

# Managing & Improving Reliability within Electronics Product Design

**24<sup>th</sup> – 25<sup>th</sup> July 2017 – Shenzhen, China**

**Take Away:  
Reliability  
Handbook**

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

## Comments from past participants:

"The course really applicable to most company. Not only necessarily for, reliability guy only. Designer should know also."  
Plexus Manufacturing

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

"Instructor credentials and evident in training"  
Infineon Technologies

"Good presentation skills and have a lots of experience in this course."  
Premium Sound

"Learn a lot of new knowledge "  
Clarion

"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)

"Fantastic. Gain a lot of knowledge from the course."  
Finisar

"Very good! Definitely learn new things"  
Bose System

"Martin is a serious guy and in reliability testing and with his last experience able give better insight and approach for NPD/NPI reliability testing."  
Dyson Manufacturing

"Course was informative, new technique and modeling 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

"Simplify complicated reliability subject into practical model for electronics industry"  
EDMI Meters

**In collaboration:**

# Program Overview

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## 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.**

**Participant will receive take home material:** The reliability handbook is a great short summary book where participant can read for easy reference and understanding after the training. It lays out how to develop accelerated stress test programme and how to make reliability predictions. It also provides simple to understand summary of basic theory that any engineer can read to get a good base understanding of the subject

### **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 MAXIMISE 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.

### **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.

## This program is intended

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- Reliability engineers
- Test engineers
- NPI engineer / Manager (New Product)
- R&D engineers.
- Research Team.
- Electronic and electro mechanical 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 electro mechanical 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.

“

Very practical and useful to develop in reliability concept.”

“

Excellent. Good mix of theory and real life experiences.”

# Managing & Improving Reliability within Electronics Product Design

(2 Days)

## DAY 1 (AM Agenda)

### Understanding Basic Reliability

- 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

- Realising the Importance of Component Reliability and MTTF spec
- Combining different MTTF levels for Different Components / Sub-Assemblies

### Accelerated Stress Testing and effect of Activation Energy

- Real Life examples of how to calculate Activation Energy level from experimental work at Product and Component level

### Understand Accelerated Testing to set up Predictive Testing Models for all products at RD stage

- High Temp Arrhenius model and Activation Energies used for key component failure modes
- Maximising Acceleration Factors by combining Temperature, Thermal Cycling, Power Cycling and Humidity

### Semiconductor Defect Types Review

- Summary of defect types and types of Reliability Tests that are most effective in stimulating Latent Semicon defects

## Day 1 (PM Agenda)

### Brainstorming session to define most effective Sequential Stress Test programme for packaged device reliability evaluation

- How to develop matrix of stress test types to apply and comparison with JEDEC

### Statistics involved in Reliability Estimation and Decision Making

### Evaluating the effectiveness of different stress test types with the Hughes Test Strength Equation

- Developing an Effective Reliability test Strategy , using Modern stress techniques, including Random Vibration and Thermal Cycling
- Product Level Case Study with real life examples

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

- Component Level prediction from Yield data
- Using yield performance data from Board and Assembly processes to Predict Warranty Field Fail Rates
- How to predict and control Early Life Fails using manufacturing data

## Day 2 (AM Agenda)

### Life Test Planning

- Setting up most effective Design Quality Life Testing to evaluate Design Reliability and using the appropriate Stress Model to maximise defect detection
- Predicting MTTF from reduced Sample Sizes

### Sub-Assy Reliability Stress Testing

- Making Reliability more effective at Sub-Assy level
- How to Accelerate Failures by stress testing Control boards, Power boards,
- Combining Rel predictions of different Sub-Assemblies to make Total product
- Understanding stresses involved at board level and how to simulate at packaged device level

### Weibull Analysis of Failure data and how to apply to any product failure data

### Applying DOE using Fractional Factorial techniques to maximise effect of Stress Test with reduced samples

- Developing best mix of Stress Testing for a Packaged Device

## Day 2 (PM Agenda)

### Setting up strong Design Quality Test Programme and using Design Maturity Measurement to measure Design Capability

- High Design Maturity controls Design Reliability
- Workshop to define methodology for Packaged Device Design Quality Testing

### Predicting Field fail Rates using development test Information from a Design Quality Engineering Test programme

- Combining Mil-217 predictions and using Design Maturity Ratings to form an efficient model

### Setting up New Product Introduction scoring model to deliver strongest Design Quality into Mass Production to maximise Reliability

### Workshop / General Q&A



Energy1 is a sub-division of PETRO1 focus on provide trainings & technical Consultancy services ranging from Revenue losses reduction, Maintenance & reliability, spares parts optimization, electrical & electronics and business related activities in the Energy & Utilities industry. We had successfully made impact to energy & utilities professional mainly the top players in the South East Asia Region.

