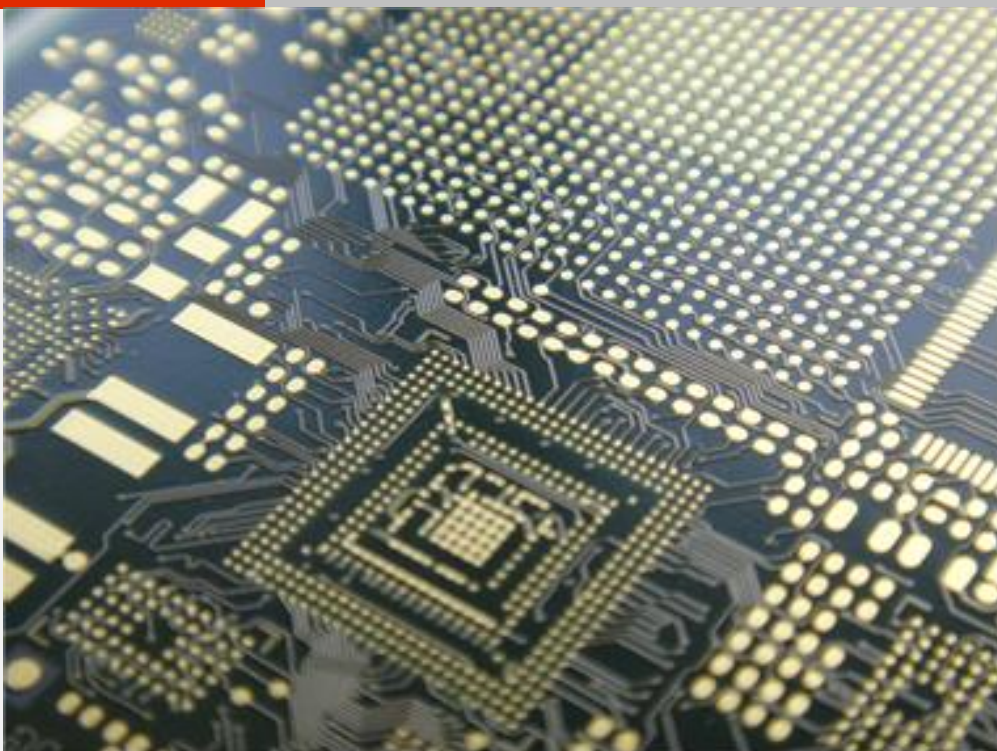


Webinar

HDI Microvia Technology – Cost Aspects



Agenda - Webinar

HDI Microvia Technology – Cost Aspects

- **Reasons for the use of HDI technology**
- **Printed circuit board (PCB) size**
- **Number of layers**
- **Stack-up and complexity**
- **Other important cost influences**
 - **Design rules**
 - **Drilling costs**
 - **Microvia filling**



Stefan Keller
Product Manager

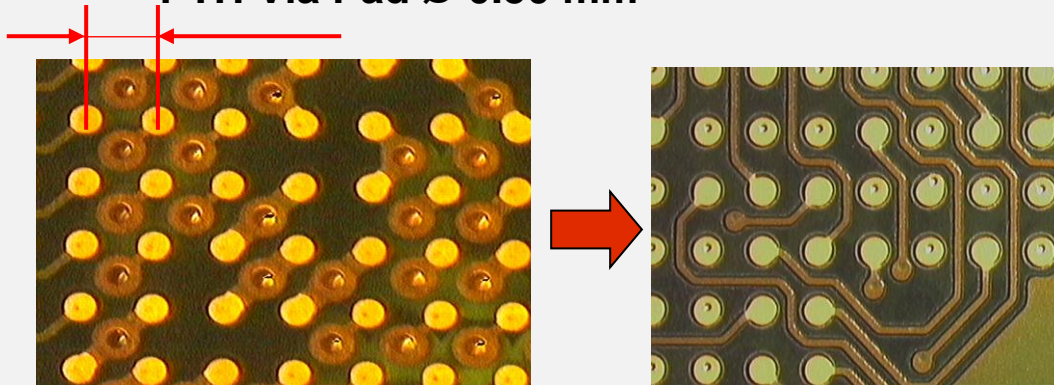
HDI = High Density Interconnection

HDI Microvia Technology – why?

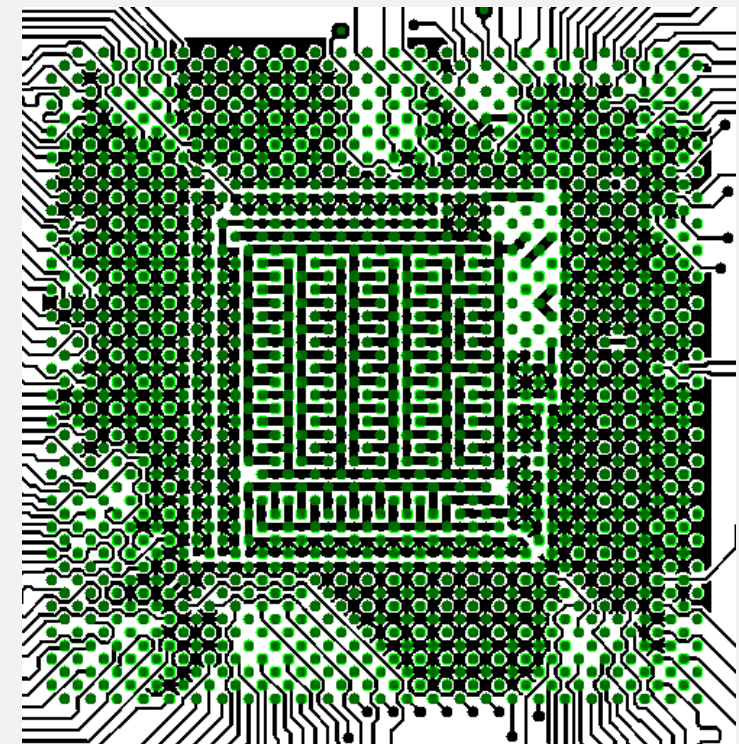
1. Complexity of the components

in particular BGA pitches 0.65 mm and less require HDI

Pitch 0,8 mm /
PTH Via Pad Ø 0.50 mm



Microvia



HDI – no question !!

Design Rules:

> HDI Design Guide and HDI webinars

www.we-online.com/online-design-conference

HDI Microvia Technology – why?

