

Performance Engineering & Reliability Testing Associates

Product Launch, Testing, Compliance and Certification; For Your Customer and Your profits and Reputation!

PERT

a collaboration of test Labs and professionals

Validation = Product Meets Specifications

Reliability = Repeatedly

Managing Product Release:

People's Training & Certification

Product Testing & Certification

Process Validation and Reliability

Performance of Manufacturing Capability and Capacity

Profits from Continuous Improvement & Cost Reduction

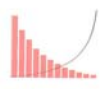
Experienced in

Large Silicon Valley OEMs and Small Start-Ups

Reshaping Product Reliability Front To Back!

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Seasoned Directors



James R. Johnson, Program Manager is a Silicon Valley technologist and Innovator since 1988 and has extensive experience in Sr. Management for high-tech product launch and disruptive technologies. He patented the first interferometric array technology and launched it in a global supply base in US, China, Europe, India, Singapore and Russia while working directly with Washington D.C. FCC & ADA regulations to clear the way for new technology and higher standards.

His reputation for engaging in reliable launch has broken implementation records and won his teams much. In 1993 he led the first ISO 9000 certification (in class); and again in 2008 for the first Medical Device Manufacturing Certification (ISO 13485) while landing top tier OEM's in Robotic Surgery, Automotive Safety, Electric Cars and Telecom; achieving Cisco Systems highest Quality Rating Awarded a supplier and landing top tier technology companies.

Mr. Johnson's B.S.B.A. degree program (University of Phoenix) focused on quantification of implementation and was published nationally by the American Production and Inventory Control Society (APICS). Experience includes business valuations, expert witness, mergers and acquisitions and several speaking engagements on technology in US, UK, China and Finland. He chaired the NASA/Ames Quality Conference and appeared on national broadcast for Root Cause Analysis and Corrective Action.

Gerry Cohen, Test Director, has nearly 40 years of hands-on professional experience in managing Reliability Engineering and Ultracapacitors.

Gerry holds a BSME from the Naval Institute of Technology and an MBA from Alameda University. He is ASQ CQE & CQA, and is a Six Sigma Black Belt.

Soly Paterson, Test Reports has over 15 years producing quality plans and manufacturing programs in high-tech products including medical optics, telecommunications and Aerospace industry.

She holds an ASQ Master 6 Sigma Black Belt Certification and has significant experience in supporting design and manufacturing processes under the guidelines of ISO 13845 and Food and Drug Board (FDB) Quality Systems while improving supplier quality product performance and Corrective and Preventive Action (CAPA).

Ms. Paterson has been a Statistics Professor for San Jose State University for 14 years and a certified Project Manager from University of California, Santa Cruz.

She holds an MBA in Computer Electronics and Business Administration from National University and a former Chair person American Society for Quality.

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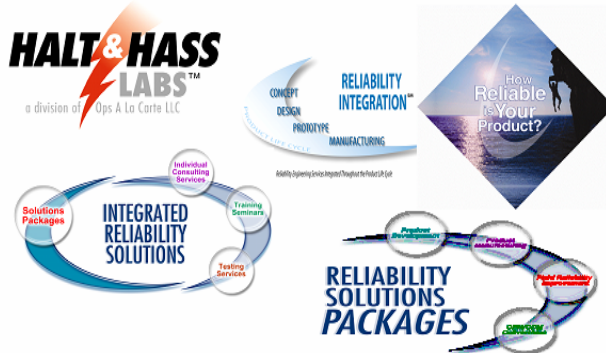
PERT Support

OPS ALACARTE™ a private professional reliability engineering firm founded in 2001 and headquartered in Santa Clara, California with offices in China, India and Singapore.



Is a compliance engineering firm with over 30 years assisting clients in Medical Devices; Information Technologies; Industrial Science Semiconductor equipment and Toys Regulatory support includes RF, EMC, EHS, EFT, ESD, RoHS, WEEE, Product Safety while working with agencies for CE, FDA, FCC, CSA, UL, SEMI, NEC, ICAN, BSI.

