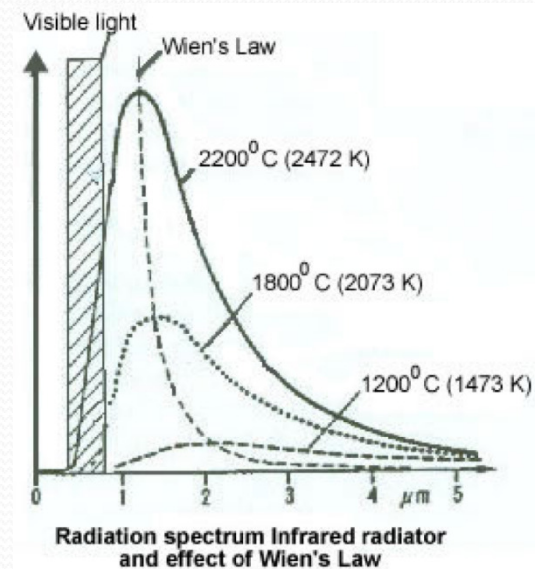
$$\lambda = C/T$$

Where,

$\lambda$  = Wavelength in Microns

C = Constant 2898

T = Source Temperature







# STEFAN BOLTZMAN LAW

$$W = kT^4$$

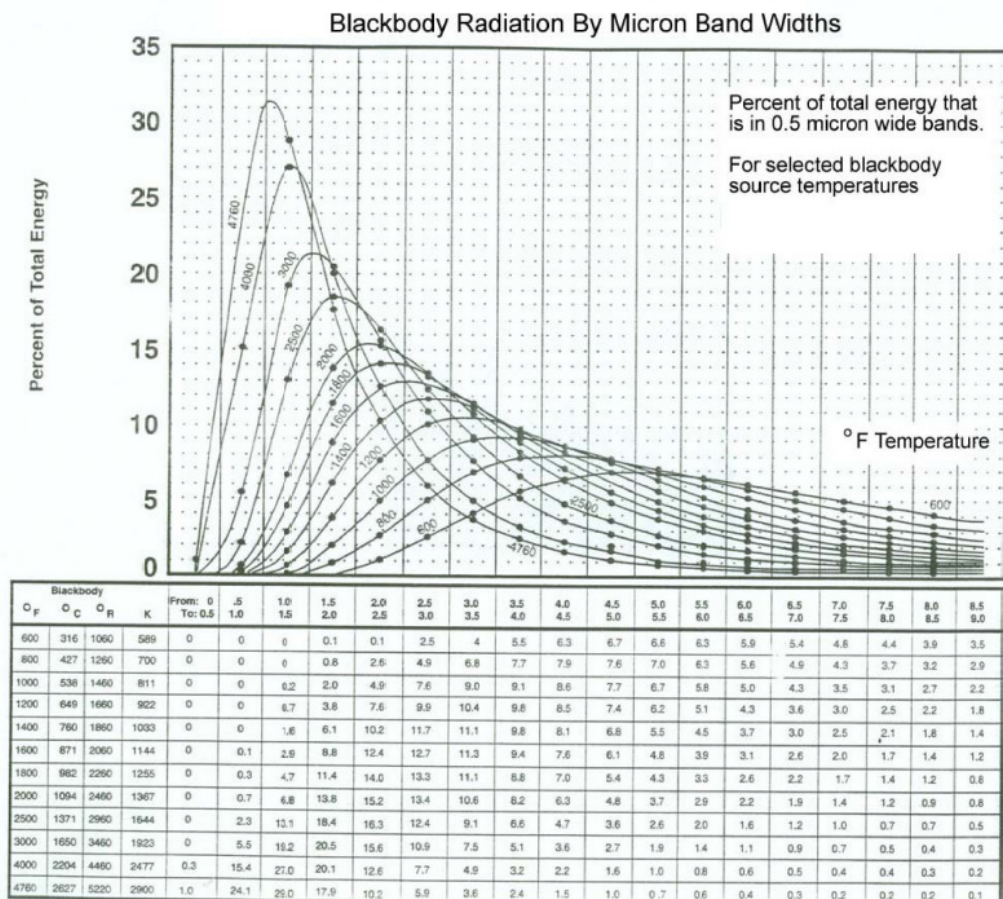
Where,

W= Emitted Power

k = Constant

T= Source Temperature (°K)