- |   |                                       |                              |
|---|---------------------------------------|------------------------------|
| ▪ Metropolitan Waterworks Authority Thailand. | ▪ Star Energy Geothermal              | • Sandisk Storage            |
| ▪ Tenaga nasional berhad.                     | ▪ Perbadanan bekalan air pulau pinang | • Muehlbauer                 |
| ▪ San Fernando Electric Light & Power co, Inc | ▪ Aliran ihsan resources berhad       | • Dominant OPTO Technologies |
| ▪ Sarawak Energy                              | ▪ Visayan Electrical company          | • Finisar Malaysia           |
| ▪ SP Powergrid ltd.                           | ▪ Glow Company                        | • Sanmina System             |
| ▪ Power Seraya                                | ▪ Suruhanjaya Tenaga                  | • Bose System                |
| ▪ SMT Technologies                            | ▪ Indah Water Konsortium              | • Amkor Technology           |
|   | ▪ Jimah O&M                           | • EDMI Electronics           |
|   | ▪ Renesas Semiconductor               | • AUO SUNPOWER               |



# Managing & Improving Reliability within Electronics product design – Class 2016 and 2017



# Principal Program Facilitator

## **Martin China experiences:**

- 'Martin has extensive experience of working in the demanding fast moving electronics market of China over a period of 20 years and understands very well how Chinese companies need fast and strong solutions, this is what Reliability Solutions has provided to a wide range of companies manufacturing in China. His energetic and strong approach has helped many companies greatly improve their Reliability and reduce Field Failure service costs significantly in very short and aggressive time frames'.
- High Volume companies he has consulted with include TPV, Atmel, Amtran, LtreOn, Hua-Wei, Emerson, TCL, etc.



## **Martin's 34 years Professional Achievements**

- ✓ Success with several of the top 3 LCD TV makers and Personal Computer power supply makers in implementing strong Design Quality / Reliability Testing to reduce no. of Design Repeat Testing by more than 2X, saving significant costs and more importantly reducing overall development cycle.
- ✓ Reduction in Field Return Rates of more than 60% within 18 months period of starting to implement Reliability Solutions unique Reliability Test and Defect Prevention processes.
- ✓ First 30 day Customer Failure Rates reduced by 50% within 12 months period.
- ✓ Cost Reduction by removal of wasteful testing such as ineffective ORT and low stress ALT programmes which rarely stimulate Early Life Defects.
- ✓ Development of Sub -System Reliability Test programmes for complex products to guarantee stimulating wide range of latent defects and reduce excessive full assy test costs.

## **Martin a 34 years veteran expert:**

- Developed wide range of solutions for many companies on how to perform effective Reliability testing very unlike traditional standard approaches which are very weak and ineffective, his solutions have been applied at multiple World Class Companies; Artesyn Power, Acbel Power (World's 3rd biggest Power Supply maker), TPV China (World's biggest contract TV / LCD Monitor maker), Melexis Germany (Supplier of sensor devices to top Auto makers BMW, Mercedes, Porsche, Audi), GE, Bosch Automotive Products, Hua Wei Telecommunications, Range of semiconductor manufacturers including Renesas, Toyota, Hyundai Electronics, Fairchild, Atmel, etc)
- Provides solutions to the problems electronic and electro mechanical designers / manufacturers face when not being able to stimulate failure of design or manufacturing weaknesses which are later found in the field as major failing items
- Focuses on applying UNIQUE measurements in Design Cycle and during manufacture to accurately estimate and predict future failure levels.
- Enables designers and manufacturers to OPTIMISE time spent on Reliability testing and REDUCE costs and avoiding old style wasteful testing, replaced by his more effective and lower cost proven methods
- Is an energetic and enthusiastic teacher who is able to inspire students to think totally differently and be able to quickly add real value to their own businesses.
- Works with range of low cost test companies who can provide services to companies which do not have relevant equipment to do proper and effective Reliability Stress Testing, enables companies to perform best possible testing at lowest cost based on reliability Solutions models
- Previously of IBM as Quality and Reliability Specialist within PC business unit.
- Worked as specialist in Product and Commodity Quality / Reliability optimisation for the Electronic Product Suppliers to IBM between the years of 1982-1997.
- During this time he worked extensively throughout Asia, USA and Europe with wide range of suppliers. Since 1997 he has worked with a wide range of companies Worldwide and provided solutions to ensure RAPID improvement in a dynamic environment.
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## **Reliability Solutions**