Certified Testing Services
Traceable to NIST & Automotive



Confidence in Reliability

Pulver Labs has helped product designers and manufacturers with regulations and design in decreasing radio frequency (RF) interference and electromagnetic waves to increase product integrity; including inventing new products to reduce electromagnetic radiation.

PERT Receives special guidance from:



NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

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Why Product Reliability

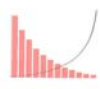
To Verify that Product Performs as Promised

Especially in claims of safety and warranty

Information is valuable in use with:

- **Risk Management Warranty Analysis**
- **Lower Insurance Premiums**
- **Lowering Supplier Cost**
- **Design for Manufacturing**
- **3rd Party Competitive Tests in Validation**
- **U.S. Regulatory Market Requirements**
- **Automotive QS 9000 Requirements**
- **Medical Certification; ISO 13485**

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Test Plan

Accelerate Failure Mechanisms & Reliability Failures

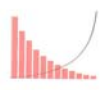
Accelerate Life Test (ACL) for Reliability Prediction

**One Each; Electrochemical double layer capacitor (EDLC)
[aka ultracapacitor; aka supercapacitor] = Device Under
Test**

Steps to complete the plan:

- 1. Establish goal**
- 2. Choose test model**
- 3. Develop decision matrix to outline parameters (to stated goal)**
- 4. Determine type of stresses, number of units, length of test and confidence**
- 5. Create methodology and characterizations**
- 6. Benchmarks for qualification and validation**

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Accelerated Life Test

temperature, humidity, and vibration

Confidence increases with sampling size

Steps to execute the plan:

Testing & Monitoring

- 1. Perform accelerated life tests**
- 2. Monitor status to goal [3 times per week to 1 per day]**
- 3. Find failures**
- 4. Determine root cause with failure analysis**
- 5. Determine classification of failure and relevancy**
- 6. Correlate test results to product life claims**

- 1. Visual inspection**
- 2. Fine Leak Test (MIL-STD-883)**
- 3. Accelerated Life (Six Tests)**
- 4. Static Burn-in (five Tests)**
- 5. Reverse Bias**
- 6. Self-Heat via Rapid Charge-Discharge (6,000 times @ three temperatures [-20C, +25C and 65C]) after 1000 cycles**
- 7. Over Voltage Pulse (eleven tests)**
- 8. Thermal Shock (one test. 100 cycles @ -55C to +85C)**
- 9. Destructive Physical Analysis**
- 10. Electrical Parameter testing at periodic intervals**

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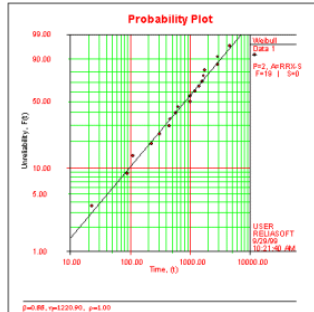


Test Analysis & Report

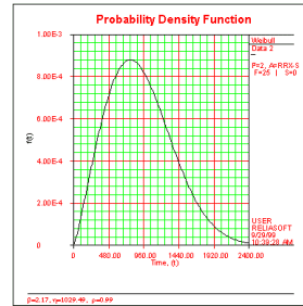
Parametric Analysis is delivered providing recommendations

1. Compile data
2. Write report on results
3. Compare results to goal
4. Show how data was calculated
5. Show information about models