# PLANK'S LAW



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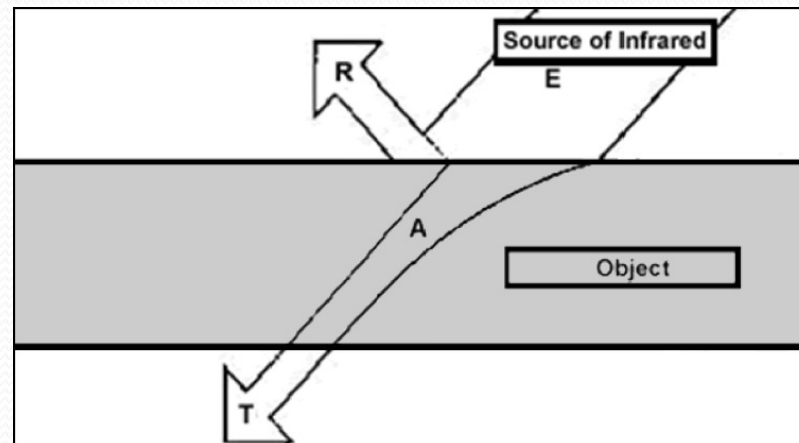
# SPECTRAL CHARACTERISTICS OF INFRARED

A = Absorbed by the Object (A)

R = Reflected by the Object (R)

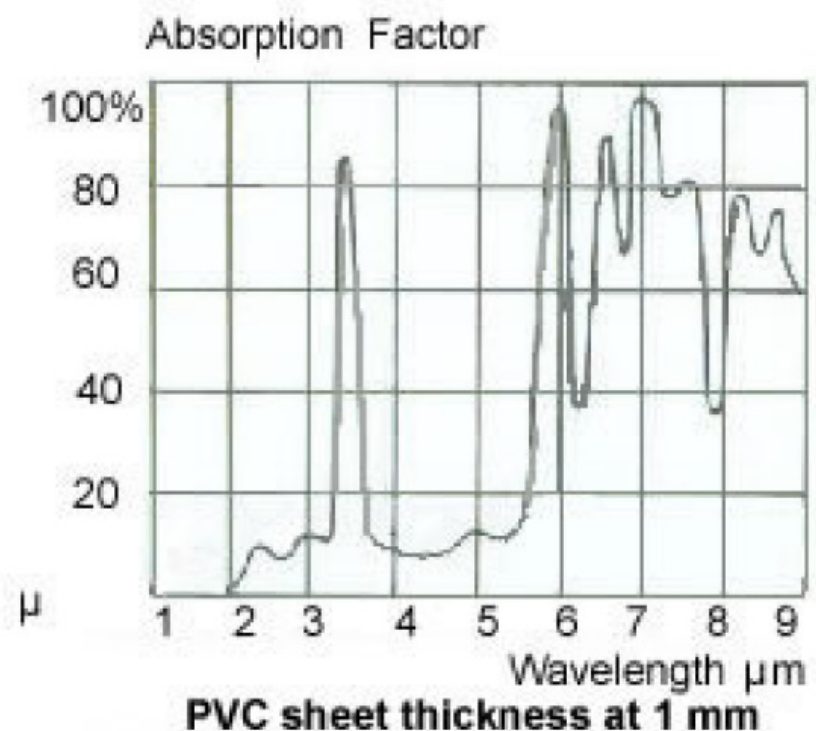
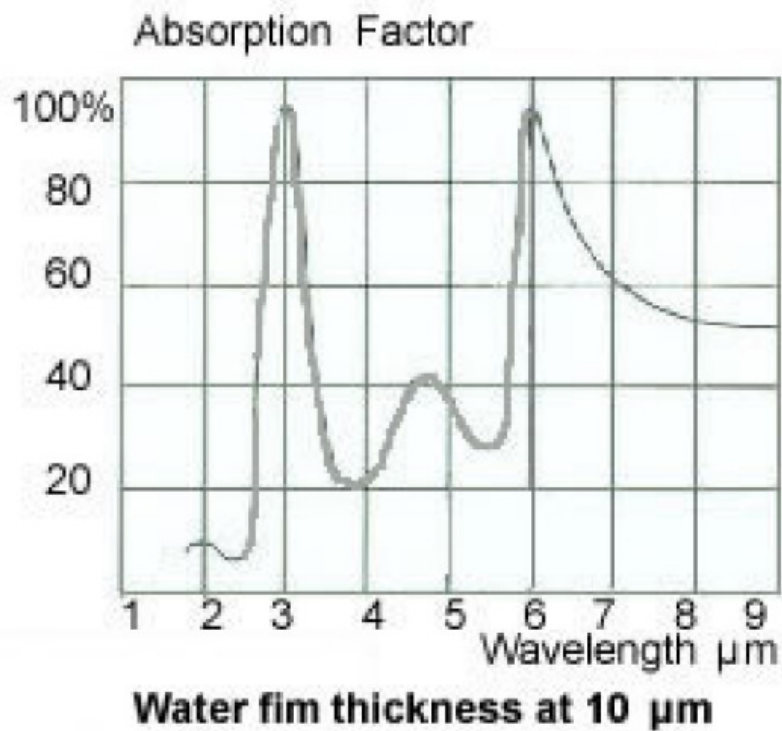
T = Transmission through the Object (T)

