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INFRASTRUCTURE

Practical Reliability Guidance for PIC Manufacturing

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Agenda

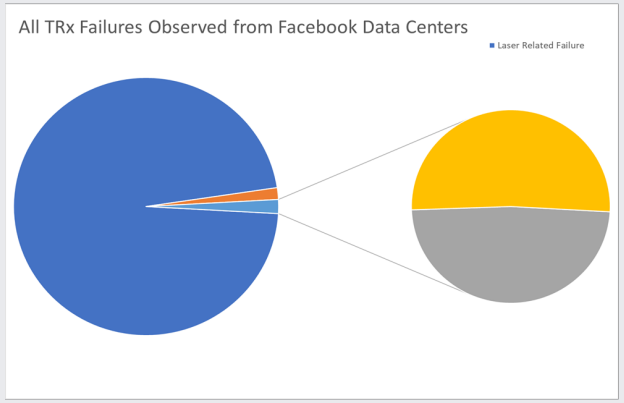
- Problem Statements
- Facebook Data Center In Scale
- Design for Reliability and Robustness
- Quality and Reliability Considerations

Problem Statements

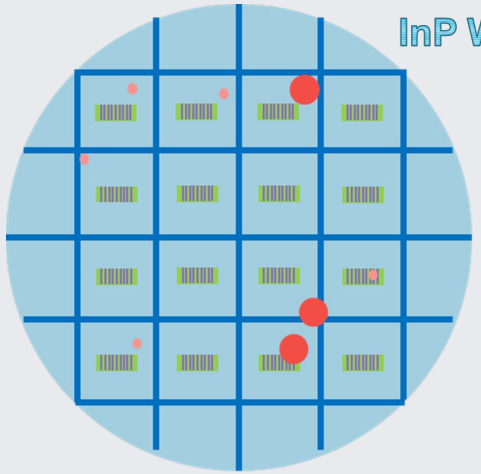
Problem Statements

1. Optical Device Failure Brings Negative Impact to Data Center applications
2. Telcordia defined the reliability requirements is not cover the actual reliability guidance- different production scale and lifetime requirement
3. How to distinguish the process variations and design robustness especially for the steep ramp up in the manufacturing process
4. How to catch the infant mortality issues, especially the laser BI issue
5. We are facing challenges as described in the following two slides

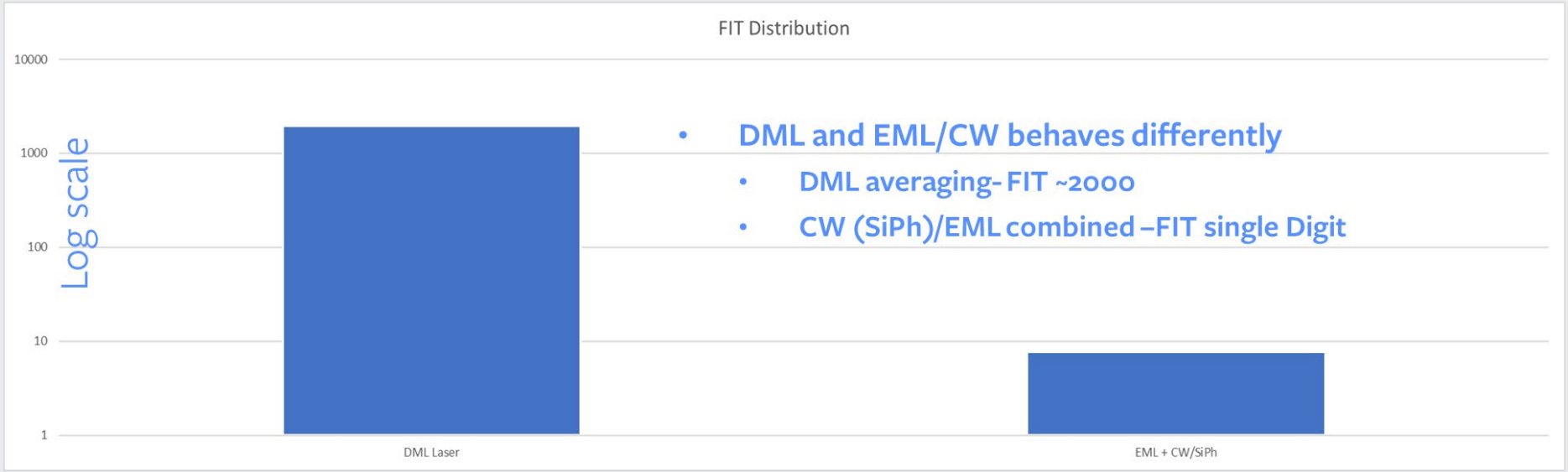
100G Optical Transceiver Quality Performance



- DOA- almost all failures were reported within 3months after power on
- Among those failures, 97% comes from laser related
- We should have more stringent screening or Burn In process on laser



