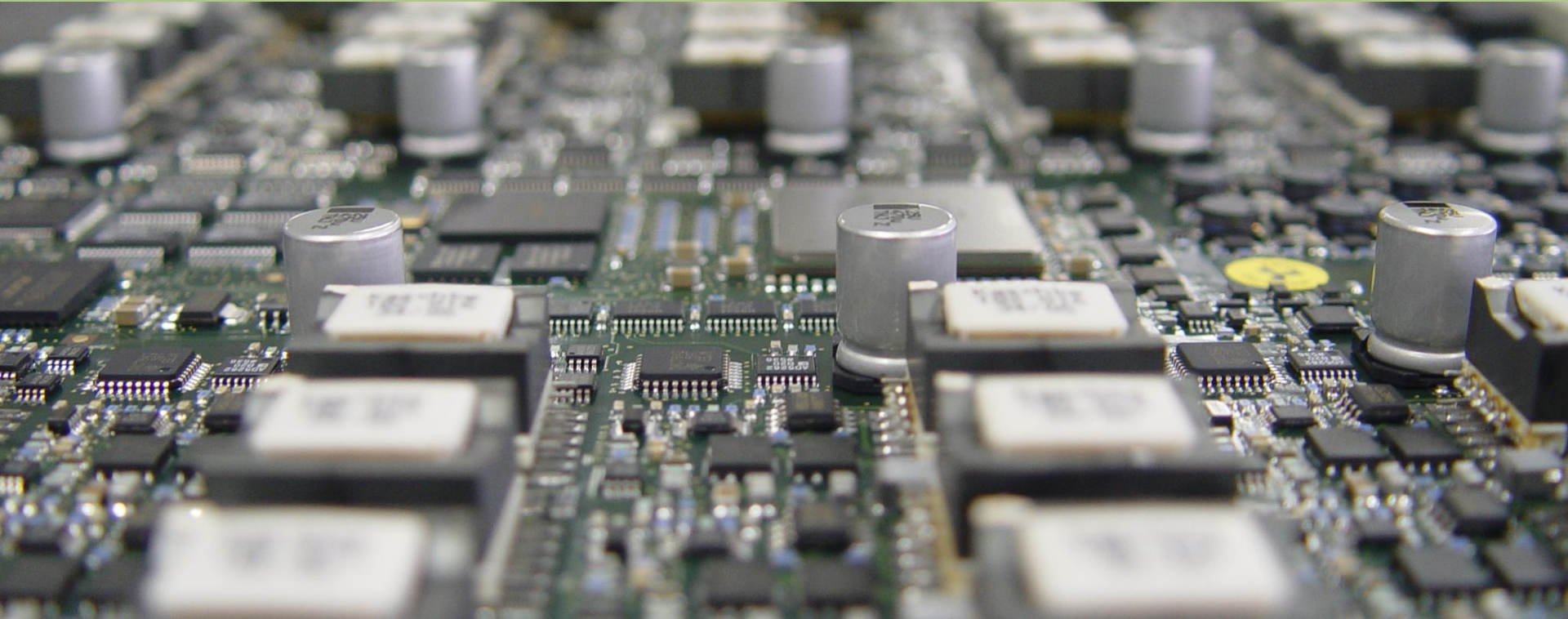


virtual pcba validation early involvement services



all pcba's are not created equal

cost

“early involvement” generates

“best buy”

