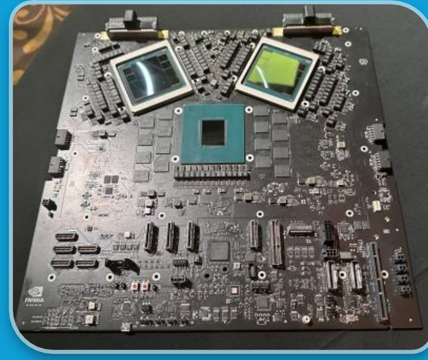
OREGON EXPO & TECH FORUM

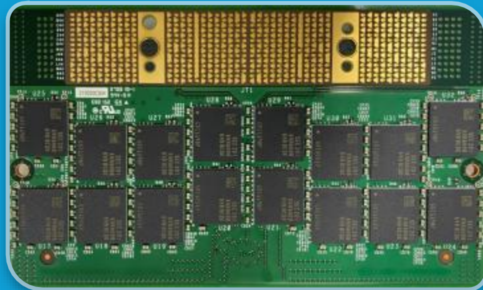
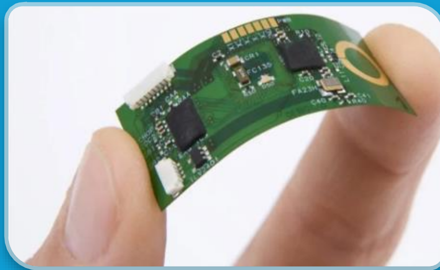
FUTURE TRENDS IN ELECTRONICS INDUSTRY AND THEIR IMPACT ON SURFACE MOUNT BOARD ASSEMBLY

JACK FROST
DIRECTOR OF BUSINESS DEVELOPMENT
CASCADE SYSTEMS TECHNOLOGY

Copywrite Cascade Systems Technology 2024

Trends In PCBA Assembly



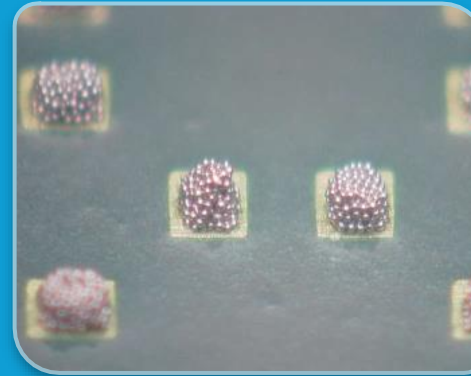
- Big Picture Stuff
  - Density – Larger in the Cloud / Smaller in Consumer
  - On-shoring – geopolitical concerns, tariffs, IP security
  - Chips Act + Government Support For US Manufacturing
- Trends
  - Increased Density
    - Higher Pin Count, Finer Pitch BGA's, Interconnects, Memory, HDI PCB's, Stacked packaging, HBM, CAMM2 Memory
    - Flex and Rigid Flex PCBAs
  - Higher and Lower Power
    - Large heat sinks, power planes, thicker multi-layer boards
    - Higher integration – ultra low power, longer battery life
  - Cost
    - Higher integration for lower cost
      - Beelink S12 Mini PC - **$169.00 is** Intel N100 based!
    - CMs focus on improving efficiency / throughput / quality

Cascade Systems Technology

Copyright Cascade Systems Technology 2024

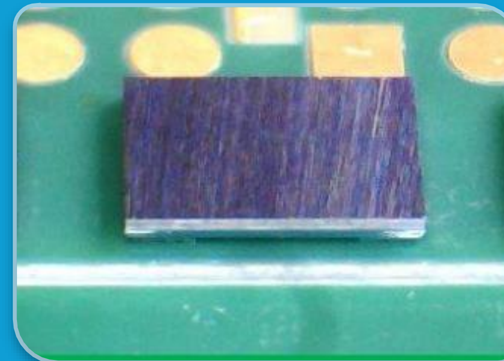
Impacts on PCB Assembly

- SMT
  - Printers – Very Small Apertures in Stencils
    - Very small pad sizes
    - Difficult to apply paste consistently
    - Migration to Type 4 and 5 solder paste
  - Pick N Place - Less Throughput Due to Longer PNP Times
    - 1200+ placements per side
    - Far more unique components per design
    - Large component count limits panelization
  - Reflow
    - Density increases solder Mask issues in High Pitch areas of PCBs
  - More and more leadless components
    - Use of silicon caps and diodes with contacts underneath
    - Requires X-Ray inspection
  - Flex and Rigid Flex
    - Tricky to Pick and Place due to flexible material
    - Run placements at ½ or ¼ speed vs. rigid PCBs

