Professional Education International

Presents 2 Public Aerospace Short Courses

Avionics & Weapons System Flight Test
Instructor: Robert McShea

August 28-31, 2006
San Diego, CA

Spreadsheet Aided Engineering
Instructors: Dr. Tom R Mincer & David R McDaniel, M.S.
Featuring latest new tool, Roark's Formulas for Excel

June 12-16, 2006
Greenbelt, MD

June 19-23, 2006
Mackinac Island, MI

July 31-August 4, 2006
Los Angeles, CA

January 15-19, 2007
S. Lake Tahoe, CA

Both courses can be taught on-site at your facility at your convenience

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Focus
This four-day course addresses the evolution of the flight test program: the need for the flight test program, assets required and the data types identified. The mystery of decrypting 1553 data, setting realistic testing goals and analyzing test data are explained. The types of Time Space Position Information (TSPI) are discussed as well as their relationship with test requirements. The differences in test programs and organizational structures are explained as well as the test community's relationship with the customer. The latest advancements in data acquisition, correlation, merging and analysis will be studied with an emphasis on true performance vs. the predicted. Each section contains an in class exercise used to reinforce the lecture series. A new section on Statistics Requirements for the Flight Test Engineer has been added at the request of previous participants. This section will attempt to answer the age old question, "How many test points do I need?" The lecture is augmented with video instruction as well as real life examples of flight test success and failures.

Instructor
Robert E. McShea, B.S. Aeronautical Engineering, Syracuse University, Director, Avionics and Systems Academic Programs at the National Test Pilot School, Mojave, CA. Responsible for the formulation, preparation and instruction of all Avionics and Weapons Systems taught at the school. Mr McShea was formerly employed as a Senior Technical Specialist at the Northrop-Grumman Corporation in Palmdale, California. His primary responsibilities include the integration, development and test requirements definition or the B-2 RADAR. Prior to that assignment, he was employed by the Grumman Corporation in Calverton Long Island as a Group Manager for Avionics and Weapons Systems Test, Test and Evaluation Department. His responsibilities included the development and test of new and upgraded avionics and weapons systems. A collateral duty involved the development of lectures on Flight Test Methodology and Requirements presented to potential FMS customers. Past positions within Grumman include: Project Engineer, F-14D Super Tomcat, Lead Test Conductor and Team Leader, F-14D upgrade, Research Engineer, Inertially Guided Technology Demonstration Lead, and Lead Vehicle Systems Test Engineer, X-29A Forward Swept Wing Technology Demonstration Lead. Mr. McShea was formally a Captain in the US Air Force flying as a Weapons Systems Officer in the F-4 C/D/E aircraft. He has presented and published papers for AIAA: Flight Testing of the X-29A Technology Demonstrator and SFTE Symposium Advanced Techniques in Avionics Systems Flight Test.

Audience
This course is designed for personnel involved with requirements definition, integration, development and test of avionics and weapons systems. Although the course is slanted to the test of systems in flight, the concepts are valid for ground and flight labs as well. Engineers new to the field as well as test managers will gain useful information from the course. Time is allotted within each section to discuss problems/questions which may be of particular interest to individual participants. No previous course or prior experience is required.

Outline
Overview
- What is Flight Test
- Why is there a need for Flight Test
- Program Concepts/Goals
- Contractual Requirements
- DTE/OTE Differences
- Demonstration/Spec Compliance

System Architecture
- 1553/1760 Bus Overview
- Data Words and Messages
- Bus Controllers and Remote Terminals
- Other Data Busses (ARINC 429, EBR-1553, IEEE 1394b)

Range Sources/Attributes/TSPI
- Types of Time, Space, Position Information
- Accuracies
- Sensor Fusion
- GPS/DGPS
- Threat Emitter Ranges

Crew Station Evaluation and Human Factors
- Purpose of the Crew Station Evaluation
- Minimum Crew Requirements
- Workload and Workload Assessment
- Subjective Rating Scales

Controls and Displays
- Types of Testing
- Evaluation and Functional Tests
- Requirements and Pertinent Documentation

Statistics Used in Avionics Testing
- Circular Error Probable
- Distributions
- Confidence Intervals
- Determination of Data Collection Requirements

Typical Avionics and Weapons Systems
- Electro-magnetic Interference and Compatibility (EMI/EMC)
- Communications
- INS
- GPS
- RADAR
- EO/IR

A Typical Flight Test Program
- Defining the Test
- Asset Planning
- Estimating
- Preparation of the Test Plan
- Test Objectives/Points/Cards
- Brief, Debrief and Conduct of Flight
- Flight Analysis and Reporting

