



**Applied Electronics  
Training**

TRAINING & CONSULTANCY



Get the chance to experience and experiment wide range of free proven xl calculation models to apply in your own environments

**Back by popular demand!**

# Managing & Improving Electronics Product Reliability across the Entire Lifecycle

## From Prototype into Volume Manufacture

27<sup>th</sup> – 28<sup>th</sup> February 2023 | Melbourne, Australia | 09:00 – 17:00 (GMT+8) Daily

*Set up and manage World Class Electronic Reliability Improvement Programmes to drive Failure Rate Reduction*

### Comments from past participants:

"Very good knowledge & experience in consulting industry leading companies in REL modelling. Will suggest to WD management to have a semiconductor specific REL assessment modelling."

Western Digital

"Martin is surely an expert in this field. I would recommend it to others who would need this training."

NI Malaysia

"Martin is very specialize and experienced"

Emerson

"This course suggested to do reliability test at PCBA level which guide me to design new system."

Netgear (Hong Kong)

"Provide an overall idea of how to set up reliability test requirement & quantities way of ensuring the test is suitable & able to detect defects."

Flextronics

"Im specialist of statistical analysis, I know theory background. However martin can share some points in practical that make me more understand and, find out the way to apply in future"

Sanmina (Thailand)

"He was an eye opener towards product reliability approach. Stress out product reliability is beyond marketing and conventional, importance of a good quality product."

Flextronics

"Workshop, It can let me clearly know how to set up / evaluate the reliability experiments for a new products."

Foxconn DCN

"Course was informative, new technique and modelling Instructor is very affective"

Sandisk Storage

"Well-versed with the training course and able to learn from its experience"

QAV Technologies

"The instructor have in depth knowledge in Reliability and Management"

Sandisk Technologies

"Very Knowledgeable on the topic and have increased my overall understanding of importance of reliability"

Dominant OPTO Technologies

"Actual cases sharing good for audience. Trainer very knowledgeable in the topic that being addresses"

Amkor Technology

"Good Knowledge on the industry and the needs to improve design for cost effectiveness"

Muehlbauer Technologies

"Approaches & techniques of Reliability Testing by considering early life failure."

Microchip Technologies

**Energy1asia.com**



# Managing & Improving Electronics Product Reliability across the Entire Lifecycle from Prototype into Volume Manufacture | 2 Days

**What could an unreliable product really cost your company?**

**Your credibility? Your reputation? Your future?**

Markets are demanding cheaper, more reliable electronic products and systems and many manufacturers find that traditional, established procedures and processes. Yet in today's market-driven climate you need, even more, to review procedures, examine options and pursue cost-effective solutions that will allow you to stay competitive and profitable, and increase your market credibility.

**Reliability enhancement is now within everyone's reach**

Leading-edge reliability enhancement technologies used to be regarded as solely the province of safety-critical avionics and aerospace applications.

But things change. These technologies are now within the grasp of all electronic designers and manufacturers; crucially the benefits in reliability that they bring are now expected by the market are now being questioned.

The idea of running months of extensive reliability testing is fast becoming a luxury – and one that few can justify.

Global customers seek out suppliers whose enhanced reliability performance improves their own market penetration and consolidates their own position – the rewards are substantial for those suppliers ready to meet the new demands.

**How will this course benefit your company?**

- Streamline your Reliability Testing and ensure only the most effective testing is performed
- Greatly Increase your capability of defect detection
- Drive Lowest field failure rates very quickly
- Drive Down cost of Failure in the field
- Lower the cost of your Reliability testing
- Bring engineers together in their understanding of reliability and how to improve it at all levels
- Provide a focused approach to Continual Improvement
- Bring BETTER quality new products into the market quicker
- Improve Customer Satisfaction

**These 2 days masterclass will have a good balance of Practical and theory. Initial theory to set the scene goes quickly into multiple case studies so participants learn quickly how to do similar on their own product types.**

**Why you should attend ENERGY1 Reliability:**

- Learn about the REAL EFFECTIVE ways to test out your product reliability.
- Realize you should NOT rely on old standards to qualify your product reliability.
- Mix with like-minded engineers and managers interested in understanding more about reliability.
- Understand how NOT to miss defects in your reliability test.
- Understand how to get an edge on your competitors.
- Learn how to improve reliability at lowest cost.
- Discover what reliability means to the world's most successful companies.

