TIM-125/225: MOT II Supply Chain Management

Getting Started with Visual Basic in Excel

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Table of Contents

Visual Basic Related Questions

1   Where can I find useful Visual Basic tutorials?

The tutorial below provide an elementary entry point, complete with pictures to the world of Visual Basic. They demonstrate how macros are made of *Subs*, which are subroutines in the program. If you are familiar with Java or C, this is similar to a *Method*.

Tutorial 1: Excel VBA Basic Tutorial 1
http://www.anthony-vba.kefra.com/vba/vbabasic1.htm
A very basic introduction that provides a good overview to using Visual Basic in Excel.

Tutorial 2: Programming In Excel VBA - An Introduction
http://www.jlathamsite.com/Teach/VBA/ProgrammingInExcelVBA_AnIntroduction.pdf
Another Introduction to VBA programming.

2   How do I open the Visual Basic Editor in Excel?

To start using Visual Basic open the Menu: *Tools* (Excel 2007) or **Developer Tab** (Excel 2010) → Macro → Visual Basic Editor.

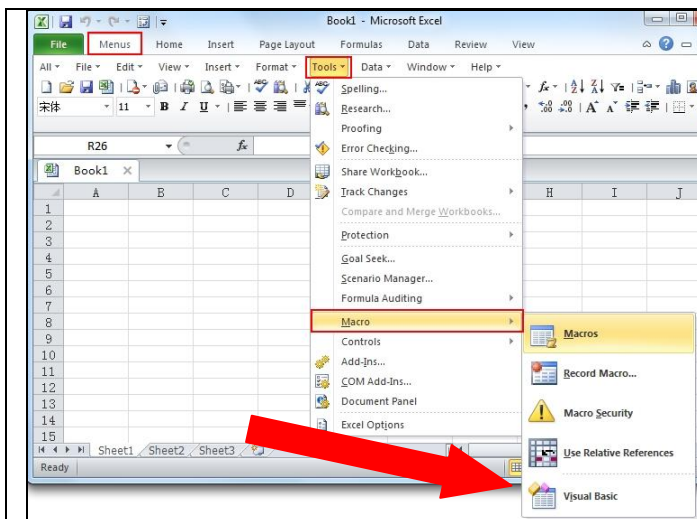 If the Developer Tab is not visible in the ribbon, follow the instructions here:
http://msdn.microsoft.com/en-us/library/bb608625.aspx

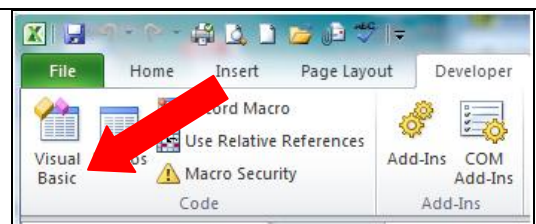**Figure 1: Excel 2007 Tools Menu**

Figure 2: Excel 2011 Developer Tab

Once you open the Visual Basic Editor, shown in Figure 3, on the left is the Project Browser. This has the different components of the program.
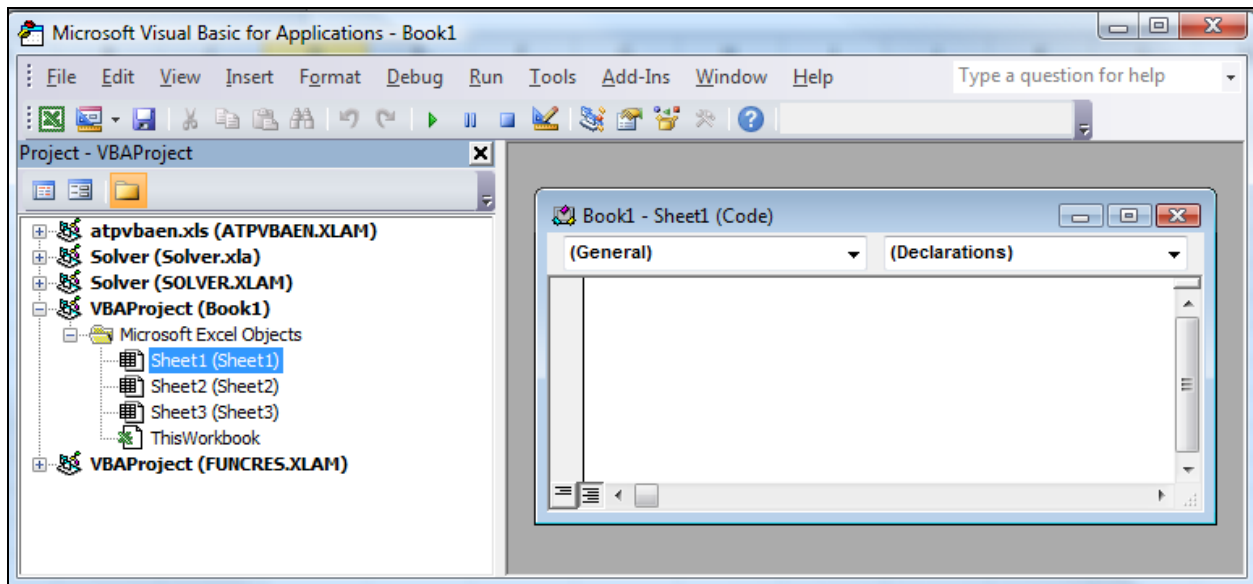
Figure 3: Microsoft Visual Basic for Application programming environment