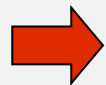
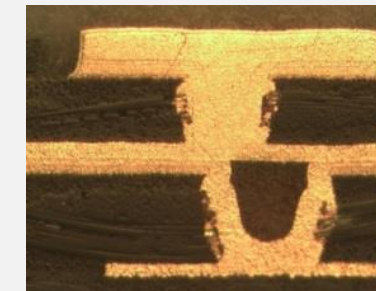
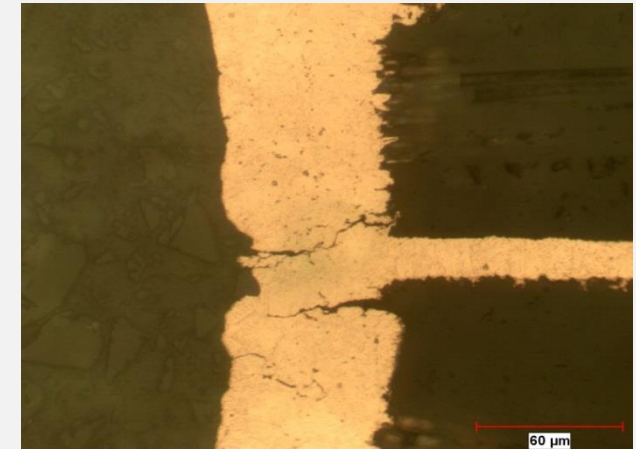
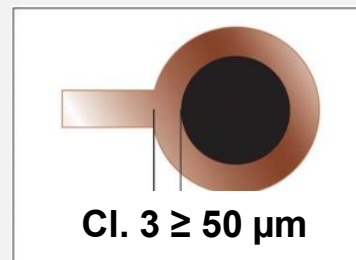
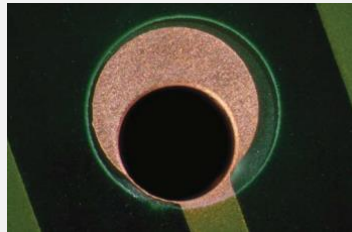
2. Reliability / Aspect Ratio

ASR 6:1 – 8:1 (PCB thickness / \varnothing)

Minimum drill tool diameter 0.30 mm / 0.25 mm

Final customer reliability requirements?

IPC class 2 or IPC class 3



>> Often the better solution: HDI microvia
instead of PTH

Microvia \approx 0.30 mm pad size / 0.10 mm \varnothing

HDI Microvia Technology – why?

3. Miniaturisation

Market requirements

size of the device
+ PCB size

Other examples:

- embedded computer
- medical technology
- industrial cameras

Other approaches / cost pressure:

- double sided assembly on the whole surface
- functional separation of top and bottom side
- Smaller or one PCB instead of two



Miniaturisation really possible only with HDI!

HDI Microvia Technology – why?

Survey:

Why do you use HDI Technology?

Multiple answers possible

- Routing Fine Pitch BGAs
- Higher reliability
- Miniaturisation in general
- Other reasons

HDI Microvia Technology – but:

HDI = expensive



This is a thing of the past !



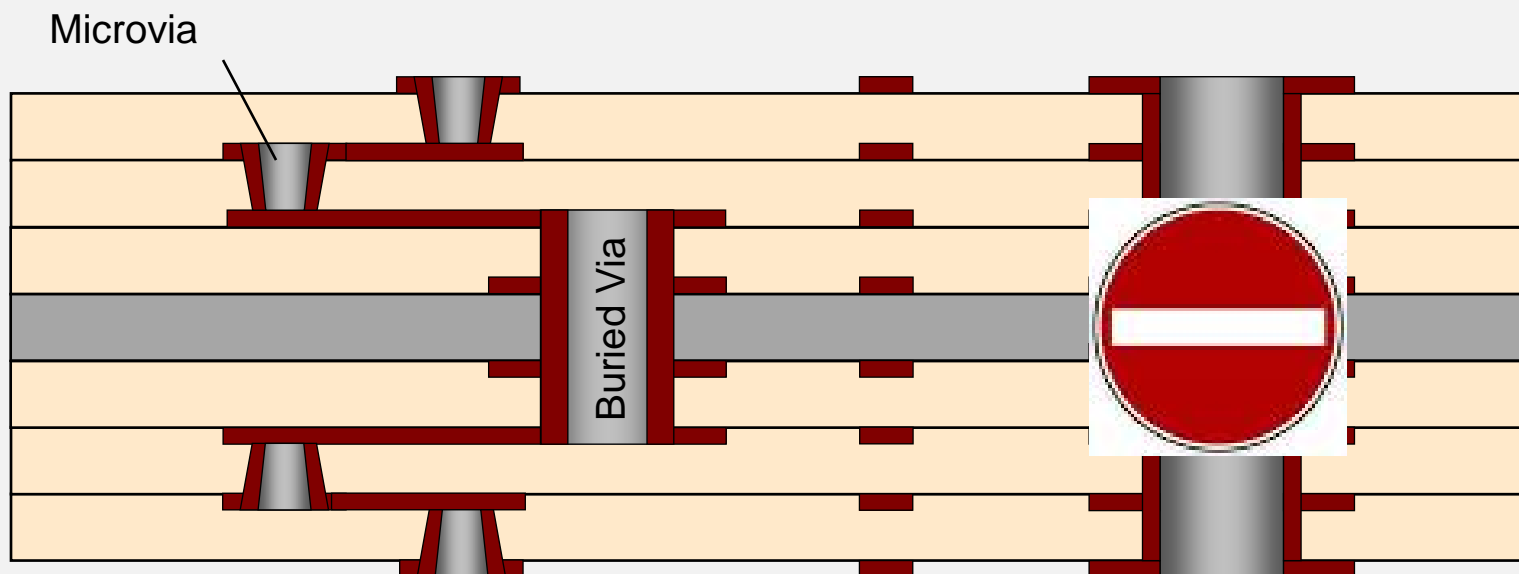
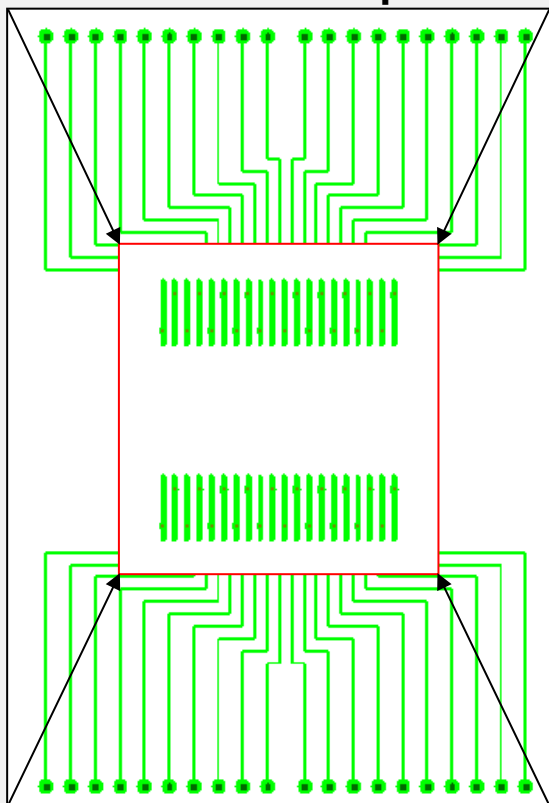
HDI – Cost Aspect PCB Size

