

# 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**

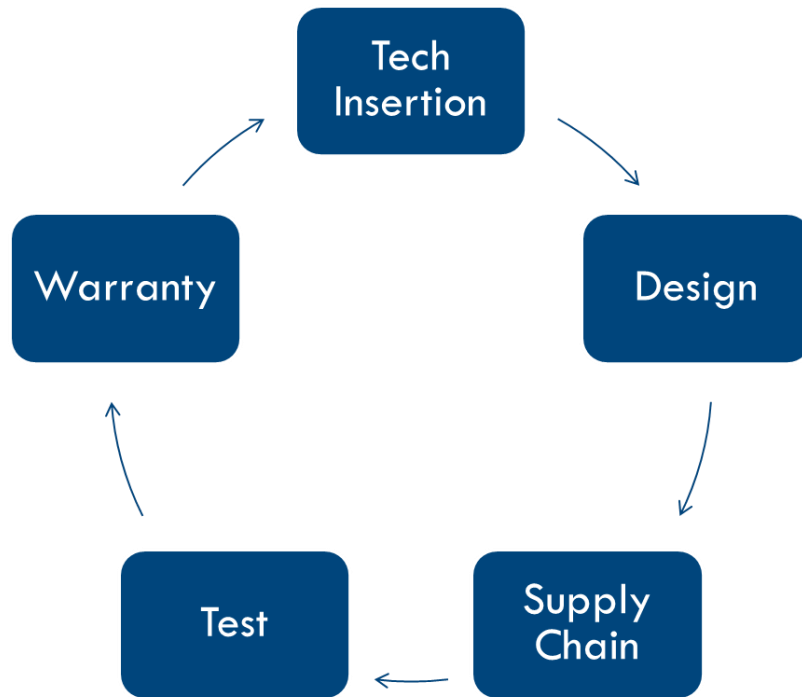
*- Inc Magazine*

**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
- 3<sup>rd</sup> 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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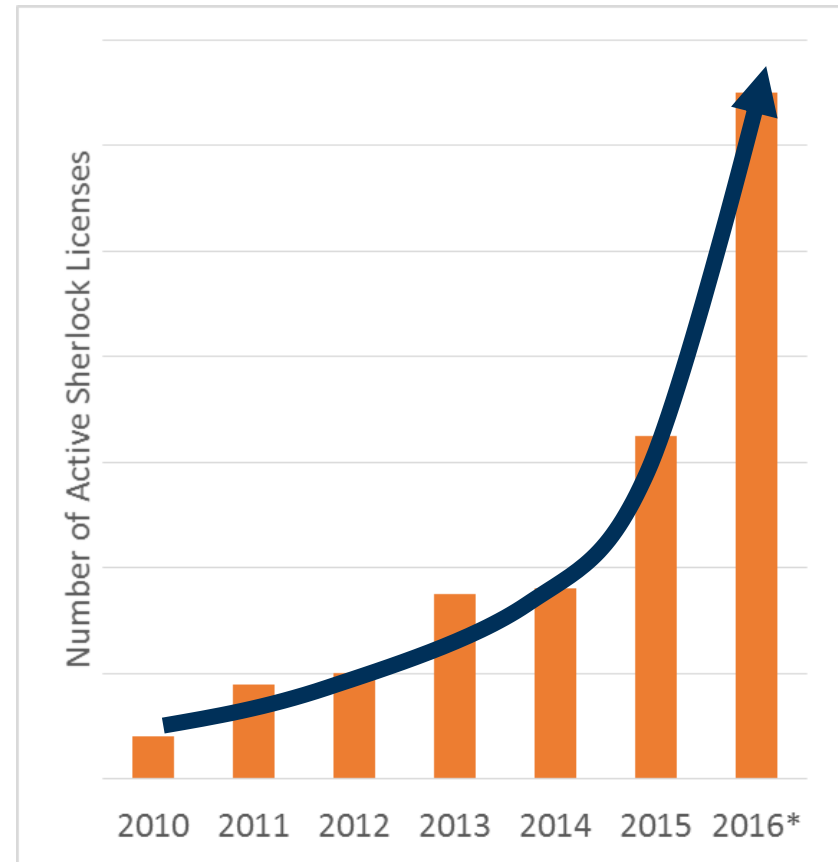
# Results: Over 1000 Satisfied Customers



