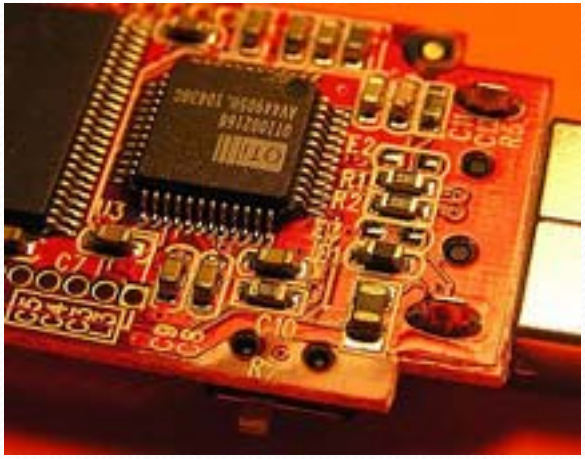
Definition of Surface Mount Technology



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.

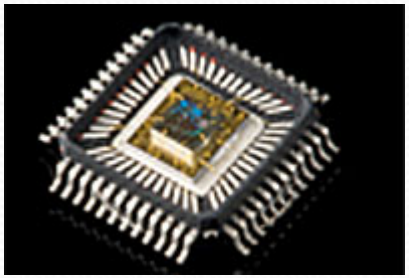
Original SMT Market Drivers 1960-?

- Smaller – Faster – Better products
- Added capacity need in restricted size form factor
- Financial advantages and prestige of smaller product sizes

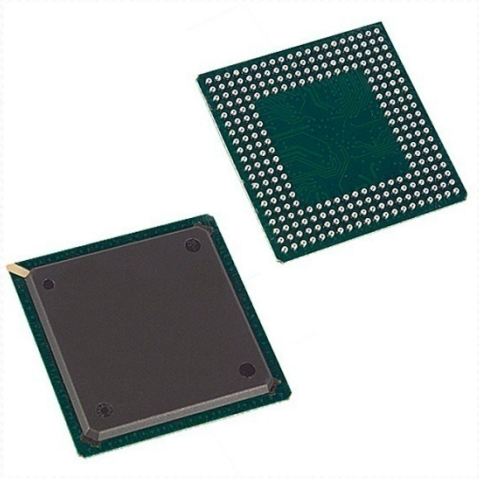
Technology Drivers

Justified needs generate technology solutions

- Digital circuit operations
- Reduced power requirements
- Refinements in
  - die technology
  - attachment methods
  - assembly methodologies
- Automation techniques
- Limited availability of through-hole components



Technology Enhancements



- Solder paste and materials maturity
- Alternate lead forms J lead, BGA, etc.
- Substrate material enhancements
- Component availability and robustness
- Standardized
  - package types
  - footprints
  - process methodologies

Department of Defense

Interest in enhanced capability for avionics, space, and support resources

- Initial reservations (DOD, Space, and others)
- Through-hole technology was mature, robust and well understood.
- Commonly defined as “Planar Mount” or on one plane
- Similar to DIP devices but doubled circuit density

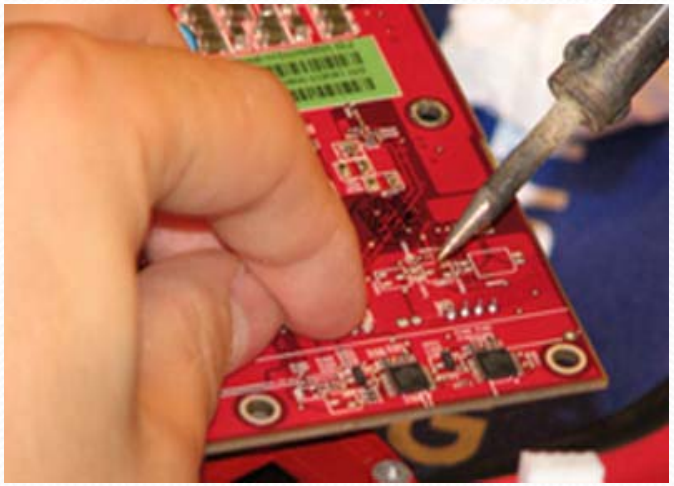
Department of Defense

- Desired components were not always available as SMD
- Original Surface Mount applications were often Hybrid or Flat-pack
- Flat-packs had dual capability for through hole as well as Planar through flexible lead form
- Leadless components were suspect when considered for rigorous applications

