

# Professional Education International

Presents 2 Public Short Courses

## SolidWorks/Excel Integration using VBA/API

Intensive Hands-On Workshop for CAD Design Engineers

Instructor: **Chris Stimson, M.S.**

November 13-15, 2006

Los Angeles, CA

## Spreadsheet Aided Engineering

Instructors: **Dr. Tom R Mincer & David R McDaniel, M.S.**

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October 30-November 3, 2006

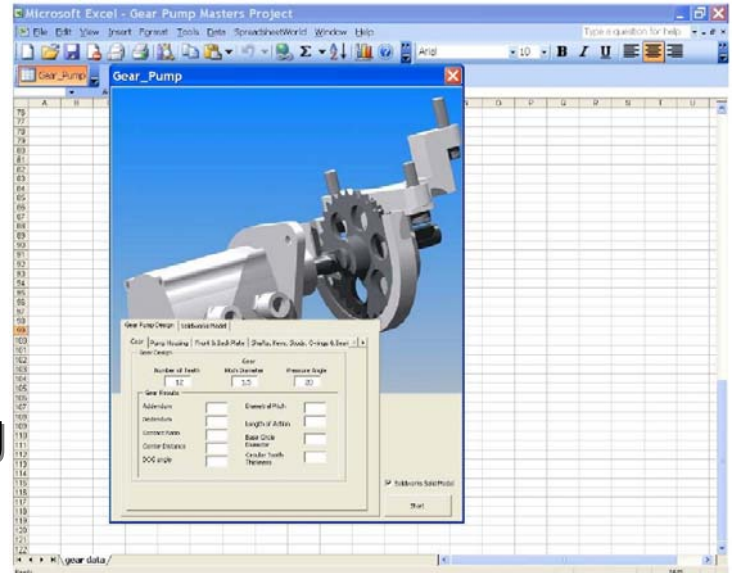
Los Angeles, CA

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

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# SolidWorks/Excel Integration using VBA-API

## **Focus**

This hands-on workshop is designed to have an immediate impact on the way that SolidWorks CAD users can integrate their CAD models with systems level analysis, trade studies, and system level optimization. Excel Spreadsheets are utilized as the system level tool integration platform. The underlying key to implementing this process is for the user to gain experience and knowledge on the use of Visual Basic for Applications (VBA) in both Excel and SolidWorks. Extensive use of VBA is the key to unlocking all the features of SolidWorks and reducing the amount of tedious work. This provides the ability to move away from the CAD interface to the more familiar Excel application. Those who attend this intensive hands-on workshop experience a dramatic change in their use of SolidWorks in the design integration process. Benefits include increased productivity, automation of tedious tasks, SolidWorks' part and assembly automation, development functions, forms and templates, improved documentation and configuration management, and improved team interaction and parameter sharing.

## **Instructor**



**Chris Stimson, M.S.**, Project Engineer, Moog, Inc. Chatsworth, CA, SolidWorks/Excel Applications Specialist, SpreadsheetWorld, Inc. and is an instructor at California State University Northridge (CSUN). Mr. Stimson is a pioneer in the integration of Excel and SolidWorks using the VBA Application Programming Interface (API). At Moog, he oversees the development of Moog's space components product line. He teaches an advanced design integration graduate course at CSUN which includes topics taught this workshop. He received his Master's Degree in Mechanical Engineering at CSUN, where his Master's Project focused on "Automation of the CAD Design of a positive Displacement Pump" using the integration of SolidWorks and Excel. In his project, he developed the concept of using the Excel platform to command, control and communicate design parameters to Excel.

## **Audience**

This workshop requires advance knowledge of SolidWorks and Excel VBA. Design engineers using CAD programs find these courses immediately useful, practical and eye-opening. Participants should have a computer background including basic keyboard and Excel skills.

## **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 workshop examples; and selected SpreadsheetWorld Engineering XLToolboxes. Workshop attendees receive free updates on selected software for 5 years. Participants also receive a copy of Computational VBA, which is written by SpreadsheetWorld.

## **Computer Requirements**

**Attendees must bring their own laptop** and have a complete installation of Excel and SolidWorks, 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.

## **Outline**

### **Overview of SolidWorks Environment**

- SolidWorks API Overview
- SolidWorks VBA Menu
- SolidWorks Macros and Microsoft VBA Overview
- SolidWorks API Standalone and Add-in Applications Overview
- SolidWorks API Object Model Overview
- ModelDoc2 Object
- OLE applications
- PartDoc Object
- AssemblyDoc Object
- DrawingDoc Object

### **Overview of Excel Environment**

- The central role of VBA in Excel
- The Excel VBA application object library
- Excel menus and toolbar objects
- Setting application level preferences
- Forms for simple worksheet user interface
- Using the VBA Recorder

### **Visual Basic for Applications (VBA)**

- Objects
- Properties
- Methods
- Events
- Procedure
- Data Types
- Option Explicit
- Overview of VBA Editor Windows
- Debugging
- VBA Statements
- Data Properties
- CreateObject function
- Array Function
- String Concatenation
- Loops
- InputBox and Message Box Functions