PCB size \approx size of the device

> *could be essential for a successful product!*



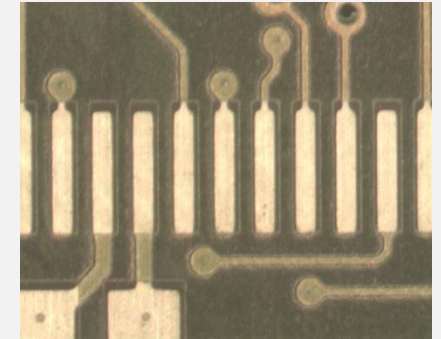
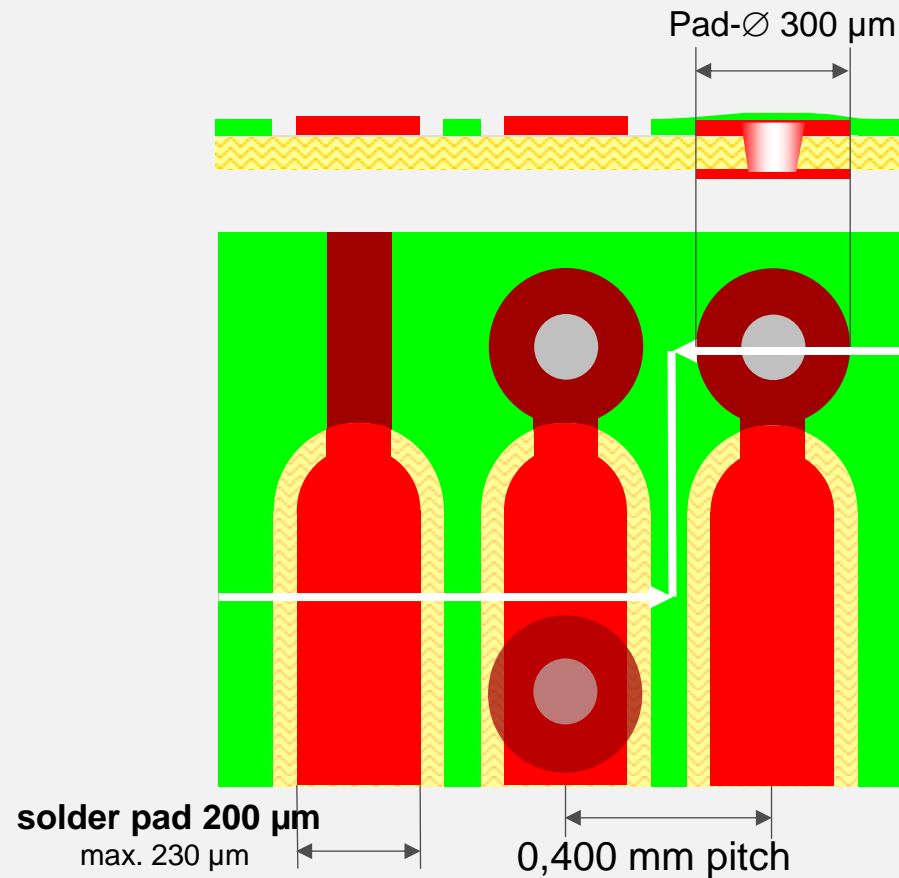
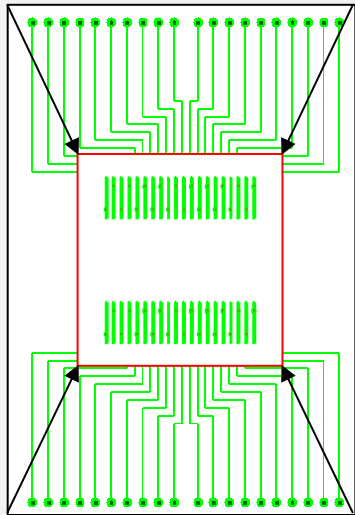
- Number of layers / stack-up



Avoidance of PTH vias!
HDI Technology
Microvias + Buried Vias

HDI – Cost Aspect PCB Size

QFP 0.40 mm pitch

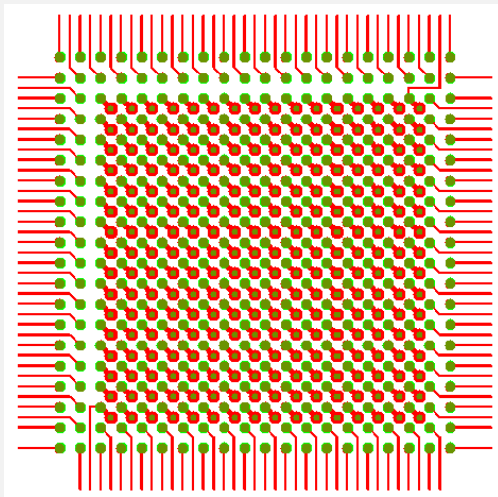


HDI – Cost Aspect Number of Layers

BGA – pitch 0.80 mm

20 x 20 = 400 pins

Design Study



How many signal layers are needed?

- **With PTH – vias
(only plated through hole vias)**
- **With Microvias (HDI)**

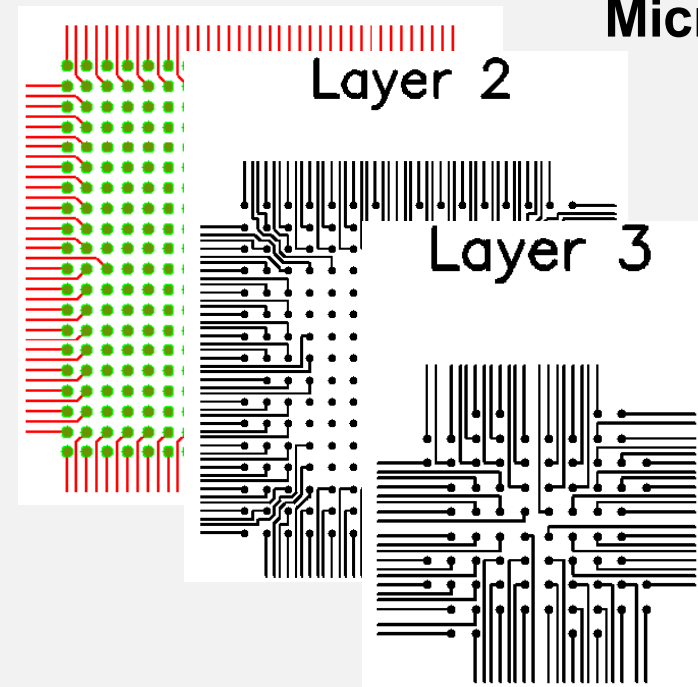
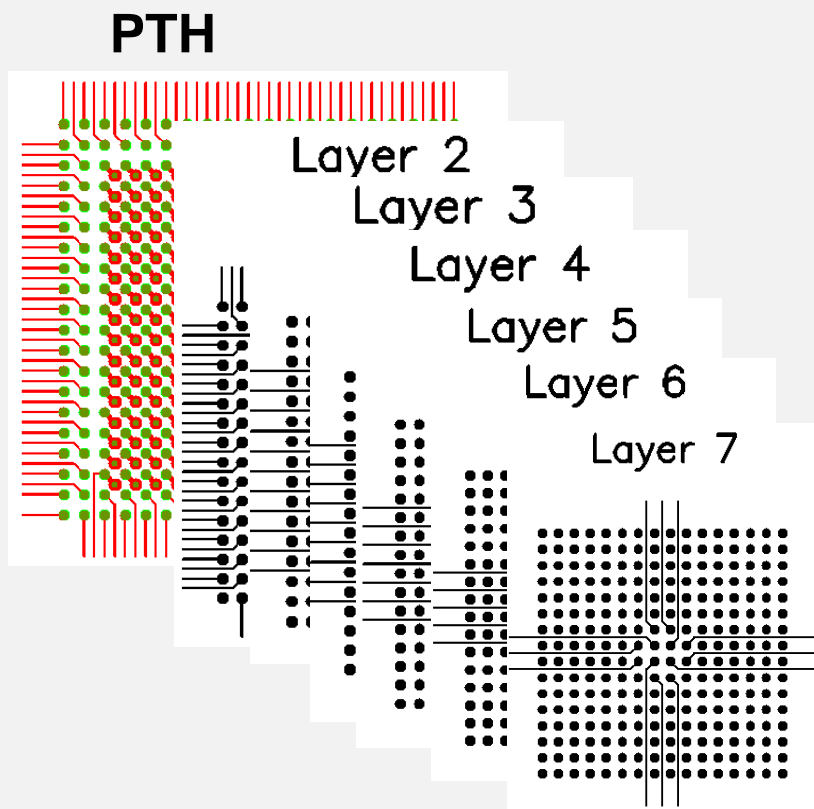
HDI – Cost Aspect Number of Layers

