



TOP EVENTS:  Symposium  Green Seminar  BLOG  Print Ver

Spring 2009

**IN THIS ISSUE**

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Theme this newsletter:  
**GREEN RELIABILITY**

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**MESSAGE FROM THE CEO**

Welcome to our 17th quarterly newsletter. Despite the current economic situation, this past quarter was one of our busiest yet. Our work remains steady and our backlog is strong. In the current downturn, our clients have turned to us as a means to supplement their reduced head counts, and thereby maintain their ability to complete projects on schedule.

Ops is poised to meet the market changes in assisting companies to save money by only hiring the resources they need when they need it. We have created four separate programs to meet our customers' ever changing needs: Ops "Solutions", Ops "Team Expert", Ops "A La Carte" and Ops "Training". [More>](#)

We just announced our brand new Reliability Blog. Read about the latest reliability topics that are hitting the industry and share your experiences along with your peers. Our Reliability Blog is a way to connect with our experts about the current issues at hand. This blog also provides an on-going source of information in order to raise the level of awareness in the reliability community.

We just released our first ever HALT Calculator in which we can calculate field reliability from HALT results. The model was created by Harry McLean, the popular author of the newly re-released book "HALT, HASS, and HASA Explained." The model is offered exclusively through Ops A La Carte.

Our 3rd annual Reliability Symposium is set for April 6-10. We have 15 different seminars lined up over 4 different tracks. Choose one class or stay the entire week. We have enough classes to keep your interest. And we know that travel budgets are tight this year so we are offering ALL of our seminars via webinar and offering a 25% discount to webinar participants.

The featured service this month is Green Reliability, and in the spirit of Green, we have teamed up with the IEEE Reliability Society to offer a FREE half day seminar (offered also as a webinar for those out of town) on May 8th. We will highlight different areas of reliability focus in the world of Green Technology.

We hope you enjoy the following newsletter. Thank you for your continued support and interest.

- Mike Silverman, Managing Partner/CEO

## COURSES

- ▶ [Certified Quality Engineer \(CQE\) Preparation Course](#) (pdf) - **April 14 - June 2, 2009**
- ▶ To register go to: [eventsinfo](#). This course is for those who plan to take the CQE certification exam and need a preparation course, or for those who just want a refresher course in Quality Engineering.
- ▶ For information on other course offerings go to: [Ops A La Carte Schedule](#)

## SEMINARS

- ▶ **Ops 2009 Reliability Symposium - Apr 6-10, 2009, San Jose, California (also via webinar)**

We will be offering the following seminars at our annual symposium:

- ▶ [Design for Reliability \(DfR\)](#), Apr 6-7
- ▶ [Design of Experiments \(DoE\)](#), Apr 6-7
- ▶ [Climatic Testing Fundamentals](#), Apr 6-7
- ▶ [Design for Testability \(DfT\)](#), Apr 8
- ▶ [Mechanical Design for Reliability \(MDfR\)](#), Apr 8
- ▶ [Best Accelerated Reliability Test Methods: HALT, ALT, and RDT](#), Apr 8-9
- ▶ [Root Cause Analysis / Advanced Problem Solving](#), Apr 9-10
- ▶ [Software Design for Reliability](#), Apr 9
- ▶ [Applied Data Analysis \(ADA\) with Capability Improvement](#), Apr 10
- ▶ [Design for Warranty Cost Reduction \(DfW\)](#), Apr 10

**This year, we are also adding a *Quality/Operations* section to our symposium.**

- ▶ [Lean Practices for the Supply Chain](#), Apr 6
- ▶ [Set Up Reduction \(quick changeover\)](#), Apr 7
- ▶ [Cycle Time Reduction](#), Apr 8
- ▶ [Vendor Managed Inventory \(VMI\)](#), Apr 9
- ▶ [Supplier Selection](#), Apr 10

Below is a matrix showing the 4 different tracks. Choose any single class, a whole track, or mix and match between the tracks.