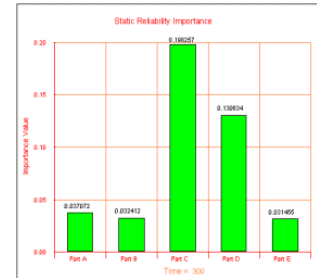
Probability Plot



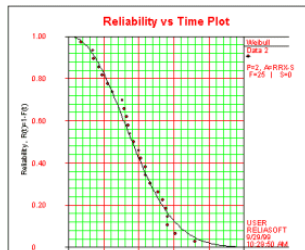
Probability Density Function



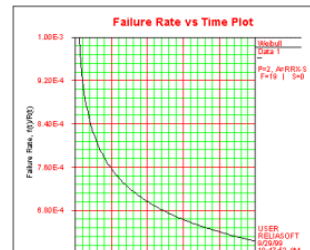
Static Reliability Importance



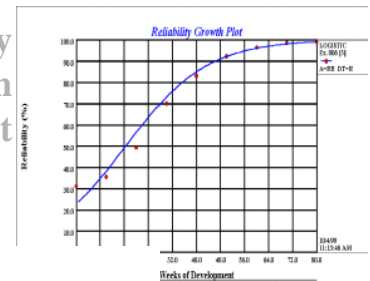
Reliability Function

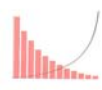


Failure Rate Function



Reliability Growth Plot





Initial Round Test Costs

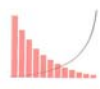
1. Test Plan	\$ 6,500
2. Accelerated Life Test (90 days)	\$ 6,500 to \$10,500
3. Test Reports & Findings	\$ 3,500
<hr/>	
Total	\$16,500 to \$20,500

Pricing includes PERT Program Management & Document Control as well as underlining data

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On-Going Reliability Testing Costs

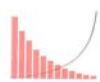
Determined for each product and each plan

**Product Compliance for other global certifications
are available as well:**

RF, EMI, EMC, ESD, EFT and EHS
FCC, CE, FDA, CSA, UL, SEMI, NEC, ICAN, BSI

Compliance price to be determined based on clients needs and product configuration

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Test Options

First Plan is to do only Alt Test to Product Specification

Finished Assembly System Test Only This Time

System Testing
Component Testing
Packaging Testing
Installation Testing

Electrical Tests

EMC
EMS
Safety
AC-DC (Line V & Freq)
RTC
ESD
Power Consumption
Electrical Acoustic Noise

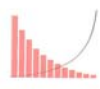
Durability Tests

IO Connector Life
Button and Switch Life
Interface & Card Reader
Keyboard [if applicable]
Casing
Internal Connections Life
Replaceable Items Life
Kensington Strength
DC in Jack Strength
Hinge Cycle (if applicable)
Rubber Foot Life
Latch Life
ODD Eject Life
Print