# 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)

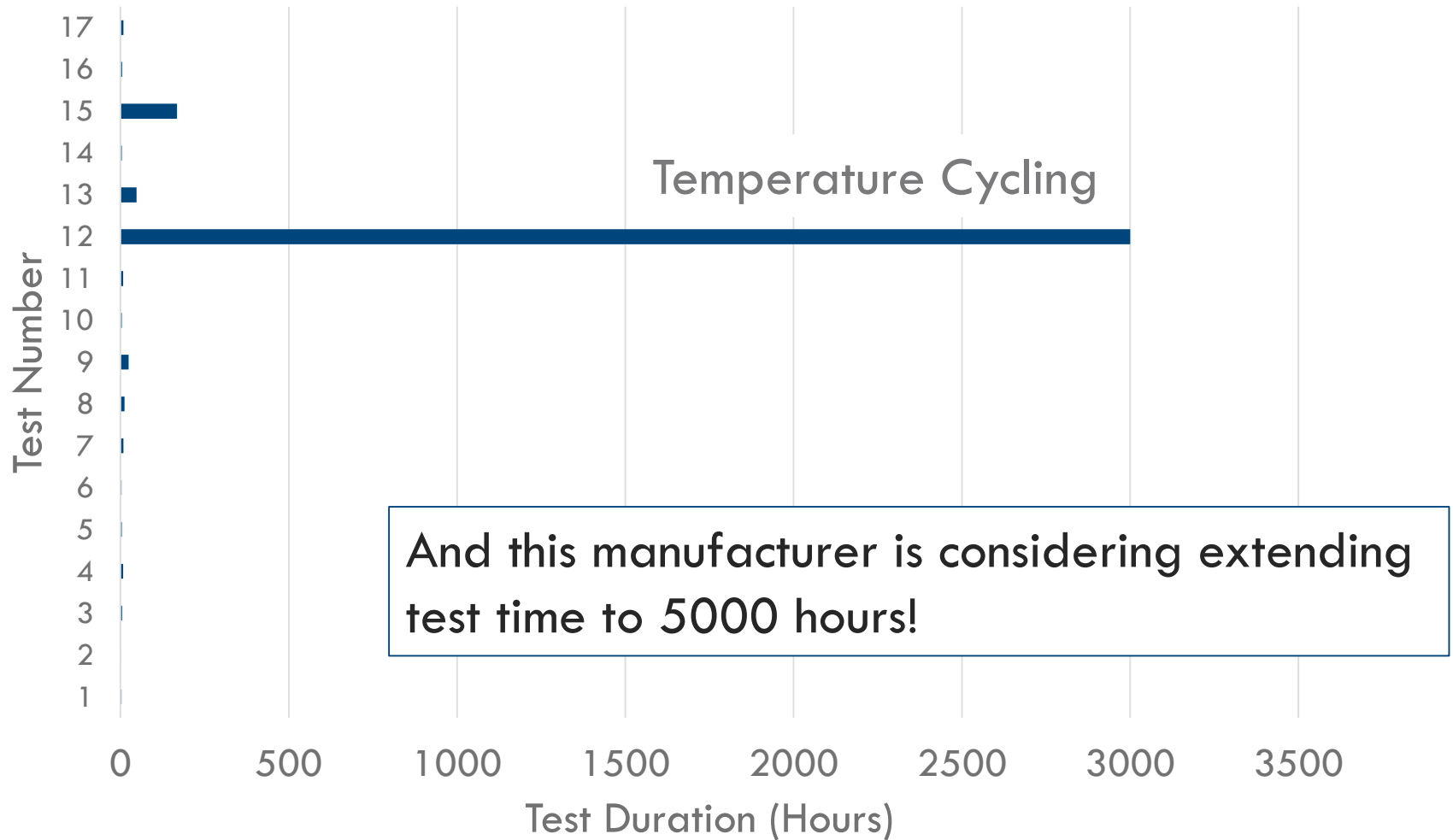


# Value Proposition: Stop Testing

- 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)

