



# A Short Introduction to API: Notes from SolidWorks World 2008

Thomas Allsup  
May 20, 2008

# Thomas Allsup

- Graduated High School from Collinsville, OK – **Go Cardinals!**
- Received BSME from Oklahoma State University - **Go Cowboys!**
- Received MSME from University of Texas at Arlington – **Go Mavericks!**
- Ended two PhDs in Mechanical Engineering from UTA and General Engineering PhD from Kennedy Western University – both ABD.
- Twenty-one years as a design engineer in consumer products, semiconductor devices, and burn-in sockets.

# How Does He Get to Be Qualified as “Regional”?

- Live and work in Dallas.
- Play on Lake Hudson.
  - North of Pryor
  - 2 Miles South of Strang



# SolidWorks World 2008

- Christie Reed, North Texas SolidWorks Users Group Chapter president, couldn't attend this past SolidWorks World so I was able to attend in her absence.
- It was my first SolidWorks World.
  - ***It will certainly not be my last.***
- In over twenty years of attending and participating in technical seminars, this was by far the best!

VIEW FROM POINT LOMA



SolidWorks World  
2008 San Diego



CORONADO



VIEW FROM POINT LOMA



# SolidWorks World 2009

- February 8-11th, 2009
- The Walt Disney World - Swan and Dolphin - Orlando, FL



# SolidWorks World 2008 Notes

- Upon my return, I wrote three pages of notes covering all aspects of the seminar.
  - *On advice of legal council, I did not include anything about the block party where they closed down three downtown San Diego blocks and gave out free food, beer, and wine one night.*
- If anyone needs a copy of my notes, go to our website:



# Stolen Information

- Slides in this presentation with an orange background come from SW World presentations.
- All these presentations are now available for download.
- If you attended the show, you were emailed a login password.
- If you didn't attend, go to your customer portal.

How to Spell API

Application

Programming

Interface

# Why Program SolidWorks?

- *Need something simple but repetitive done?*
- *Need something complex with multiple steps done a couple times?*
- *Need consistency?*
- *Need to show off?*
- **If you answered yes to any of the above questions then you need to program SolidWorks.**



"I THINK WE MIGHT HAVE TROUBLE WITH THE NEW GUY"

# SolidWorks – Official Training

- API Fundamentals
- Length: 3 days
- Prerequisites: SolidWorks Essentials, Visual Basic programming.
- Description: API Fundamentals teaches you how to use the SolidWorks API to automate and customize SolidWorks.

*Ebay has the notes from this class for about \$30.*

# Visual Basic?

- Whether it is VBA, VB6 or VB.NET, Visual Basic is a Windows based programming language with a very short learning curve.
  - Unfortunately that learning curve is still longer than this presentation.
- The majority of the controls are built in and only need to be dragged onto a form and have a few properties set.

# How to Spell VBA

Visual

Basic

Application

*Built into SolidWorks allowing  
you to edit Macros!*

# API Download

- It is worth mentioning that the API is free and comes with SolidWorks but the documentation does not install with SolidWorks.
- If you are going to program anything in SolidWorks, go the SolidWorks website and download the API documentation.
- Each year has an API Help File for Regular SolidWorks and Edrawings.