BGA – Pitch 0.80 mm

20 x 20 = 400 Pins

Design Study

Microvia



How many signal layers are needed?

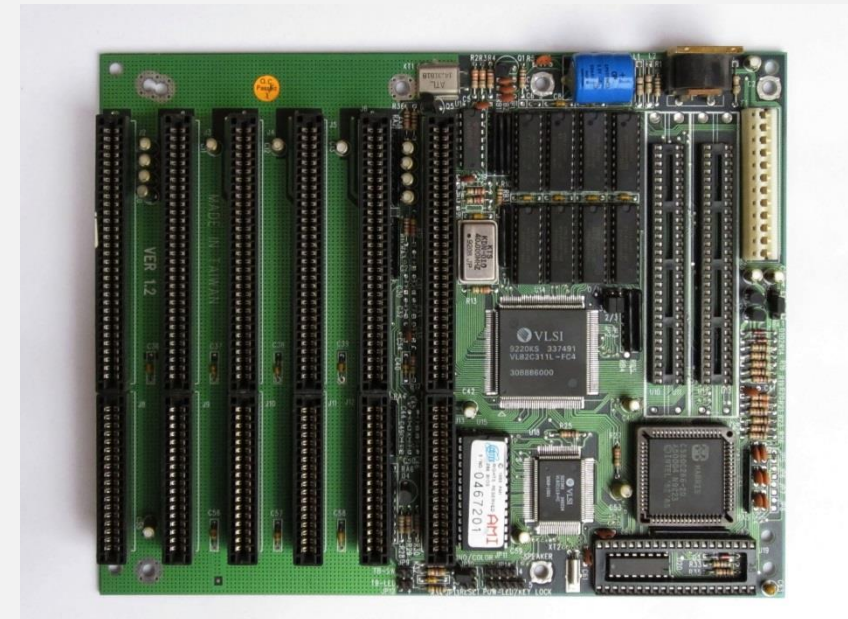
How many signal layers are needed?

HDI – Cost Aspect Stack-up

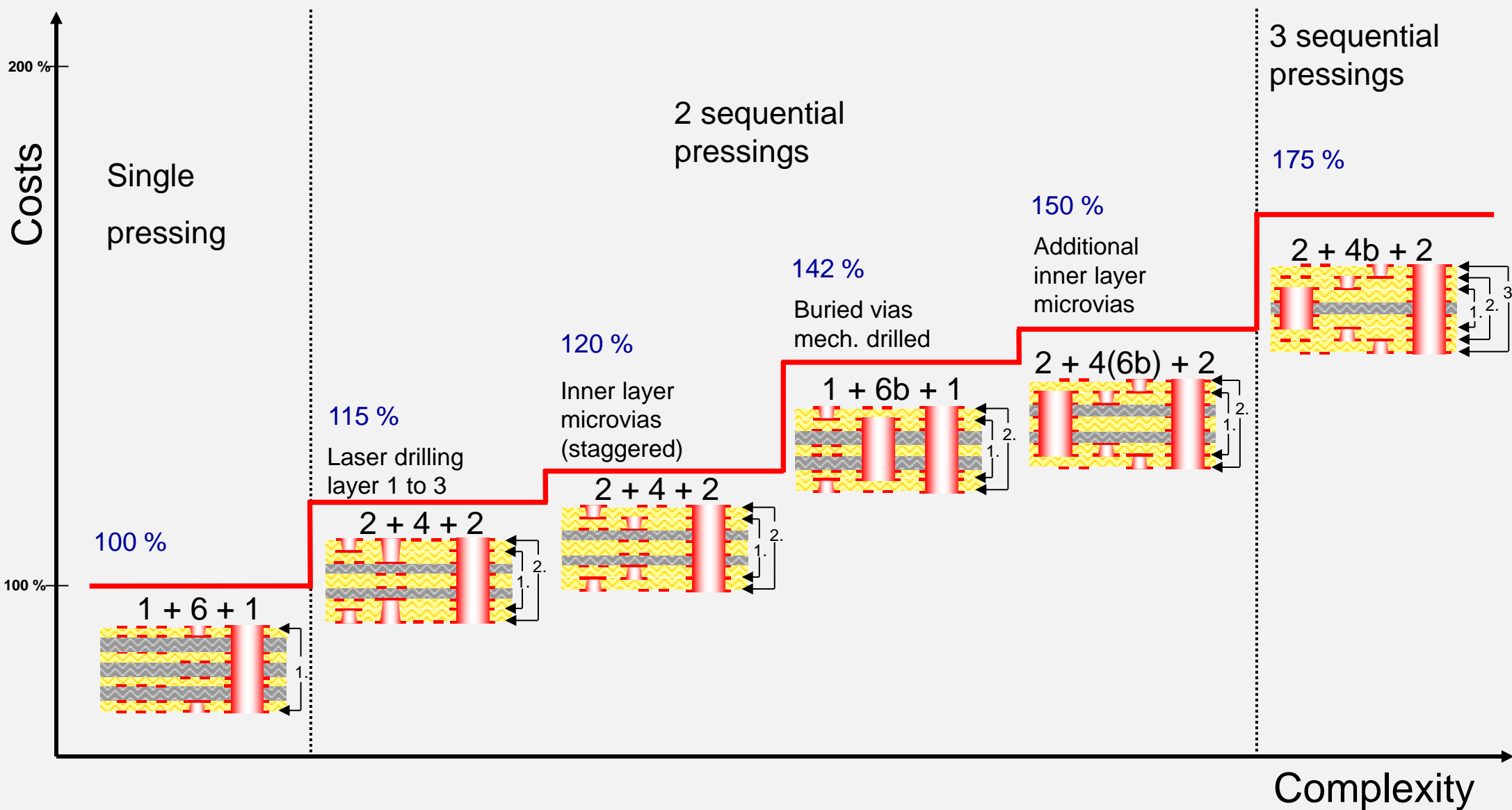
If the PCB size is fixed:

