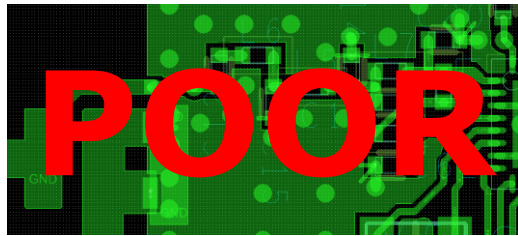
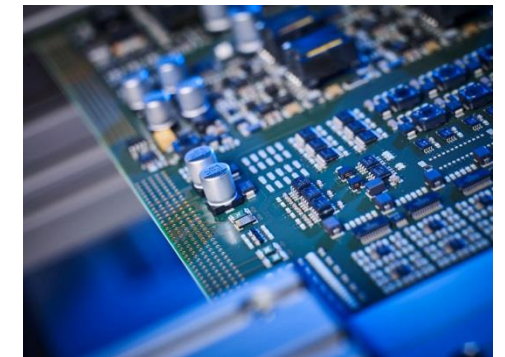
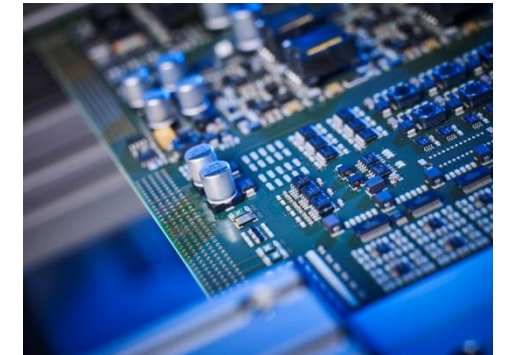
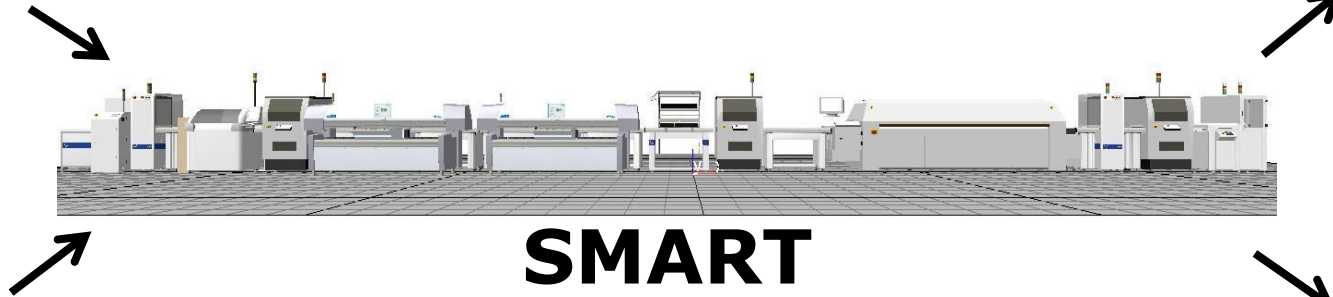
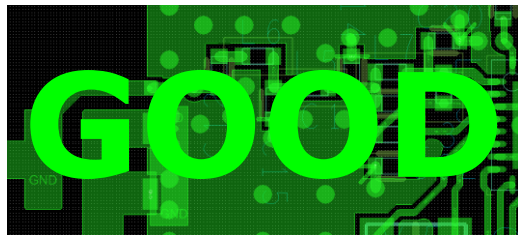


the way to a reliable (electronic) product

Marcel Swinnen

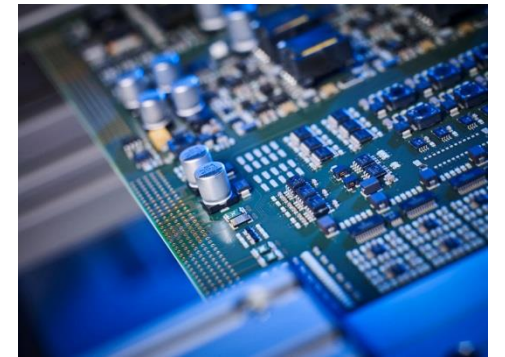


↓ DfX



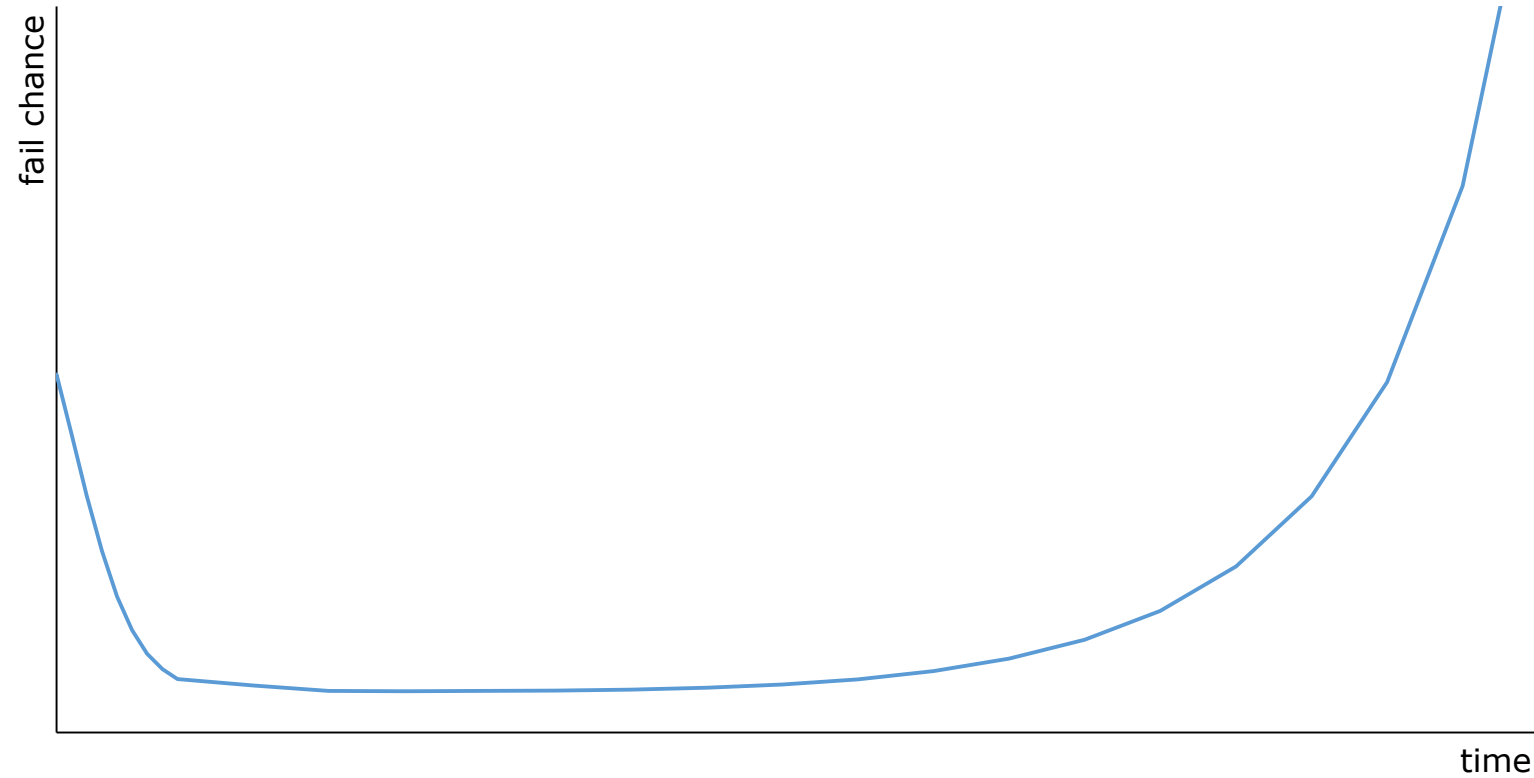
reliability starts with quality

what about reliability during product lifecycle?