**Attend this to Master:**

- Different reliability tests to detect the different failure mechanisms.
- Why Early Life reliability is so critical to new product success.
- Applying Test Strength models to make sure you MAXIMIZE the defect detectability of your reliability testing.
- How to set up Design Reliability testing in totally different way to your existing approach.
- How to perform reliability testing at sub assembly level and AVOID the HIGH COST of complex product reliability testing.
- How to develop unique Accelerated Life Testing for any Electronic or Electro-Mechanical Product.
- How to set up Design Quality Testing and measure Design Quality Maturity measurement as Key Performance Indicator (KPI) during development.
- Taking Process Failure data and converting into Early Life failure rate prediction and AVOID the need for expensive Ongoing Reliability Testing (ORT) during volume manufacture.
- How to make your Reliability test approach WORLD CLASS.

**PRACTICAL INVOLVEMENT: Wide range of free proven xl calculation models to apply in your own environments:**

Participant will get the chance to experience how the models are used and experiment as training progresses hence gaining familiarity in Real time. The xl files show in a very simple organized way how to do the required reliability modelling for accelerated stress testing and prediction of reliability which participant can then start applying and modifying them to suit their own needs.

- Acceleration Factor Modelling High Temperature, Temperature / Humidity, Thermal Cycling to use in Accelerated Life Test (ALT) Planning.
- Test Strength Modelling to define strongest possible Early Life Reliability Stress Test and how to apply different stress test methods.
- Design Quality Test Maturity Measurement to allow measured performance of Design Quality during development cycle.
- Early Life Failure Escape predictions from Manufacturing Yield data to assess escape levels to customer.
- MTTF prediction models with sample size definition calculations using binomial and poisson statistical models.
- New Product Introduction (NPI) scoring model to assess product suitability for volui

# Managing & Improving Electronics Product Reliability across the Entire Lifecycle from Prototype into Volume Manufacture | 2 Days

## The Course is designed to:

- Reliability engineers
- Test engineers
- NPI engineer / Manager (New Product)
- R&D engineers.
- Research Team.
- Electronic and electromechanical designers / manufacturers
- Quality Assurance/Quality Lab/Quality Engineers / Departments.
- Design Team / Hardware engineer / Product engineer
- Manufacturing
- Design reliability section.
- Electronic Team.
- Testing companies provides reliability stress testing.
- Anyone who is doing reliability testing at design stage.
- Contract manufacturers - There remains a need to understand reliability to add value to the service being provided to the client. This knowledge would be a big advantage for doing in-house. By in-house mean, they benefit from being able to analyse their test data themselves. Analysis of test data and being able to discuss results in more professional manner.

## Learning outcomes for other disciplines:

### NPI / Project Manager

Understand how important it is to ensure high reliability BEFORE Mass production begins, otherwise product cost of failure can be excessive and kill the profit margin. NPI engineers will understand the quickest, low cost methods to assess product reliability enabling them to move forward with confidence into MP. Also will learn how a detailed NPI scoring mechanism is developed which allows NPI engineers to benchmark different designs / product's state of 'health' before the final decision to move into Mass Production.

### R&D (Research & Development)

Learn how the strongest Design Quality and Design Reliability Testing programmes are set up which allow fail rate predictions to be made from earliest design stages. Learn how to measure and score Design Quality Maturity which is a unique tool R&D can use to assess their own designs throughout the development cycle giving them fundamentally sound measurements for benchmarking designs and driving continual improvement. R&D engineers will learn quickly how the 'old' standards of reliability testing are meaningless in today's complex electronic and electromechanical products

### Test Engineer

Test engineers will learn how Reliability Testing is closely aligned to product test and how the test coverage will greatly affect the 'escape' of Early Life defects into the field. Test engineers will learn how to make predictions of Field Early Life Failure Rates from Process Yield data which is a key measure for Test Engineering in any company/ they will also learn how functional testing coupled with accelerated stress testing optimises the ability to detect latent defects. Test engineers will learn why end of line burn-in is ineffective in today's manufacturing and is wasteful in cost.