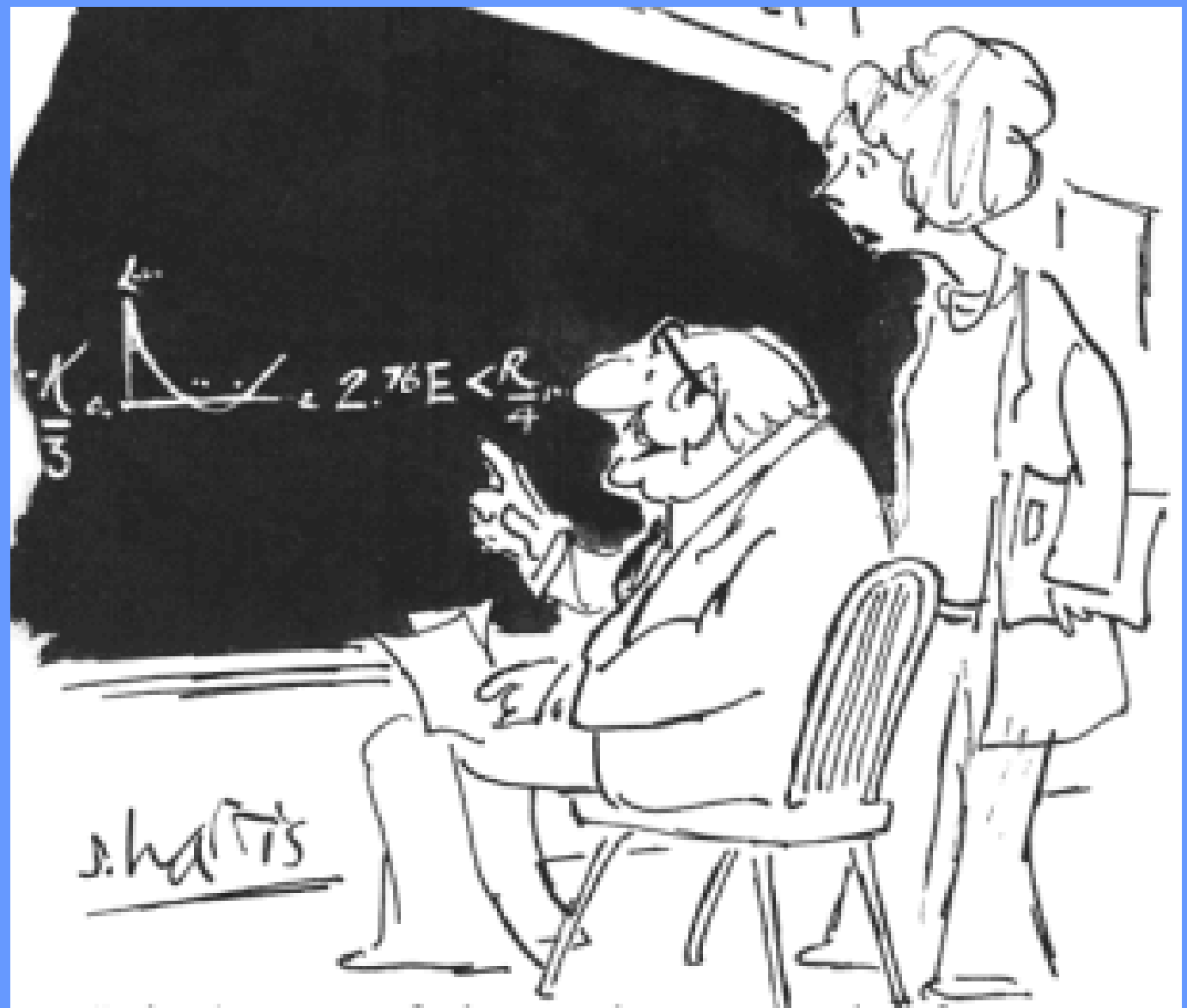


# File Types Through The Ages

- Old macro files had an .swb file extension and were text files.
  - *b is usually for binary but not here!*
- Starting with SolidWorks 2001, macros are saved with a .swp extension and are Visual Basic for Applications (VBA) project files that cannot be edited with a simple text editor.

# Visual Basic Training

- If you can read and learn on your own there are a lot of great books including ***VB Programming in 24 Hours***.
- If you prefer some instruction there are some good canned DVD training programs such as Knowledge Base.
- If you need an instructor, check out your local junior college for a night or weekend class.



*"The beauty of this is that it is only of theoretical importance, and there is no way it can be of any practical use whatsoever."*

# How I Learned SolidWorks Programming

- I've programmed computers since I was a teenager: Assembly, Basic, C, Lisp...
- I've programmed Visual Basic for over 10 years.
- I went to SolidWorks World 2008.
- I purchased the API Fundamental training manual on Ebay.
- I downloaded the API Help file.
- Jumped in, head first...

# Remember Macros

- A **macro** in computer science or **macro-instruction** is the idea to make available to the user a sequence of computing instructions as a single program statement or keystroke, making the task less tedious and less error-prone.
- Anyone recognize – **Control S: ESC – ESC – F1 – F1 – RETURN**? Cadkey Macro to save part.
- Anyone remember AutoCAD scripts?

# Dumb Macros?

- More accurately, macros are ignorant.
- Most macros simply repeat the keystrokes or commands as they are recorded.
- If the system is ready for the macro to run, great, if not, then too bad for the user, also too bad if an error occurs while the macro is running.
- ***But wait, we use SolidWorks which is anything but dumb!***

# SolidWorks Macros

- Under Tools, there is the “simple” Macro command.
- Use Edit or Run to load existing macros.
- New starts a new macro.
- Record turns on and off the command and mouse movements.



# SolidWorks API Demystified

**Lenny's SolidWorks Resources:**

**<http://www.LennyWorks.com/SolidWorks>**

**Blog:**

**<http://designsmarter.typepad.com/lennyworks/>**

Leonard Kikstra

Designer / CAD Administrator

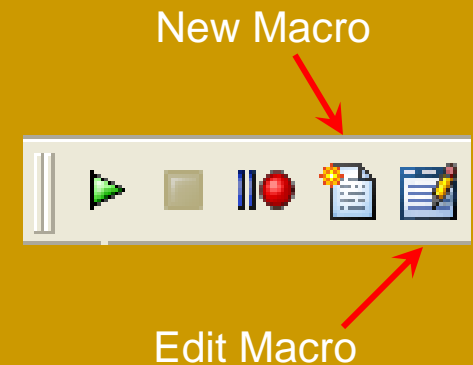
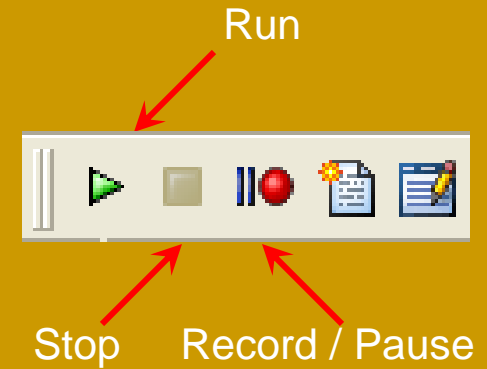
RITE-HITE Products Corp.