	RELIABILITY TRACK 1	RELIABILITY TRACK 2	RELIABILITY TRACK 3	QUALITY/ OPERATIONS TRACK
<b>Monday April 6</b>	Design for Reliability Day 1	Design of Experiments Day 1	Climatic Testing Day 1	Lean Practices for the Supply Chain
<b>Tuesday April 7</b>	Design for Reliability Day 2	Design of Experiments Day 2	Climatic Testing Day 2	Set Up reduction (quick changeover)
<b>Wednesday April 8</b>	Mechanical Design for Reliability	Accelerated Life Testing Day 1	Design for Testability	Cycle Time Reduction
<b>Thursday April 9</b>	Software Reliability	Accelerated Life Testing Day 2	Root Cause Analysis Day 1	Vendor Managed Inventory
<b>Friday April 10</b>	Design for Warranty Cost Reduction	Applied Data Analysis	Root Cause Analysis Day 2	Supplier Selection

## EVENTS

- ▶ **Ops A La Carte Live Seminar/Webinar on GREEN RELIABILITY - May 8th, 2009, 9am-12pm**

Ops A La Carte and the IEEE Reliability Society will be hosting a FREE seminar/webinar on GREEN RELIABILITY - some of the current trends as well as some of the issues and concerns around reliability in this rapidly expanding market. We will have the following presentations at the event.

**Location - De Anza College, Cupertino California (this is being offered via webinar as well)**  
**Speakers/Titles (you can view full [abstracts](#) here):**

- ▶ **Dr. Cheemin BoLinn, Peritus Partners:** Getting the Bang - Green Agile Solutions Designed for Eco-Environmental Impact!

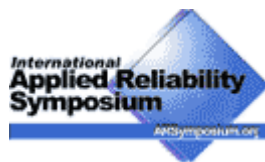
- ▶ **Alan Wood, Sun Microsystems:** The End of Redundancy - alternative methods for achieving high reliability
- ▶ **Subhasish Mitra, Stanford University:** Globally Optimized Robust System Design
- ▶ **Bryan Stallard, Ops A La Carte:** EDA Usage in Reliability Aspects of Green Technology

Email us via our [contact form](#) to register for this event

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### ▶ **Applied Reliability Symposium (ARS) in San Diego, CA - June 9-12, 2009**

We will be giving a presentation on "Developing a Better Reliability Test Program". We will also be exhibiting at this symposium so please come by our booth. For more details, please go to [ARS San Diego](#). Email us via our [contact form](#) for more information on this event.



### SPECIAL OFFERS

- ▶ **\$1000 off** your next service or seminar or one free pass to any of our upcoming events or seminars *to any individual who introduces us to a new customer with whom we engage.*

Email us via our [Special Offers Contact Form](#)

### NEWS



- Mar 1, 2009

We have completed and released our **HALT Calculator** for public use. It can be used to calculate MTBF from HALT and Field Data. [More>](#)

- Feb 28, 2009

We have released our new Blog dedicated to the topic of Reliability. You can find it at [Reliability-Blog](#). Already various articles have been posted. Check back frequently to find your favorite subjects. All blog articles can be viewed without registering. If you would like to respond to any blog article or would like notification sent to you when new blog topics have been posted, then you will need to fill out a quick registration [form](#).



- Feb 15, 2009

We have added five new consultants to our company in several different regions of the US:

- ▶ **Rich Fries** (*Central US - Wisconsin*) has over 35 years experience in hardware and software reliability, software development, regulatory compliance, and device design.
- ▶ **Gary Howell** (*Northwest US - Washington*) has over 30 years experience in system modeling and analysis, risk management, threat analysis, probabilistic design, reliability, availability and maintainability modeling and analysis, safety analysis, accelerated life testing and accelerated stress screening.

▶ **Greg Larsen** (*Central US - Colorado*) has over 30 years experience applying statistical methods to solve problems and has made significant contributions in measurement system analysis (MSA) and inventory modeling to better manage supply chains.

▶ **Ron Purcell** (*Northern California - Bay Area*) has an extensive background in electronic design engineering and business, with special focus in Analog / RF design analysis, design-for-reliability, stress testing and failure analysis.

▶ **David Tu** (*Northern California - Bay Area*) has 20 years experience in reliability testing and regulatory compliance, both startup and established companies in the Medical Device, Telecom, Internet network and Consumer electronics industries.

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- Feb 10, 2009

Ops A La Carte presented a paper at the annual Components for Military and Space Electronics (CMSE) entitled: "*How to Develop a Qualification Test Plan for RoHS Products*" by Mike Silverman of OPS A La Carte and Dr. Hillman of DfR Solutions. Download a copy at [TechPapers](#).

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- Feb 1, 2009

Ops A La Carte presented, exhibited, and helped manage the 55th annual Reliability Availability and Maintainability Symposium (RAMS) Cliff Lange gave one of the tutorials, Harold Hart moderated one of the sessions and Fred Schenkelberg was again on the management committee along with Cliff. We had four other consultants in attendance - Rich Fries, John Hansen, Lennox Bennett, and John Cooper. Congratulations to Jerome Anderson of General Dynamics for winning our grand prize drawing, a lovely Valentine's gift basket.



