

Your Partner Throughout the Product Life Cycle

Welcome and What's New At DfR Solutions

March 9, 2016

DfR Solutions

Beltsville, MD



Who is DfR Solutions?

***The Industry Leader in
Quality-Reliability-
Durability
of Electronics***

Fastest Growing Companies in the Electronics Industry

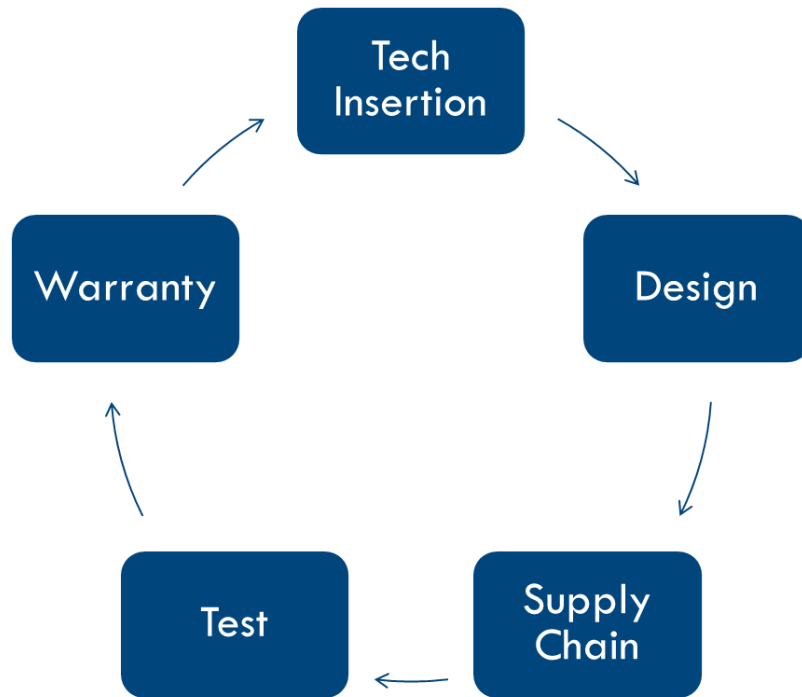
- Inc Magazine

Best Design Verification Tool

- Printed Circuit Design

2012 Global Technology Award Winner

10 Years of Providing Solutions to the Electronics Marketplace



End-to-End Quality and Reliability Expertise

- DfR / DfM / DfT / DfS..... DfX
- Finite Element / Fluid Dynamics
- Physics of Failure Modeling
- FMEA / FTA
- 3rd Party Design Review
- Failure Analysis
- Root Cause Investigations
- Forensic Engineering
- Circuit Analysis
- Connector/Wiring Selection
- Analog/Power Design
- Material Characterization
- PCB / PCBA Onsite Audits
- Pottings and Coatings
- Software Risk Mitigation

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Results: Over 1000 Satisfied Customers