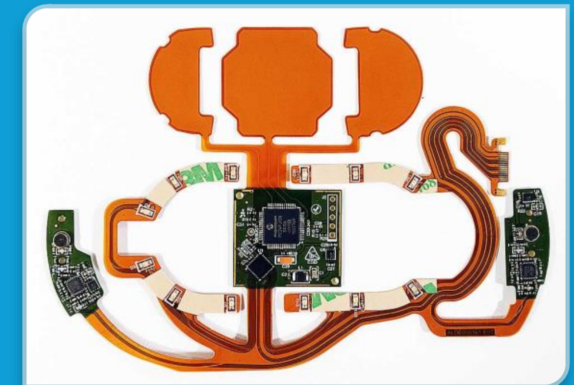


Type 4 solder paste
Required for finer geometries

High density PCBA
1200+ placements on top side
800+ placements bottom side
SMT, TH and Mechanical



Leadless silicon capacitors
Require X-Ray inspection



Rigid Flex PCBA

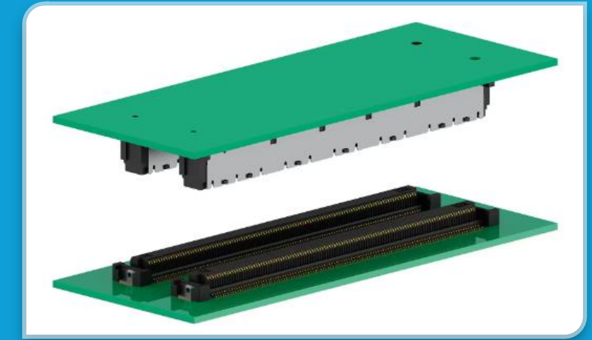
Cascade Systems Technology

Copyright Cascade Systems Technology 2024

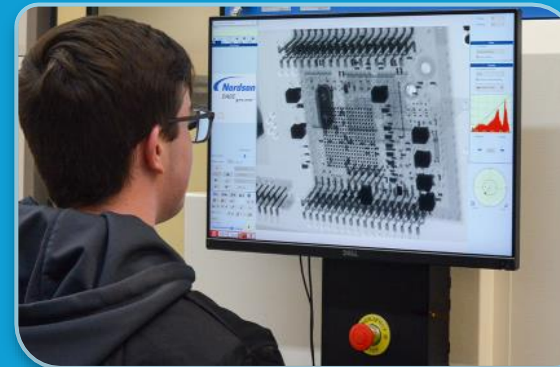
Impacts on PCB Assembly

- Through Hole
  - More and higher density interconnects
  - Hybrid connectors – both SMT and TH
- Inspection
  - Inline SPI
    - Required for high volume SMT
  - 2D / 3D AOI
    - High density / small components require 3D or 3D X-Ray only
    - 2D AOI becoming less useful
  - 3D X-Ray
    - Bottom terminated components difficult to identify opens
    - High density connectors with multiple rows need X-Ray inspection to see bridging and opens
- SW Tools
  - Better process automation to improve process of estimation, costing, PCB and component quotes, project planning
  - Process monitoring – lot tracking, quality escapes, etc.
  - Improved AOI and X-ray results using AI

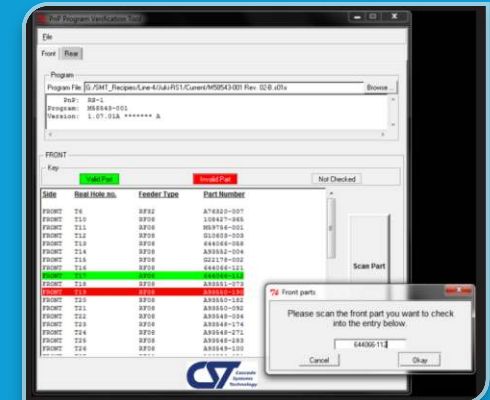
Hybrid connector
Both SMT and TH



High density interconnect
0.5mm pitch SMT connectors



3D X Ray of high
Density connectors



CST Custom PNP Part
Verification Tool

Cascade
Systems
Technology

Copyright Cascade Systems Technology 2024

Thank You!

www.cascadesystems.net