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▶ **For more information** on news, please visit our [News Page](#) or call (408) 654-0499.

#### FEATURED SERVICE



### Green Reliability

**Contributing Authors: Dr. Cheemin BoLinn, Alan Wood, Subhasish Mitra, Bryan Stallard, and Mike Silverman**

Today, the topic of Green is discussed more and more. Every day we hear about companies "going green". But what does this really mean?

In fact, "Going Green" has many implications, from the materials being used to the type of energy being used and the quantity being consumed. And each aspect of "Going Green" has reliability implications. In fact, any time we change material properties or design concepts, there are inherent reliability risks that need to be addressed.

We have put together a FREE Seminar on this topic to raise the awareness of how we are addressing "Going Green" from a reliability perspective.

Ops A La Carte and the IEEE Reliability Society will be hosting a FREE seminar/webinar on GREEN RELIABILITY - some of the current trends as well as some of the issues and concerns around reliability in this rapidly expanding market. We will have the following presentations at the event.

**Location - De Anza College, Cupertino California (this is being offered via webinar as well)**

**Date/Time - May 8th, 9am-12pm**

**Abstracts:**

**▶ Dr. Cheemin BoLinn, Peritus Partners: Getting the Bang - Green Agile Solutions Designed for Eco-Environmental Impact!**

As significant investments in green technology continue, there are immense opportunities to demonstrate leadership in designing reliable green technologies and products. These green solutions can fulfill the need for increased power with a smaller or net zero carbon footprint.

However, robust reliability and maintenance practices will need to continue to be rapidly deployed. This focus will be required throughout the product life cycle of these green solutions, from concept design to prototype to manufacturing and throughout the ecosystem including supply chain and disposal. Even the traditional perspective of a data center has already given way to a broader ecosystem view that focuses on designing reliable energy efficiency not only within, but also among the data center, utilities, facilities, and surrounding environments. To receive optimal benefits, the "best practice" tools and processes utilized in other industries plus new agile innovations will be required for this new clean tech industry. These innovative solutions will be the bellwether that demonstrates new energy efficiency measures will not cost reduced reliability.

Green solutions, proactively designed from concept stage, with the fundamental precept of reliability and energy conservation and reuse, have a strong business value proposition. Green reliability drives increased profits which can be a new funding source for increased R&D to fuel continuous improvement, critical for sustainable product development. Green reliable solutions have a compelling value proposition not only for the environment but for the profitable growth of businesses.

This session will examine:

- 1) Trends and directions in the clean tech industry for green, reliable solutions
- 2) Hotbed investment areas
- 3) Ecosystem view of energy efficiency
- 4) Business and environmental impact of green reliability and efficiencies
- 5) Value proposition for green "carbon neutral" technical designs
- 6) "Greening" as an economic growth driver and implications for marketing

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**▶ Alan Wood, Sun Microsystems: The End of Redundancy - alternative methods for achieving high reliability**

Minimizing power consumption has become a very important topic in the design of components, computers, and data centers. Industry analysts predict that, within the next few years, the cost of power will surpass the cost of compute equipment in the data center. Dependability research has not traditionally considered the cost or availability of power to implement the proposed techniques. If redundant equipment was needed for fault-tolerance, it was blithely assumed that the power and other facilities overhead was negligible. That assumption is no longer valid, and dependability research and practice needs to change accordingly.

Many classical fault-tolerance techniques, such as voting, assume redundant compute resources. Having redundant hardware to derive duplicate results minimizes single point failures but is unlikely to be popular in a power-constrained data center. As an example, the IBM Z-series microprocessor has moved from duplication to error checking and sparing to save power. This type of dependability design shift is likely to accelerate. Active redundancy will not be affordable in many data centers. Even passive redundancy may be questioned because it takes space, and space usually equates to power, especially if the "sleep" mode for the passive components does not do a better job controlling leakage current.

At the chip level, the drive to lower voltages and power along with other factors will make logic more vulnerable to soft errors. Thus, the error rate is likely to increase as the redundancy decreases, making dependable computing a greater challenge. Techniques that detect/correct errors with minimal power consumption, such as information redundancy and self-checking logic together with some form of retry mechanism, will be favored. Power impact analyses of the proposed dependability technique may be more important than the traditional analyses of the performance and chip area impact.