Recommendation: stack-up only as complex as necessary

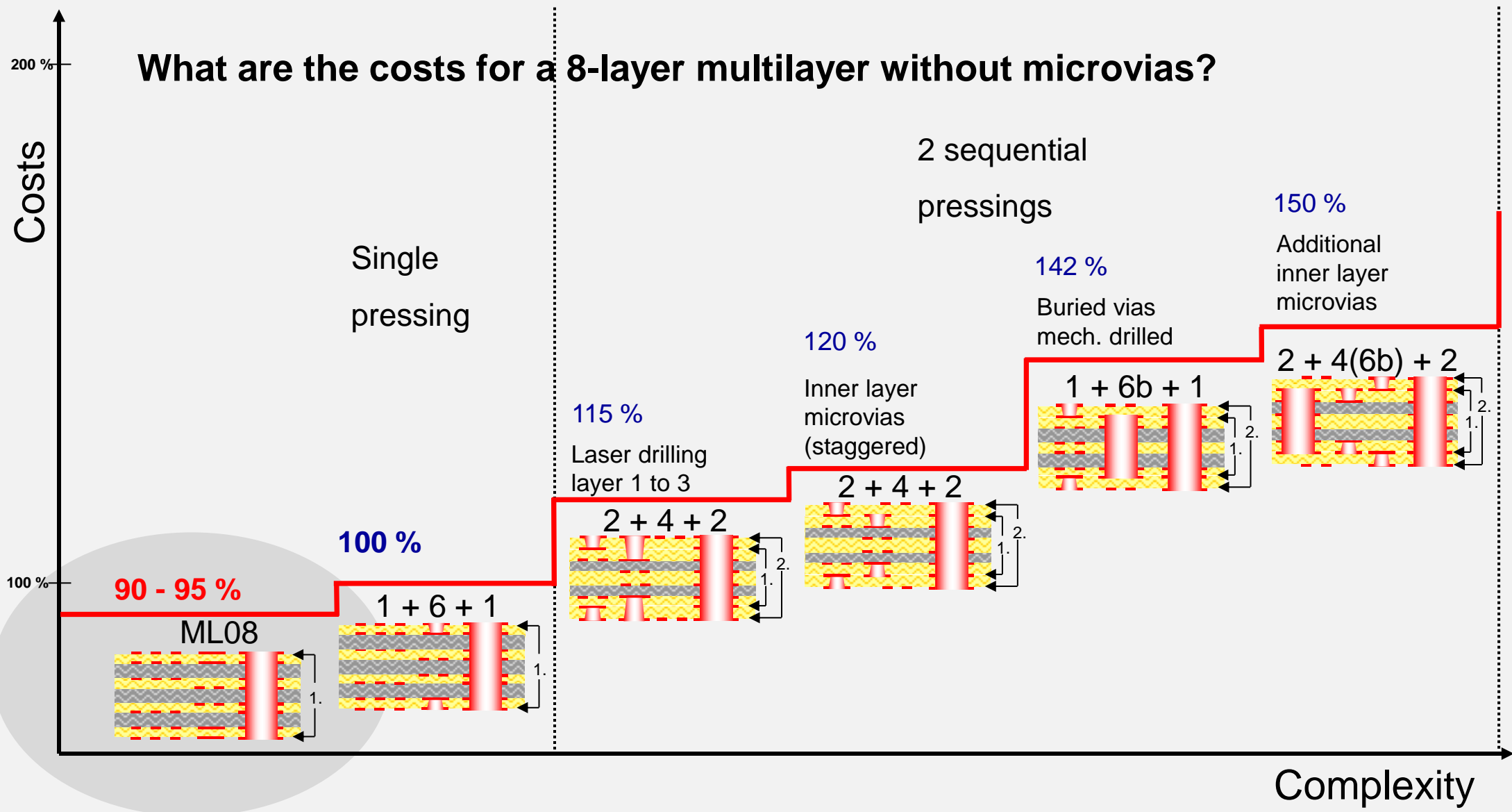
- **Number of layers**
- **Number of lamiations / pressing processes / manufacturing processes**