Reliability Solutions focuses on providing the complete range of Reliability Improvement tools and Application Solutions to Significantly Reduce your product failure levels at the most expensive end of the product cycle, the Consumer.

## **Martin's Blue Chips Clients:**

Daewoo Electronics, LiteOn, Astec Power, GE, Bosch Automotive products, Philips, TPV, Vestel, Acer, LiteOn Power, LG, Amtran, Fairchild Semiconductors, Atmel Semiconductors, Wolfson Microelectronics, ULTRA Electronics, Melexis Germany, IDEAL Heating, SKY TV, Hua Wei Telecommunication, Emerson Power, EE Phones, TCL, SMART Technology, Singapore Technology Kinetics, Artesyn Power, Acbel Power, Range of semiconductor manufacturers including Renesas, Toyota, Hyundai Electronics, Fairchild, Atmel, etc) and etc.

## Investment Packages

Managing & Improving Reliability within electronics product design	Early Bird Full 2 Days	Standard Price Full 2 Days
Per Delegate	USD 1199 ( )	USD 1599 ( )
<ul style="list-style-type: none"> <li>Early Bird Promotion Deadline – 31<sup>st</sup> May 2017</li> </ul>		

## REGISTRATION FORM

### PROGRAM DETAILS

Venue: Shenzhen, China  
Date: 24<sup>th</sup> – 25<sup>th</sup> July 2017

**REGISTER NOW**  
CONTACT: Sam  
MAIN: +603 7727 3952  
FAX: +603 7727 5278  
Email: [sam@petro1.com.my](mailto:sam@petro1.com.my)

**I would like to organize this training on-site and save at least 50% on the total course Fees!**

( ) Package 1 : 1 Day full training at the cost of **USD 8,000** ( Max 30 Participants)

( ) Package 2 : 2 Days full training at the cost of **USD 15,000** (Max 30 Participants)

**Date:** 26/7 ( ) 27/7 ( ) 28/7 ( ) 31/7 ( ) 1/8 ( ) – *Please tick you preferred packages and dates*

### 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 : \_\_\_\_\_

### Credit card Payment

**Please Debit my credit card:**

VISA  MASTERCARD

Card Number: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Security Code:     Expiry Date:

Named printed on card: \_\_\_\_\_

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 will include a charges 2.8%**

**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.

**Venue:** All of our training courses are held in 4 – 5 star venues. The course fee does not include accommodation or travel cost. It's recommended to book the hotel room early as there are only limited room available at the discounted corporate rate.

#### DATA PROTECTION

The information you provide will be safeguarded by Petro1 that may be used to keep you informed of relevant products and services. We take it seriously when it comes to protection of our client data.

#### Cancellation & Substitutions:

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. Should you be unable to attend, substitutes are always welcome 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 a substitute is welcome at no additional charges. If cancellation occurs 5 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.

PETRO1 SDN BHD is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. PETRO1 SDN BHD shall assume no liability whatsoever in the event this training course is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, war, fire, labor strike, extreme weather or other emergency.

**Walk in Registration:** Walk-in participants with payment will only be admitted on the basis of seat availability at the event and with immediate full payment.

**Program Change policy:** The organizer reserves the right to make any amendments and/or changes to the workshop, venue, facilitator replacements and/or modules if warranted by circumstances beyond its control.