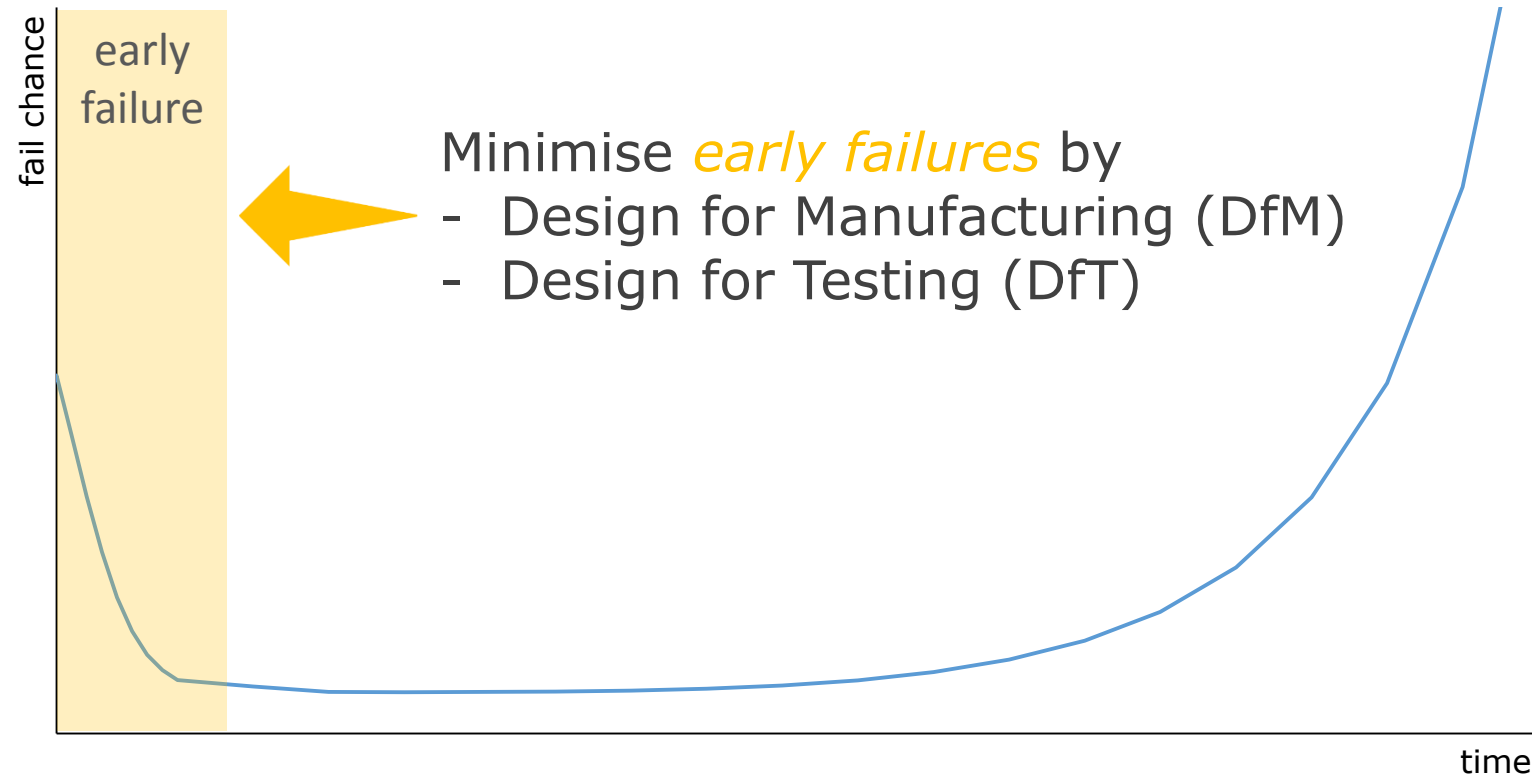
high quality

bathtub curve



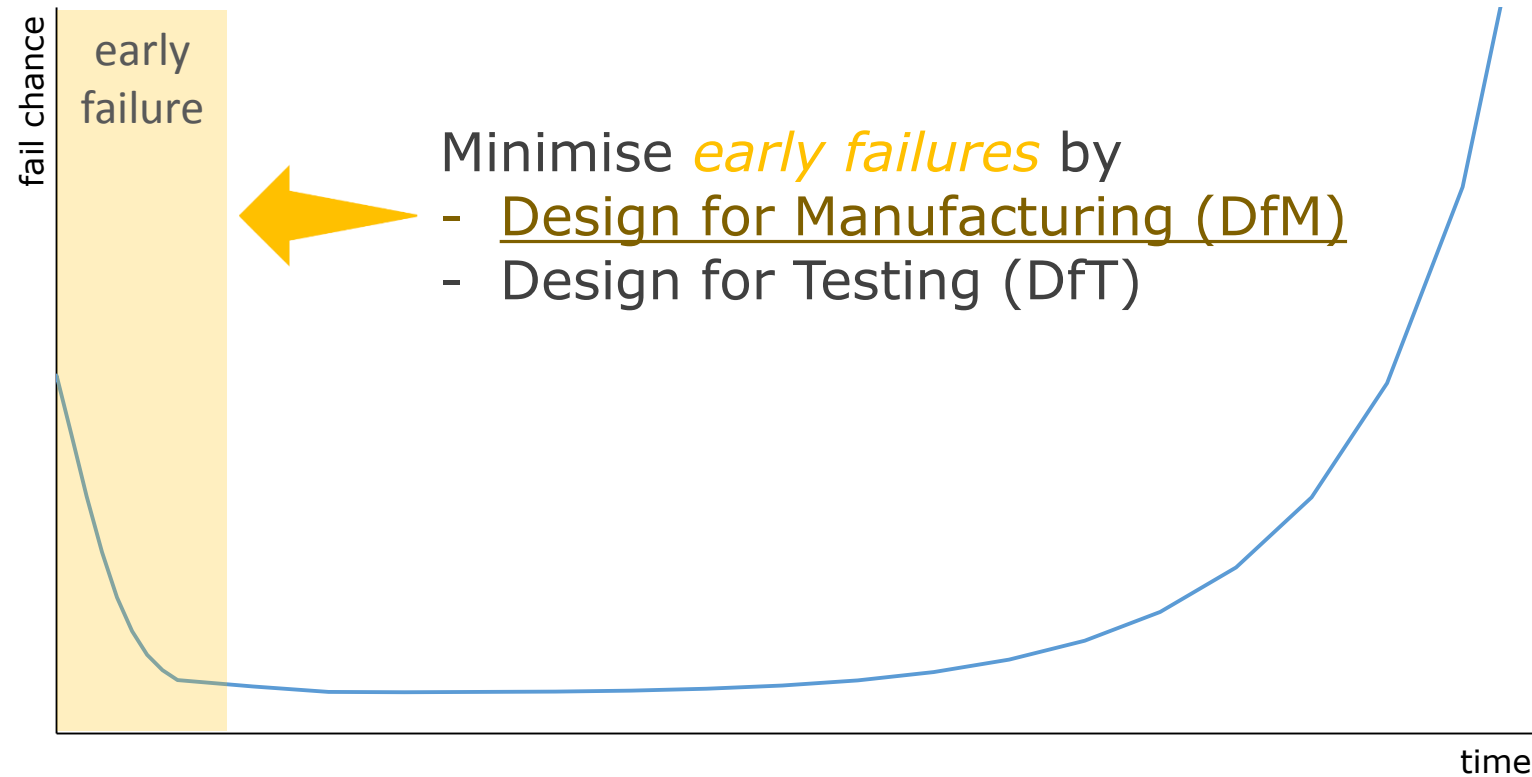
required product lifecycle

bathtub curve



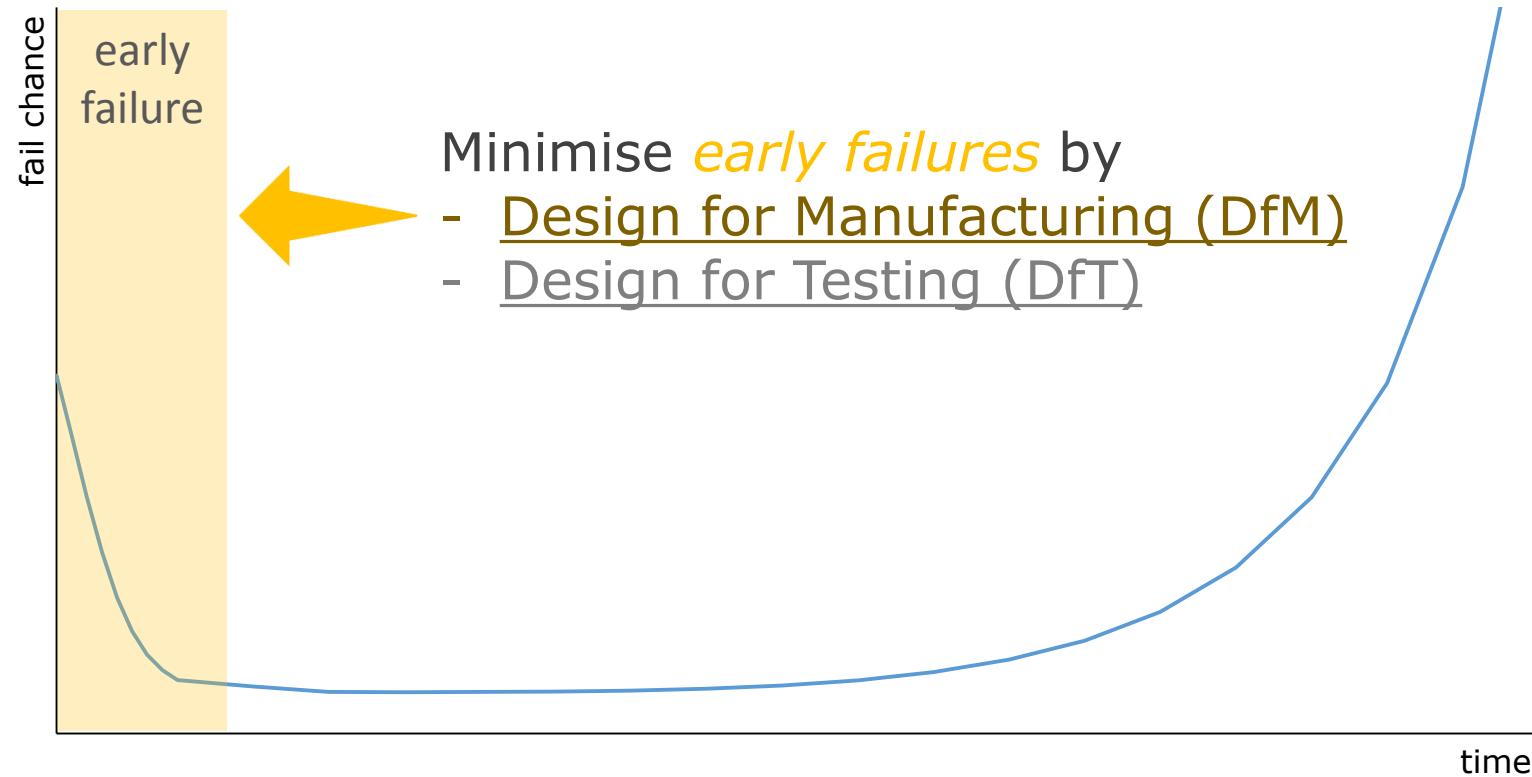