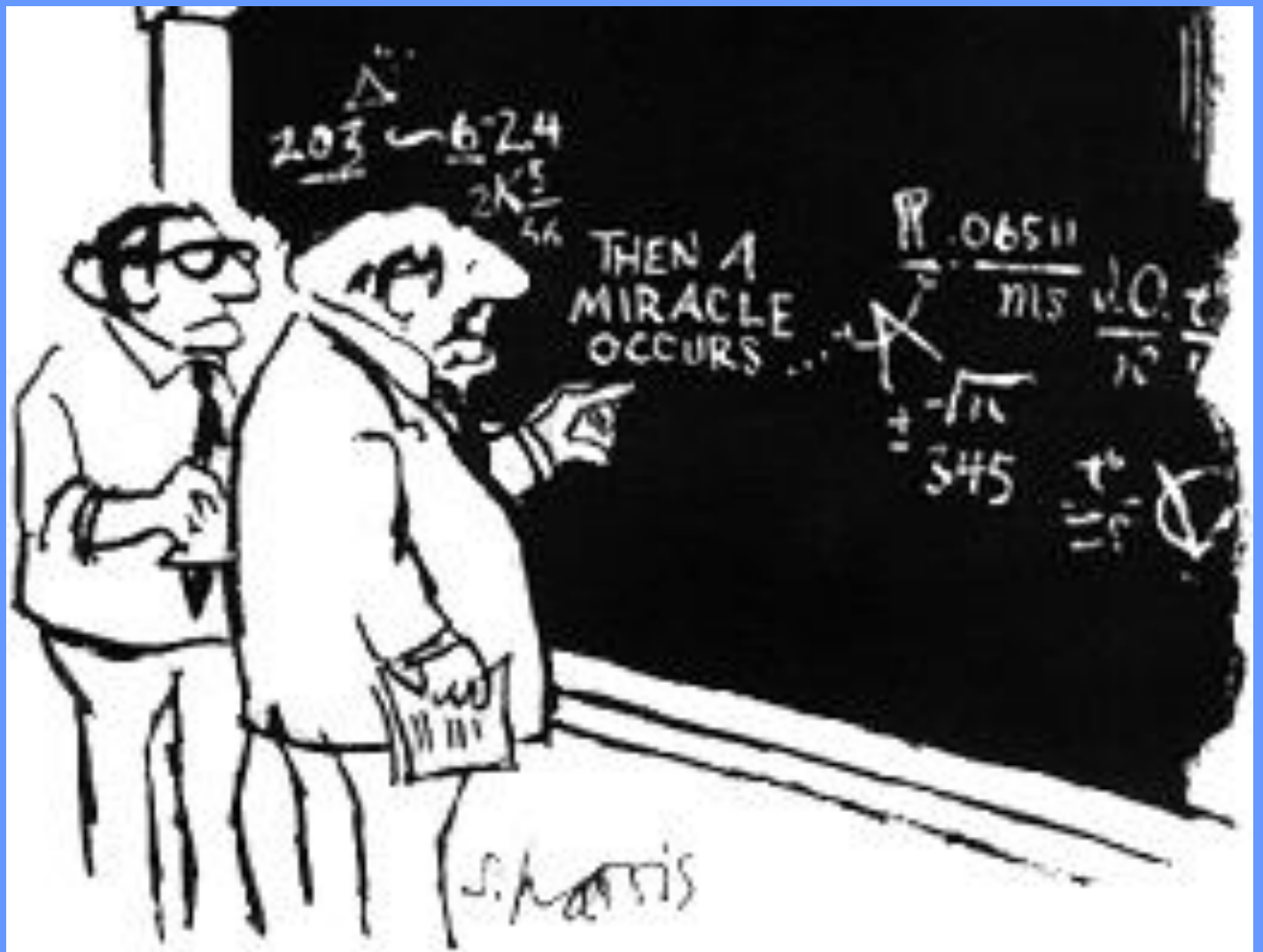
Milwaukee, WI



# Macro Toolbar

- Running a macro
  - Tools, Macro, Run.
  - Select macro.
  - Macro will automatically run.
- Record a macro
  - Tools, Macro, Record.
  - Complete tasks.
  - Pause macro recorder if needed.
  - Stop recorder and save new macro.
  - Source for learning about object and their properties.





"I think you should be more explicit here in step two."

# Somebody Should Have Told Me

- There's a cute little "***bug***", I mean ***feature***, that SolidWorks lets you save, run, and edit Macros in any directory including network drives but you can't add assign Macros to keys or add them to menus unless they reside in a user created directory called "Macros" under your SolidWorks program.
- Once you create this directory and move all your macros, assign away!!!
  - Tools->Customize->Keyboard or Menu

# Macros For Everyone: Part I

Clint Hudson  
Vermeer Corporation

**Clint Hudson**  
**1210 Vermeer Road East**  
**Pella, IA 50219**  
**641-621-7922**  
**[chudson@vermeer.com](mailto:chudson@vermeer.com)**

# Project #1: DXF Maker

- Big picture
  - We want to have a drawing of sheet metal part on the screen
  - Click a button and get a DXF of the part in a specific folder
  - Little to no interaction
- The details
  - From an existing drawing, create another drawing
  - Create a flat view of the part from the existing drawing on the new drawing
  - Save the drawing as a DXF with the same name in a specific location
  - Close the new drawing