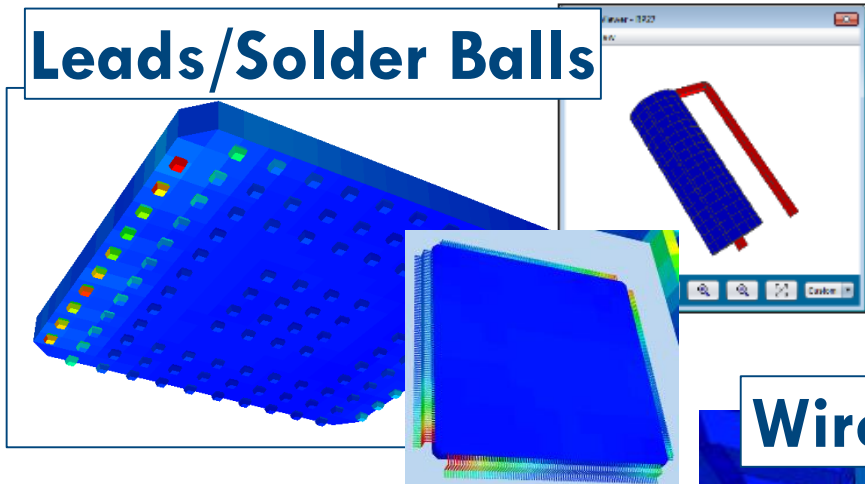


# Test Durations Example: Automotive OEM

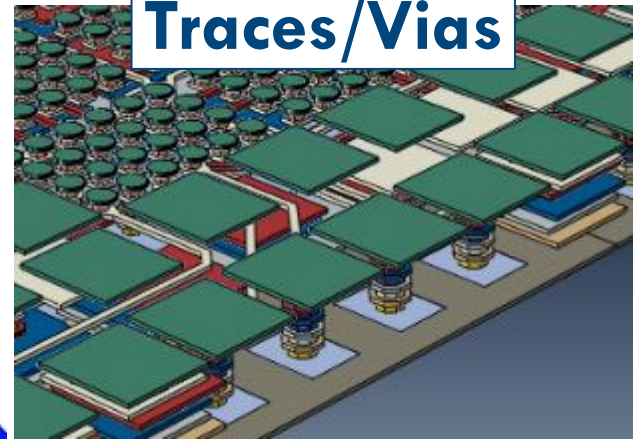


# Highlights of Sherlock in 2015 (cont.)

## Leads/Solder Balls



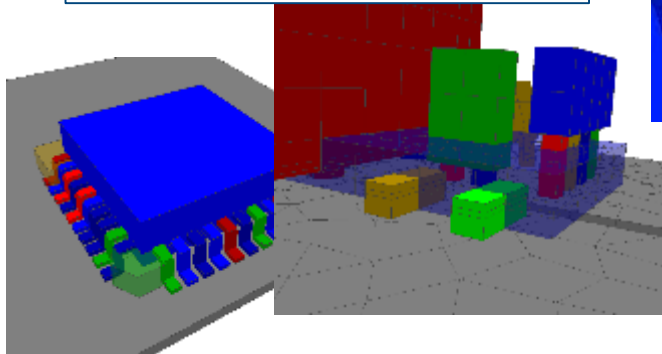
## Traces/Vias



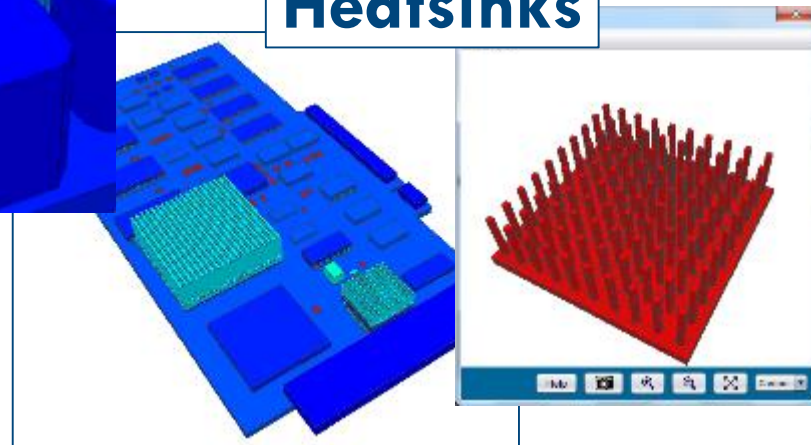
## Wirebonds



## 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 ( $>125\text{C}$ ) 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!