SMT Advantages Embraced by Commercial Users

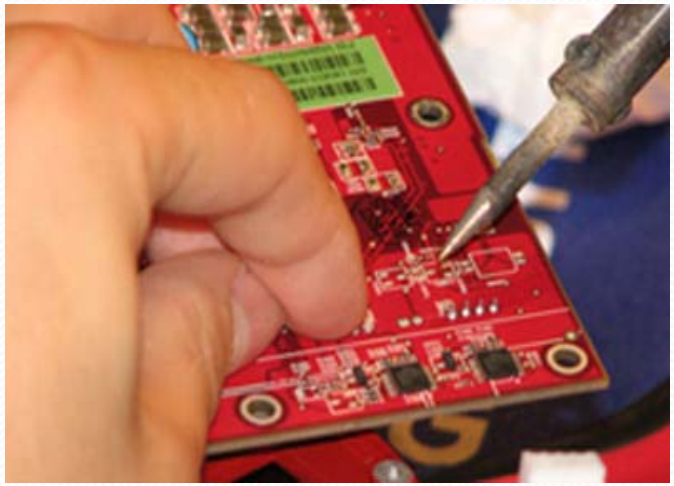
Reduction in

- Human intervention
- Labor cost
- Production cost
- Material cost
- Overhead

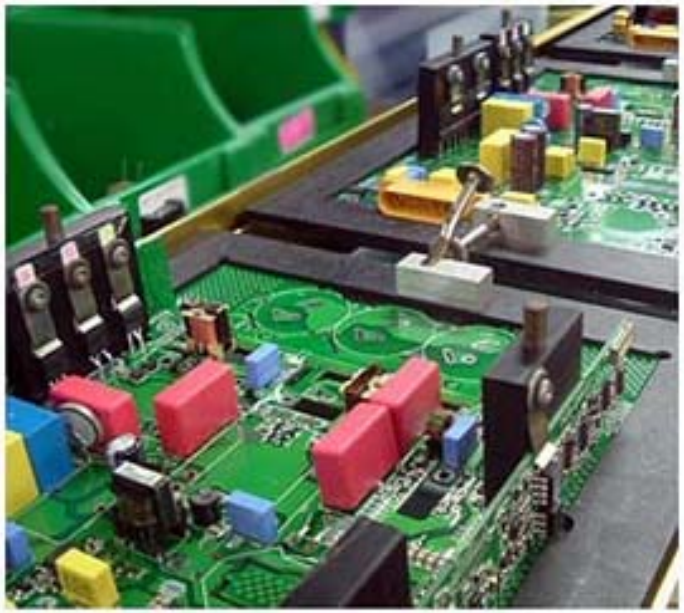


SMT Advantages Embraced by Commercial Users

- Enhanced production speed
- Increase circuit density
- Higher operating speed
- Repetitive operations support
  - process control
  - quality concepts