# What the macro recorded

```
Dim swApp As Object
Dim Part As Object
Dim SelMgr As Object
Dim boolstatus As Boolean
Dim longstatus As Long, longwarnings As Long
Dim Feature As Object
Sub main()
Set swApp = Application.SldWorks
Set Part = swApp.ActiveDoc
Set SelMgr = Part.SelectionManager
swApp.ActiveDoc.ActiveView.FrameLeft = 0
swApp.ActiveDoc.ActiveView.FrameTop = 0
swApp.ActiveDoc.ActiveView.FrameState = 1
Set Part = swApp.NewDocument("S:\Titleblocks\drawing.drwdot", 2, 0.2794, 0.4318)
Set Part = swApp.ActivateDoc2("Draw4 - Sheet1", False, longstatus)
Dim DrawView As Object
Part.CreateFlatPatternViewFromModelView
    "H:\Projects\SolidWorksWorld2008\Presentation\6-SocketOutlet.SLDPRT", "Default",
    0.1092046641509, 0.1470487471698, 0
boolstatus = Part.Extension.SelectByID2("Drawing View1", "DRAWINGVIEW", 0, 0, 0,
    False, 0, Nothing, 0)
boolstatus = Part.ActivateView("Drawing View1")
Part.ClearSelection2 True
boolstatus = Part.SetUserPreferenceToggle(196, False)
boolstatus = Part.Extension.SelectByID2("Annotations", "DCABINET", 0, 0, 0, False, 0,
    Nothing, 0)
Part.ClearSelection2 True
Part.SaveAs2 "H:\Projects\SolidWorksWorld2008\Presentation\6-SocketOutlet.DXF", 0,
    True, False
Set Part = Nothing
swApp.CloseDoc "6-SocketOutlet - Sheet1"
swApp.ActiveDoc.ActiveView.FrameLeft = 0
swApp.ActiveDoc.ActiveView.FrameTop = 0
swApp.ActiveDoc.ActiveView.FrameState = 1
Set Part = swApp.ActivateDoc2("6-SocketOutlet - Sheet1", False, longstatus)
End Sub
```



THE PIECE OF STRING REDUCED THE  
NUMBER OF TIMES JIM MISLAID  
HIS CORDLESS MOUSE

# Mouse Movements?

- Something very different with SolidWorks macros is that recording SolidWorks macros records most commands and mouse picks and movements.
- This recording feature adds a lot of power to the SolidWorks macros but it also causes some issues.



# Split Camps

- Most of the API programmers at SWWorld 2008 thought using the record command was a great way to start macros.
  - Comments of heavy editing to remove view changes, spins, and lots of extra selection were common.
- A vocal minority of programmers said that macros should be written by hand without using the record button.
  - This may be good for professional programmers but not for the rest of us.

# Things to Remove in Macros #1

- Unless you are making a macro that watches your part or assembly spinning around, look for and delete these commands like:  
“Part.ActiveView().RotateAboutCenter  
XXXX,YYYY”.
- You will see a lot of these in a self recorded macro.

# Things to Remove in Macros #2

- Look for extra “ClearSelection” that have a SelectByID or SelectByMark immediately afterward.
- You will see a lot of SelectByID if you select faces and edges in your macros.

# Things to Remove in Macros #3

- Look for and probably delete all:
  - Part.ActiveView().ZoomByFactor ###
  - Part.ShowNamedView2 “\*\$\$\$\$”,#
  - Part.ViewZoomToSelection
  - Part.ViewDisplayShadedWithEdges
  - Part.ActiveView().TranslateBy -#####,#####
- These will appear in your macro if you change views while you are recording.

# Things to Add to Macros #1

- COMMENTS
- **COMMENTS**
- ***COMMENTS***
- Did I forget anything?
- You can add comments by placing an apostrophe anywhere on a line and anything to the right is a comment.

# Things to Add to Macros #2

- User Forms are extremely difficult to add to macros.
  - Step 1: Insert User Form
  - Step 2: Drag controls onto User Form
  - Step 3: Add Form.Show to Main routine so form will appear when macro is run.
- Ok, so it isn't very hard at all, but I did skip step 2B which is to program the controls which can be difficult and step 3B which is add a corresponding Form.Hide when you are done.

# Things to Add to Macros #3

- If all you are trying to do is notify the user that something happened then maybe don't add an entire form but use the MsgBox command – Message Box.
- This command is easy:
  - MsgBox("This command is easy.")
  - You can concatenate variables to the output as well with "&".
- It displays the message on the screen with a built in "OK" box to close it.
- I use MsgBox to debug programs.

# MsgBox Enhancements

- Message Box can have some other parameters and pass a response back to the program:
- `Results=MsgBox(Msg, Style, Title)`
- Style indicates what buttons appear (see `SendMsgToUser2`).
- Title is the little message windows title.



# Things to Add to Macros #4

- ***How about a smarter MsgBox?***
- result = SldWorks.SendMsgToUser2 ( message, icon, buttons )
- Message is the same as MsgBox
- Icon is a symbol to the left of the message box:
  - swMbWarning - Exclamation-point (!)
  - swMbQuestion - Question-mark (?)
  - swMbInformation - i in circle
  - swMbStop - Stop-sign
- Buttons that appear in Message Box
  - swMbAbortRetryIgnore-Abort,Retry,&Ignore
  - swMbRetryCancel - Retry & Cancel
  - swMbYesNoCancel - Yes, No, & Cancel
  - swMbOk - OK
  - swMbOkCancel-OK&Cancel
  - swMbYesNo - Yes and No
- Result is which button is clicked:
  - swMbHitAbort - Abort
  - swMbHitNo - No
  - swMbHitRetry - Retry
  - swMbHitCancel - Cancel
  - swMbHitIgnore - Ignore
  - swMbHitOk - OK
  - swMbHitYes - Yes



"NO, IT ISN'T THE LATEST FLAT SCREEN  
TECHNOLOGY - IT'S A WINDOW"

# Things to Look For When Writing Macros #1

- You will notice that “old” commands seem to never die in SolidWorks.
- If a command needs to change then SolidWorks will add a number to it but leaves the original.
  - Previously written macros continue to work for years.
- Examples:
  - CircleCircleByRadius2
  - SendMsgToUser2
  - SelectbyID2
  - InsertSketch2
  - AddCustomInfo3 (there are three versions of this command)

# Things to Look For When Writing Macros #2

- Assigning your new macro to a key is super easy as we have already seen but you can also add new Macro Buttons.
- The hardest part here is going to Paint and creating a 16x16 bitmap to use as your icon – it's a kind of magic.
- Tools->Customize->Commands->Macro->Add New Macro which lets you drag a New Macro onto any tool bar.
- To delete the new button simply drag it back to the command area.