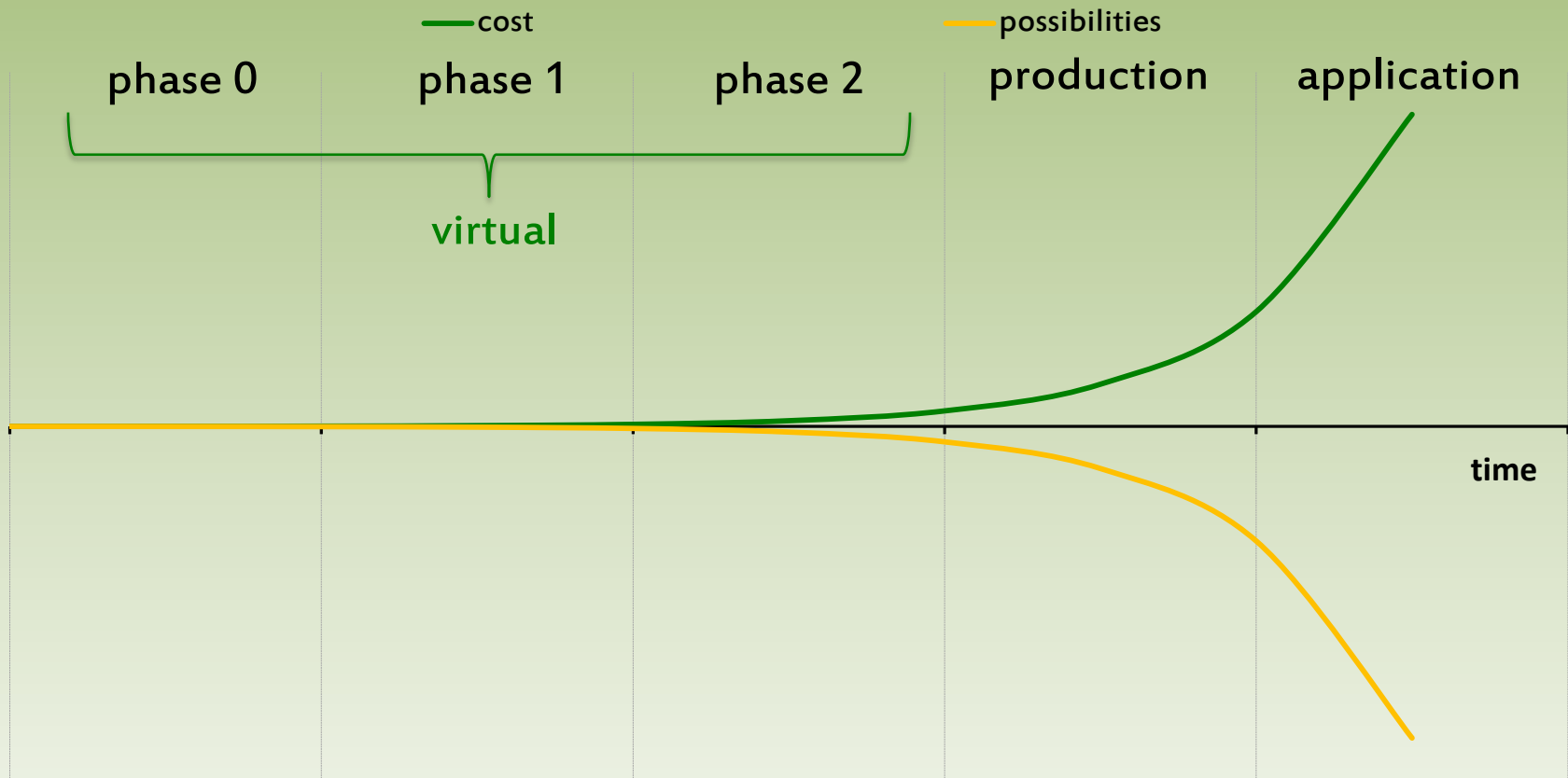
during product lifecycle

quality

delivery quality < 1.000 ppm

when?

early involvement - development cycle



- virtual hardware devices
- concerning manufacturability (DfM)
- concerning testability (DfT)

why?

- increase production yield (DfM)
- increase test coverage (DfT)
- decrease slip through (DfX)
- increase reliability

how?