early failures are quality issues that have slipped through production tests

bathtub curve



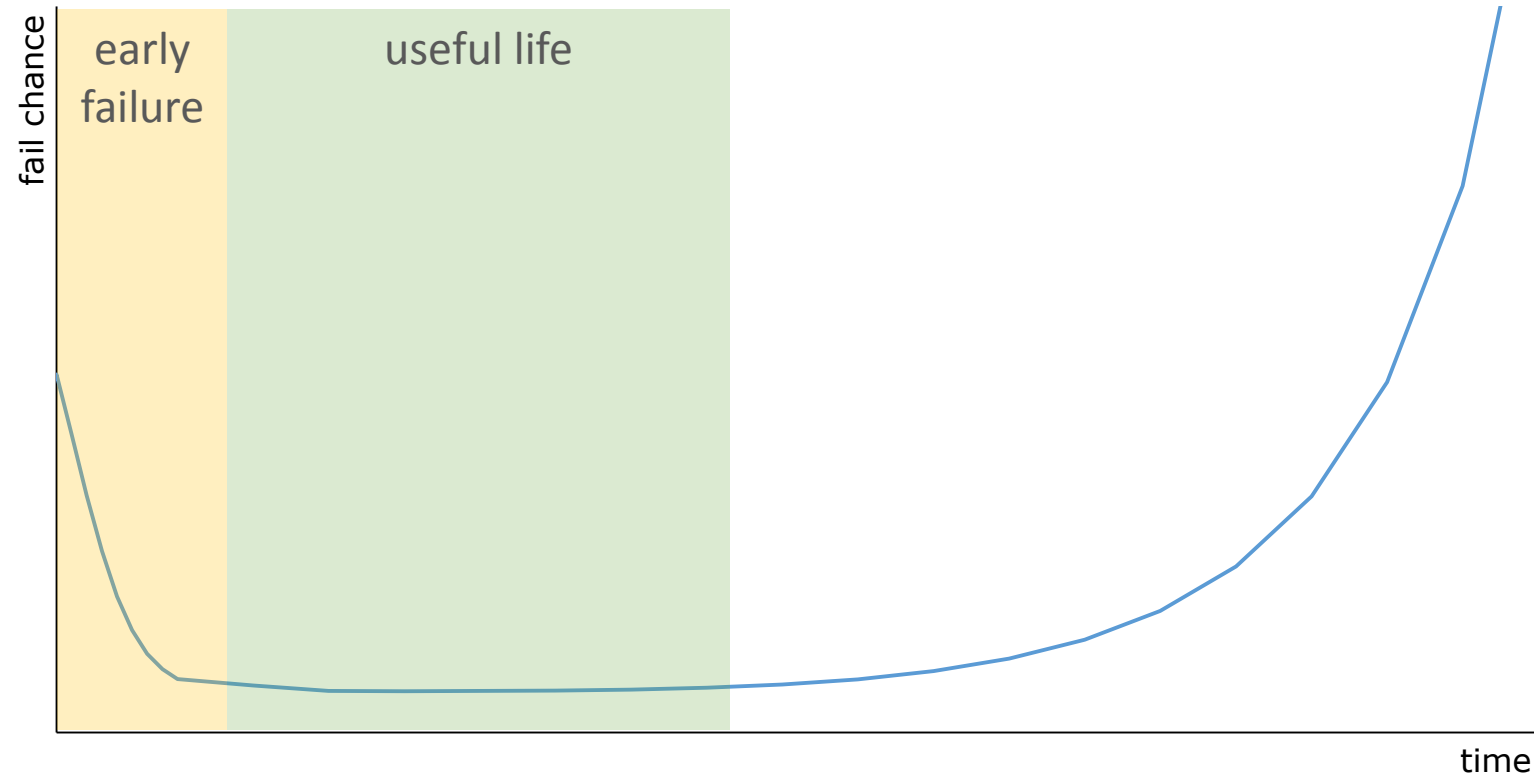
early failures are quality issues that have slipped through production tests

