SURFACE MOUNT EQUIPMENT MANUFACTURERS ASSOCIATION
REFLOW TERMS AND DEFINITIONS 4.0

TABLE 1: Classification of Reflow Technologies:

TYPE A: Vapor Phase
TYPE B: Area Conduction
TYPE C: Hot Bar
TYPE D: IR, Convection/IR and Convection Ovens
TYPE E: Laser Reflow

with TYPE D" further classified as:

CLASS 1: RADIANT IR **DOMINANT SYSTEMS**
Heating of the PCB assembly is accomplished predominantly by infrared radiation with little or no convection.

CLASS 11: CONVECTION/IR SYSTEMS
Heating of the PCB assembly is accomplished by a combination of infrared radiation and convection in varying ratios.

CLASS III: CONVECTION DOMINANT SYSTEMS
Heating of the PCB assembly is accomplished predominantly by convection with little or no infrared.

TERMS DEFINITIONS

Aeroso - Fluid or gas particles small enough to be airborne
Absorbtivity - Percentage of infrared absorbed by a substrate as compared with the total incident infrared.
Blackbody - A body that absorbs all radiation incident upon its surface
Bonding Time - The time from commencement of hot bar heatup (moment of hot bar contact) until the reflow profile is completed.
Color Selectivity - Preferential absorption of radiation caused by emitted energy in the visible band wavelength (.39-.78 microns).
Conduction - Heat transfer that occurs within or between solids due to temperature gradients across the solids (s).
Convection - Heat transfer that occurs at the interface of a solid and fluid or gas due to temperature differences.
Convection, Controlled - Convection heat transfer in which the convective characteristics (such as flow, rate, velocity and temperature are precisely controlled
Convection, Enhanced - Convection heat transfer that occurs by drawing or drafting the fluid or gas over the solid media
Convection, Forced - Convection heat transfer that occurs by forcing the fluid or gas over the solid media.
Convection, Free - Convection heat transfer that occurs due to movement of air caused by density gradients near the solid surface.
Conveyor, Edge - Conveying mechanism that supports product by the edges Conveyor, Mesh - Conveying mechanism that fully supports the product.
Conveyor, Secondary - Conveying mechanism used beneath the edge conveyor. Used to catch fallen product.
Cooldown - The period in the reflow process, after peak temperature, during which the temperature falls to the point where the solder joints solidify or freeze.
Drying Time - A portion of the reflow process after preheat and before the reflow spike where volatile materials escape from solder paste.
Emissivity - The ratio of the emissive power of a body to the emissive power of a blackbody at the same temperature
Heaters, IR Panels - Radiant energy emitters that emit IR energy in the middle to far infrared region from a plane surface.

Loading Factor - Percentage of conveyor area that is covered by product.
Muffle - - A rectangular cross section enclosure, located between the heating elements and the parts being processed, which contains the atmosphere required for the reflow process.
Nitrogen Containment Capability - Ability of an oven to contain nitrogen. Expressed in parts per million (ppm) of residual oxygen as measured anywhere in the heated process area of the oven tunnel unless otherwise specified.
Plenum - - A chamber that is used to uniformly distribute a fluid or gas (air, nitrogen or other gas), into the process chamber.
Preheat - - A composite term generally referring to a process portion of the heat curve where the product is heated from ambient, at a determined rate until it reaches the preheat temperature.
Preheat Force - That portion of the force profile where light contact is made between the hot bars and the component leads to allow for wetting of the joining material (solder) prior to application of full bonding force.
Quartz Lamp - Rapid responding tungsten filament emitter used as an infrared heat source. Lamps generate IR at wavelengths of 2.5-5.0 micron in SMT applications.
Quench - - A cooling process that is used to rapidly cool the molten solder below its melting point in order to solidify it and obtain a strong and reliable solder joint.
Radiant Heat Transfer - The electromagnetic radiation emitted by one body due to the temperature difference between it and another body, the radiation being proportional to the difference.
Radiation, Focused Infrared - Backup reflector is used to concentrate infrared on a point or line.
Radiation, Infrared - Thermal radiation emitted in the infrared wavelength region (0.7-1000 microns) of the electromagnetic spectrum.
Radiation, Long Wave IR - Infrared occurring between the wavelengths of 5-100 microns.
Radiation, Medium Wave IR - Infrared occurring between the wavelengths of 2.5-5 microns.
Radiation, - Near IR - See short wave IR.
Radiation, Non-focused Infrared - Diffuse backup reflector used to scatter infrared over an area.
Radiation, Re-emitted Infrared - Thermal energy absorbed by a media is re-emitted as infrared at a wavelength dependent on its temperature.
Radiation, Reflected Infrared - IR energy that is redirected to a target. No change in wavelength occurs.