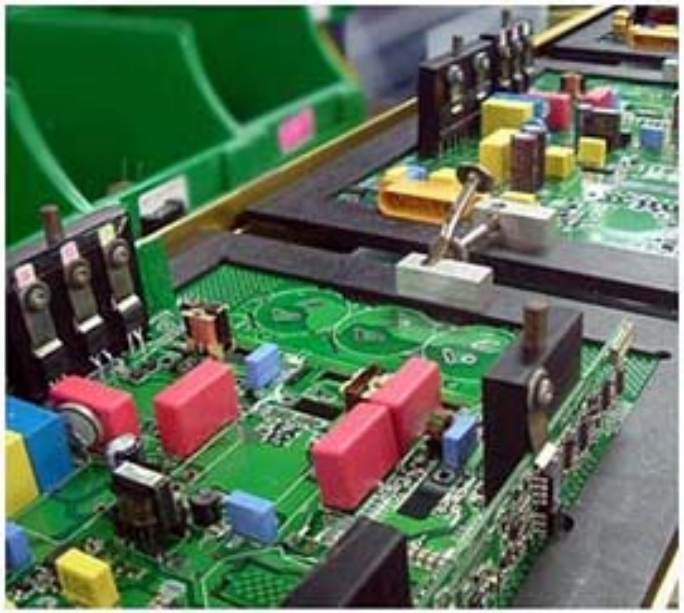


SMT Advantages Embraced by Commercial Users



- Useful in combination with through-hole technique
- Reduced power consumption
- Reduced heat generation