bathtub curve



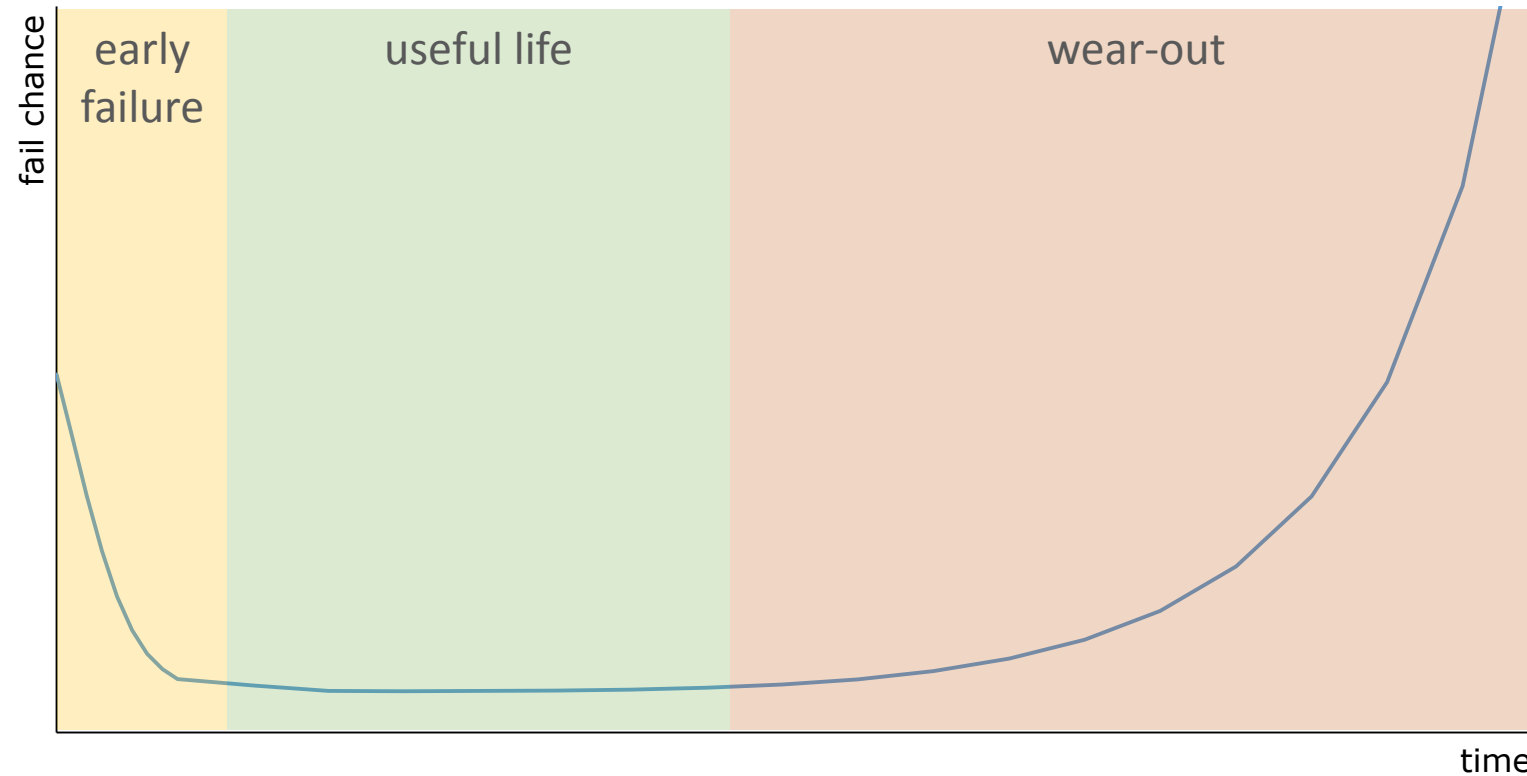
early failures are quality issues that have slipped through production tests

bathtub curve



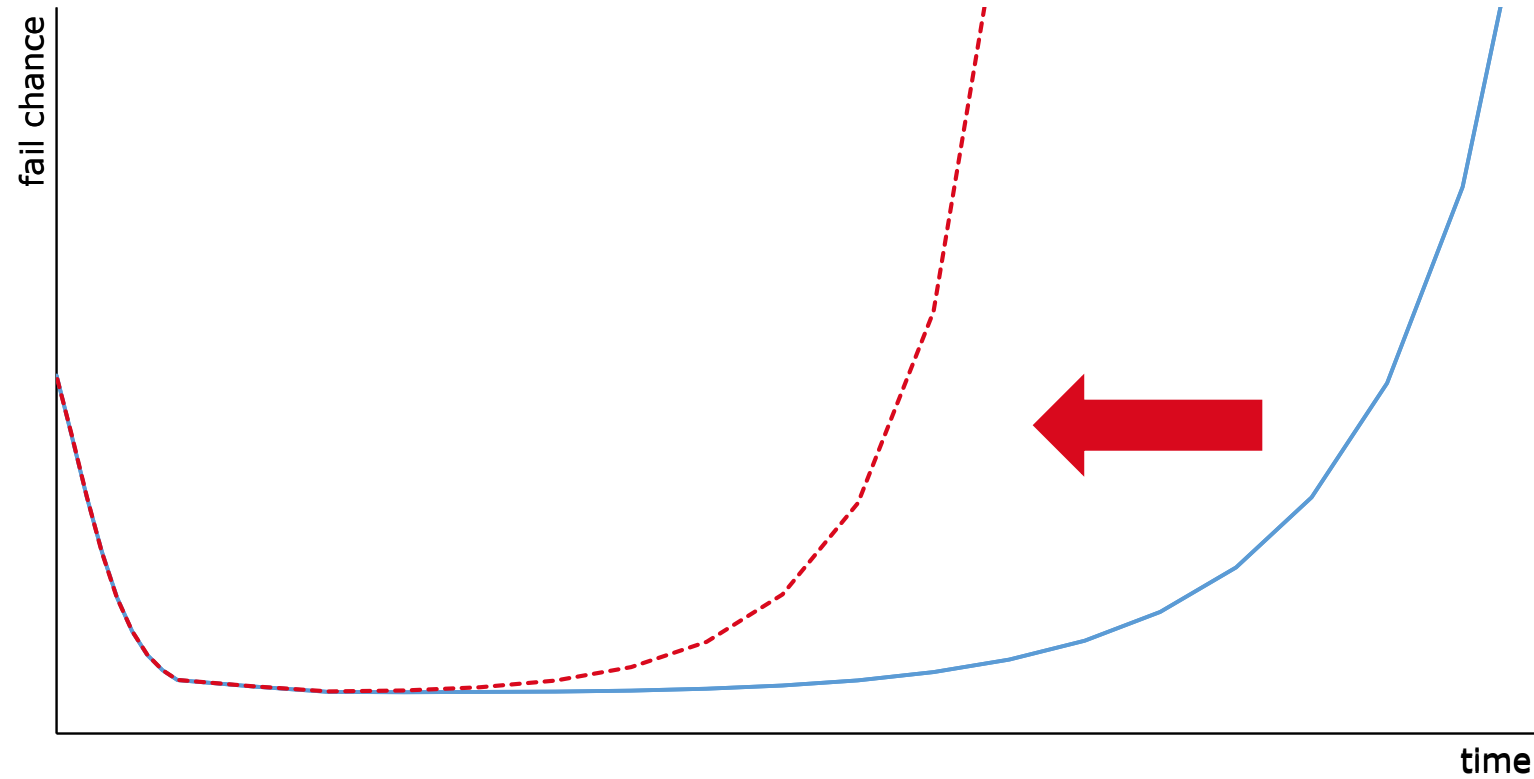
useful life is period of "failure free" use