To add a macro, double click on the sheet or workbook you wish to modify within the project browser window and a new module will open on the right side to enter your program code.

3 How to I program in the Visual Basic Editor

Type the following into the module as an example for the "Hello World":

```
Sub showMessage()
    MsgBox "Hello World"
End Sub
```


Figure 4: Example of how to program "Hello World" Example

To run this program go to the Run menu on the top menu bar and click on the Run Sub/UserForm (or you can click F5 on the keyboard).
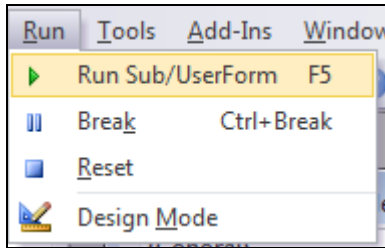
Figure 5: Running a Sub/UserForm

The program will display the phrase "Hello World" in a dialog box that pops up.
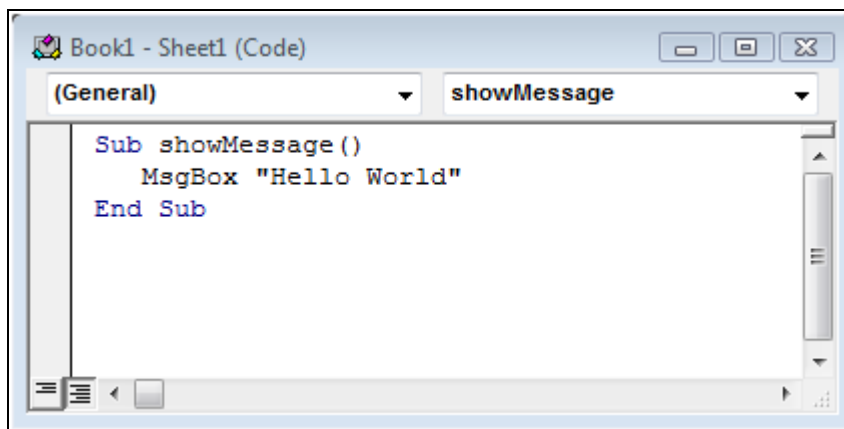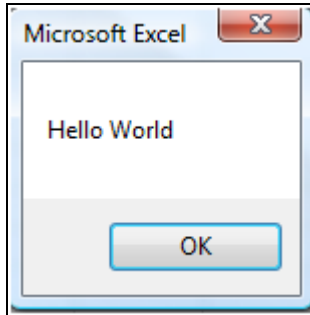

Figure 6: Hello World run from the macro program

See *Tutorial 1* for more detail.

4   How do I reference a cell in a workbook?

To reference a cell the Range command is used. See *Tutorial 1: Section 2* for more details.

5   How do I link a cell between two different Worksheets?

This is a good Youtube.com video to demonstrate this process:

Title: *Linking Cells in Separate Worksheets in Excel*
Uploaded by ExcelisHell on Aug 18, 2008
Website address: http://www.youtube.com/watch?v=pIleRzwQ_FU&feature=relmfu
The author shows you how to link between two worksheets in one excel workbook to share data.