### **Using the SolidWorks Macro Recorder**

- Marco Recorder Introduction
- Marco Tool Bar
- Cylinder Example
- Run SolidWorks Macro
- Edit or Debug SolidWorks Macro
- Assign SolidWorks Macro to Button
- Assign SolidWorks Macro to Shortcut Key
- Angle Bracket Example

### **Assigning Material Properties**

- Example 1: Assigning Materials Properties to Parts
- Example 2: Assigning Material Properties to Assemblies
- Example 3: Materials Editor PropertyManager

### **Model Dimension using Excel VBA**

- Section Overview
- Cylinder Example
- Box Assembly Example

### **Custom Properties**

- Summary information
- Setting Properties
- Modifying Properties
- Add and Delete Properties

### **Importing Data From Excel or a Text File**

- Working with Excel
- 3Dcurves

### **Automating the Solid Model Process**

- Creating a model
- User - forms

### **Model Editing**

- Editing a Part Document with Known Features
- Traversal Editing

### **Drawing Automation**

- Introduction
- Creating Drawings
- Accessing Directory Information

# 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 computer-aided-engineering. For the past 15 years he has worked extensively in the areas of systems design, simulation and optimization using the Excel Structured Spreadsheet environment. In 1995, he extended his efforts to industry by launching his popular hands-on workshop on **Spreadsheet Aided Engineering**, which has now been taught over 150 times to engineers from over 150 companies worldwide. Alumni from these workshops exceed 2,500 engineers. This workshop is offered on a regular basis at over 30 companies. Dr. Mincer founded SpreadsheetWorld to extend the training services to include development of a high quality line of engineering XLToolboxes, and process consulting services to enhance the implementation of the best practices and methods taught in his workshops for individuals and teams.



**David R. McDaniel, M.S.**, Vice President, Applications Development, SpreadsheetWorld, Inc. and former Asst. Professor of Aeronautic, U.S. Air Force Academy. 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](http://www.peinternational.com/576)



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## 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

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Registration Online



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## 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
- **US 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**  
Hanover, 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](http://www.spreadsheetworld.com/Roark) for details!**

**Course:** SolidWorks/Excel Integration using VBA-API  
**Date:** November 13-15, 2006  
**City/Number:** Los Angeles, CA/1844.01  
**Fee:** \$1795  
**Time:** 8:30 a.m. - 4:30 p.m.  
**Units:** 2.1 CEUs

<b>Course:</b> <u>Spreadsheet Aided Engineering</u>	<u>Spreadsheet Aided Engineering</u>	<u>Spreadsheet Aided Engineering</u>
<b>Date:</b> October 30-November 3, 2006	January 15-19, 2007	June 18-22, 2007
<b>City/Number:</b> Los Angeles, CA/576.214	S. Lake Tahoe, CA/576.207	Mackinac Island, MI/576.213
<b>Fee:</b> \$2495	\$2495	\$2495
<b>Time:</b> 8:30 a.m.—4:30 p.m. (M-Th) 8:30 a.m.—12:00 p.m. (F)	7:00 a.m.—12:00 p.m. & 5:00 p.m.—7:00 p.m. (M-Th) 7:00 a.m.—12:00 p.m. (F)	7:00 a.m.—12:00 p.m. & 5:00 p.m.—7:00 p.m. (M-Th) 7:00 a.m.—12:00 p.m. (F)
<b>Units:</b> 3.5 CEUs	3.5 CEUs	3.5 CEUs

**Course Fee and Payment:** *SolidWorks/Excel Integration using VBA-API:* \$1,795/student; *Spreadsheet Aided Engineering:* \$2,495/student (\$1,995 for on-site members). Fee includes tuition, course materials and refreshments. Checks or purchase orders should be made payable to *Professional Education International*. Major credit cards are accepted.

### **Discounts:**

**Group:** Available when registered as a group and requested in advance: 3-5=10%, 6-10=20%, 11+=30%.

**Full-time Faculty, Graduate Students and Small Business:** 50%

**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.

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Spreadsheet Aided Engineering	10/30-11/03, 2006 01/15-01/19, 2007 06/18-06/22, 2007	Los Angeles, CA S. Lake Tahoe, CA Mackinac Island, MI
Advanced Spreadsheet Aided Engineering	03/05-03/07, 2007	Los Angeles, CA
SolidWorks/Excel Integration using VBA-API	11/13-11/15, 2006	Los Angeles, CA
Spreadsheet Aided Data Plotting & Analysis	10/02-10/04, 2006	Los Angeles, CA
Design & Development of Auto A/C Systems	10/16-10/17, 2006 04/23-04/24, 2007	Pontiac, MI Southfield, MI
Design & Development of Auto Engine Cooling Systems	10/18-10/19, 2006 04/25-04/26, 2007	Pontiac, MI Southfield, MI
Explosive Technology and Modeling	10/02-10/06, 2006	Santa Fe, NM