bathtub curve



wear-out: the product is used until it is no longer in good condition or working order

bathtub curve

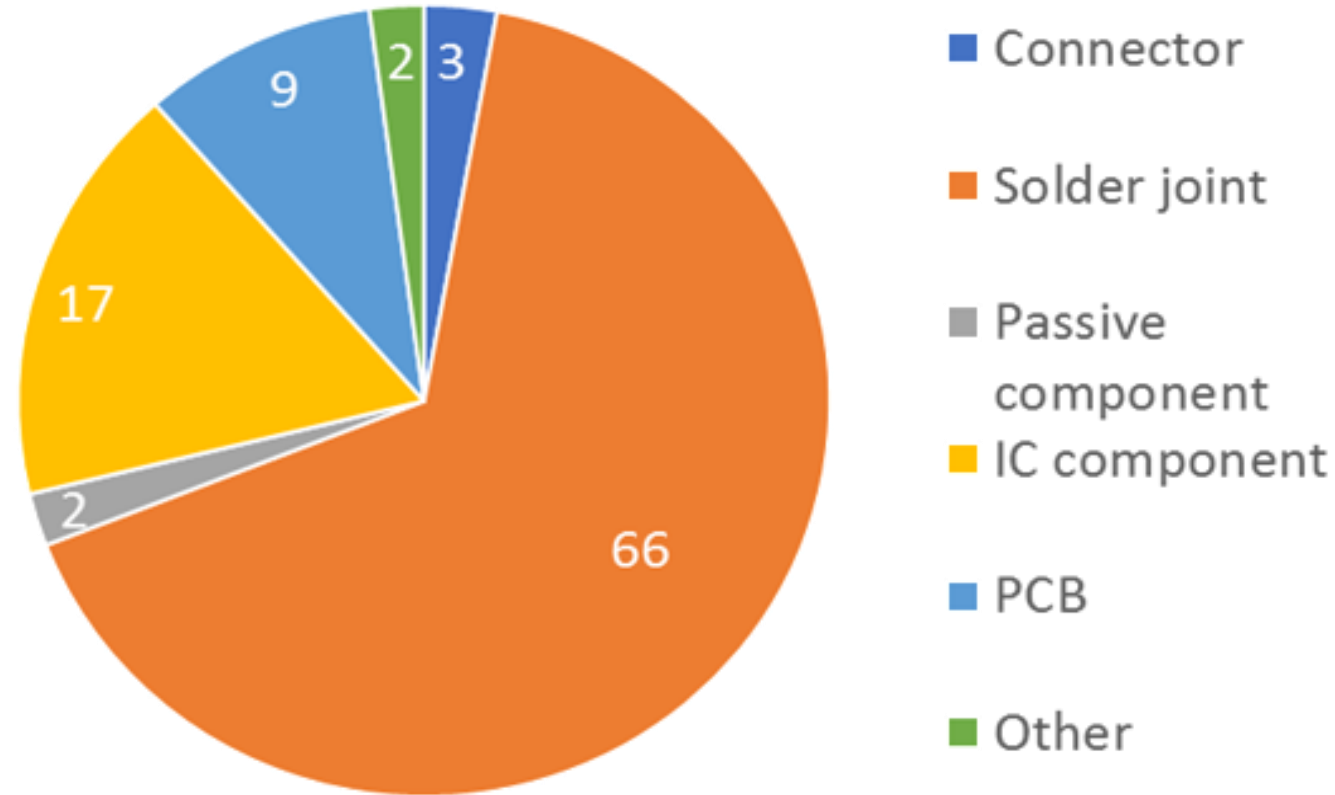


without Design for Reliability (DfR)

Design for Reliability (DfR)

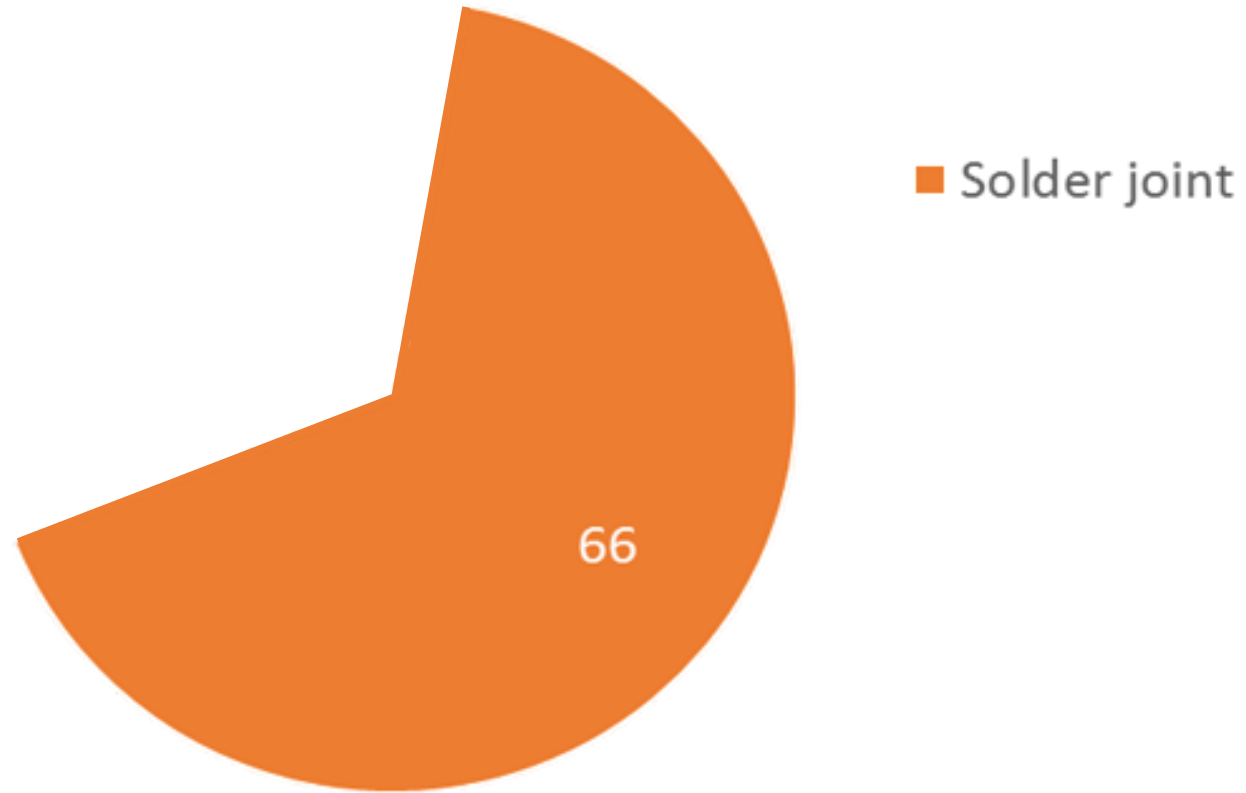
% distribution of Failure studies by cEDM (imec)