TESLA MOTORS

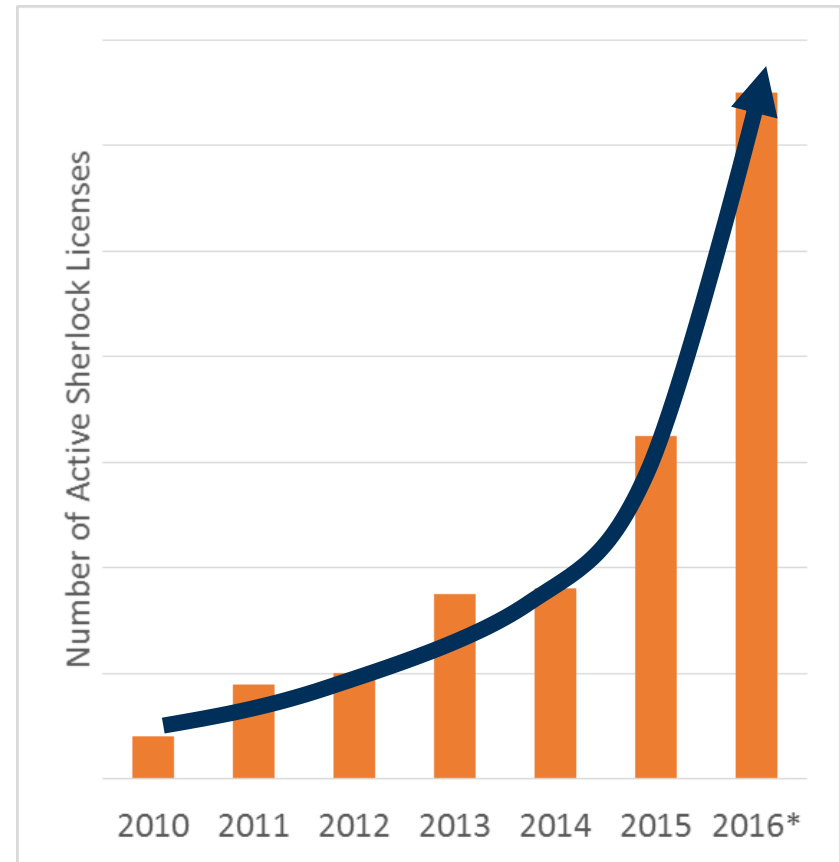


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What is New At DfR Solutions?

What's New with Sherlock Software in 2015/2016?

- One Word: Adoption
- Amazing growth in the use of physics of failure (PoF) and simulation/modeling of electronic hardware
- What's driving this adoption?



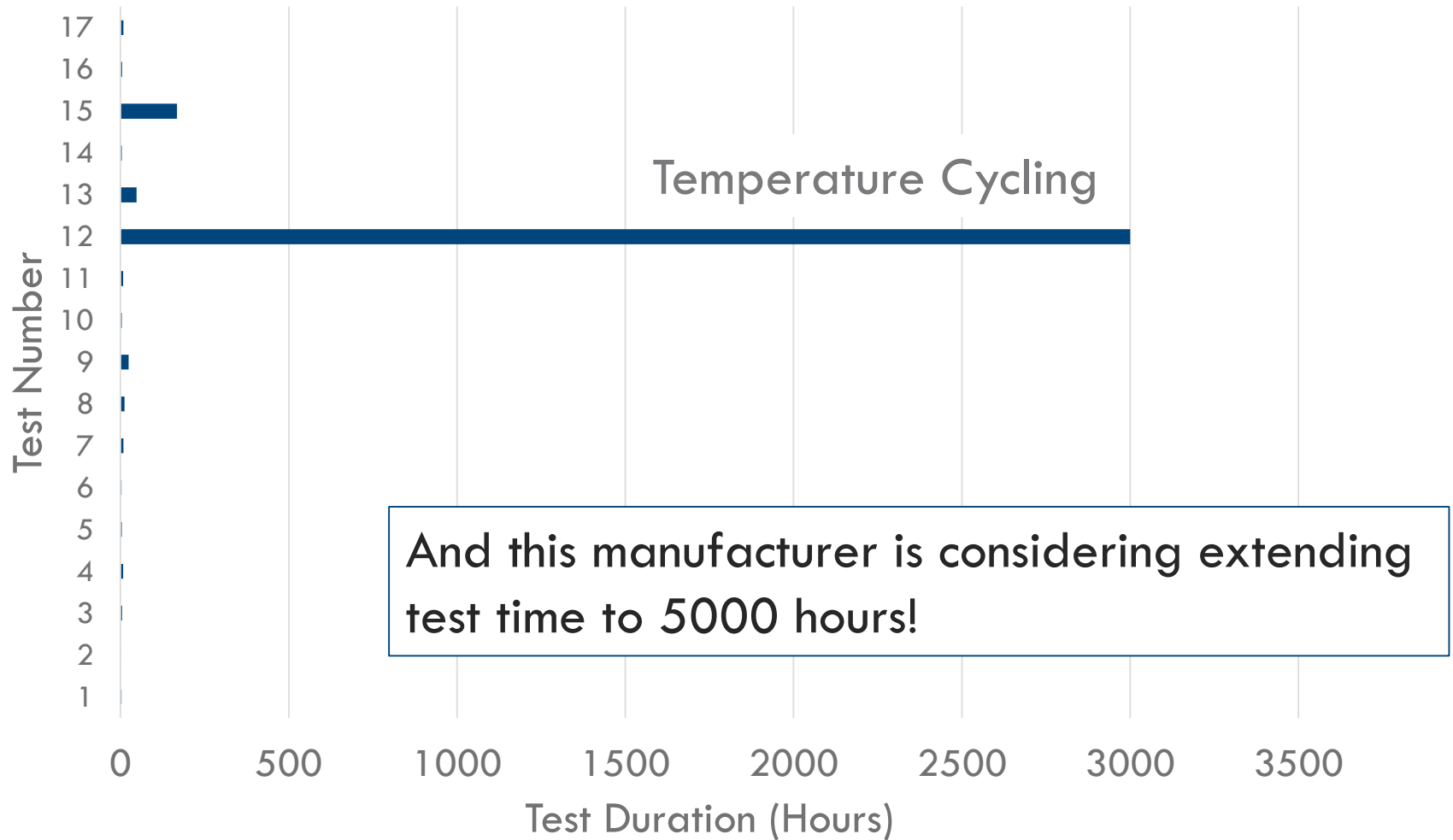
What's Driving Adoption?