Lessons Learned
Spreadsheet Aided Engineering

Workshop Instructors

Tom R. Mincer, Ph.D., Founder and President of SpreadsheetWorld, Inc. and Professor of Mechanical Engineering, California State University, Northridge (CSUN). Dr. Mincer is widely recognized as an early pioneer in the extensive use of Excel, VBA and FORTRAN DLLs in engineering. In 1985, he initiated extensive use of Excel into the curriculum at CSUN by integrating it into the courses on systems design, computational methods and high level modeling and analysis loops. He has been developing specialized toolboxes which are integrated into the use of class modules, the development of custom dynamic link libraries, and the integration of these capabilities into the worksheet World Toolbox Manager as well as the ongoing development of specialized toolboxes which are integrated into Excel using the Toolbox Manager. Mr. McDaniel made extensive use of Excel spreadsheets and VBA programming as a flight dynamics flight test engineer at the Air Force Flight Test Center at Edwards Air Force Base, California while testing and evaluating the B-2A and B-1B aircraft. He manages the continued upgrades for the SpreadsheetWorld Toolbox Manager as well as the ongoing development of specialized toolboxes which are integrated into Excel using the Toolbox Manager. Mr. McDaniel specializes in advanced Excel/VBA techniques such as the use of class modules, the development of custom dynamic link libraries, and the integration of these capabilities into higher level modeling and analysis loops. He has been teaching courses covering these topics as well as many other workshops for the past five years at various locations.

Computer Requirements

Attendees must bring their own laptop and have a complete installation of Excel, a CD-ROM drive and a mouse. Verify that the Solver; Analysis Toolpak Add-ins and the Excel and VBA help files have been installed.

Audience & Prerequisites

Engineers from all disciplines find these courses immediately useful, practical and eye-opening. Participants should have a computer background including basic keyboard and Excel skills.

Course Description

This workshop is designed to have an immediate impact on the way that Excel Spreadsheets are used in the engineering process. The underlying key to this change is for the user to gain experience and knowledge on the use of Visual Basic for Applications (VBA) in Excel. Extensive use of VBA is the key to unlocking all the features of Excel, and moving away from attempting to program on worksheets.

Those who attend this intensive hands-on workshop experience a dramatic change in their use of Excel and VBA. Benefits include increased productivity, automation of tedious tasks, increased use of XLToolboxes and Add-ins, development of re-usable functions, forms and templates, improved documentation and configuration management, and improved team interaction and parameter sharing.

Course Materials

Each participant receives a 3-volume set of workshop notes which include all the PowerPoint slides used during the workshop for concept discussion and setting up of workshop exercises. The CD-ROM contains an electronic version of the course notes; the course examples; engineering case studies; and many SpreadsheetWorld Engineering XLToolboxes including XL QuikPlot, XL Numerical Methods, XL Simulation, XL Thermal-Fluids, XL Heat Transfer, XL GasDynamics, geometric modeling add-in, and data analysis add-in. It also includes the new and popular Units Converter PowerBook which brings a comprehensive capability of unit conversion as well as extensive engineering constant reference. Workshop attendees receive free updates on all included software for 5 years. Participants also receive 30-day demo copies of other selected XLToolboxes including XL Eigenvalues, XLProPlot, XL Linear and Roark for Excel. Participants also receive a copy of the course textbook Computational VBA, which is written by the course instructors.

The participants in this workshop will learn how to:

- Define the mission and process flows
- Define system physical object structure
- Create engineering information tables
- Develop re-useable system functional models
- Monitor the impact of key design and process variables
- Monitor performance and constraint functions
- Deal with implicit relationships using Goal Seeker
- Develop and use VBA Add-Ins for rapid modeling
- Use XLToolboxes to support modeling
- Solve systems of equality and inequality rules
- Dynamic system simulation
- Do system optimization using Solver
- Monitor System Requirements using Solver
- Setup system sensitivity maps about a design point
- Do dynamic system simulation in the optimization loop
- Setup Configuration Trade-Study Matrix
- Use Userforms for man-in-the-loop design and analysis
- Develop graphic user interfaces for systems design
- Setup system modeling for integrated design teams
- Use Fortran and C modules from Excel
- Use MATLAB models in Excel

For a complete outline go to: www.peinternational.com/576

Spreadsheet Aided Engineering

Key Workshop Topics of this hands-on engineering workshop include:

- The Excel/VBA Platform
- Structured Spreadsheets and Documentation
- Visual Basic for Applications (VBA)
- Building Engineering Function Libraries
- Object Oriented Programming
- Userforms & ActiveX for Project Control
- System Optimization & Rules Solving
- Numerical Methods for System Modeling
- Data & Data Analysis and Graphing
- Interfacing VBA & FORTRAN-DLLs

Call PEI today for details about this exciting workshop! See back page for schedule of offerings.
Spreadsheet Aided Engineering On-Site Sponsor Members

The following organizations have sponsored on-site offerings of Spreadsheet Aided Engineering at their facility. Many of the organizations below sponsor these workshops on an on-going basis and comment on how their engineers benefit immediately by methods taught in SpreadsheetWorld hands-on workshops. Your technical staff can also benefit from the best practices taught in this program by hosting the workshop on-site.