Radiation, Short Wave IR - Infrared occurring between the wavelengths of 0.78-2.5 microns.

Radiation, Thermal Infrared (IR) - Thermal electromagnetic radiation heat transfer occurring between the wavelengths of .78-1 000 microns.
Reflectivity - Percentage of incident infrared that reflects from the surface, thus having no heating effect.
Reflow, Process - A general term referring to the overall process of reflowing solder paste in attaching surface mount components to various substrates. It usually includes the preheat process, stabilization and/or drying, the reflow spike, and cooldown, but sometimes refers to the reflow spike area only.
Reflow, Spike - A portion of the reflow process where the temperature is raised sufficiently to cause the solder paste to reflow.
Response Time - Time required for thermal equilibrium to occur after a setpoint change is made. **Scavenged Air** - Air removed from appropriate parts of the process area, i.e. tunnels to insure there are no fluid or gas vapors in the work place.
Stabilization Period - Period of time after preheat and before the reflow spike where the internal temperature differences between components are allowed to equalize. (Also known as "Drying Time", "Preflow" and 'Soak").
Temperature, Ambient - Dry bulb temperature of area under consideration.
Temperature, Flux Activation - A point of elevated temperature that causes the flux to become active in removing oxides on the metals to be joined.
Temperature, Liquidus - The temperature above which an alloy is completely liquid.
Temperature, Maximum Reflow - The maximum temperatures that any point on a board will reach at reflow conditions.
Temperature, Preheat - The final temperature a selected point achieves in the preheat process.
Temperature Profile - A graphic depiction of the temperature, a selected point traverses as it passes through the reflow process.
Temperature, Reflow - Often listed in reference to a band of temperatures where solder reflow takes place, i.e. 205-220 C.

Temperature, Saturation - The boiling point of a fluid.
Temperature, Solidus - The point above which solder first melts.
Thermode - A heating element utilizing electrical current to generate heat for contact reflow soldering.
Thermode Temperature Gradient - The difference in temperature between the highest and lowest temperature as measured from one end of a thermode to the other at a given instant in time once steady state temperatures are attained.
Thermode Temperature Variation - The difference between the highest and lowest thermode temperature as measured at one point when controlled to one temperature over a period of time.
Thermode-Thermode Variation - The maximum difference in thermode temperature between the same point on each thermode of a multiple thermode tool.
Time Above Liquidus - The time that a selected solder joint is above the liquidus temperature in the reflow process.
Transmissivity - Percentage of incident infrared energy that is transmitted through a defined thickness of material.
Vapor Phase - A general term referring to condensation heating where the part to be heated is submerged into a hot saturated vapor. The part being cooler than the vapor causes the vapor to condense on the part transferring its latent heat of vaporization to the part. This is an equilibrium method of heating as the part temperature becomes asymptotic to the vapor temperature over a short period of time.
Vapor Recovery - The process of retrieving working fluid vapors and aerosols from scavenged air and turning it into reusable working fluid.
Vapor, Saturated - The condition of a vapor when it is in equilibrium with its boiling fluid.
Vaporization, Heat Of - The amount of heat required to change a given amount of saturated fluid into saturated vapor.
Visible Light (band) - Electromagnetic radiation occurring between the wavelengths of 0.39-0.78 microns. Produces light and heat.
Working Fluid - Usually a fully perfluorinated hydrocarbon that is extremely stable and is clear, odorless and chemically inert.

ABOUT SMEMA

The Surface Mount Equipment Manufacturers Association (SMEMA) is a non-profit organization of companies manufacturing equipment or producing software for surface mount board production. Its objectives are to: promote standards for the interface and operation of equipment, provide users with the ability to select equipment with the assurance that the equipment will interface easily, advance SMT and promote its use, and investigate areas where the association can act to the benefit of all member companies.