# Macros for Everyone: Part II

Clint Hudson

Vermeer Corporation

# Programs can include neat stuff!

- Your programs can make decisions
  - Conditionals
- Your programs can perform repetitive operations
  - Loops
- Your programs can talk to the users
  - Message boxes
  - Input boxes
  - UserForms
- Your programs can re-use blocks of code
  - Functions
  - Procedures

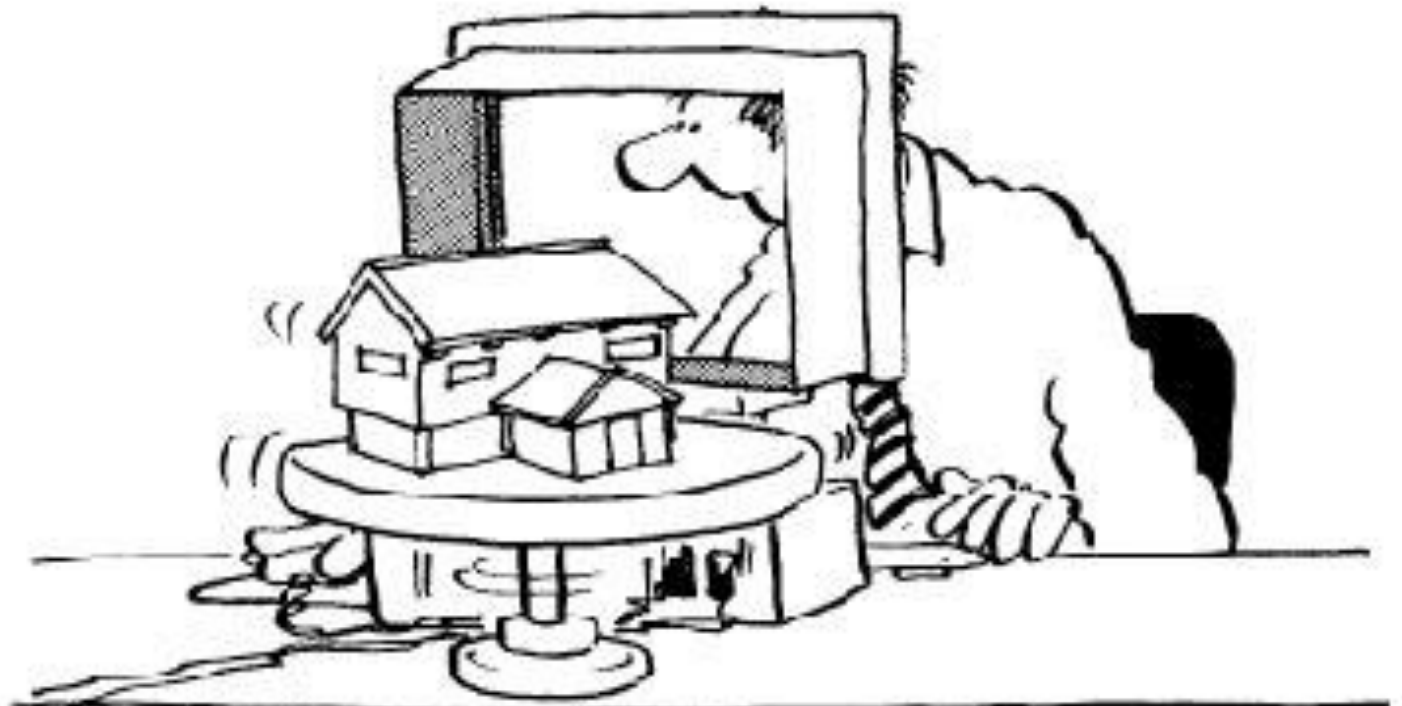
# Units

- Everything in SolidWorks macros is meters for length and radians for angles regardless of the units used in the parts, assemblies, or drawings.
  - You draw a 10 inch line in a part and then use it in a macro and the length in the macro is 0.251 meters.
- This causes a lot of conversions inside subroutines.

# Numbers

- False is zero.
- True is any number other than zero, usually 1 or -1 but can be any number other than 0.
- No selection or empty set is not zero, it is nil, null or specifically "".





PENWILL

ENTRY LEVEL 3D CAD

How to Spell SDK

Software

Development

Kit

*Free download from  
SolidWorks for SW and  
Edrawings*

# Why Do I Need the SDK?

- Download the SDK if you already program using Visual Suite and you want to create stand alone “add-in” programs.
- Visual Suite includes:
  - Microsoft Visual Basic.NET, Visual J# (Java), Visual C#, and Visual C++.
- Most simple Macro programmers never need the SDK.

# Two Odd Items

Two things popped up in several presentations at SolidWorks World 2008 and although they have nothing to do with the API, they are both real neat.

- **Cosmic Blobs**
- **Slots**

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FOR CREATIVE PROFESSIONALS  
THAT UTILIZES CUTTING-EDGE  
FREEFORM SURFACE TECHNOLOGY.