6   How do I use Solver to perform an optimization?

For help programming Solver, please reference the built-in Help button, 🔵, within Excel usually located in the Top Right-Hand corner of the Excel Window. You can then search for keyword: solver. A hyperlinked article will appear which provides a good starting point.
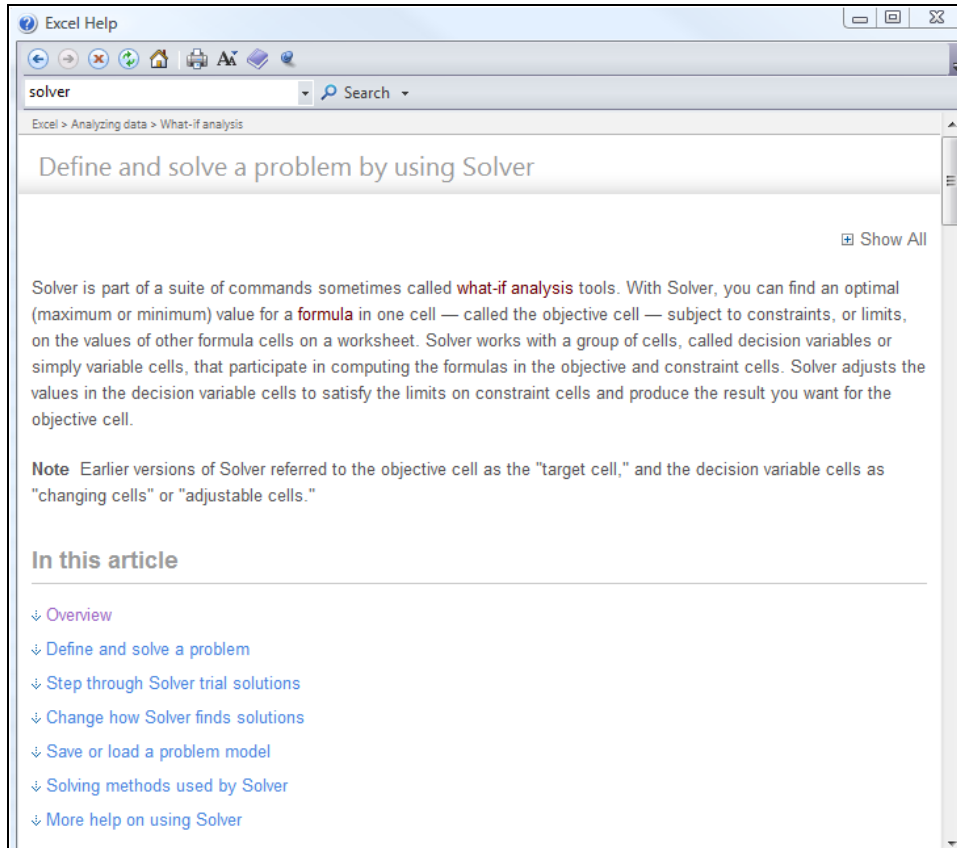
Figure 7: Excel Help for using Solver

You can watch this free youtube.com video tutorial:

> Title: *Using Excel Solver in Excel 2007*
> Uploaded by niftynei on Mar 7, 2010
> Website address: http://www.youtube.com/watch?v=YAugMpW-aJw
> The author shows you how to install and use Solver Add-In for Excel 2007 on PC/Windows.

Examples of Software from Previous Years

Here are sample screenshots from SCM software that was created in previous years.

