

# Surface Mount Technology A Historical Perspective



**SMTA**  
Surface Mount Technology Association



# SMT Historical Perspective

## Definition of Surface Mount Technology

Surface Mount Technology is the practice and method of attaching leaded and nonleaded electrical components to the surface of a conductive pattern that does not utilize leads in feed through holes.

# 1960 - ?

## SMT Historical Perspective

### Why SMT?

Implementation of SMT is Technology rich and Market driven

Desires of market customers for **Smaller Faster Better**

The need for additional capability within restricted size envelopes

Market competition is keen to achieve fiscal advantage or  
prestige in the market place



Justified needs generate technology solutions

## SMT Historical Perspective

### Technology drivers

Digital circuit operations

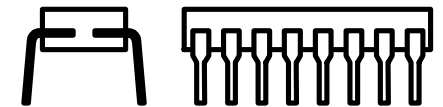
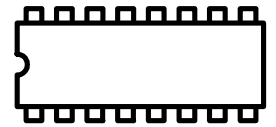
Reduced power requirements

Refinements in die technology and attachment methods

Refinements in assembly methodologies

Automation techniques

Limited availability of Through-Hole components



# SMT Historical Perspective

## Technology enhancements

Solder paste and materials maturity

Alternate lead forms J Lead, BGA, etc.

Substrate material enhancements

Component availability and robustness

Standardized package types, and footprints

Standardized process methodologies

# SMT Historical Perspective

## Department of Defense interest

DoD desire for enhanced capability

Avionics, Space, and support resources

- Original Surface Mount applications were often Hybrid or Flat Pack
- Commonly defined as “Planar Mount” or on one plane
- Flat Packs had dual capability for through hole as well as Planar through flexible lead form

Similar to DIP devices but doubled circuit density

# SMT Historical Perspective

Initial Reservations (DOD, Space and others)

Leadless components were suspect when considered for rigorous applications

Through hole technology was mature and robust and well understood

Desired components were not available

# SMT Historical Perspective

## SMT advantages embraced by commercial users

- Reduced human intervention
- Reduced labor cost – production cost – overhead
- Repetitive operations support process control quality concepts
- Enhanced production speed
- Reduced material cost
- Higher operating speed

# SMT Historical Perspective

## Commercial embrace (continued)

- Increase circuit density
- Increased circuit capability
- Adequate performance capability
- Reduced heat generation
- Reduced power consumption
- Continued production enhancements and evolution
- Useful in combination with through-hole techniques

# SMT Historical Perspective

Industry segments driving SMT technology today

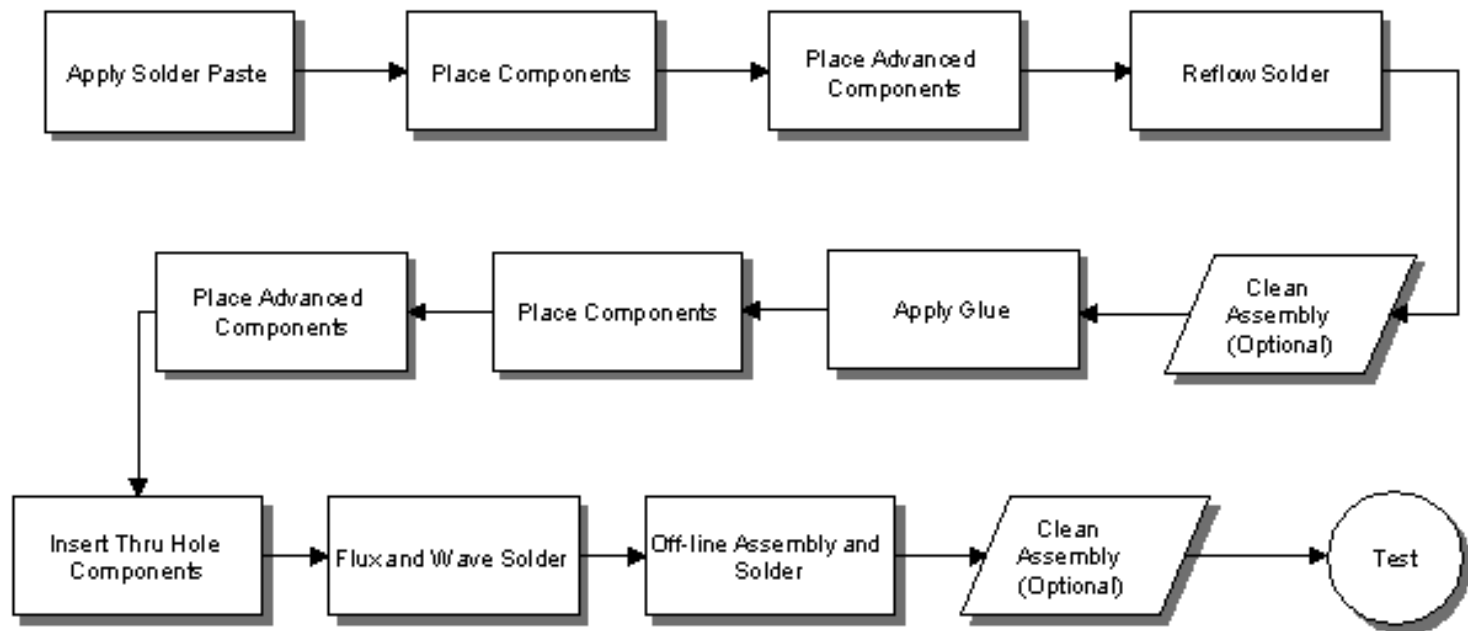
- Telecommunications
- Personal computers
- Automotive

DOD and Space piggybacking commercial (COTS)



# SMT Historical Perspective

## The Process



# SMT Historical Perspective

## Smaller - Better - Cheaper

New technology enhancements and challenges for the future

- Direct die attach, COB, Flip Chip
- BGA
- Micro-via technology
- System on a package
- Low Voltage development
- Component and substrate material enhancement
- Imbedded component (sub-surface mount?)