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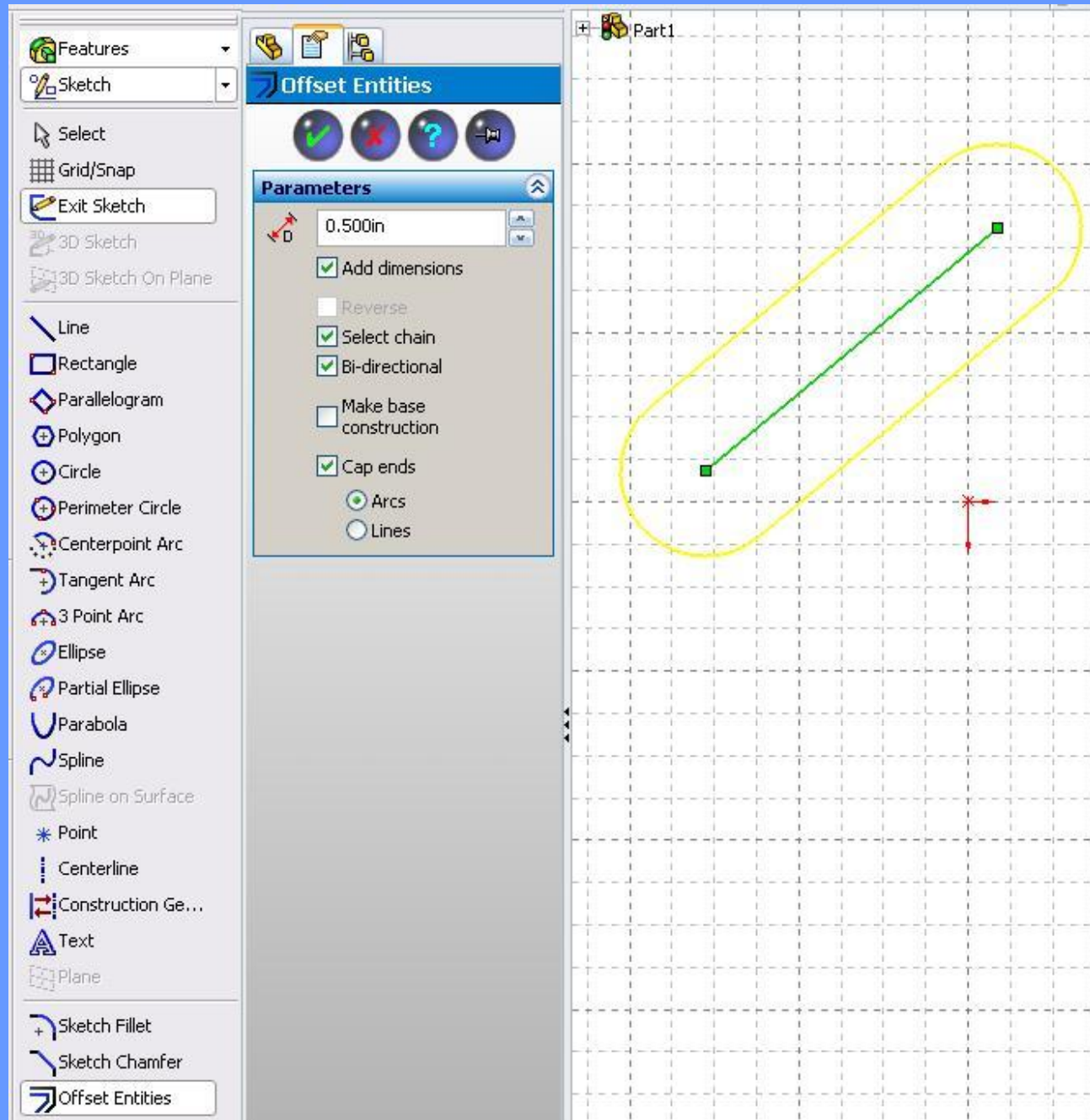
- 1 Clean, clear intuitive interface
- 2 Simple, precise tools enabling direct surface manipulation
- 3 Create realistic models and characters quicker and easier
- 4 Export output compatible with most popular programs



ACTUAL MODELING TIME: 2 HRS.

# Slot

- This sketch tool option popped up in several presentations including the modeling test: Model Mania
- Make sure you select “Make base construction” to change original sketch to a construction line so you can extrude or cut your slot.
- Works with contiguous lines and arcs but not splines.



# Iron Man



- Opened May 2, 2008.
- Hero.
- Mechanical Engineer.
- Well, as long as we're talking about wonderful super weapons let's go to the best presentation at SW World:

