Flex-rigid Designs carefully examined

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Agenda

- Plug Splitter
- Backplane
- IR Camera
- Sensor use B
Plug Splitter | Initial Situation and Challenge

- Simple cable harness replacement
- Well-known stack-up for Flex-rigid
- By chance found in production

- But unnecessarily expensive, as
  - crossings in layout forcing 2 flex layers
  - 1x „array“ consumes a lot of area
Plug Splitter | Solution

- Reposition of crossings into rigid area, pre-alignment of lines before flex-rigid transition
  - reduction from 4 to 2 rigid layers considerable, from 2 flex layers to 1
  - replacing PI-coverlayer by flexible soldermask

- Nesting would improve utilisation ratio in the delivery array
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Backplane | Initial Situation and Challenge

- Size: 431mm x 300mm x 2mm
- 1652 component connections
  - 14 connectors 64 pins
  - 18 connectors 42 pins
- Mechanical construction: Sequence of connections in a chaotic manner

- idea / question:
  - 4 flexible layers
- ?
- very expensive!

sources: Sirona, book „Leiterplattendesign“, Leuze-Verlag
Backplane | Solution

- Crossings only in rigid areas
- Lines 1:1 over the flex areas
- Are you replacing round cables? Or perhaps shielded / hf cables?
  - omit panic layers in the flex area: shielding or reference layer really required?
Backplane | Solution

- Placing of all crossings in rigid area, pre-alignment of lines before flex-rigid transition

- 4 layers: 1F-3Ri

- Costeffective solution
Call for more Examples | Success Stories

You apply flex-rigid designs or have just started? Maybe you are facing a number of challenges to tackle? Either in terms of:

- material and layer structure
- design and space requirements
- delivery panel and processing
- module interfaces
- performance in the application
- cost reasons

We will be glad to assist!

Also we are sure that you have already mastered similar or even greater challenges!

- Would you like to share these successes with us?
- Which of your application could be of general interest and are we allowed to present this at a webinar?

Please give us a hint now in the question window, we will then contact you.
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IR Camera | Initial Situation and Challenge

- Some components on flexible parts

- Special production of pcb
  - openings in coverlayer foil
  - ENIG on flexible innerlayer

- Special processes for
  - solder paste
  - assembly
  - soldering
  - testing
IR Camera | Solution

Components always on rigid parts!

- **Standard production of flex-rigid**
  - No openings in coverlay film needed
  - No ENIG on inner layers needed
  - No Vias in flex areas!

- **Standard processes for**
  - solder paste printing
  - assembly
  - soldering (no hand soldering!)

- **Cost savings: up to 30%**
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Sensor use B | Initial Situation and Challenge

- Sensorhead in flex-rigid technology
  - 4 layers 1Ri - 2F - 1Ri

- Problem: open circuit in the flex-rigid intersection near to the sensorhead after 500,000 bending cycles in Test setup (Target was 1 Mio. cycles)
Sensor use B | Solution

- **Change in Stack-up to 1F-3Ri**
  - 1 layer Flex outside, flexible soldermask
  - thus significantly thinner = more flexible
  - PCB price reduced by 40%

- **Geometric improvement:**
  Improved flexibility due to a longer flexible part

- **Result:** better and cheaper!
  - Requalification test terminated after 2,1 Mio. bending cycles:
    All contacts were still OK!
Thank you very much for your attention!

What Applications do you have?

Where we can support you?