### Quality Engineer

Quality Engineers will learn so much from the seminar as they will learn an excellent amount about the best ways to perform reliability testing that will provide them with ability to drive defects back to source and MINIMISE effects on the end customer and Field Failure Returns. They will understand the optimum reporting methods that carry most power with management and be able to get their voice heard. They will understand the need for process yield management in minimising process escapes that cause Early Life failure in the field.

### Contract Manufactures

In today's market of fast-moving companies and new technology companies starting up at an unprecedented rate, there is a greater need than ever to understand reliability of the new products that come onto the market so quickly. Unfortunately, many smaller companies and even the larger contract manufacturers do not possess the required reliability skills. **Contract manufacturers** are being given a much wider responsibility than before where they are being asked to provide warranty, manage warranty failures and have overall responsibility for product reliability from Design through to Mass production and throughout product lifetime. This of course means they **MUST** understand and manage reliability very effectively to ensure maximum profit and maintain strong client relationship for future business expansion

## CASE STUDIES & PAST PARTICIPANTS ACHIEVEMENT:

- Realize how world class companies manage Reliability and make major cost savings in Field Failure costs.
- Understand how to make your Accelerated Testing most efficient and low cost.
- Making Reliability Testing much more effective and NOT generic according to Military Std specs which many companies follow due to lack of knowledge.
- Realizing the need for making Accelerated Testing unique to the product type to maximise effectiveness.
- Ability to drive 50% REDUCTION in Field Failures within 12-18 months once a new and effective low cost programme set up.

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## DAY 1 (AM Agenda)

### Introduction to Basic Reliability Understanding

- Application of Bathtub Curve theory
- Importance of Early Life Reliability and the Importance of Exponential and Normal Distributions in Reliability Prediction
- Definition of Hazard Rate and its importance in Reliability estimation at RD stage
- Understanding MTTF and effect on Product Level Fail Rates

### Understanding Accelerated Testing to set up Predictive Testing Models for all products at Design Stage

- Modeling Acceleration Factors using range of models and how to combine, Arrhenius, Peck's, Coffin Manson, etc and focusing on Activation Energies used for key component failure modes
- Maximising Acceleration Factors by combining Temperature, Thermal Cycling, Power Cycling and Humidity
- **Real Life examples of how to calculate Activation Energy level from experimental work at Product and Component level and develop OPTIMUM Accelerated Test profiles**

### Setting up typical Early Engineering Level Reliability Stress Testing to 'Find and Fix' for information purpose and preparing more robust design for Stress Testing at later Design Stages **before Design is Frozen**

- Electronic sub-assemblies
- Electromechanical type products
- How to Accelerate Failures by stress testing at PCBA levels to drive FAST, EFFECTIVE, LOW-COST Reliability
- Testing that provides **FAST RESULTS** – Control Board and Power board case studies

### Component level Stress Testing and the typical methods for Key device qualification

- Defining how to Qualify NEW / ALTERNATE components in an effective manner with the 'right' type of accelerated stress test to MINIMISE RISK.

### Evaluating the effectiveness of different stress test types with the Hughes Test Strength Equation to optimise Early Life Test programmes

- Developing an Effective Reliability test Strategy, using Modern stress techniques, including Vibration and Thermal Cycling.
- Product Level Case Study with real life examples using the **FREE Reliability Solutions calculation models.**

## DAY 1 (PM Agenda)

### Understanding the Statistics and Probability of Failure to define optimum Reliability test Sample Sizes

- When is a sample size TOO SMALL to evaluate and qualify product reliability
- Understanding WHY JEDEC test specs and sample sizes are **OUT OF DATE!**
- Understanding the 'real' cost of minimising reliability test budgets
- Real Examples of NOT testing enough products and the negative impact