- **Astronomical Return on Investment (ROI)**
 - Based on recently completed user case studies, the average organization using Sherlock experiences a \$200K to \$1M annual ROI
- **Customer Requirements**
 - System Integrators and OEMs are increasingly demanding PoF analysis from their supply chain (failure at test is too late!)
 - For the first time, Sherlock analysis is now required for certain automotive and avionics supply chains
 - PoF is a validated prediction methodology for ISO-26262
- **Technology Challenges**
 - Increasing adoption of consumer technology into high reliability applications (automotive, aviation, space)

Value Proposition: Stop Testing

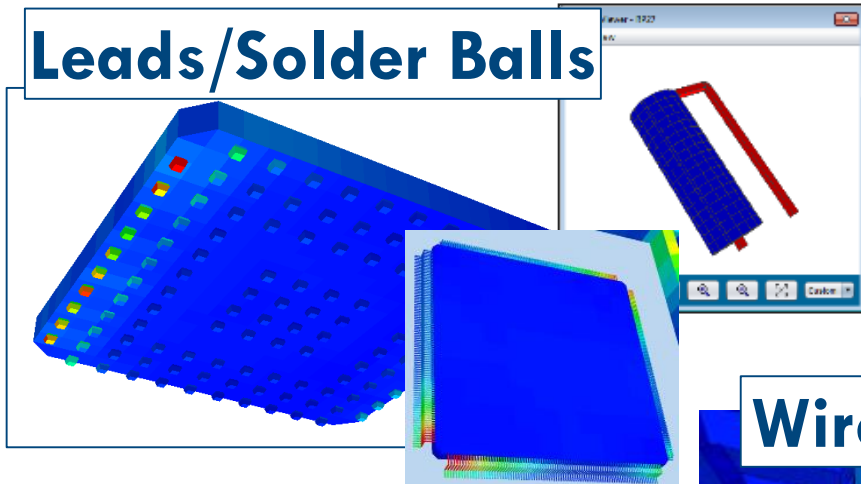
- Most OEMs in the Automotive and Aviation communities hate environmental testing
- It takes too long
- It costs too much
- It is too late in the process
- Suppliers rarely fail
- Failures are not always relevant
- It stymies innovation and modification (no one wants to retest)

Test Durations Example: Automotive OEM

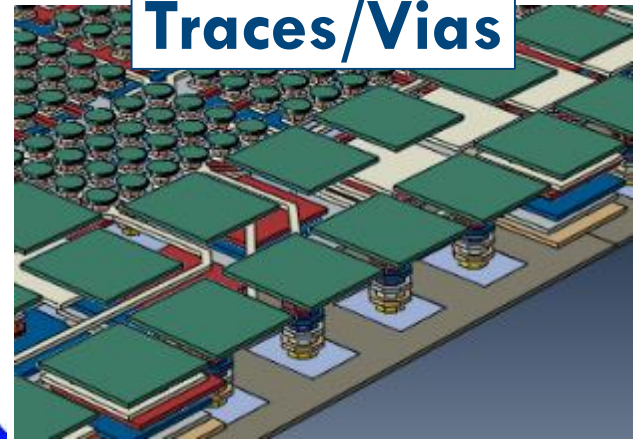


Highlights of Sherlock in 2015 (cont.)