Environmental Tests

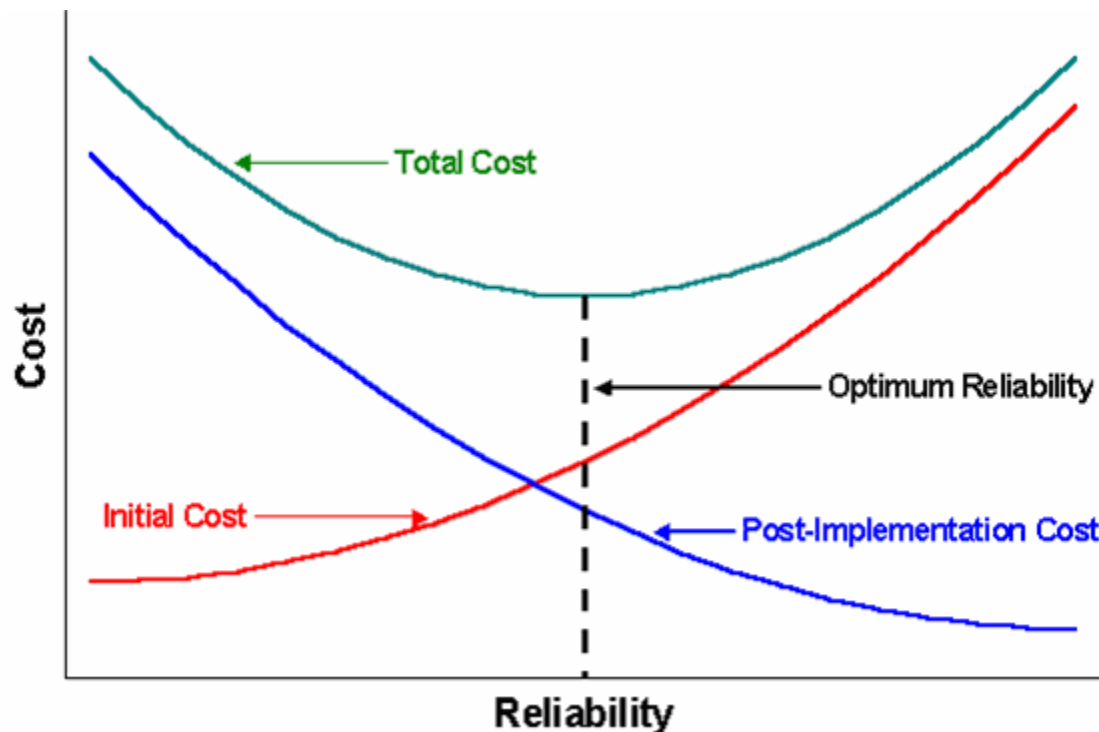
Operation Temp/Hum Cycle
Storage Temp/Hum
Cold Start Test (cold/warm boot test)
Shock
Operational Shock
Non-Op Shock
Package Shock
Operation Vibration
Package Vibration
Bare System Drop
Bench Handling
Adaptor Drop
Battery Drop
Package Drop
Altitude
Pressure
Water Spill
PCBA Thermal Shock

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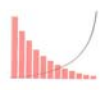
On-Going Reliability

Keeping Balance Between Savings & Risk Management



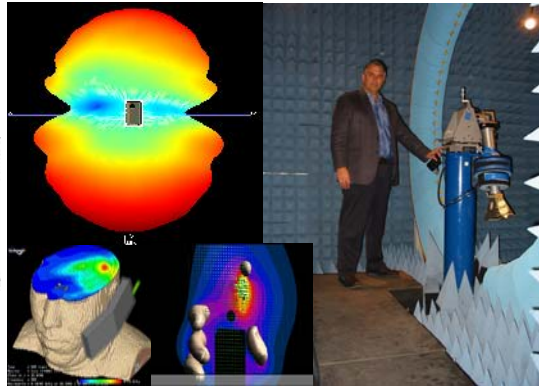
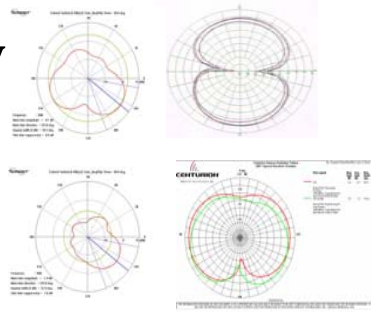
Red = No Reliability Cost Curve
Blue = Reliability Cost Curve
Green = Optimized Cost Curve

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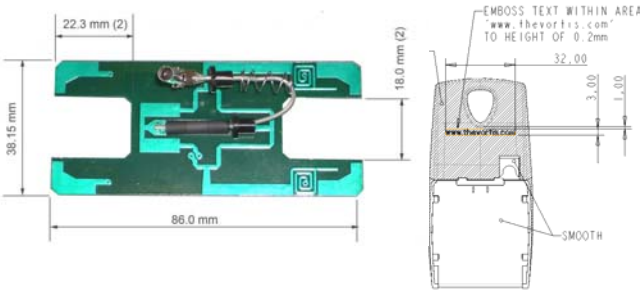


JRJ Product Experience

#1 Study



#2 Analyze



#3 Plan



#4 Plan



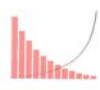
#5 Deliver



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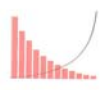


JRJ Regulatory Work; FCC

Matter of Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones; Findings (August 12, 2003):

