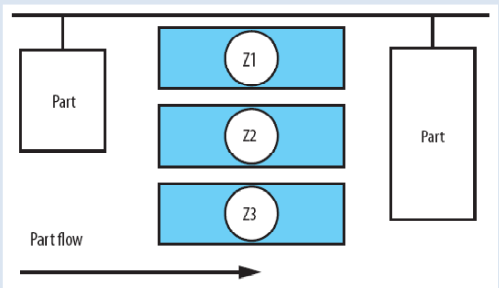
Potential and Control

Infrared heating offers numerous advantages over convection heating including:

- Higher rate of heat transfer
- Higher efficiency
- Floor space savings
- Lower maintenance
- Faster response
- Greater control accuracy
- Lower capital expense

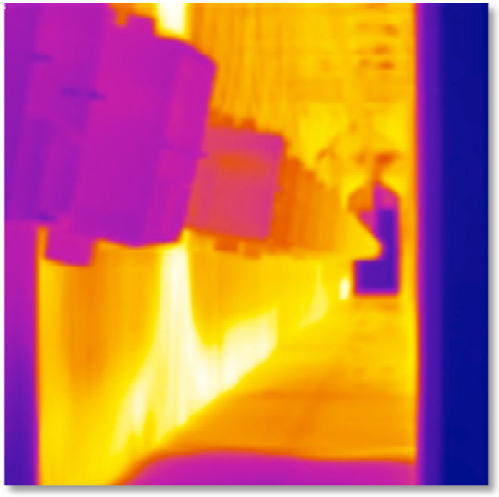
Due to IR system provides advantage on fast respond when adjusted temperature, this offers capability for controlling the process heating even **On/Off or Variable control** by integration of sensors, Proportional Integral Derivative (PID) and Silicone Controlled Rectifier (SCR).

The other potential of IR heating system is **Zone temperature control** which multiples zone offer different heat intensity suit for the particular object and can enhance process flexibility.



IR Process Heating

Start Heating “Object”
Instead Heating “Air”



Infrared Applications

Types of IR Oven

Energy Sources

Potential Use

For more Information

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What is Infrared?

Infrared (IR) is electromagnetic radiation which longer wavelength than visible light. It can be divided into three major bands;

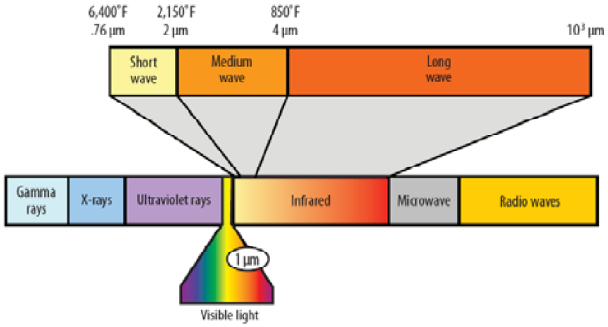


Figure-1: Infrared Spectrum

The example of infrared is generated by *sun beam* as you felt hot when standing at outdoor while your surrounding temperature still lower because the radiation energy is not much absorbed by air but absorbed by object particularly blackbodies.

IR energy generally produced from emitting source which has temperature from 500F to 4,200F and be transported through electromagnetic wave with tiny energy loss. The energy was then transformed to vibrational motion at the object's atoms as a result of rising target temperature.

Infrared Applications

Infrared heating was firstly used to cure painting on automobile since 1930s and then applied in various applications particularly heat sensitive and high mass object.

- Appliances and cook wares
- Furniture and wood
- MDF and wood veneer
- Automotive components
  - Engine blocks
  - Truck springs
- Construction machinery
  - Steels beam
  - Hydraulic excavator
- Papers and air filters

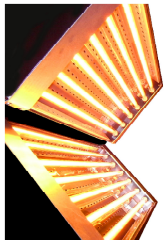
There is various process heating employed IR sources as major equipment or implement to intensify heat transfer efficiency such as baking, drying and particularly curing powder coating.

Because IR wave length seems suitable with absorption band of organic material which can be generate heat intensity on the particular material.

Types of IR Oven and Source

Industrial IR processing equipment is either fueled by electricity, natural gas or propane. However, the radiant output of emitters depends on its temperature, not on its composition.

Electric

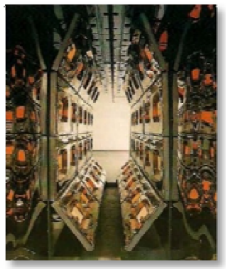


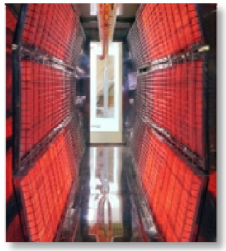
Electrical emitter, heat is generated by hot surface of thin filaments tungsten covered by glass tube.
All bands of IR can be generated and rapidly respond time (on-off) in a second.

Natural Gas and Propane

IR gases heater can be classified into gas fired emitter and gas catalytic emitter. Only long to medium wavelength can be produced.

Fired emitter, heat is generated by premixing of gas and air are released through porous materials (metal fiber, ceramic fiber and ceramic tile) and burned at the surface at temperature range 1,200-2,000F.





Catalytic emitter require electric preheat system to start catalytic reaction of gas and oxygen. Flameless infrared energy can be generated with temperature range 450-1,000F.