**Workshop with class to discuss the main challenges they face in their own organisations when asked to develop Effective Reliability Test Plans which last Shortest Time**

**Participant should try to bring examples of the difficulties they face which can be discussed openly**



**Participants are encouraged to bring examples of the difficulties they face which can be discussed openly.**

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## DAY 2 (AM)

### Life Test Planning

- Theory behind classical Life Testing set up
- Using the **FREE Reliability Solutions calculation models** to combine Acceleration Factors / Sample Sizes / % confidence predictions

### Relationship of Manufacturing Yield with Early Life Failure Rate

- Using yield performance data from PCBA and Product assembly processes to Predict Warranty Field Fail Rates
- How to predict and control Early Life Failure Rates using manufacturing data, Case Studies using the FREE Reliability Solutions calculation model

### The benefits of Sequential Reliability Stress Testing and how gradual cumulative stress testing finds more 'real' defects

- LCD Panel Accelerated Stress Testing using a more effective sequential stress test approach with failure rate prediction modelling

## DAY 2 (PM)

### Developing a packaged semiconductor Sequential Reliability Stress Test Approach

- Applying a matrix approach to select MOST EFFECTIVE SEQUENTIAL STRESS TEST approach for semicon packaged devices
- Making Reliability Testing EFFECTIVE compared to INEFFECTIVE JEDEC non sequential stress test approaches

### Weibull Analysis of Failure data and how to apply to any product failure data and understand how standard software packages actually work

### Class Activity

Classroom session where students split into groups and develop their plan for New Product Reliability Management from Design Stage using the FREE Reliability Solutions measurement and prediction models they have learned in the training

- Developing Eng Level stress testing with confidence
- Setting Longer Life Test model for predicting failure levels
- Acceleration Modelling and Acceleration Factor
- Feedback from each team of workshop summaries and their key points
- 20 min feedback summary from each group

### Review of Reliability Solutions Test Plan for Workshop product example plus how the various tools are best applied to define sample sizes for testing, accelerated test plan, Test Strength modelling for Early Life Test approach, etc

- Will show students how to develop a TOTAL reliability and Robustness test plan

### General Q & A session



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"This reliability training is the most practical one to solve my difficulties on driving the design team on decision for reliability"

Quality Manager



**RATED ONE OF THE BEST AND PRACTICAL COURSES ATTENDED 7 YEARS IN A ROW  
IN ASIA PACIFIC (Singapore, Australia, Malaysia, Thailand, Philippines and China)**

**LIST OF COMPANIES THAT HAD BENEFIT FROM THIS TRAINING:**

- |                               |                           |                         |
|-------------------------------|---------------------------|-------------------------|
| Amkor                         | Flextronics               | On semiconductor        |
| Analog Devices                | Foxconn                   | Osram                   |
| Artesyn Embedded Technologies | Hayco                     | Plexus Manufacturing    |
| Apple                         | Honor Eletronics          | Premium Sound           |
| Beckman                       | Harman Automotive         | QAV Technologies        |
| Benchmark Electronics         | HGST                      | Qorvo                   |
| BOSE                          | Infineon Technologies     | Quasar Eletronics       |
| Bel Fuse                      | Jilin WeEn Semiconductors | Sandisk Storage         |
| BI Technologies               | Johnson Electric          | Sanmina System          |
| BBOX Business consultancy     | Kaertech Electronics      | Schaffner EMC           |
| Clarion                       | Kitron Electronics        | Schneider Electric      |
| Cypress manufacturing         | Logitech                  | Sernet Technologies     |
| Celestial Electronics         | Lumentum                  | SharkNinja              |
| Channel well technology       | Laird Technologies        | Sky-Light               |
| Design Pool                   | Littlefuse                | Smith Medical           |
| Domino OPTO Technologies      | Mattel                    | Sony Technology         |
| Dyson Manufacturing           | Macom                     | ST Microelectronics     |
| Delta networks                | Microhip technology       | TF-AMD Microelectronics |
| EDMI Electronics              | Microsoft                 | Traxton Technologies    |
| Electrolux                    | Mircosemi                 | Tridonic                |
| Emerson                       | Muehlbauer Technologies   | Vishay Semiconductors   |
| Finisar                       | NXP Seimiconductors       | Vtech Communication     |
| Fisher & Paykel               | National Instrument       | WD Media                |
| Fitbit                        | Netgear                   | Western Digital         |
| Freescale Semiconductor       | Nexteer Automotive        | Wistron NeWeb           |
| Funing precision              | NOTE Electronics          | Leica                   |