$A + R + T = 100\%$  Efficiency received.





# ABSORPTION CURVES FOR DIFFERENT PRODUCTS



# TYPES OF HEATERS

## 1. Short Wavelength

Quartz Tube Emitter (T-3)



## 2. Medium Wavelength

Quartz Emitters





# TYPES OF HEATERS

3. Medium Wavelength  
Stamped Foil Type Heaters



4. Long Wavelength  
Infrared Heaters





# GAS INFRARED HEATERS

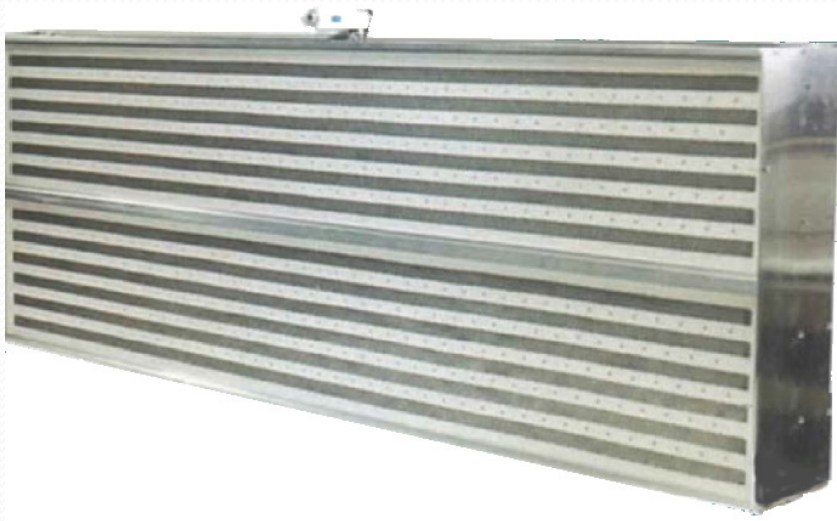
## 5. Gas Infrared Heaters



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# APPLICATIONS

## 1. Infrared Pre-dryer



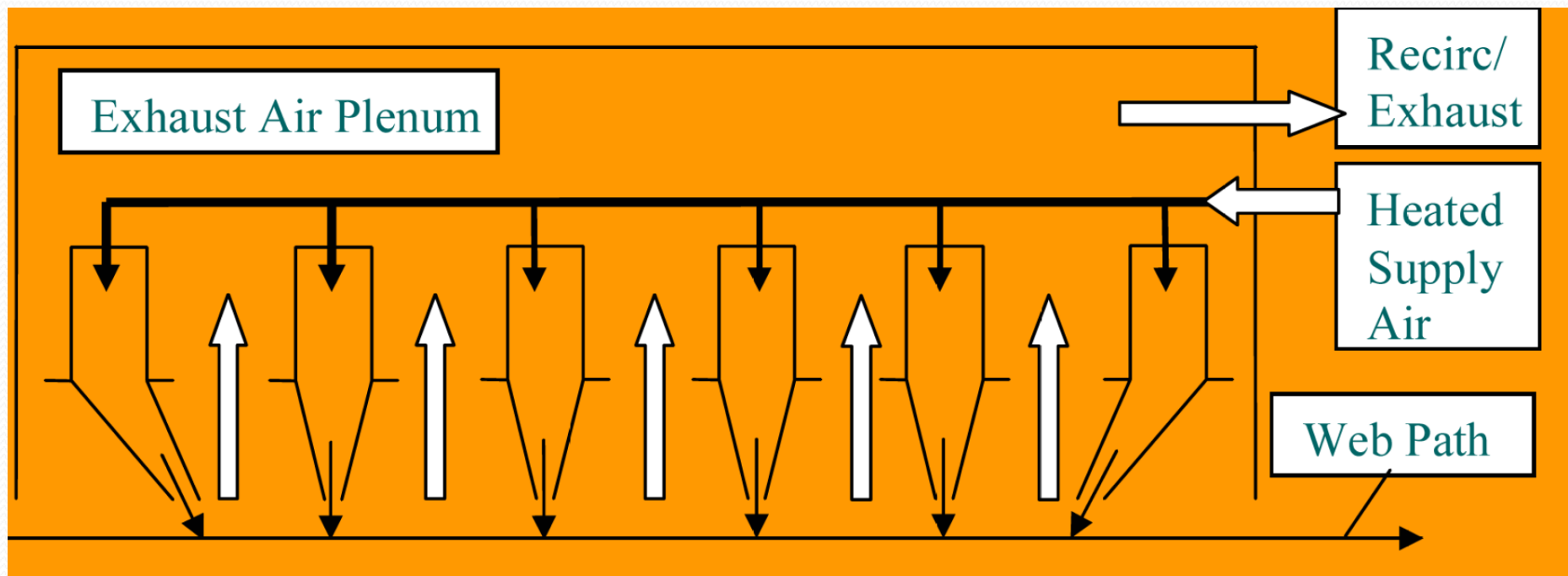
## 2. Infra-red Air and Hot Air Dryer on a Coating line





## WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE GENERALLY DRIED USING THREE TECHNOLOGIES

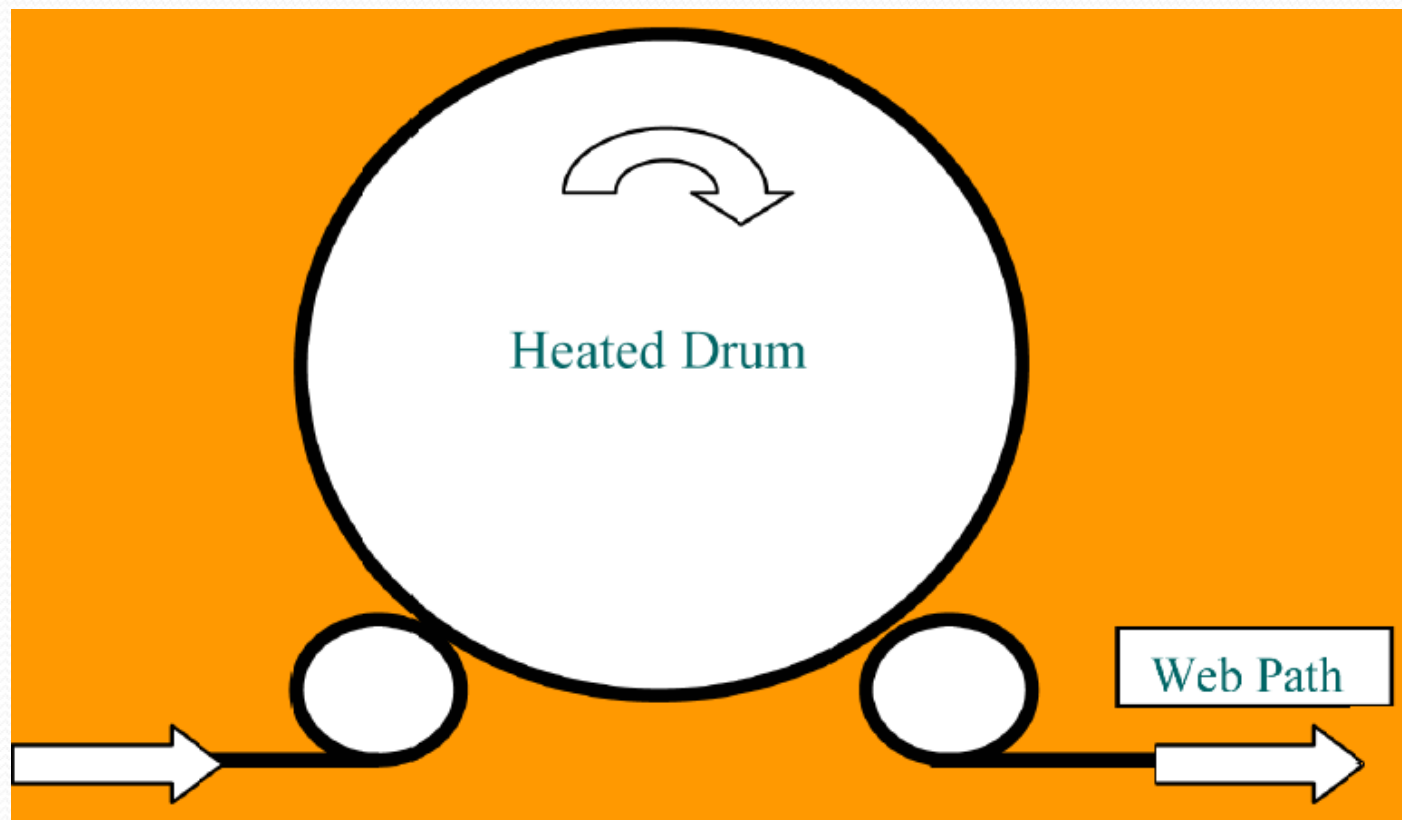
1. Conventional such as hot Air