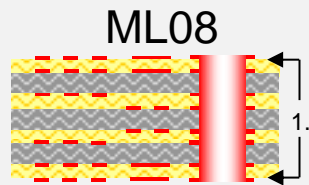
HDI – Cost Aspect Complexity HDI08



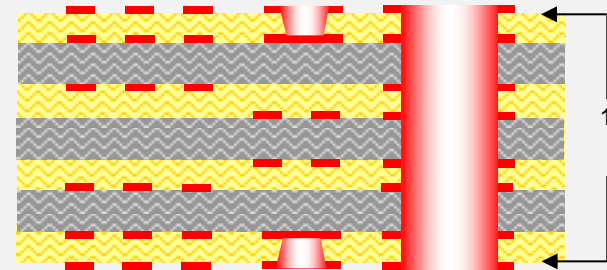
HDI – Cost Aspect Complexity HDI08



HDI – Cost Aspects Stack-up and Complexity



HDI08_1 + 6 + 1



eurocard 100 x 160 mm / 200 boards

1000 boards: $\approx 0.50 \text{ €}$



HDI – Cost Aspect Technology

Microvias stacked
0,40 mm BGA pitch

Microvias staggered

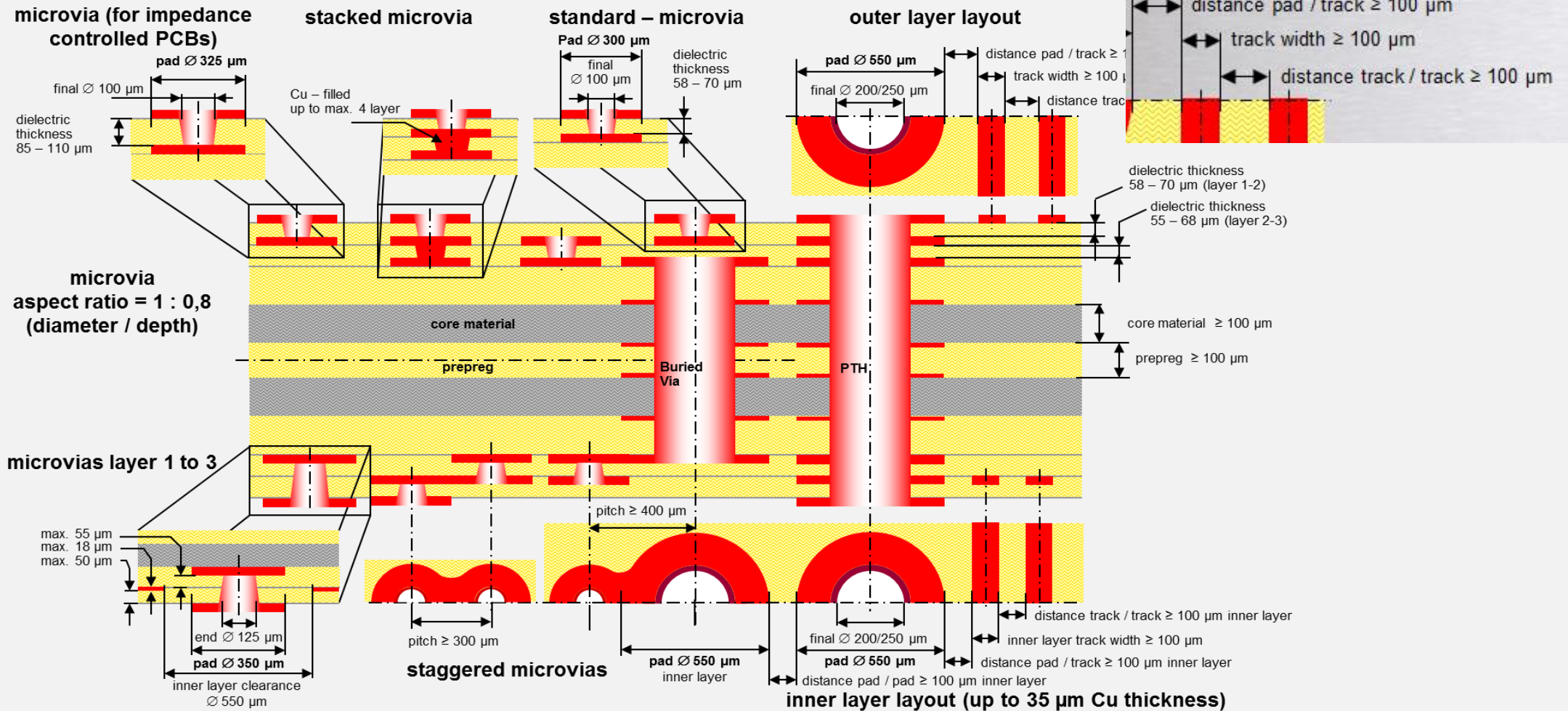
Smaller pitch & higher connection density
Fine line structures & complex multilayer stack-up

Filling ?