- NASA
  Dryden Test Flight Center
  Glenn Research Center
  Goddard Space Flight Center
  Jet Propulsion Lab
  Johnson Space Center
  Marshall Space Flight Center
- United Technologies
  East Hartford, CT
- U.S. Army Tank Command
  Warren, MI
- General Motors
  Milford, MI
  Pontiac, MI
- Hamilton Sundstrand
  Rockford, IL
  Windsor Locks, CT
- U.S. Air Force
  Arnold AFB
  Edwards AFB
  Eglin AFB
  Rocket Research Lab
- National Security Agency
  Hansover, MD
- Pratt & Whitney
  West Palm Beach, FL
- L.A. Water District
  Los Angeles, CA
- U.S. Navy
  Indianapolis, IN
  Patuxent River, MD
  NRL-Washington, DC
- L3 Ocean Systems
  Sylmar, CA
- Booz-Allen Hamilton
  McLean, VA
- Delphi Steering
  Saginaw, MI
- Northrop-Grumman
  Palmdale, CA
- Lockheed Martin
  Fort Worth, TX
  Marietta, GA
  Palmdale, CA
- Honda R&D
  Raymond, Ohio
- ERDC
  Vicksburg, MS
- Harley-Davidson
  Wauwatosa, WI
  Talladega, AL
- Goodyear Tire
  Luxembourg
  Akron, Ohio
- TRW
  Redondo Beach, CA
- Raytheon Consulting
  Troy, MI
- Dow Chemical
  Midland, MI
  Freeport, TX
- International Truck
  Fort Wayne, IN
- Parker-Hannifin
  Irvine, CA
- Goodrich
  Rome, NY
- SAIC
  Houston, TX
- Ricardo
  Detroit, MI

New! Roark’s Formulas for Excel. Go to www.spreadsheetworld.com/Roark for details!

Course: Avionics & Weapons System Flight Test
Date: August 28-31, 2006
City/Number: San Diego, CA/1372.03
Fee: $1995
Time: 7:00 a.m.—12:00 p.m. (F) 7:00 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Course: Spreadsheet Aided Engineering
Date: June 12-16, 2006
City/Number: Greenbelt, MD/576.212
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Course: Avionics & Weapons System Flight Test
Date: June 19-23, 2006
City/Number: Mackinac Island, MI/576.201
Fee: $2495
Time: 7:00 a.m.—12:00 p.m. & 5:00 p.m.—7:00 p.m. (F-M(Th))
Units: 3.5 CEUs
Course: Spreadsheet Aided Engineering
Date: July 31-August 4, 2006
City/Number: Los Angeles, CA/576.209
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Course: Spreadsheet Aided Data Plotting & Analysis
Date: October 2-4, 2006
City/Number: Los Angeles, CA
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Course: Avionics & Weapons System Flight Test
Date: October 9-11, 2006
City/Number: San Diego, CA
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Course: Design & Development of Auto Engine Cooling Systems
Date: October 16-18, 2006
City/Number: Southfield, MI
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Course: Explosives Technology and Modeling
Date: October 20-21, 2006
City/Number: S. Lake Tahoe, CA
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Course: Fundamentals of Systems Engineering with Exercises
Date: Call for Dates
City/Number: Los Angeles, CA
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs

Discounts:
- Group: Available when registered as a group and requested in advance: 3-5=10%, 6-10=20%, 11+=30%
- Alumni Refresher (Spreadsheet Aided Engineering Only): $500 (Complimentary if you bring a full paying associate and assist during the help sessions)

Refunds: The course fee (less a $50 processing fee) will be refunded if cancellation is received at least one week prior to the first day of the course. Substitutions may be made at any time.

Other Upcoming public courses selected from our library of over 300 on-site engineering courses:

For detailed brochures or on-site information, call toll free 1-866-272-8095 or e-mail: info@peinternational.com

Spreadsheet Aided Engineering
Date: 06/12-16/2006
City/Number: Greenbelt, MD/576.212
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Spreadsheet Aided Data Plotting & Analysis
Date: 10/02-06/2006
City/Number: Los Angeles, CA
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Avionics & Weapons System Flight Test
Date: 08/28-31/2006
City/Number: San Diego, CA
Fee: $2495
Time: 8:30 a.m.—4:30 p.m. (M-Th)
Units: 3.5 CEUs
Design & Development of Auto A/C Systems
Date: 10/16-20/2006
City/Number: Southfield, MI
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Design & Development of Auto Engine Cooling Systems
Date: 10/18-21/2006
City/Number: Southfield, MI
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Explosives Technology and Modeling
Date: 10/02-04/2006
City/Number: S. Lake Tahoe, CA
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs
Fundamentals of Systems Engineering with Exercises
Date: Call for Dates
City/Number: Los Angeles, CA
Fee: $2495
Time: 8:30 a.m.—12:00 p.m. (F)
Units: 3.5 CEUs

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