impingement or Floatation Dryer





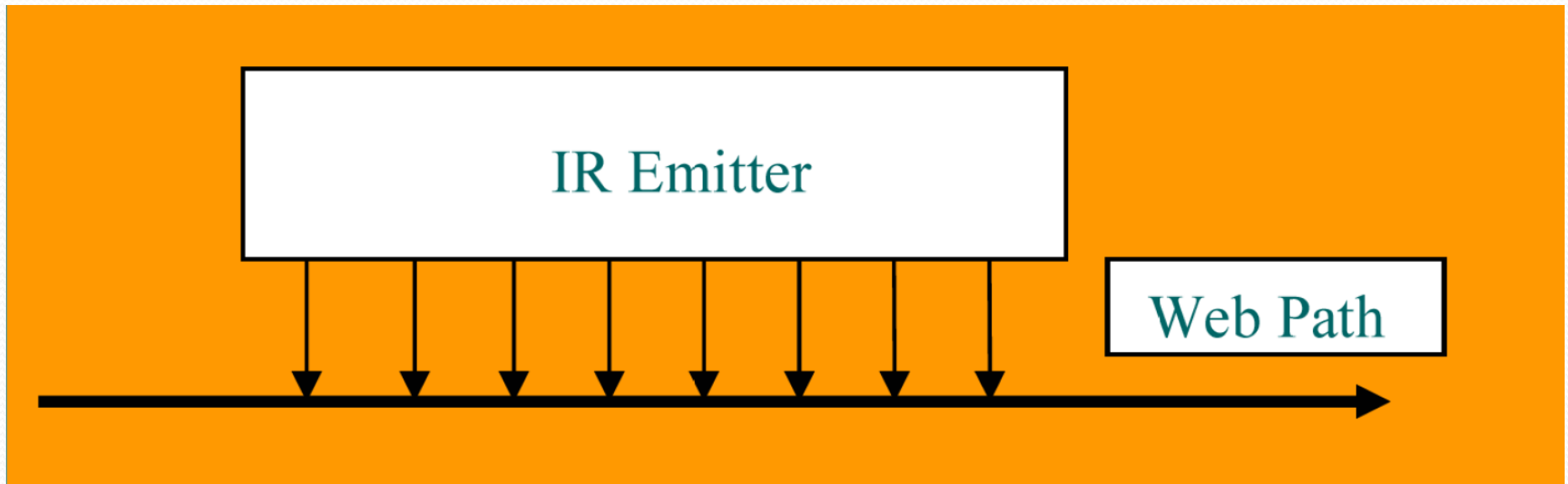
WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE  
GENERALLY DRIED USING THREE TECHNOLOGIES