At the server level, it will be important to find different architectures and software approaches for

dependability in the absence of hardware redundancy. It may be possible to consider trading recovery time for power. As flash memory is used as a partial DRAM replacement in some applications, it may be possible to consider storing checkpoints or other data in flash memory to improve dependability. More than ever, dependability research and practice will need to focus on the entire system to devise methods that do not require additional power.

At the data center level, operations may impact dependability. Equipment may be turned off to save power, causing more power and temperature cycling. Equipment with a sleep mode that uses minimal power but can quickly be activated when new tasks arrive will be valuable. Functions such as automatically throttling power when not needed and providing real-time information on power utilization will also be popular. Data center cooling may actually improve as power-saving features such as hot-aisle containment that reduce hot spots are implemented.

The dependability community is faced with the challenge of using less power while maintaining the same levels of dependability. Existing assumptions need to be altered, and new research is needed.

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### ▶ Subhasish Mitra, Stanford University: **Globally Optimized Robust System Design**

Most future systems, not only high-end mainframes and safety-critical systems, must be designed such that they can cope with imperfections in the underlying hardware. In contrast, today's design methodologies assume perfect hardware during useful system lifetime. Classical redundancy techniques are too expensive and inadequate for this purpose.

This talk will present an overview of techniques that can enable a sea change in robust system design:

1. Built-In Soft Error Resilience (BISER) for correcting radiation-induced soft errors;
2. Circuit Failure Prediction, together with on-line self-test, to overcome early-life failures and transistor aging;
3. Effective test and post-silicon validation techniques.

Opportunities for global optimization across multiple abstraction layers will also be discussed.

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### ▶ Bryan Stallard, Ops A La Carte: **EDA Usage in Reliability Aspects of Green Technology**

The use of Electronic Design Automation (EDA) in GREEN situations, specifically in lowering energy consumption, is a natural extension of long-existing usage in two related contexts: thermal management in complex systems, and portable-device battery-limited usage. For years semiconductor companies, and their EDA suppliers, have battled power dissipation issues, driven by the twin facts that MOS ICs burn power proportional to clock frequencies (ignoring minimal idling currents), and that as majority-carrier devices, the MOSFET elements have channel resistances that increase with the absolute temperature, ultimately increasing RC time constants until they limit both raw speed and race-condition margins.

At board levels, the issue bifurcates between commercial usages, where convective cooling is dominant, and military/aerospace use where conductive cooling is primary. Both high-altitude and space applications essentially discount convection completely. In neither group is there any appreciation of excessive power dissipation.

In portable devices, the ability to use a product without continuous recharging has long been a primary selling point for premium offerors, and a source of irritation for generic knock-off users. So, mobile devices are already biased (sic) toward energy efficiency.

Three topics are worth considering, or revisiting, in a GREEN light:

- 1) Conversion of existing circuitry to emphasize or improve energy-consumption performance;
- 2) Modification of production designs to meet RoHS or other material issues;
- 3) Development of ongoing engineering practices to institute or upgrade Green features to a level parallel with established customer "-ility" expectations (reliability, quality, availability, maintainability).

*Mention this article and receive \$1K off your next service if it has anything to do with Green Reliability.*

## PROBLEM SOLVER



### GREEN RELIABILITY

In the Featured Article above, we discussed three major aspects of Going Green: RoHS/material bans, Alternative Energy, and Energy Reduction. Can you name any other aspects of "Going Green". OFFER: Free pass to any upcoming event or seminar, or \$1K off your next lab or consulting service.

## HALT CALCULATOR

We have completed and released our HALT Calculator for public use. It can be used to calculate MTBF from HALT and Field Data. The model was created by a distinguished member of the reliability community, Harry McLean and is being offered **exclusively through Ops A La Carte**.

How many of us have wanted to use the HALT data to estimate Annualized Failure Rate (AFR)? The common response is that "it cannot be done." In fact, it is possible but what you need is a good model and good data to back the model. This is exactly what Harry did. See the following write-up [HALT Calculator](#) for more information on the calculator and how to use.

Previous attempts by individuals to derive a model were unsuccessful because the approach was to determine an acceleration factor for HALT using a physics-of-failure approach, and that is impossible to do accurately because the time at each stress is too short and it is difficult to account for all of the interactions. Instead, we approached it as a model based on data. Given enough data, just about anything can be modeled, and with our wealth of HALT experience, obtaining the data was not a problem.

We will run calculations for customers at a cost of \$500 per calculation. Or for customers that perform HALT and a Reliability Prediction with our company, we are offering the calculation for free.