- (47) "**A directional antenna manufacturer, Myers Johnson, Inc. (MJI), has filed a petition** for revision of this rule. MJI believes that the rule, as it is written, prohibits the use of directional antennas." The FCC says that "the EIRP requirement does not in any way prohibit employing wireless phone directional antennas." Therefore, the petition was denied (13)
- (46) "Because such antennas have the potential to significantly reduce the RF interference to hearing aids, as well as provide efficiency benefits both to the wireless network and to battery life, **there are several benefits that could be gained from their increased use in handsets.**"
- Redefined HAC as not just T-coil compatible, but included mitigation of **RF Interference** and EM Interference.
- Stated that it does not appear to be possible to completely shield against all RF interference from digital wireless phones (echoing HIA).

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People's Republic of China

ZTE中兴

Jim Johnson presented the Vortis at the 5th International Hearing Conference outside of Beijing, Oct 21-24. (www.chinadeaf.com).

The theme was "Building a Global Hearing Aid / Cellular Phone Interference Consortium" Met with the Deputy Director of China Rehabilitation Research Centre for Deaf Children (and many other titles) Liu Tingting

Dr. Peng, Hongli, Sr. RF Engineer, ZTE, in Shanghai Hi-Tech Science Park gave validation and support for the Vortis' marketing effort; Dr. Peng is personally supportive as he authored a paper in array

From Dr. Pung: "You are welcome to shang hai ZTE new place to talk about cooperation."

ZTE Corporation is China's largest listed telecommunications equipment provider specializing in offering customized network solutions for telecom carriers worldwide. The company develops and manufactures telecommunications equipment for fixed, mobile, data and optical networks, intelligent networks and next generation networks as well as mobile phones.



White board described China/Suppliers Roll Out Plan and criteria for strategic partners

China Mobile [JRJ met with Mr. Xiao on 10/23 who told us he will help position us with handset makers.



Meeting Ph.D Xiao Jianming (the Vice Director of Planning Department of China Mobile responsible for wireless network development planning. Dr. Xiao suggested help in finding partners in order to build business here. The Directed pointed out that there are 200 million users in China and by 2005 this will double.

This market is called the Personal Home System (PHS) Market

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China Support



James Schlosser; China Program Manager; lived and worked in Singapore, since 1968. Jim has opened China's doors along with Cathy Wu, Jim's direct contact in China



Beijing's meeting: Ph.D Xiao Jianming (the Vice Director of Planning Department of China Mobile): Meeting Ministry of Information Industry (MII) to discuss hearing aid interference and SAR. Met with Mr. Li Haiqing--Director of the Frequency Planning Division of the Radio Regulatory Department and NRSMC (National Radio Spectrum Management Center) and with Zhou Xingguo, Deputy Director of the Frequency Planning Division of the Radio Regulatory Department and NRSMC (National Radio Spectrum Management Center). Recommendations on file "your technology and your idea is attractive"



People's Republic of China, the Director and the Deputy Director, Frequency Planning Division, Radio Regulatory Department of the Ministry of Information stated: "This is a very good thing to know since we would like to have lower SAR standards but were unaware of this technology. Please come to our industry conference next week for additional assistance from our industrial associates."



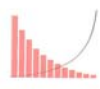
Meeting MII Wang Nan, Deputy Director of NTMS (National Telecommunication Metrology Station) of the Ministry of Information and Director of Radio Communication and EMC Lab (Professor). Responsible for certifying new China handsets. Mr. Wang Hongbo, Master Engineer of Radio Communication and EMC Lab who offered assistance with testing and dissemination of Vortis Technology to RF engineers throughout China.

Andrew Leung, founder and president; Ability Engineering Products, Shenzhen City will help MJI in manufacturing Vortis plastics.

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Thank You

Questions

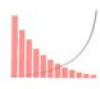
&

Discussion

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**Extra Slides Beyond this Point
In case of questions and discussion**

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