## 2. Conduction- Oil or Seam Heated Drum



WATER OR SOLVENT BASED WET COATINGS APPLIED ON WEB ARE  
GENERALLY DRIED USING THREE TECHNOLOGIES

### 3. Infrared or Radiant heating





# APPLICATIONS

- There are numerous applications where Infrared and Infrared Air Dryers have been successfully used to enhance drying and curing capabilities of coating lines. Listed below are some of the more common and more successful applications:
  1. Dry and Pre-dry Water and Solvent based pressure sensitive Adhesives.
  2. Laminate form to Fabric using web Adhesives for Automotive and Furniture Industries.
  3. Dry and Pre-dry Water based Latex and Clay coatings on Paper.
  4. Moisture profiling across the machine direction in Paper Industry.
  5. Pre-heat films for Laminating and Embossing.
  6. Dry flexo and gravure printed links.
  7. Dry Silicone coatings on Fiberglass Fabrics.
  8. Cure Silicone coatings on various substrates.
  9. Cure PVC coatings on scrim, nonwovens and woven fabrics.
  10. Dry and Cure solvent base resin coatings on Fiberglass for Printed Circuit Boards.
  11. Pre-dry, Dry and cure coatings on industrial Fabrics.
  12. Dry food Nutraceutical and Pharmaceutical coatings on film.





# ADVANTAGES OF INFRARED DRYERS

1. High efficiency conversion of Electrical Energy into heat for Electrical Infrared.
2. Heater rate of Heat Transfer.
3. Floor space savings due to smaller size.
4. Heats only the object without heating the surroundings.
5. Easy to zone for uniform heating of the product.
6. Faster response to changing process conditions.
7. Quick start-up and shut-down.
8. Easy to have cutoff zones for narrow widths.
9. Ease of Control.
10. Lower capital and Installation cost.
11. Can be easily added to existing conventional Dryers to increase line speed.
12. Infrared Air Dryers suitable for Solvent based coatings.



# LIMITATIONS OF INFRARED DRYERS

1. Some coatings may not be able to take advantage of higher rate transfer and may skin and blister.
2. Difficult to work with temperature sensitive substrates.
3. Scaling up of the heaters is not always straight forward.
4. Since Infrared is basically a surface phenomenon, harder to Dry heavier coatings.
5. Almost essential to run trials in lab or on the Pilot line to confirm design.



# How we can help you?

If you plan to set-up any Infrared System and are confused about its feasibility, we can help you....

Just mail us your requirements at [kerone2007@yahoo.co.in](mailto:kerone2007@yahoo.co.in) or at [vhpl@bom5.vsnl.net.in](mailto:vhpl@bom5.vsnl.net.in)

we will reply with our complete techno-commercial quote within 7 to 8 working days

In case you have any query please feel free to contact us:

**OFFICE : B/14, Marudhar Industrial Estate, H.P. Gas Lane, Goddev Road,  
Bhayandar (East), Dist. Thane – 401105. Ph:++91-22-28195820 /  
28150612-13-14 Fax :- 022-28186138**



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**DESIGNERS & MANUFACTURERS OF INDUSTRIAL ELECTRICAL HEATING EQUIPMENTS &  
CONTROL PANELS/A.C. DRIVE/PLC [TECO], LAB EQUIPMENTS, VACUUM & INFRARED EQUIPMENTS**

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# THANK YOU

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