- Design for Manufacturing
- Design for Test

targets

- right first time
 - less labour (full reflow)
 - no fault forward

virtual pcba validation - DfM

design

block diagram

schematics

placement

routing

validation

phase 0

phase 1

phase 2

Customer delivers EMS:

- design idea (in block diagram)
- batch size and year volume of product
- traceability
- PCB requirements
- design requirements
- special requirements

EMS delivers customer:

- DfM guidelines
- data exchange guidelines
- ABC component list
- **product manufacturability advise (face to face)**

Customer delivers EMS:

- full BOM containing MPN, manufacturer and circuit references
- ODB++ (CAD data), containing
 - component layers
 - outer copper layers (OCL)
 - solder mask
- requirements described in phase 0

EMS delivers customer:

- **DfM report** containing:
 - component placement issues
 - footprint issues
 - component placement recommendations
 - footprint recommendations
 - board complexity index

Customer delivers EMS:

- full BOM containing MPN, manufacturer and circuit references
- ODB++ (CAD data) (complete design)
- requirements described in phase 0

EMS delivers customer:

- final DfM report containing:
 - manufacturability recommendations
 - footprint issues
 - component placement issues
 - netlist verification
 - board complexity index
- **production yield**

virtual pcba validation - DfT

design

block diagram

schematics

placement

routing

validation

phase 0

phase 1

phase 2

Customer delivers EMS:

- design idea (in block diagram)
- batch size and year volume of product
- traceability
- component requirements
- test requirements
- quality requirements

EMS delivers customer:

- DfT guidelines
- data exchange guidelines
- **test access advise (face to face)**
- ABC component list

Customer delivers EMS:

- schematics in EDIF 2.0 (or Cadence Allegro format)
- schematics in searchable PDF
- BOM containing MPN, manufacturer and circuit references
- Boundary Scan Description Language files
- requirements described in phase 0

EMS delivers customer:

- DfT report containing:
 - preliminary test coverage
 - preliminary test strategy
 - **preliminary slip through**
 - test access recommendations
 - board complexity index

Customer delivers EMS:

- ODB++ (CAD data)
- schematics in searchable pdf
- BOM containing MPN, manufacturer and circuit references
- requirements described in phase 0

EMS delivers customer:

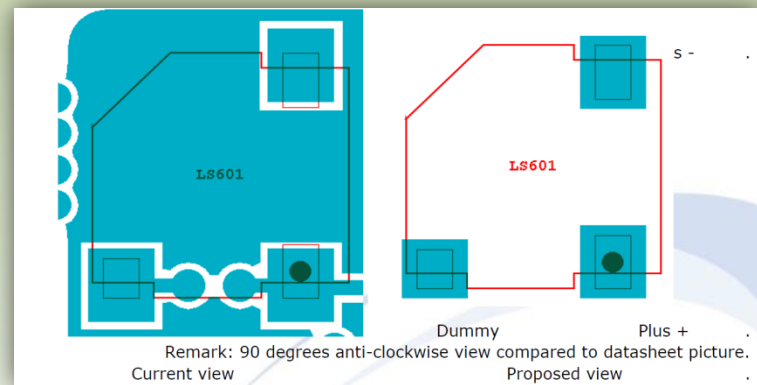
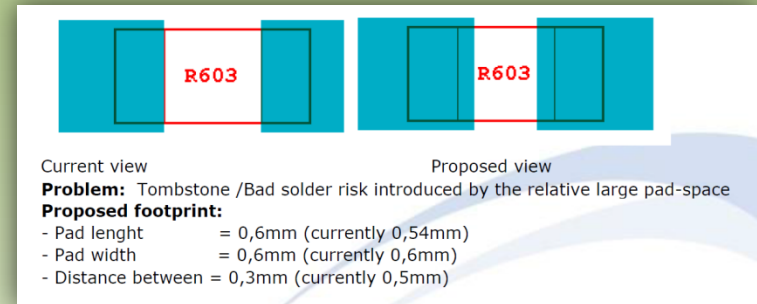
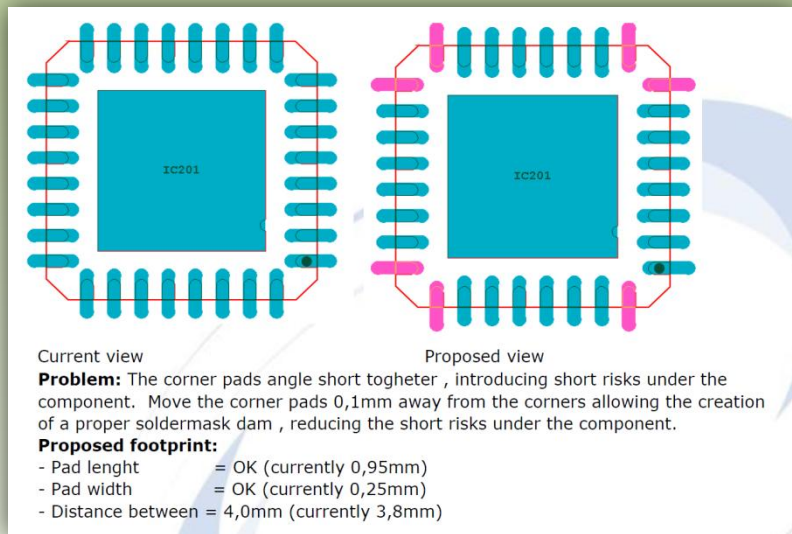
- final DfT report containing:
 - final test coverage
 - final test strategy
 - **percentage slip through**
 - test access recommendations
 - board complexity index

