Automotive Electronics modules Assembly & testing - complexity & Cost Challenges

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Agenda

- Automotive Trends
- SMD Technology
- Final Assembly Technology
- Test Technology
- Mobile technology for testing & assembly
Automotive Electronics trends

- China Passenger Car OEM’s grew by 14.4% YOY as of July 2014. Korean Market grew by 5.1%. India has growth in the last 3 months.

- Electronics content in the vehicle has grown from 1% in 1950 to 30% by 2010. Expected to grow 35% in 2020 & 50% by 2030.

- Very high cost pressure on automotive component manufacturers

- Reliability requirements – 40 to 85/150 deg C/15 years life; 0-100% humidity; Zero defect rate target
Automotive driving technologies are the trend in future

Active safety products are growing rapidly
- Radar (Mid range radar)
- Parking aids (Short range radar)
- Intelligent forward vision
  (Lane departure warning etc)
- Gesture recognition
- Birds eye view

Connectivity is the key
- Information technology in the car
- Traditional navigation to advanced search
- Connectivity to home, work & society (Integrated place)
SMT Technology

Processes
- Under-fill process Vs No under-fill
- Elimination of Wave soldering / selective soldering
- PIP technology for the larger components
- X-ray Inspection Vs No X-ray inspection
- Reliability of 0201; 01005 Chips into automotive electronics
- LED binning issues

Equipment
- Equipment cost Vs number of placements/ Changeover & flexibility.
- Traceability to the individual components board at reasonable cost
- Use of modern IT technology (Mobility applications, IPAD’s & mobile devices on the floor)
Final Assembly technologies

- Adhesive free assemblies (welding or other technologies)
- Eliminate the curing cycles on the line/Go to lower temperature cure material
- Coating Vs no coating. How to eliminate the coating process?
- Issues with the bubbles, coverage of small tolerance components and cycle times. How to improve coverage for small components?
- Compliant pin / Press fit assemblies Vs soldering process
  - SMT + Compliant pin + Point to point soldering
  - SMT + Compliant pin + Pin in paste
- Optical Bonding process for no <0.5% reflectivity on displays.
- High gloss molding/painting. (environmental constraints)
- Need of next generation haptic for infotainment products
- Odour sensitivity/Weight reduction
Technologies on watch

◆ Odd form singulation of the PCBA
◆ Alternate leak test methods
◆ Lead forming for the bigger components (Power Electronics)
◆ Spray coating under connectors and small components
◆ Tin whisker mitigation
◆ Plasma deposition/vapor deposition
◆ Optical bonding for the displays
Test Technology

- Test coverage & test cost (Need better coverage at lower cost)
- Test philosophy? – Should we test more at board level?
- Extended use of vision and optical technology
  - Display testing using Camera
  - Optical alignment for next generation Camera
- How to test like customer?
  - How to do production testing simulating the customer use?
  - Temperature testing (Hot / cold /humidity)
  - Powered burn-in and vibration testing
- How to test for reliability?
  - How to catch infant mortality failures?
  - Conditioning tests?
Test Challenges

◆ Memory testing
  – Increase in the memory content. How to test?
  – Programming is long

◆ Retaining the re-programming capability at product level

◆ How to cope with numerous software iterations?

◆ Factories of the future
  – Digital manufacturing
  – Mobility (use of mobile technology in manufacturing)
  – Mobile devices on manufacturing floor.
  – Collaboration for continuous improvement