Leads/Solder Balls



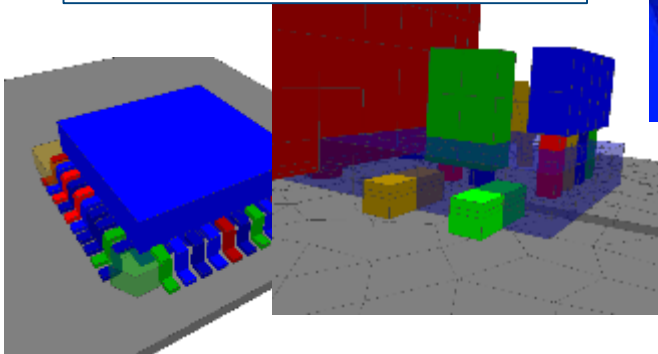
Traces/Vias



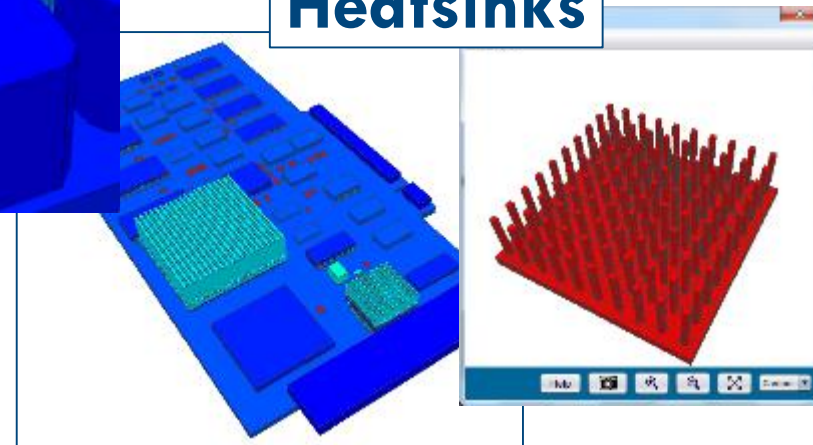
Wirebonds



Coating/Potting



Heatsinks



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Sherlock in 2016: Sneak Peak

- Modeling regions
 - High fidelity where you want it
- Expand lead/solder failure capabilities
 - Mixed mode failures (potting, overconstrained boards)
 - Mechanical loads (vibe, shock) + temperature
- PoF-based IC failure rate predictions
 - Compliant to SAE ARP6338
- Propagating up to system-level assessment

What's New with DfR Solutions in 2015/2016?

- **Expanding Physics-of-Failure (PoF) up to System-Level**
 - Awarded SBIR Phase II for developing Methodologies for Predicting Dormant Missile Reliabilities
 - Developing Physics-of-Failure based tool for Predicting Reliability of Towed Array Cables
- **Increased Research Efforts (Multi-Year Activities)**
 - High Temperature (>125C) Failure Models (AFRL)
 - Gold Embrittled Solder Joints (Army)
 - Tensile and Mixed-Mode Damage Models for Solder Joints (IR&D)
 - Reliability of Printed Electronics (IR&D)

Highlights of DfR Solutions (Semiconductor Packaging)

- Continued engagement in Semiconductor Packaging
 - Copper Pillar
 - Simulation and Modeling of Failure Modes (Assembly/Test)
 - Identifying Optimum Design and Material Selection
 - Copper Wire Bond
 - Testing and Reliability Prediction
 - Qualification Guidance to Automotive OEMs
- Recognized as Leader in Board Level Reliability Testing (BLRT)
 - Required facility for suppliers to several OEMs (shock, vibration, temperature, thermal cycling, THB)

Highlights of DfR Solutions (New Technologies)

- DfR is deeply engaged in all major new markets
 - Wearables
 - Internet of Things
 - Electric/Hybrid Propulsion
 - Drones
- Engagements
 - Helping establish uses cases (how often is it sunny in Phoenix?)
 - Deriving test plans based on physics of failure
 - Design reviews and reliability prediction

Spreading the Word on PoF

- DfR is leading a new IPC committee on implementing physics of failure (PoF) requirements down the supply chain
 - If you are interested in more details, see Craig Hillman
- Leading an automotive effort to implement PoF as an acceptable alternative for semiconductor failure rate predictions
 - If you are interested in more details, see Jim McLeish

DfR Solutions Wrap Up

- Any questions on DfR Solutions Services or Software?
 - Talk to any DfR employee
- Feel free to take advantage of our Open Door Policy
 - Call / Email to any DfR staff about any issue at any time
- Thanks to all the Conference Attendees for coming to DfR Solutions!