

Liverpool John Moores University

Title: PRODUCT TESTING AND VERIFICATION
Status: Definitive
Code: **5502ENGSBC** (113900)
Version Start Date: 01-08-2011

Owning School/Faculty: Engineering
Teaching School/Faculty: Shanghai British College

Team	Leader
Gareth Bradley	Y

Academic Level: FHEQ5
Credit Value: 12.00
Total Delivered Hours: 37.00
Total Learning Hours: 120
Private Study: 83

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	10.000
Practical	25.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Portfolio	AS2	Product Testing Exercise and Case Studies	40.0	
Exam	AS1	Examination	60.0	2.00

Aims

The aim of this module is to introduce students to the important area of product testing and verification. The techniques covered will allow students to identify design deficiencies and problems early in product development.

Learning Outcomes

After completing the module the student should be able to:

- 1 Identify a range of tests useful in optimising a design solution and product.
- 2 Undertake product tests for performance assessment and Understand international standards on products testing and verification
- 3 Design a series of functional tests of products
- 4 Analyse test data and make design decisions to improve its quality and reliability.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Product Testing and Case stud	1	2	3
EXAM	3	4	

Outline Syllabus

Testing: mechanical; vibration; fatigue; mechanical shock; acceleration; Electrical: Power surge, electro magnetic compatibility (EMF); multiburst and multiple stroke lightning; high intensity radiated fields (HIRF); electrostatic discharge (ESD). Environmental effect on the performance of products: corrosion; temperature, thermal cycling /shock; solar radiation, flammability. Flow: Aero / hydro dynamics; hydraulic / pneumatic flow; fuel systems; fluid flow; pressure impulse; burst and proof pressure;

Equipment and Instrumentation: Labview; materials testing equipment; wind tunnel; vibration test rigs; drop test rig; environmental chamber; strain gauges; accelerometers, force sensors, data recording; high speed digital camera and thermal imaging camera, Temperature measurement

Test methodology: Collecting experimental data; analysing data and design optimisation. Case studies

Learning Activities

A range of case studies, laboratories, videos and a structured lecture programme will be employed in the delivery of this module. Lectures and test laboratory exercises will be integrated into topical case studies based on group works.

References

Course Material	Book
Author	Chan, H. A.
Publishing Year	2001

Title	Accelerated Stress Testing Handbook
Subtitle	Guide for Achieving Quality Products
Edition	
Publisher	John Wiley and Sons
ISBN	0780360257

Course Material	Book
Author	Ulrich, K; Eppinger, S
Publishing Year	2003
Title	Product Design and Development
Subtitle	
Edition	3rd ed
Publisher	McGraw-Hill Higher Education
ISBN	0071232737

Course Material	Book
Author	Beebe, R
Publishing Year	2004
Title	Predictive Maintenance of Pumps Using Condition Monitoring
Subtitle	
Edition	
Publisher	Elsevier
ISBN	9781856174084

Course Material	Book
Author	Barron, R
Publishing Year	1996
Title	Engineering condition monitoring : practice, methods and applications
Subtitle	
Edition	
Publisher	Longman
ISBN	0582246563

Notes

The emphasis of this module will be learning through lab works and case studies, although a basic understanding of reliability engineering and testing should be covered.

is part of: Accelerated Stress Testing Handbook: Guide for Achieving Quality Products. H. Anthony Chan. All Authors. Combined Thermal and Vibration Equipment. Ancillary Mechanical Equipment for Stress Testing. Environmental Analysis Equipment Used for Stress Testing. Electrical Test Equipment and Software Used for Stress Testing. Other Stress Options. Page(s): 136 - 154. Copyright Year: 2001. Abstract. Electrical Engineering Accelerated Stress Testing Handbook Guide for Achieving Quality Products As we move closer to a genuinely global economy, the pressure to develop highly reliable products on ever-tighter schedules will increase. Part of a designer's "toolbox" for achieving product reliability in a compressed time frame should be a set of best practices for utilizing accelerated stress testing (AST). The Accelerated Stress Testing Handbook delineates a core set of AST practices as part of an overall methodology for enhancing hardware product reliability. This handbook is written to show how greater control can be gained over total product reliability by the utilization of Accelerated Stress Testing techniques (AST). It will examine the concept of AST; how Accelerated Stress Testing compares to Accelerated Life Testing; the technologies used in Accelerated Stress Testing; and the issues involved in properly implementing Accelerated Stress Testing. General questions relating to the purpose and intent of Accelerated Stress Testing are also addressed in this booklet. In understanding Accelerated Stress Testing, there are a number of areas where these variations cause confusion. In interest of clarity, this book makes some needed distinctions. Stress testing completely focuses on testing the system under extreme load conditions to find its breaking point and see if the appropriate messages are shown in case the system becomes unresponsive. Stressing anything beyond a point results in serious consequences in humans, machine or a program. It either causes serious damages or breaks it completely. Similarly, in this tutorial, we will learn how to stress test web applications along with its effect. In order to avoid any permanent damage to your apps or websites when they are stressed i.e. heavily loaded, we need to find the breaking point and in turn the solution to avoid such conditions. Just think how it would be when your shopping website goes down during Christmas sale. How much would be the loss?