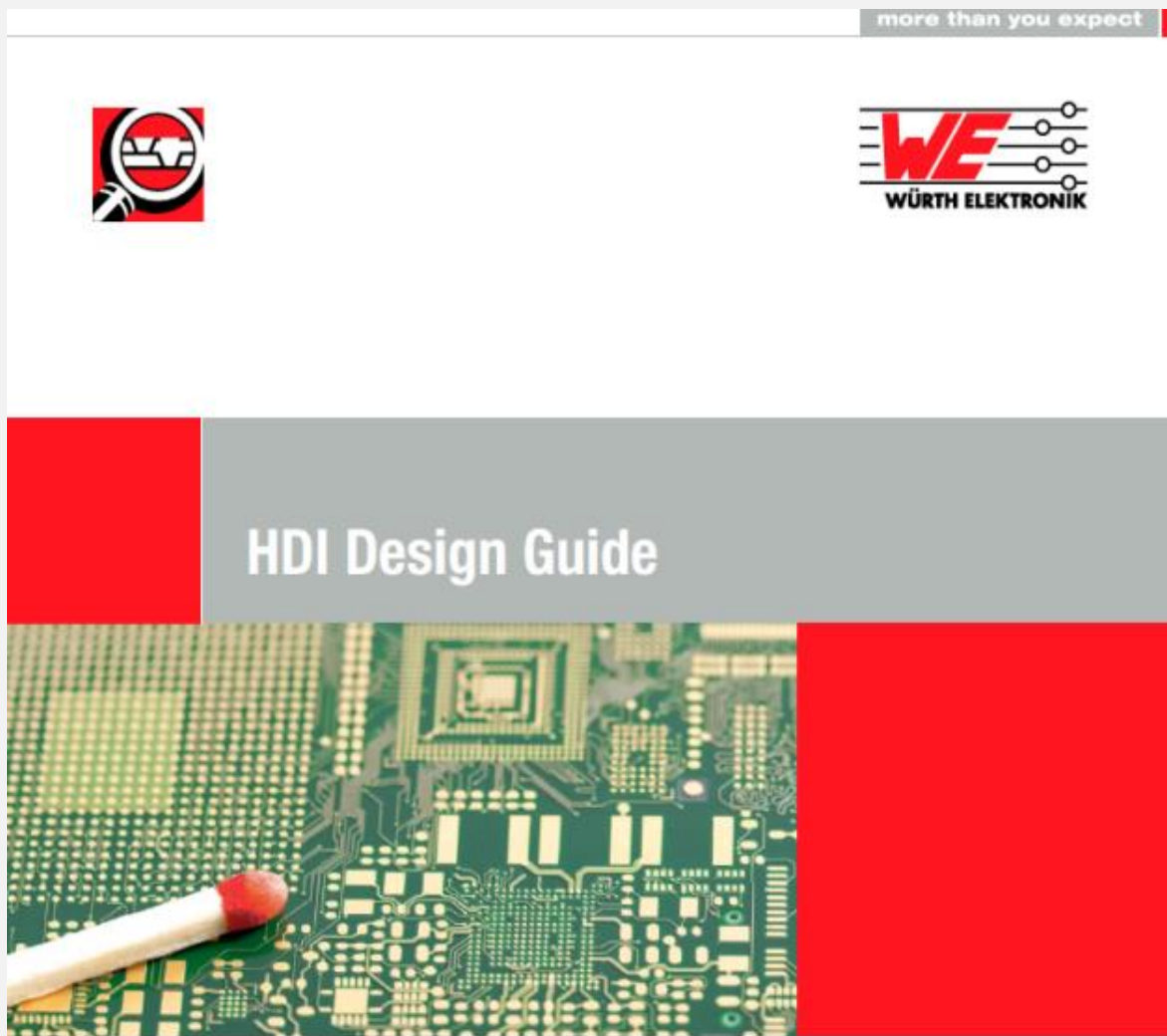
HDI – Cost Aspect Design Rules

HDI Microvia Standard Design Rules

download// www.we-online.de/microvia - Design Rules

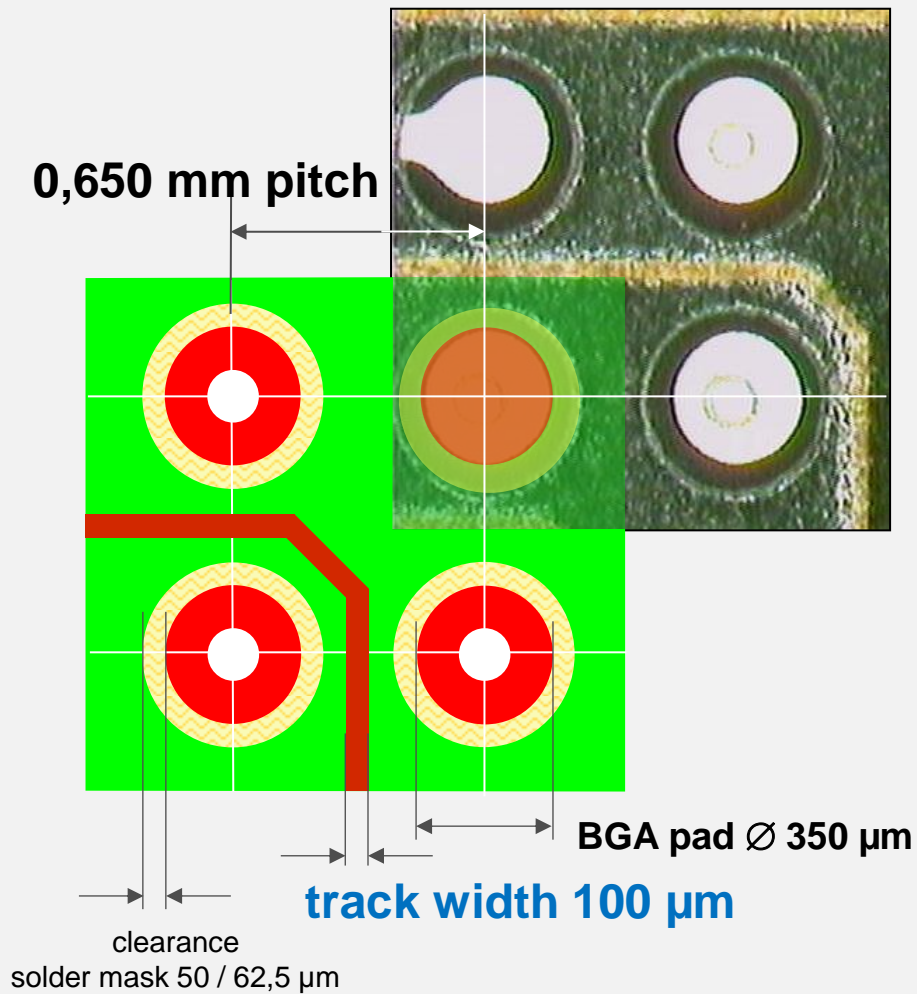


HDI – Cost Aspect Design Rules

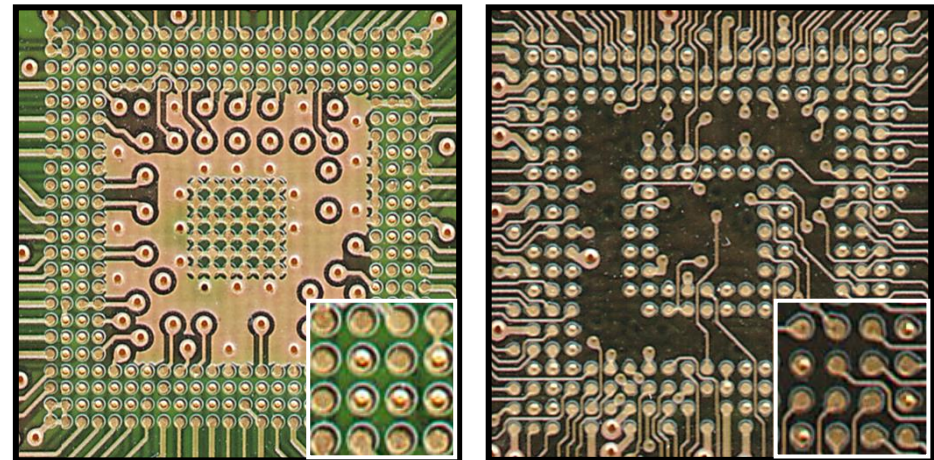


- **BGA pitch ≤ 0.80 mm**
- **90 μm track width often uncritical**
- **Fine line structures 75 μm usually only for 0.50 mm pitch BGAs absolutely necessary**

HDI – Cost Aspect Design Rules

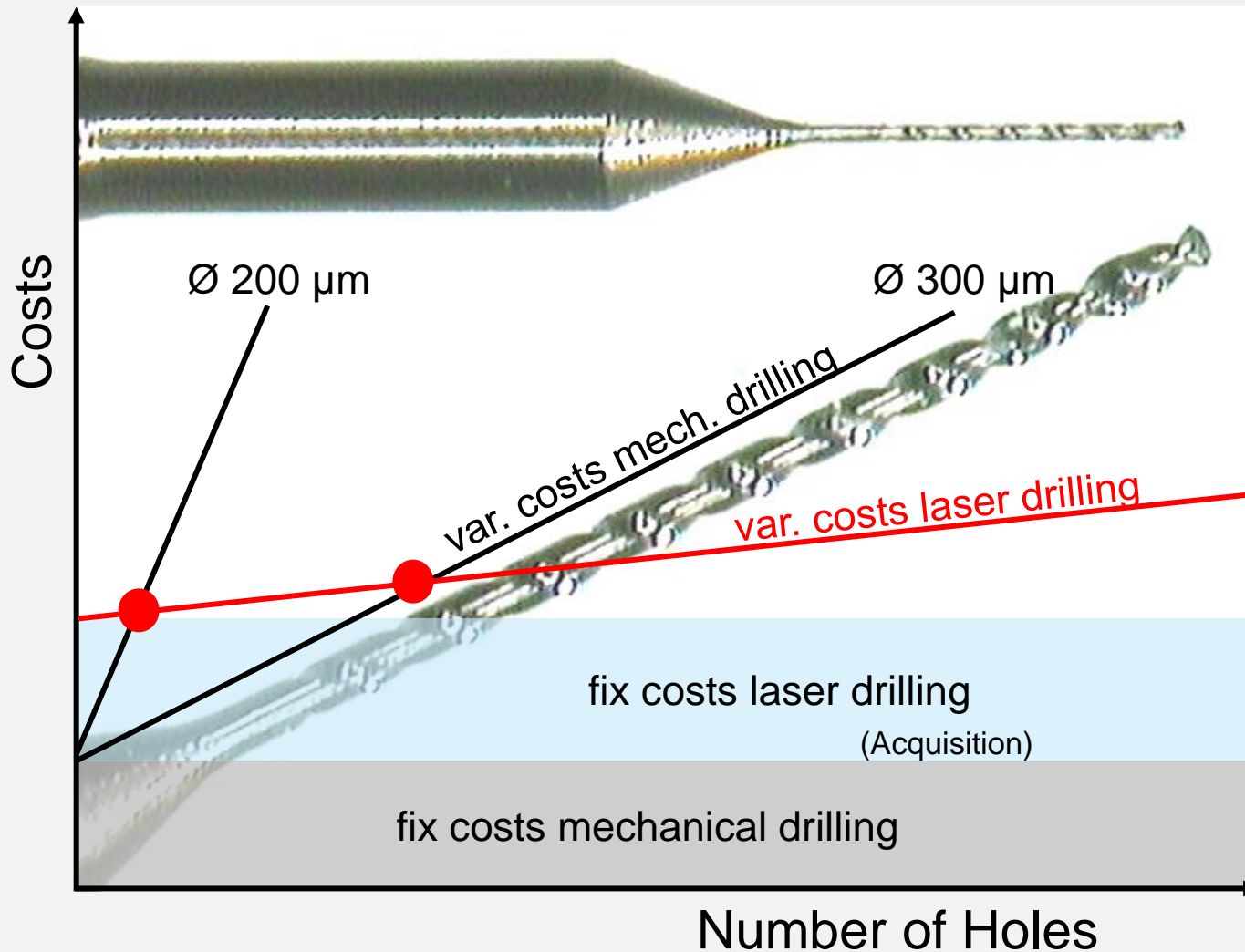


0.50 mm pitch BGA



75 μ m fine line structures
 in any case on the inner layers
 outer layers: different options