2014-2016





Design for Reliability (DfR)





design process industrial product

time pressure → key components = consumer ICs



🙄 problem:

limited lifecycle

→ obsolescence

💡 solution:

Design for Logistics (DfL)



design process industrial product

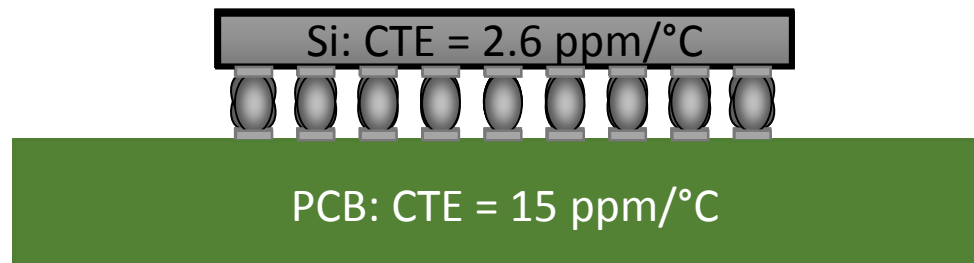
use of consumer ICs

😞 problem:

smaller packages (BGA, QFN)

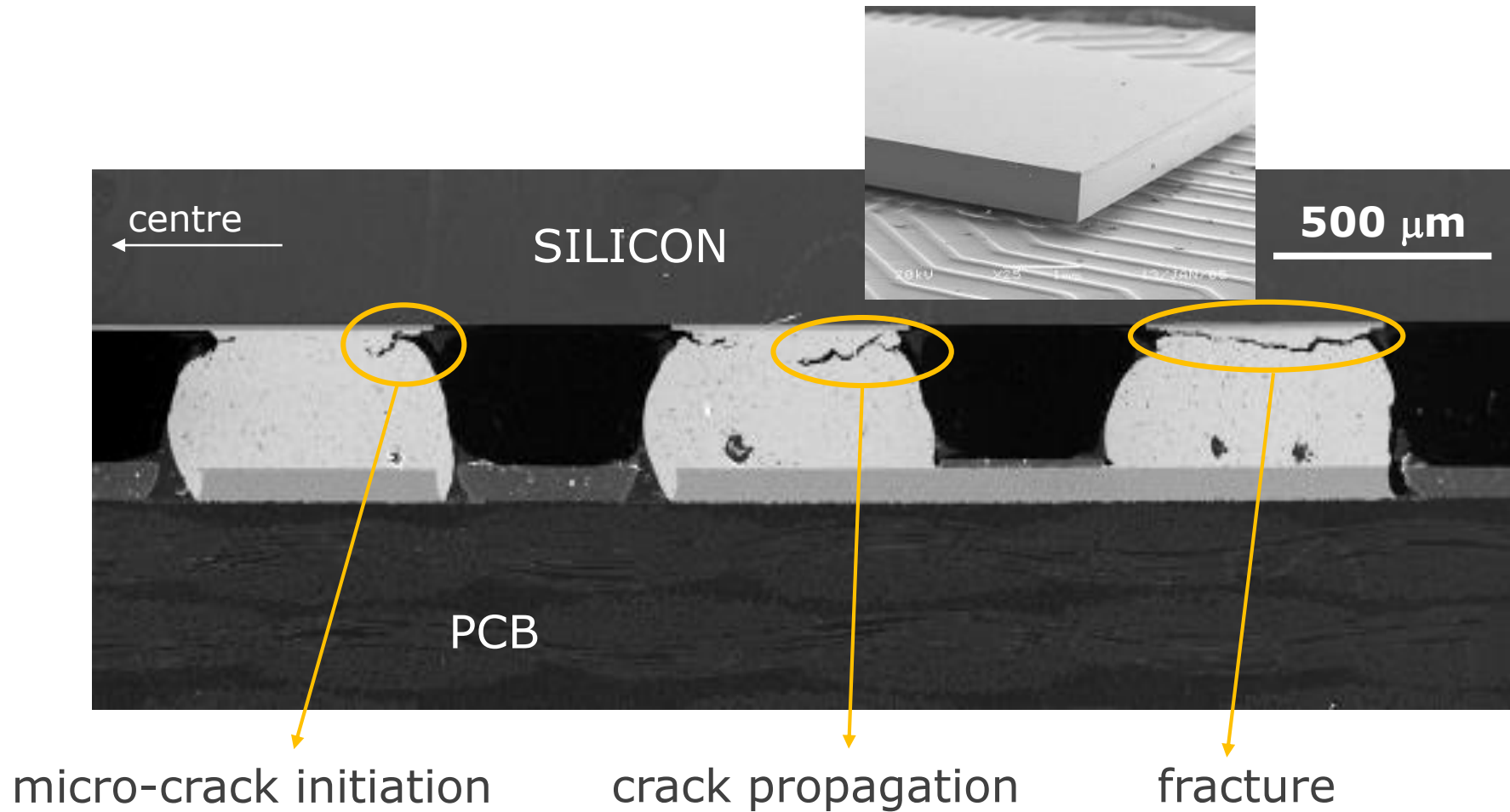
→ *bigger chance on solder joint cracks*


