SATURN ELECTRONICS CORPORATION

Bridging the Gap between Design & Fabrication

From a PCB Manufacturer's Perspective

SATURN FLEX SYSTEMS

Presenter Information

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Purpose

- Methodologies to address:
  - Today's challenging designs
  - DFM Violations that cannot be corrected
  - Performance Requirements

Designer's Standpoint

- Designers often:
  - Have never toured the PCB fabrication process
  - Assume that if they can design it on a PC screen, you can build it
  - Are constrained by others' requirements for:
    - Physical size
    - Cost
    - Performance

Communication

- Key concerns when you are communicating back to the designer:
  - Explain problem so that they understand your challenge
  - Explaining design issues without insulting them
  - Working around responses such as “We have no issues with our other suppliers” or “we’ve been getting it built this way for a long time”

Communication

- Tools:
  - Process Flow Charts
  - Examples from other customers' designs or write-ups on past issues
  - Visual examples of modifications that can be made to resolve the issue (to compare against existing vendors' product)

What to Do?

- Assuming there's no other way to proceed but build to a DFM violation, you can:
  - Reject the order
  - Take on the challenge and use out of the box thinking and tools to build successfully

Strategy

- In many instances of addressing ways around DFM violations, a Buy vs Try decision can be made. Either buy your way out of the dilemma through advanced equipment, or find ways to engineer yourself out of the dilemma through advanced techniques and process materials.

Fine Lines / Spaces

Buy	Try
Automatic film to film and film to panel exposure units with collimated light sources	Advanced dry films such as DuPont FX and PM300 series dry films for advanced resolution
PC-PLC controlled etchers with anti-puddling spray systems to balance etching from top to bottom	Modeling your etcher to see etch effect at various panel angles and nozzle configurations

Drill to Cu Spacing

Buy	Try
High-Precision Drilling Machines (Micronic, Pluritec, etc.) capable of +/- 0.0005” positional tolerance via linear motion systems	Coated Entry Material such as Bullseye for better drill centering

Drill Quality w/ Heavy Cu

- Eliminate the effect of high heat on drill bit with regard to hole quality with:
  - Lubricated Entry materials (LE Sheet)
  - Lubricated Backup materials (Slickback)

High Aspect Ratio Vias

- Achieve Class III acceptability by reducing copper plating variation:
  - Dual side rectification
  - Routine Anode maintenance – Standard Deviation reduced from .45 to .16
  - Optimize anode to cathode and cathode to cathode distance
  - Agitation / Vibration
  - Specialty copper plating chemistries
    - » Reverse Pulse
    - » High Throw DC
    - » Two part additive systems to control leveler and brightener individually.

Resist Stripping

- Stripping out dry film between “mushroomed” traces :
  - Specialty resist strippers that result in fine chip size of stripped resist that are not solvent based.
  - Two part system – standard resist stripper ending with a final chamber of solvent-based stripper

Conclusion

- Bottom Line
  - There are always going to be challenges for NA PCB Fabricators big and small
  - Ongoing investment programs are crucial
  - Engineering can help overcome inadequate equipment and DFM violations