HDI – Cost Aspect Drilling Costs



Ø 200 µm (1 € / drill bit)
 Endurance: 1000 holes
 Frequency: 3 / s

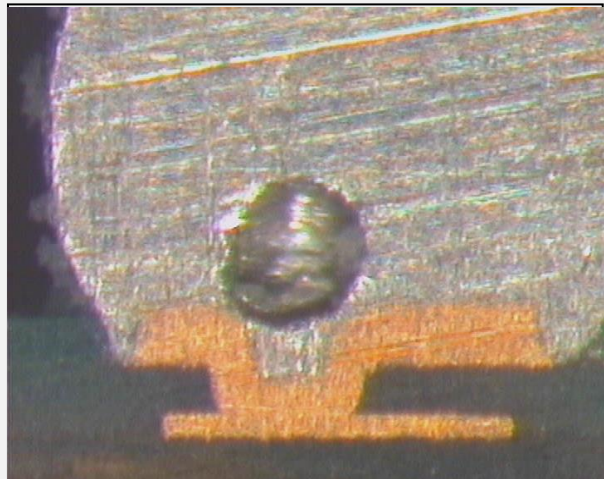
Ø 300 µm (0,60 € / drill bit)
 Endurance: 2000 holes
 Frequency: max. 8 / s



Microvia:

Ø 125 µm (0,0 € / Microvia)
 Frequency: 150 – 180 / s

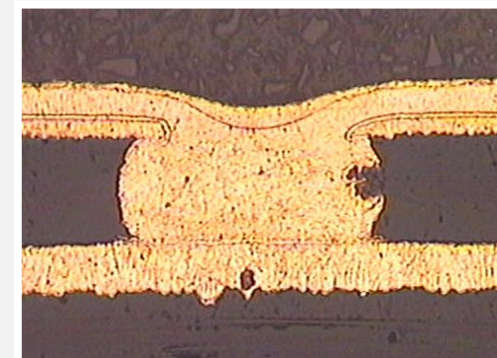
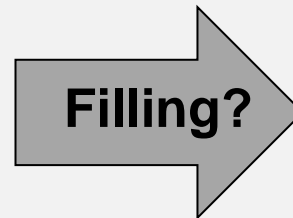
HDI – Cost Aspect Microvia Filling



IPC-7095C: „max. 22% of the image diameter“

The appearance of voids depends on:

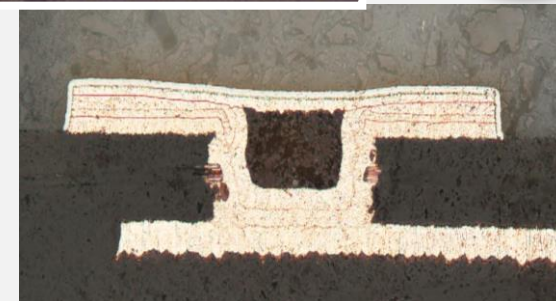
- Flux, solder paste
- Temperature profil
-



Extra charge!!



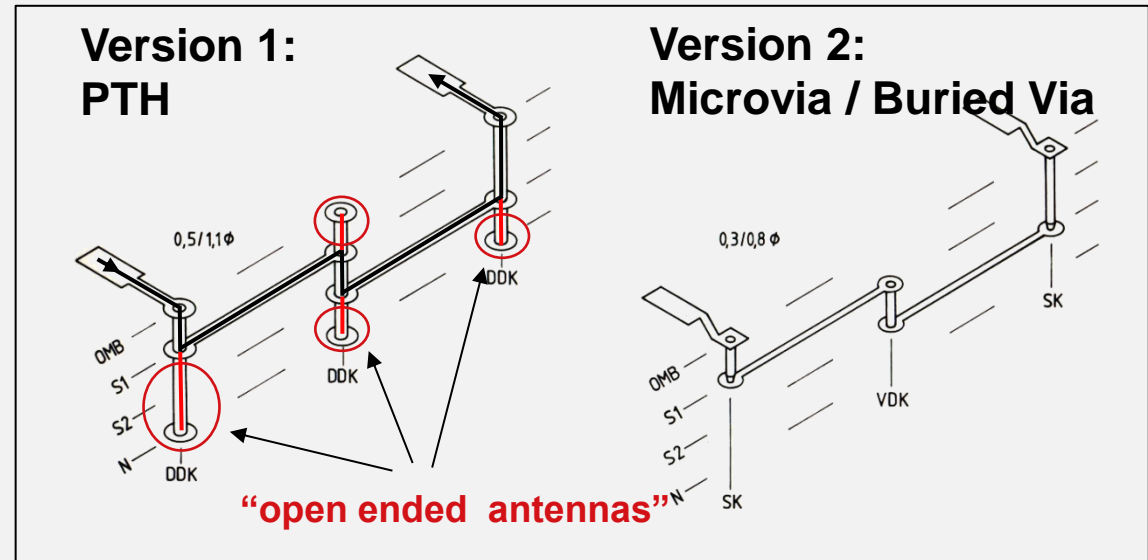
Customer / EMS have to decide for themselves which variant could be used!



HDI – other Cost Aspects

High speed / signal integrity

HDI Technology instead of expensive high frequency material



Made in Germany

more than you expect

Technical advice and support,

Product Management, local sales representatives and engineering

Workshops

Impedance calculations

DFM

Stack-ups

Design Conferences

Design Rules

Metallurgic analyses



HDI – Cost Aspects Summary

- **Components**
- **Total complexity**
- **Reliability requirements**
 - **Determine which PCB Technology should be utilised**

- **PCB size**
- **Build-up**
- **Drilling costs**
- **Design Rules**
 - **Are the determining cost factors**
and they could be decisively influenced by HDI technology
 - **The relationships should be considered**
 - **Miniaturisation is really possible only with HDI technology**

HDI Cost Aspects

HDI = expensive ?

This is a thing of the past !

Can no longer be
generally said!



Knowing the relationships - is a secret of success!

**more
than you
expect**

**We are looking
forward to good
cooperation!**

Stefan Keller
Product Manager

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