SMT Advantages Embraced by Commercial Users

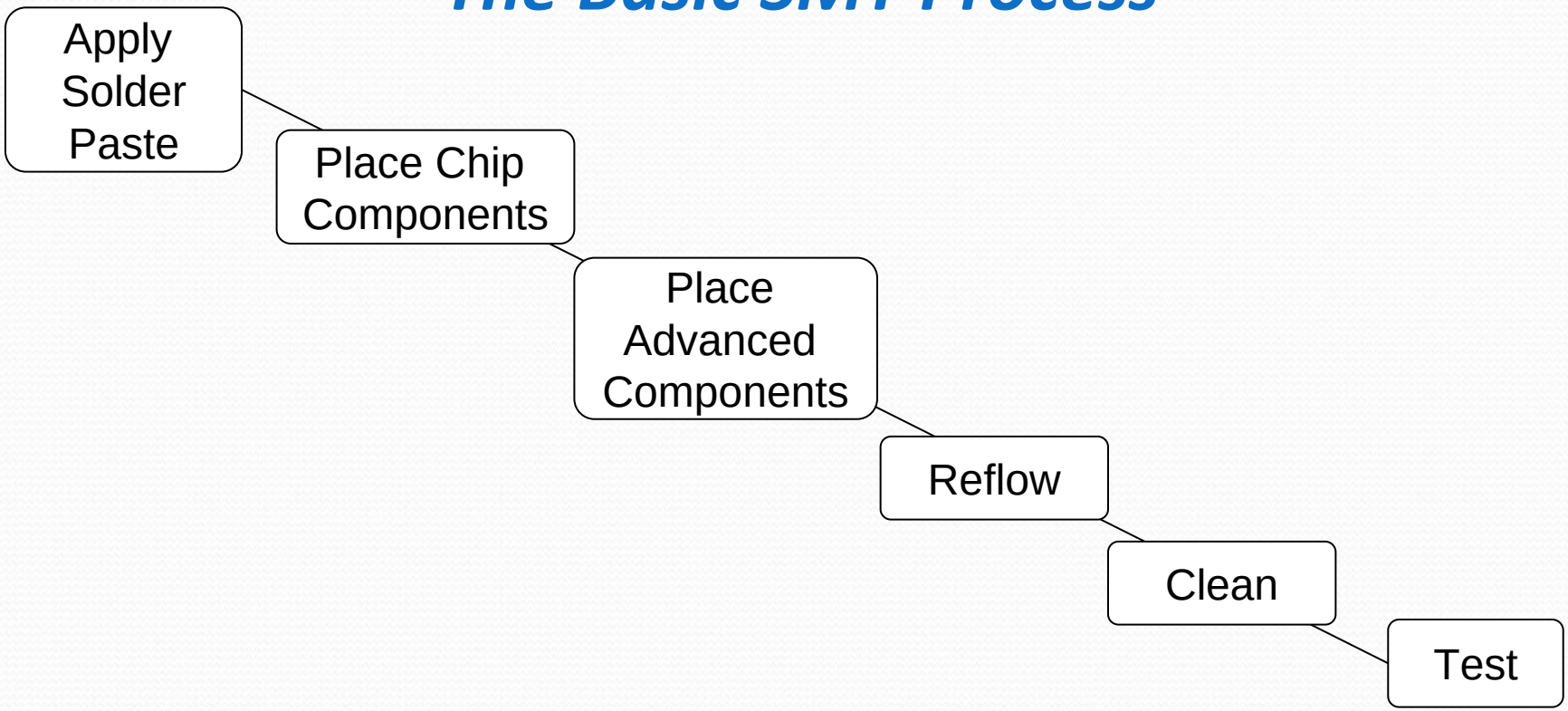


- Increased circuit capability
- Adequate performance capability
- Continued production enhancements and evolution

Industry Segments Driving SMT Technology Today

- Telecommunications
- PDA
- Netbook
- Laptop computers
- Automotive
- DOD and NASA piggybacking commercial (COTS – commercial, off-the-shelf) components

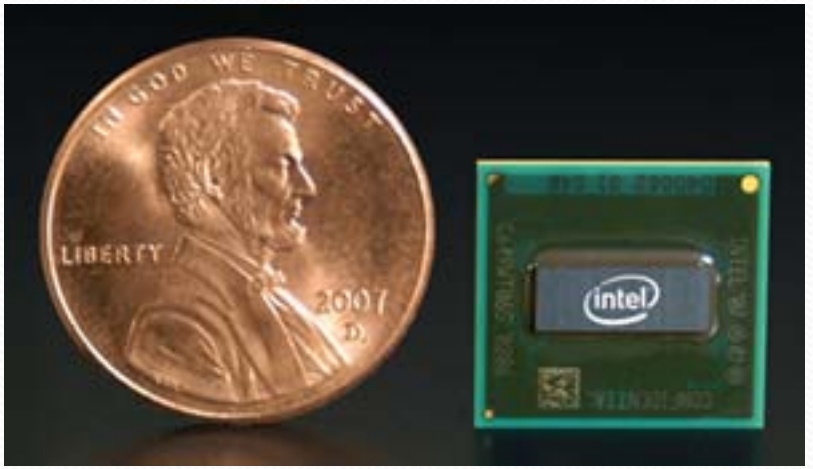
The Basic SMT Process



Current Technology Enhancements

Smaller – Better – Cheaper

- Direct die attach, COB, Flip Chip
- BGA, microBGA, PoP
- Micro-via technology
- System –In- Package
- Low voltage development



Current Technology Challenges

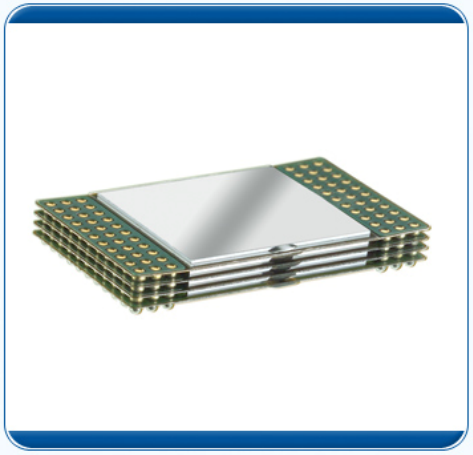
- Pb-Free QFN/DFN/LGA
- Component and substrate material enhancement
- Embedded component (inter-layer capacitor/resistor)

New Technology Enhancements and Challenges for the Future

- Nanotechnologies
- 3D semiconductor architectures
- Next generation lead-free alloys & fluxes

New Technology Enhancements and Challenges for the Future

- Harsh/Hostile environment
- Photovoltaic
- More complex tack/SOC/PoP



The future is limited only by our imagination