# Exploring the SolidWorks API from a Battleship

Bill Briggs

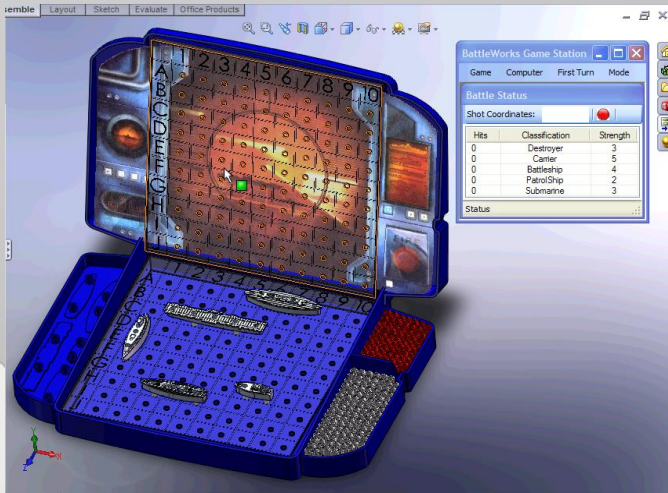
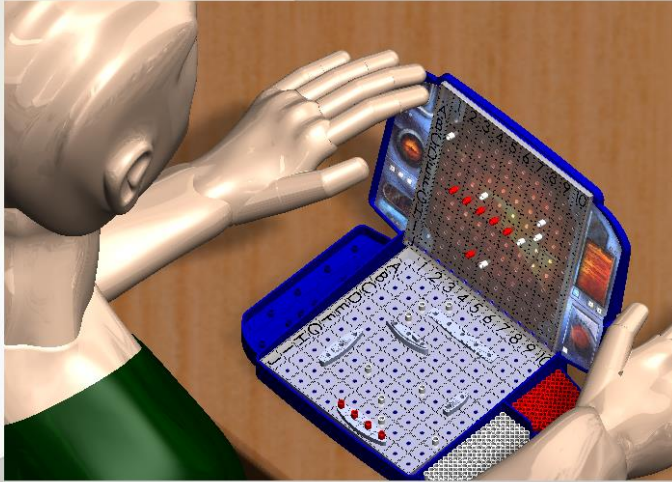
SolidWorks

SR Technical Support Engineer

January 22, 2008



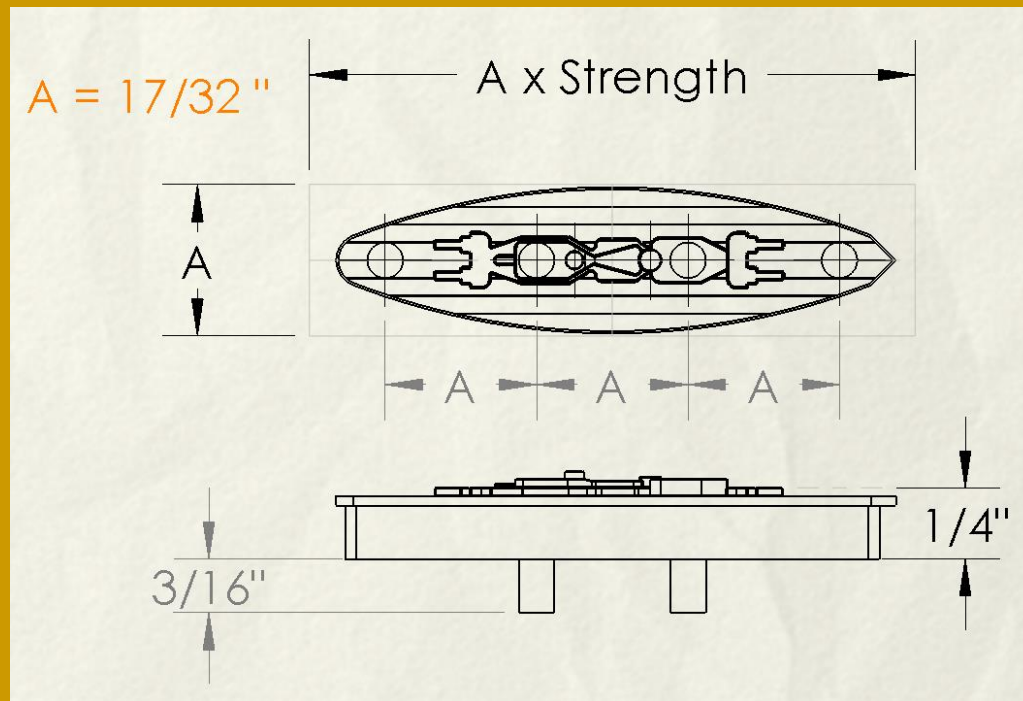
# SolidWorks For Fun



Battle Status		
Shot Coordinates:		
0	Destroyer	3
0	Carrier	5
0	Battleship	4
0	PatrolShip	2
0	Submarine	3
Status		

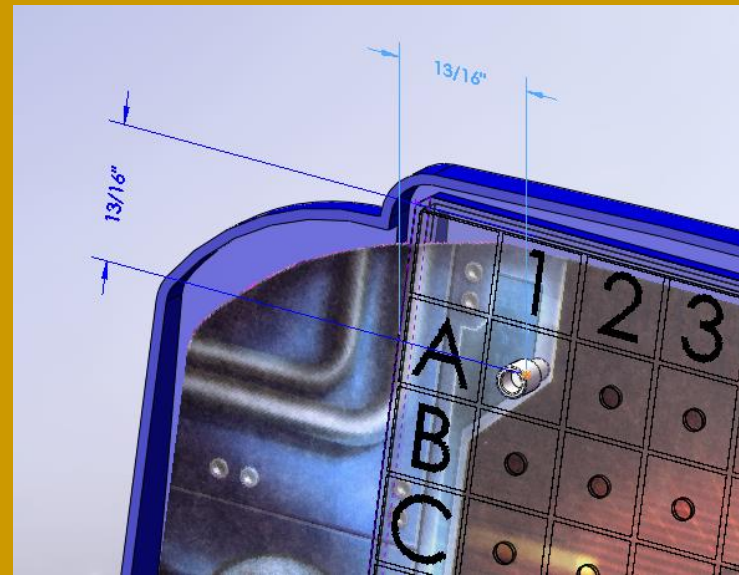
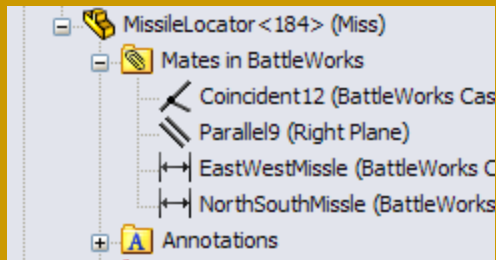
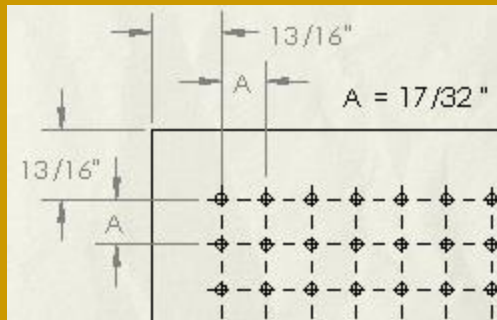
# Build the Ships