virtual slip through explained

- reduced production faults during assembly, less DPMO, aiming for zero defect (DfM)
- test coverage maximised resulting in the lowest slip through(DfT)
- slip through is the amount of boards which are passing the test strategy and still may contain production faults at delivery
- slip through will be calculated in advance (virtual)

DfM: e-brace

footprint issues:



phase 1

DfM: e-brace

virtual pcba validation results in:

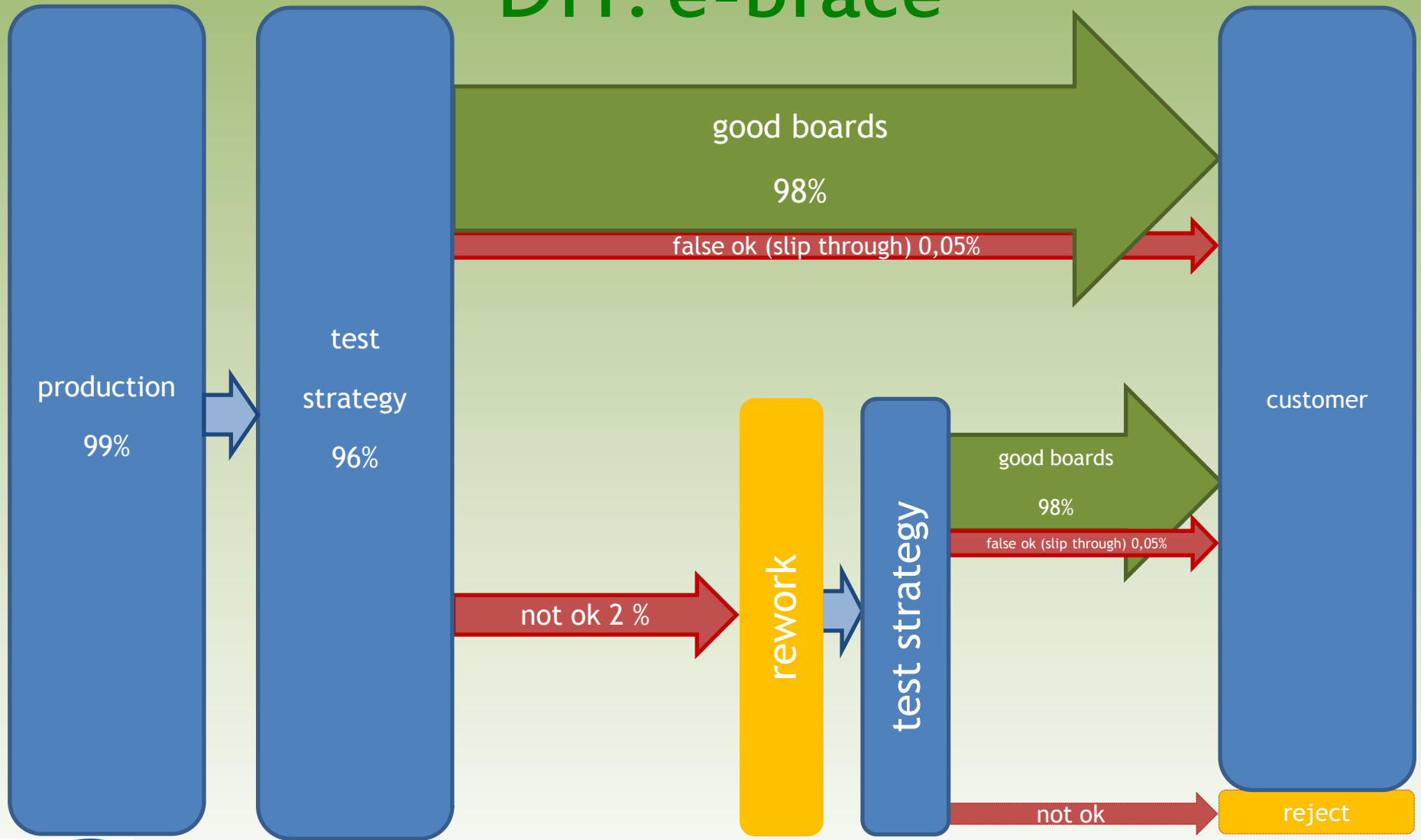
- 85 % \Rightarrow 99 %:
14 % production yield increase
- 254 DPMO \Rightarrow 27 DPMO:
9 times better

