

AGENDA
SHORT COURSE ON PROBABILITY OF DETECTION
JULY 17, 18
MARRIOTT MISSION VALLEY – SAN DIEGO, CA
SIERRA 5 AND 6

Saturday, July 17, 9 a.m. - 5:30 p.m.

Context

9:00 a.m. Welcome, Description of Course, and Overview of Role of POD in Structural Integrity Bruce Thompson, Center for NDE, Iowa State University (ISU)

Overview of Empirical Determination of POD

9:30

- Historical Perspective: Binary to Moving Average to Approaches Assuming a Particular Statistical Model (Hit/Miss and \hat{a} Versus a) Floyd Spencer, Sfhire
- Examples of \hat{a} Versus a and Hit/Miss Analyses Bill Meeker, ISU
- Relative Attributes of These Approaches Spencer
- Probability of a False Alarm and ROC Curves..... Meeker

10:16 **BREAK**

Fundamentals of Empirical Determination of POD

10:30

- POD Models that do not go from 0 to 1 Hit Miss; Assessing Goodness of Fit..... Spencer
- POD Models that do not go from 0 to 1 \hat{a} Versus a Meeker
- Basic Ideas of Likelihood Analysis Meeker
- Confidence Intervals for POD and 90/95 Values .. Spencer
- Wald Versus Likelihood-Based Methods for Obtaining Confidence Intervals Spencer
- Designing a POD Study. How many specimens are needed for a POD study?..... Meeker
- Software for POD Analysis Mnitab Spencer
- Software for POD Analysis MIL-HDBK-1823A..... Meeker
- Discussion

12:00 p.m. **LUNCH**

Advanced Topics in Empirical Determination of POD

1:00

- Treating Incomplete Data with Advanced Analysis Techniques (truncation, left censoring, right censoring, etc)..... Meeker
- Dealing with Multiple Flaws at a Site Spencer
- Discussion

2:30 **BREAK**

Fundamentals of MAPOD

- 2:45
- MAPOD Overview (Motivation for MAPOD, Time/Cost Concerns, Views of Different U. S Aerospace Agencies, Combining Empirical and Model-Based Information) Summary of Phase I Activities of Model-Assisted POD Working Group) Thompson
 - MAPOD Protocol Developed by MAPOD Working Group..... Thompson
 - Overview of the MAPOD (SISTAE) General Approach (including some 'practical exercises')..... Frederic Jenson and Philippe Benoist, CEA
 - A Comparison Between Full Simulated POD and Full Experimental POD..... Nicolas Dominguez, EADS
- 5:30 **ADJOURN**

Sunday, July 18, 8:30 a.m. - 4:00 p.m.

Application Examples

- 8:30 a.m. **Airframe**
- B1-B (U.S.) Eric Lindgren, AFRL
 - F-111(Australia) Thompson for Hugo and Harding
- Aircraft Engines**
- POD at Billet, Forging and In-Service Stages..... Thompson for Smith and ETC Team
- Nuclear Power Plants**
- Development of POD and Flaw Sizing Uncertainty Distributions from NDE Qualification Data to Support Probabilistic Structural Integrity Assessment for Dissimilar Metal Welds..... Mark Dennis, EPRI

10:30 **BREAK**

Cutting Edge Topics

- 10:45
- Assessing POD with a Dual Detection Criterion (amplitude and SNR)..... Meeker
 - Recognizing Random Effects in Estimating POD and Computing a Quantile POD Meeker
 - Quantifying POD from Multiple Inspections and Estimation of Signal and Crack-Size Distribution..... Meeker
 - Assessing POD from a Sequence of Images Meeker
 - POD of Structural Health Monitoring Lindgren
 - Future Potential Directions on POD Research Lindgren and Jeremy Knopp, AFRL

1:00 p.m. **LUNCH**

Group Discussion of Outstanding Topics

2:00

Topics to be selected by the course participants.
A list of candidate topics, identified during a recent European-American Workshop on POD, includes the following:

- Relative Roles of Model-Assisted vs Fully Model-Based POD Determinations
- Validation/Calibration
- Applications
- Quantification of Accuracy
 - Relationship of Accuracy of Model and POD Prediction
 - Validating Models and Metrics for Model Accuracy and POD Uncertainty
- Application to Image Based Data
- Combining Empirical and Model-Based Information
- Accuracy of Resulting POD Predictions
- Assessing Dependence on Multiple Parameters
- Use of DOE to Make Practical
- Determining Input Distributions for Stochastic Calculations
- Role of Coverage Predictions
- Validation/Calibration of MAPOD Predictions
- Relative Roles of Model-Assisted vs Fully Model-Based POD Determination
- Glossary of Terms
- Description of Use in Training, Certification, and Testing of Operators
- Relationship of Accuracy of Model and POD Prediction
- Validating Models and Metrics for Model Accuracy and POD Uncertainty

4:00

ADJOURN