- Fully rely on post burn-in Process
- Volume Drives

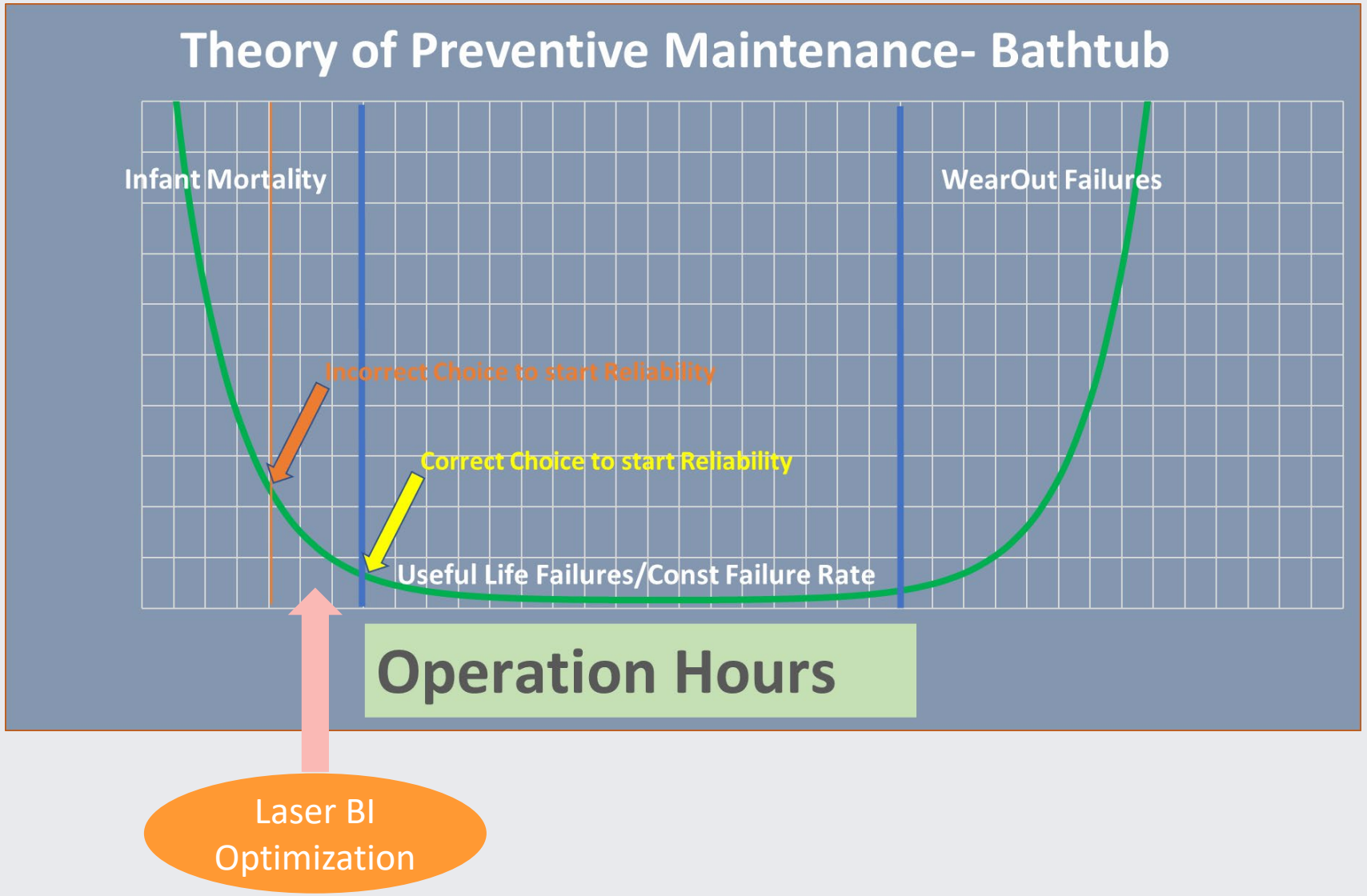


Facebook Data Center In Scale


Prineville, OR
Forest City, NC
Luleä, Sweden
Altoona, IA
Huntsville, AL
Fort Worth, TX
Clonee, Ireland
Los Lunas, NM
Odense, Denmark
Eagle Mountain, UT
Papillion, NE
New Albany, OH
Henrico, VA
Newton County, GA
Singapore

Design for Reliability and Robustness

Infant Mortality and Wear Out Reliability Concern



- To early to Consider Reliability when
  - Less Stringent BI Screening
  - Less wafer level Process Control
  - Classic GR468 ONLY

Quality and Reliability Standards

Practical Approaches

1. Component Quality and Reliability Control

a. FIT < 300 during first 5 years of use

b. AFR will be kept below ~1%

c. GR468 is still effective after adding some highly accelerated tests, such HTOL and aggressive TC

d. BOL vs EOL: 5+years (deployment and transition period) is a good choice to start

e. No trade off between the reliability requirements and network redundancy

2. Enhanced ORT (On-Going Reliability Test) is required

a. More stringent screening and ORT is proposed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Questions

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Thank you

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