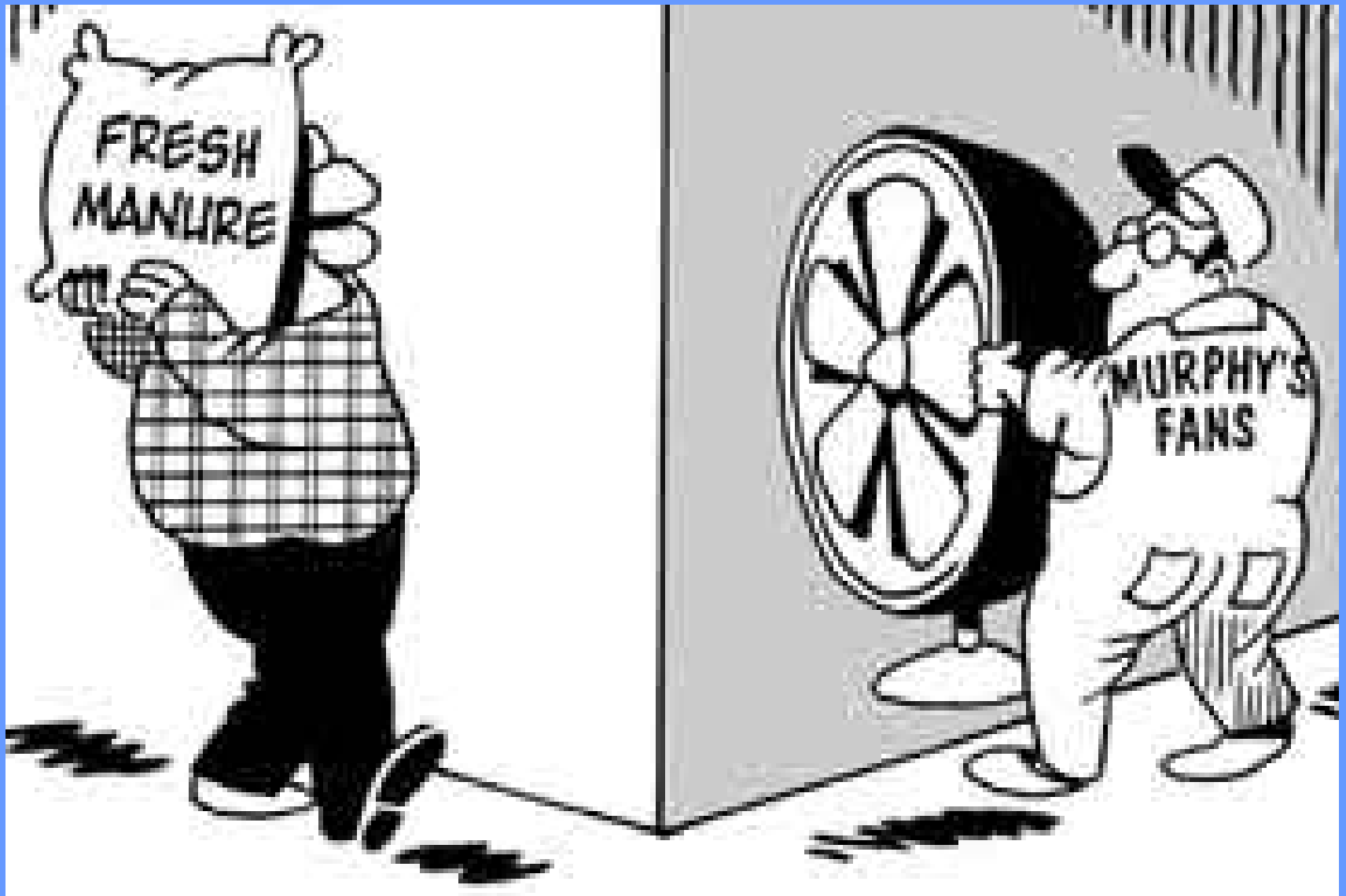
- Actual geometry of the ship does not affect game play
- For visual purposes, ship must fit within these parameters



# Construct the Battle Field

- Battle field grid size controls ship and shot placement
- Shots Placed using Translation from Missile Locator
- Opponent Shots Placed Mathematically





# QUESTIONS



# Thanks

- Please be careful getting home tonight.
- I hope to see you all at SolidWorks World 2009 in Florida!
- This presentation, the three page notes from SolidWorks World, and several One Minute Tip submissions can all be found at our website at [\*www.anidatech.com\*](http://www.anidatech.com).