DfT: e-brace

virtual component based test coverage

Ref	Type	Presence	Polarity	Value	Solder	Coverage
S101	SWITCH	100	100	0	100	99,01
R406	RESISTOR	100	100	98	100	99,14
R405	RESISTOR	100	100	98	100	99,14
R404	RESISTOR	100	100	98	100	99,14

DfT: e-brace

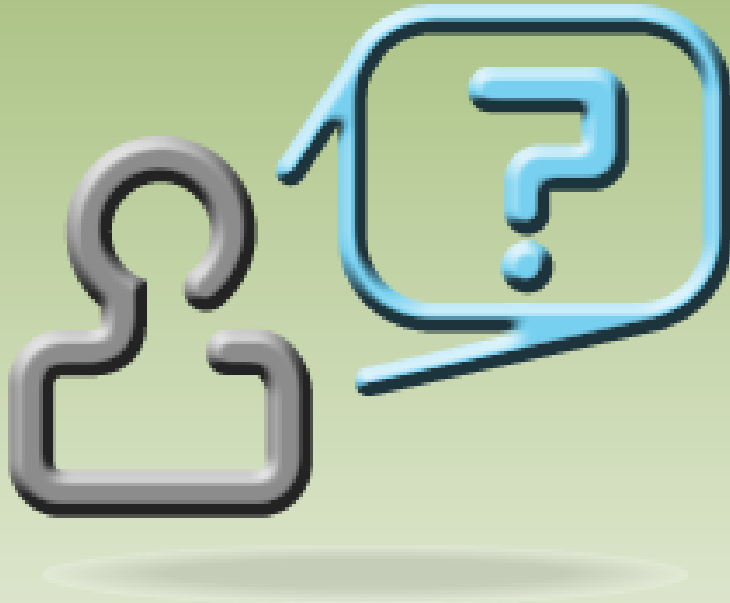


DfT: e-brace

virtual pcba validation results in:

- 66% \Rightarrow 96%:
45% test efficiency increase
- 4.600 ppm \Rightarrow 500 ppm:
9 times increase of delivery quality

virtual pcba validation early involvement services



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“that’s one small step for EMS,
one giant leap for manufacturing”