T = 205°C





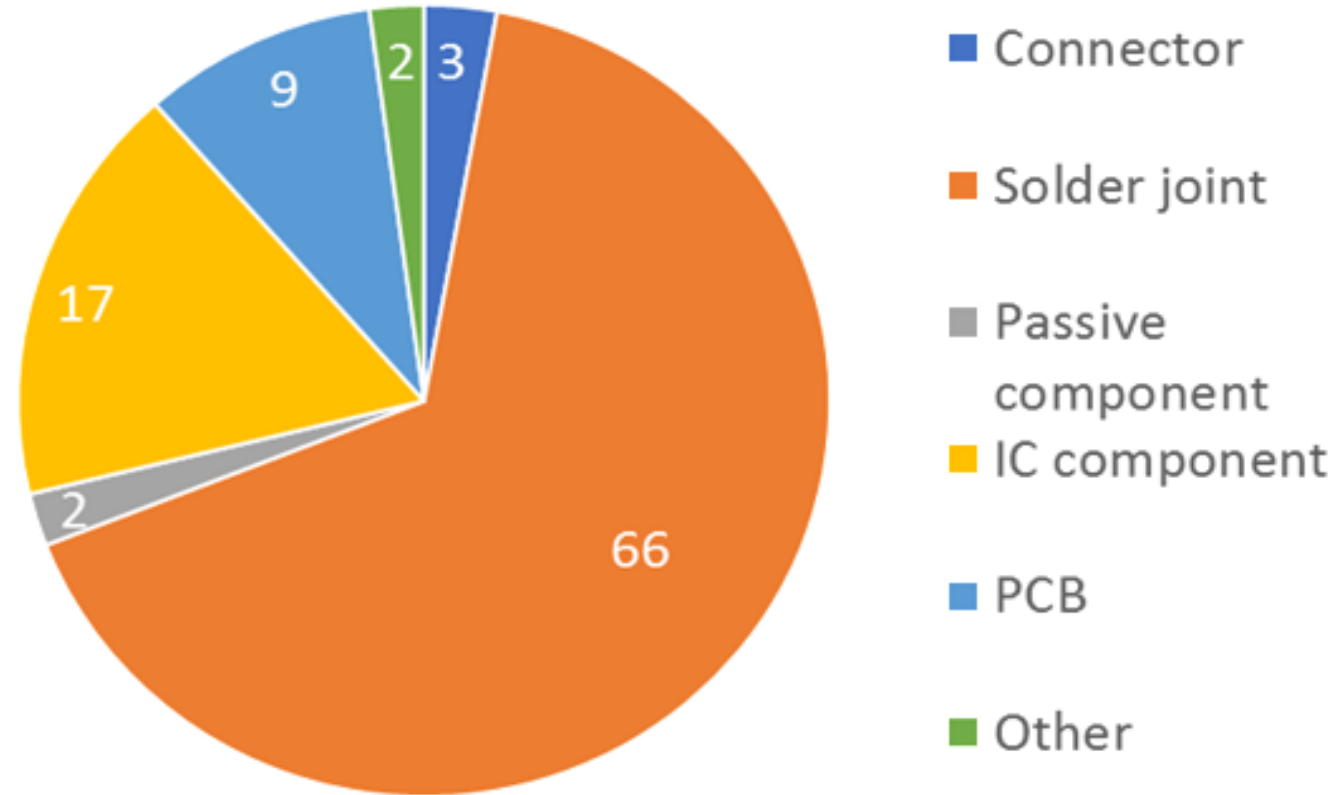
design process industrial product



Design for Reliability (DfR)

% distribution of Failure studies by cEDM (imec)

2014-2016





Design for Reliability (DfR)



■ PCB



design process industrial product

use of consumer ICs

 problem:

smaller packages (BGA, QFN)

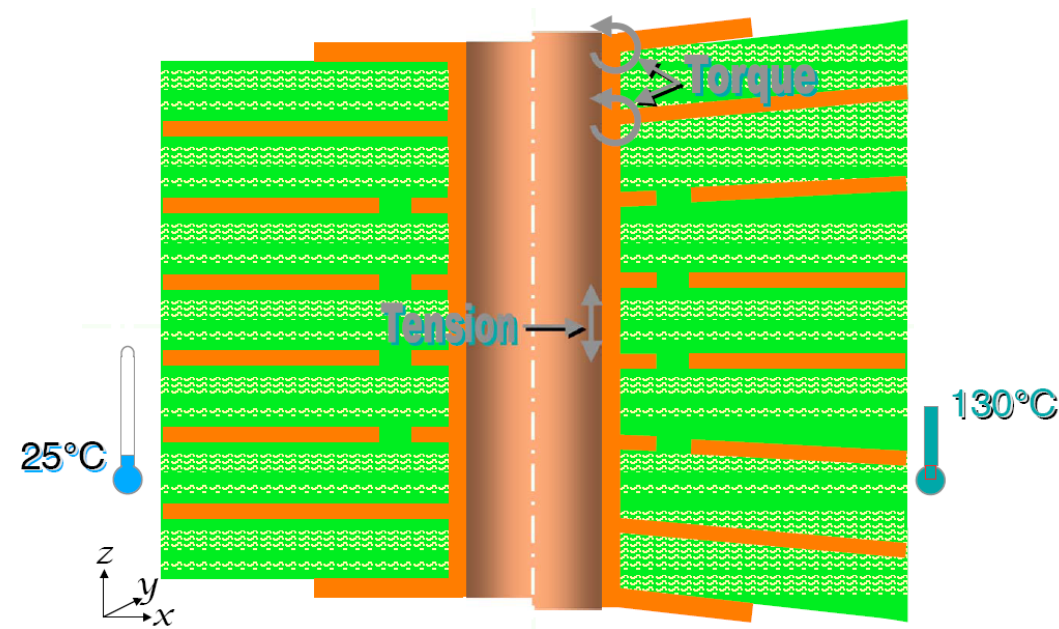
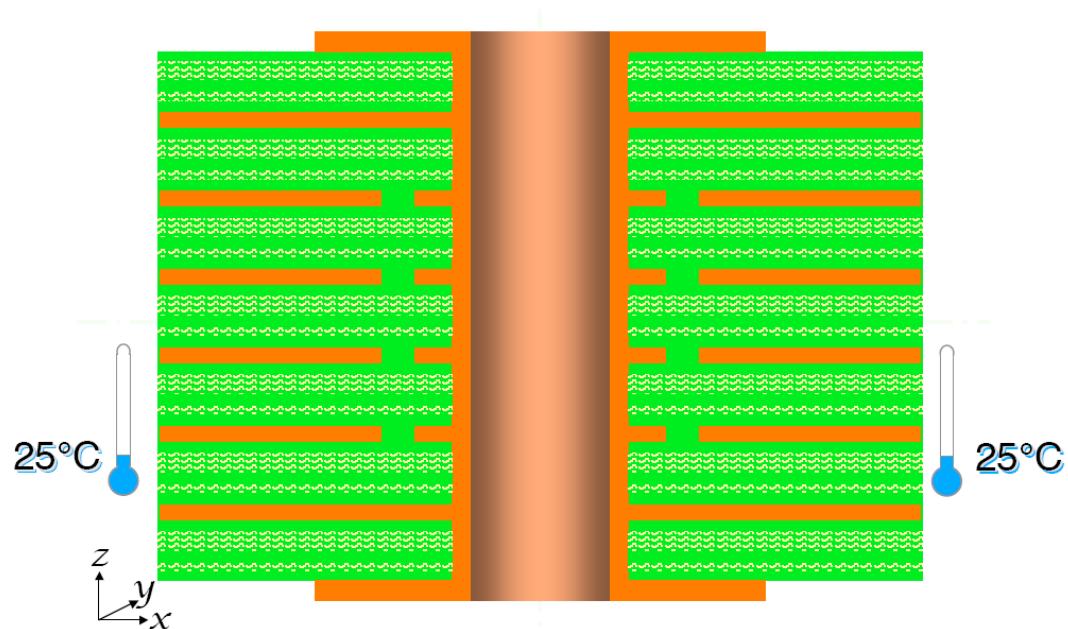
→ more difficult to route the PCB tracks