Harry presented this calculator at the annual ASTR Conference. Download a copy at [TechPapers](#).

Below is an example of the calculator. The green area is customer input and the pink area is model output.

### Field Failure Rate Estimate from HALT Results

	Input Matrix	Data Verify	Key
MTBF (in Hrs) =	200,000	OK	User input
Product Thermal (Hot in °C) =	98	OK	User input
Product Thermal (Cold in °C) =	-50	OK	User input
Product Vibration (in Gms) =	18	OK	User input
Prod Published Spec Level (see below) =	2	OK	User input
Vibration Table Technology =	3	OK	Selection
Number of HALT Samples =	3	OK	Selection
HASS or HASA (yes = 1, no = 0) =	1	OK	Selection
IFHASS or HASA, Daily Sample Size =	96	OK	Selection
IFHASS or HASA, Detectable Shift in AFR (in %) =	6	OK	Selection
Steady State AFR, % (HALT Only) =	1.33		Calculated
Steady State Field MTBF, Hrs (HALT Only) =	659,838		Calculated
Lower 90% HALT Confidence Limit =	355,720		Calculated
Upper 90% HALT Confidence Limit =	1,356,246		Calculated
Days to Detect Shift w/ HALT/HASS/HASA (Max) =	12.5		Calculated

Published Spec	Level #	Guard Band Limits
0 to +40	1	Consumer -30 to +80
0 to +50	2	Hi-end Consumer -30 to +100
-10 to +50	3	Hi Performance -40 to +110
-20 to +50	4	Critical Application -50 to +110
-25 to +65	5	Sheltered -50 to +110
-40 to +85	6	All Outdoor -65 to +110

Vibration Technology	Factor
Rigid Tables	1
Segmtd & LF	2
xLF	3

Note that the calculator is a model based on data, and with all data-driven models, the more data, the better. So if you have any HALT data you can share with us, we will give you free access to the model. Here is what we need:

- 1) HALT results (final HALT values after corrective actions have been verified)
- 2) Estimated MTBF
- 3) Annualized field failure (AFR)
- 4) Type of product; i.e., internet server, etc.
- 5) Your contact info in case of questions

**Send Responses to:**

Email us via our [HALT Calculator Contact Form](#). Any individual who sends us usable data will be entitled to use this calculator for no charge once it is released.

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## ADVERTISEMENTS



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DfR Solutions has world-renowned expertise in applying the science of Reliability Physics to electrical and electronics technologies, and is a leading provider of quality, reliability, and durability (QRD) research and consulting for the electronics industry. The company's integrated use of Physics of Failure (PoF) and Best Practices provides crucial insights and solutions early in product design and development and throughout the product life cycle. DfR Solutions specializes in providing knowledge- and science-based solutions to maximize and accelerate the product integrity assurance activities of their clients in every marketplace for electronic technologies (consumer, industrial, automotive, medical, military, telecom, oil drilling, and throughout the electronic component and material supply chain). For more information visit [www.dfrsolutions.com](http://www.dfrsolutions.com).

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*Ops A La Carte's newsletter goes out to over 17,000 subscribers. If you would like to advertise in next quarter's "Reliability News", email us via our [Advertise Contact Form](#) or call at (408) 654-0499.*

**JOB OPENINGS**

*Given the current economic climate, we know of many talented individuals that are currently looking for work. Therefore, if you are an employer and have a need for any position within reliability, engineering, or operations, we are offering to advertise in our newsletter at no cost. Just doing our part to help stimulate the economy! Below are a few positions that we do know about.*

**Senior In-Circuit Test Engineer**

Develop, debug, and install in-circuit test programs for HP3070 test heads. Capable of Flash/ISP programming, Mac Address, Boundary Scan, and large complex board types.

For more info, please go to <http://www.ssprog.com/newsite/jobs.shtml> or email [dano@ssprog.com](mailto:dano@ssprog.com)

**Senior Reliability Consultant**

Ops A La Carte is looking for Senior Reliability Consultants *around the world* to join our team of consultants and work on some of the most exciting and challenging projects in the industry. Whether you have an existing consulting practice or are interested in developing one, please contact us.

If interested, email us via our [OPS Job Search Contact Form](#) or call (408) 654-0499.

*Ops A La Carte's newsletter goes out to over 17,000 subscribers. If you would like to put a job opening in next quarter's "Reliability News", email us via our [Job Openings Contact Form](#) or call at (408) 654-0499.*

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