# Managing & Improving Electronics Product Reliability across the Entire Lifecycle from Prototype into Volume Manufacture | (2 Days)

Managing & Improving Reliability across the Entire Lifecycle from Prototype into Volume Manufacture	3 or more participants	Per Participant	<b>PROGRAM DETAILS</b> Location: Melbourne, Australia Date: 27 <sup>th</sup> – 28 <sup>th</sup> Feb 2023 Time: 09:00 – 17:00 (GMT+8) Daily
Full 2 Days	USD 1699 ( )	USD 1899 ( )	<b>STEPS TO REGISTER:</b> Simply fill up the registration form and email it to: Email to : <a href="mailto:registration@petro1.com.my">registration@petro1.com.my</a> Call us : +603 7727 3952 Mobile /Whatsapp: +6012 568 4696 (Harn)
<ul style="list-style-type: none"><li>Please note that all registrations must be made at the same time to qualify.</li><li>The above investment fee is inclusive of course material, tea breaks and lunch.</li></ul>			
<b>Want to Train your whole team</b> at your Convenient Time and Location through in-house training ? Contact +6012 568 4696 (Harn) or email us at <a href="mailto:ihtraining@petro1.com.my">ihtraining@petro1.com.my</a> or visit us at <a href="http://www.energy1asia.com">www.energy1asia.com</a>			

## Delegate Details

1. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

2. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

3. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

Head of Department: \_\_\_\_\_

## Invoice Details

Invoice Attention to: \_\_\_\_\_

Company: \_\_\_\_\_

Industry: \_\_\_\_\_

Address: \_\_\_\_\_

Postcode: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Authorized Signature : \_\_\_\_\_

### Payment Method

By Direct Transfer: Please quote invoice numbers on remittance advice.

ACCOUNT NAME : PETRO1 LIMITED

BANK : MAYBANK

ACCOUNT NO : 715120013353 (USD)

All bank charges to be borne by payers. Please ensure that PETRO1 SDN BHD received the full invoice amount.

### CREDIT CARD PAYMENT

Credit card payment will include a charge 3.1%.

**Payment Policy:** Upon receipt of a completed registration form, it confirms that the organization is registering for the seat(s) of the participant(s) to attend the conference or training workshop. Payment is required with registration and must be received prior to the event to guarantee the seat. Payment has to be received 7 working days prior to the event date to confirm registration.

### DATA PROTECTION

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### Cancellation & Substitutions:

Should you be unable to attend, substitutes are always welcome anytime at no additional cost. Please inform us as early as possible. Payment is non-refundable if cancellation occurs 7 working days prior to event commencement. However, delegates will receive a 100% credit on the amount paid which can be used in another PETRO1 Limited training course for up to one year from the date of issuance. The credit is transferable to other persons in the same company and applicable against any future PETRO1 Limited public course/ virtual Instructor Led Training (VILT). If cancellation occurs 7 working days prior to the registration date and there is no substitute, the organizer reserves the right to charge 50% of the total investment from your organization.

In the event that, PETRO1 Limited, postpones or cancels a course, delegate payments at the date of cancellation or postponement will be credited to a future PETRO1 Limited course. This credit will be available for up to one year from the date of issuance, and it is transferable to other persons in the same company and applicable against any future PETRO1 Limited public course.

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### Program Change policy:

The organizer reserves the right to make any amendments and/or changes to the webinar, Date/ time, facilitator replacements and/or modules if warranted by circumstances beyond its control.

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