

## EMC testing for IEC/CISPR standards

A three day in-house training course for EMC test engineers

*Suitable for any company with their own EMC test facilities*

### Description

This seminar will cover all the major tests required to meet the compliance requirements of the European EMC Directive via the generic standards, and most product standards. These include conducted and radiated RF emissions, conducted and radiated RF immunity, and transient and power quality immunity. The seminar is structured to achieve the maximum learning potential from a combination of tutorial and case study exercises. It emphasises the underlying physics of each test and how it affects the required methods, without resorting to complex mathematics.



"The best EMC test course I've been on"  
– heard in the corridor

### Who should attend

**EMC test engineers and technicians:** a basic knowledge of electronics is assumed; some prior knowledge of EMC testing is helpful but not essential. The course will be of particular interest to accredited laboratories wishing to fulfil the training requirements of accreditation, but non-accredited laboratories and manufacturers' in-house testers will also benefit equally. Design and project engineers will also gain an understanding of the tests that are applied to their products.

**Course material:** course notes, including all slides used and explanatory text, will be sent before the start for copying and distribution to the delegates.

### Cost for the basic course

**£2950.00 + VAT (no per-delegate fee)**

plus travel and accommodation expenses for the course instructor

### For a firm quote and booking

Contact:

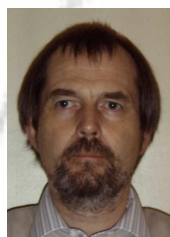
Elmac Services,  
Gorseacres, Puddletown Road, Wareham, Dorset  
BH20 6AE UK Tel 01929 558279

e-mail [courseenquiry@elmac.co.uk](mailto:courseenquiry@elmac.co.uk)

web <http://www.elmac.co.uk>

### Payment, admin and cancellations

The course will be invoiced on completion. The client is responsible for administering the seminar. Cancellations less than one month before the agreed start date will incur a charge.



### The presenter

**Tim Williams**, consultant with Elmac Services, is the author of "EMC for Product Designers" (third edition), now regarded as a standard reference for design engineers needing to meet the EMC Directive, and "EMC for Systems and Installations" (with Keith Armstrong). He has written and presented many articles, conference papers and seminars internationally on circuit design and testing for EMC. As well as being an EMC technical assessor for UKAS and SWEDAC, he has contributed to several research projects looking at repeatability and best practice of EMC tests and measurements.

## Programme

### Day 1 – introduction and theory

#### Morning

09.30-12.30 Introduction to EMC; CISPR and IEC test standards

*Why EMC? – the definition of EMC – the various phenomena – the product life cycle and reliability aspects – the EMC and R&TTE Directives – other Directives and requirements*

*The standards regime – standards generating bodies – the three types of EMC standard – content of the most common test standards*

(continued)

Afternoon

- 13.30-15.00 Principles of interference coupling  
*Using the dB – frequency versus time domain – coupling modes – electric, magnetic and electromagnetic fields – VSWR*
- 15.15-16.30 The test plan and good lab practice  
*The tests performed – EUT configuration – ancillary equipment – choice of ports and test points – performance criteria and EUT monitoring – pre-test checks – care of equipment*

**Day 2 – RF emissions**

Morning – Conducted emissions measurements

- 09.30-10.30 Instrumentation  
*The CISPR measuring receiver – the spectrum analyser and preselector – the effects of bandwidths and detectors (peak, quasi-peak, average) – overload responses – sweep rates*
- 10.45-12.15 Transducers and the conducted test setup  
*The LISN – Telecom port ISNs – the ferrite absorbing clamp – current and voltage probes – the test set-up and equivalent circuit*  
Exercise – instrumentation, conducted transducers

Afternoon – Radiated emissions measurements

- 13.30-15.00 Test sites and antennas  
*The CISPR open area test site requirement – normalised site attenuation – the problem of ambients – tests in screened rooms – anechoic lining – compliant vs. non-compliant chambers – popular EMC antennas: biconical, log periodic, BiLog, horn, loop – alternative methods: FAR and GTEM*
- 15.15-16.30 Procedures and uncertainty  
*Measurement uncertainty in emissions tests – the radiated test setup – software and procedures: the turntable and height scan, maximising the emission*  
Exercise and case study – radiated emissions testing

**Day 3 – RF and transient immunity**

Morning: RF immunity

- 09.30-11.00 Instrumentation and methods  
*RF fields in the environment – generating the RF test signal: the substitution method – control software for calibration and testing – level setting and field uniformity – step size, sweep rate and modulation*
- 11.15-12.45 The test setup and transducers  
*Immunity antennas – conducted transducers – power and VSWR – radiated and conducted test setups – test procedures – functional checks*  
Exercise and case study: the RF immunity system

Afternoon: Transient immunity

- 13.30-15.00 Electrostatic discharge  
*The generation of electrostatic charge – the discharge event – test method – the ESD generator – test set-up – procedural requirements of the standard*
- 15.15-16.45 Electrical fast transients, surge and power quality  
*Transient generation in the environment – the EFT burst test in IEC 61000-4-4 – the surge test in IEC 61000-4-5 – voltage dips and interrupts in IEC 61000-4-11 – functional checks*
- 16.45-17.00 Wrap up and final discussion