→ more layers in PCB + more vias

→ ***bigger chance on via cracks***

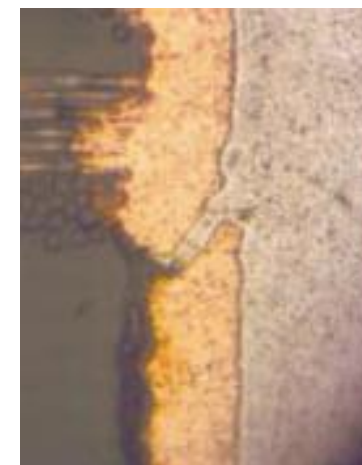
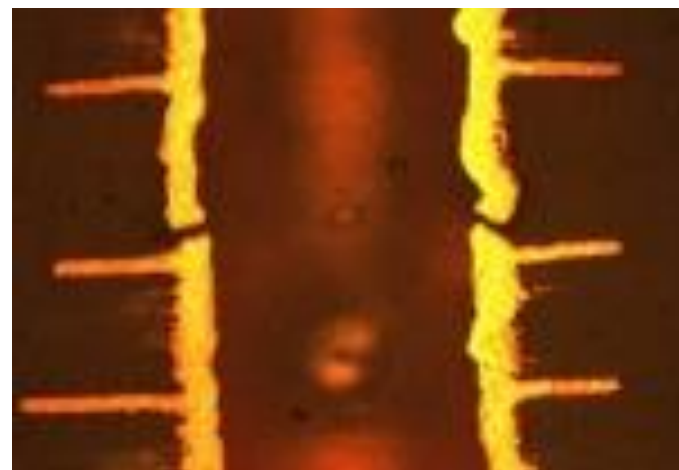
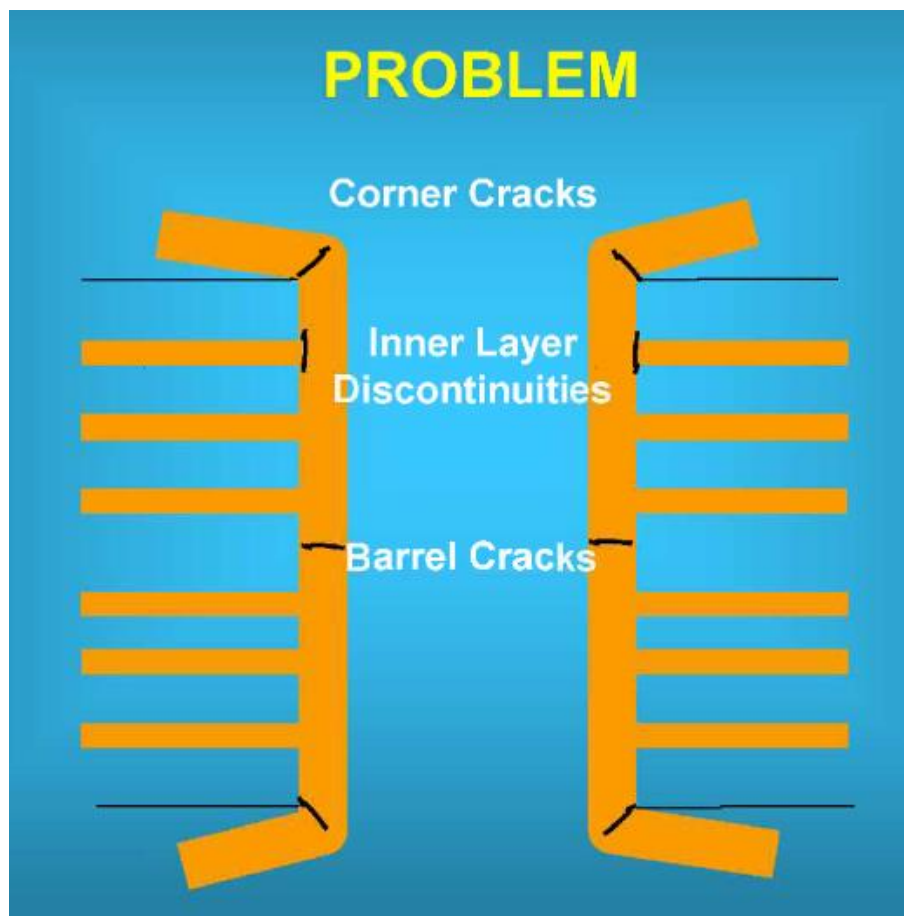


design process industrial product





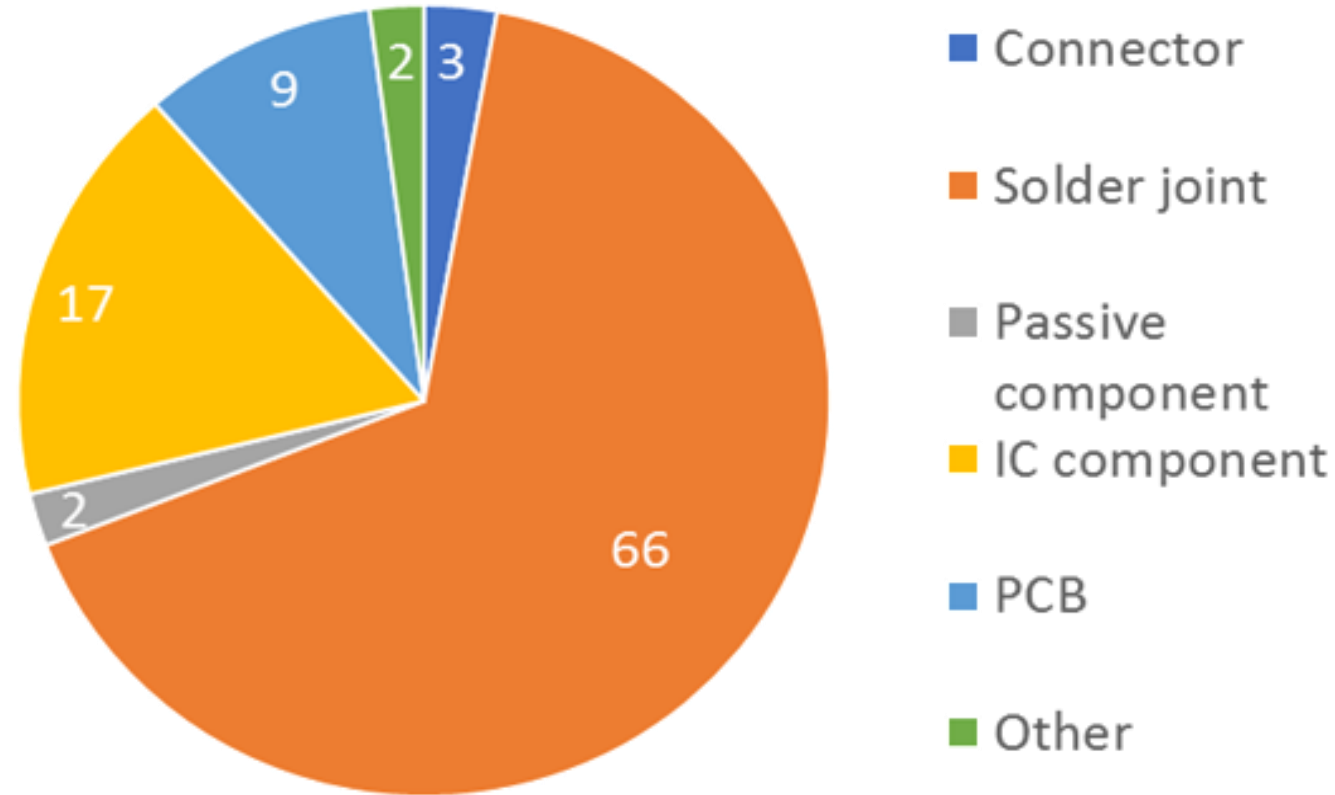
design process industrial product



Design for Reliability (DfR)

% distribution of Failure studies by cEDM (imec)

2014-2016



Design for Reliability (DfR)

■ Passive
component



2

design process industrial product

use of electrolytic capacitors

😞 problem:

logarithmic decrease of lifetime by temperature





*the bitterness of poor
quality remains long*

*after the sweetness of
low price is forgotten*



booth: 7B048

ELECTRONICS
& **APPLICATIONS**
14 T/M 16 MEI 2019 JAARBEURS UTRECHT

Marcel Swinnen
consultant test & DfX
e mswinnen@tbp.nl
m +31 657 884 009



thank you for your attention - www.tbp.eu