1. *Example: Simple High-level GUI Showing Modules Available to the User*
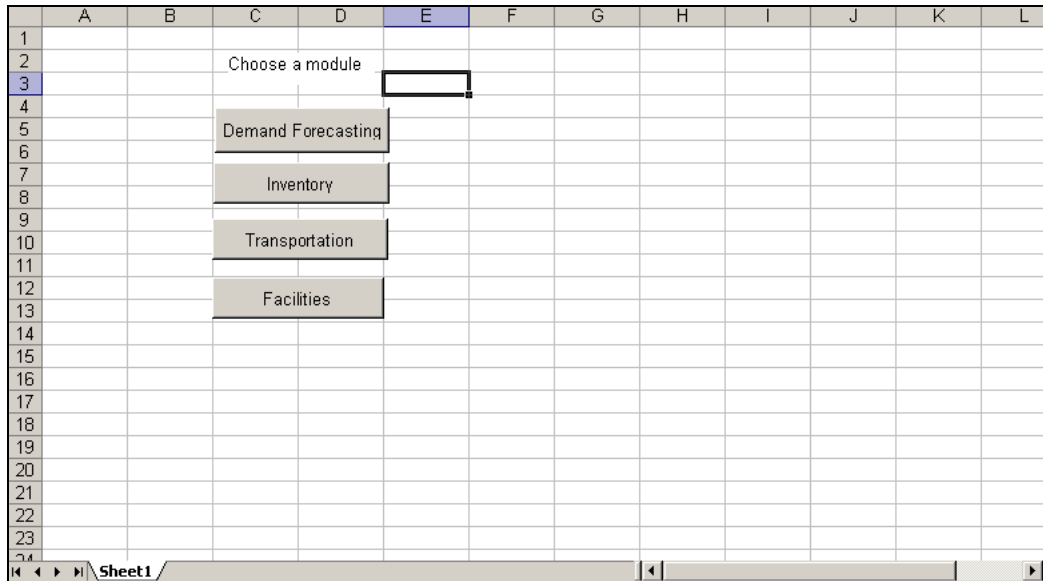
2. *Example: Intermediate Demand Forecasting GUI Showing Inputs By the User*

Figure 8: Intermediate Demand Forecasting GUI

Buttons are created on a Form to allow the user to select the different forecasting method.

Figure 9: Intermediate Simple Exponential Smoothing GUI

A form is created to allow the user to enter the numeric values for the number of periods and the smoothing constants for Alpha.

3. Example: Output: Demand Forecasting

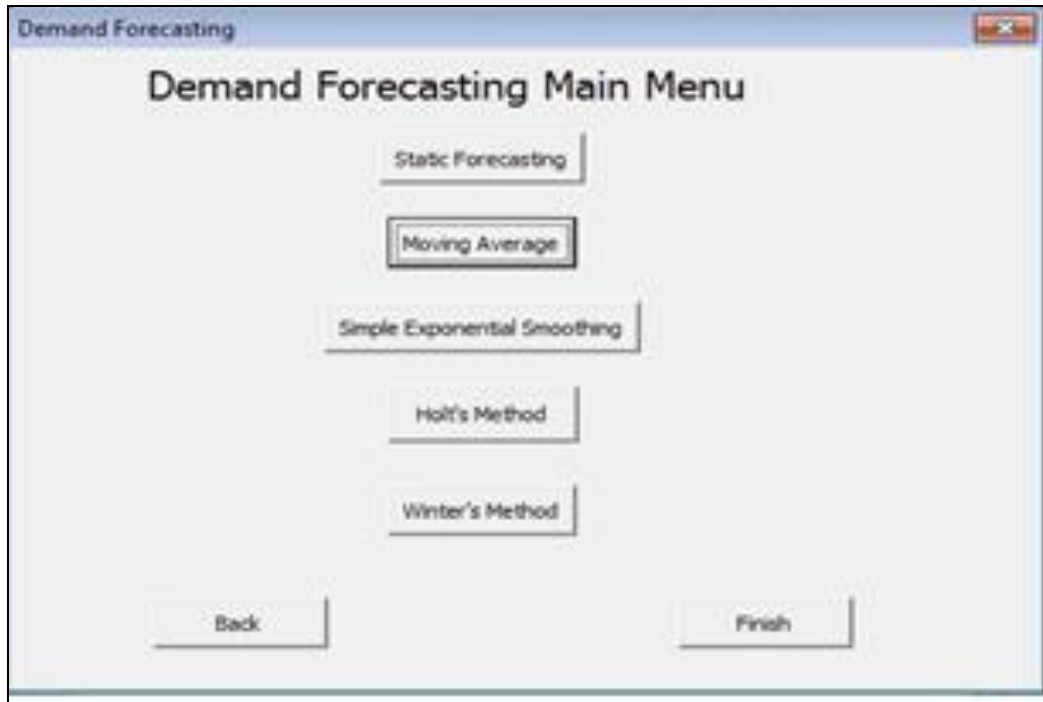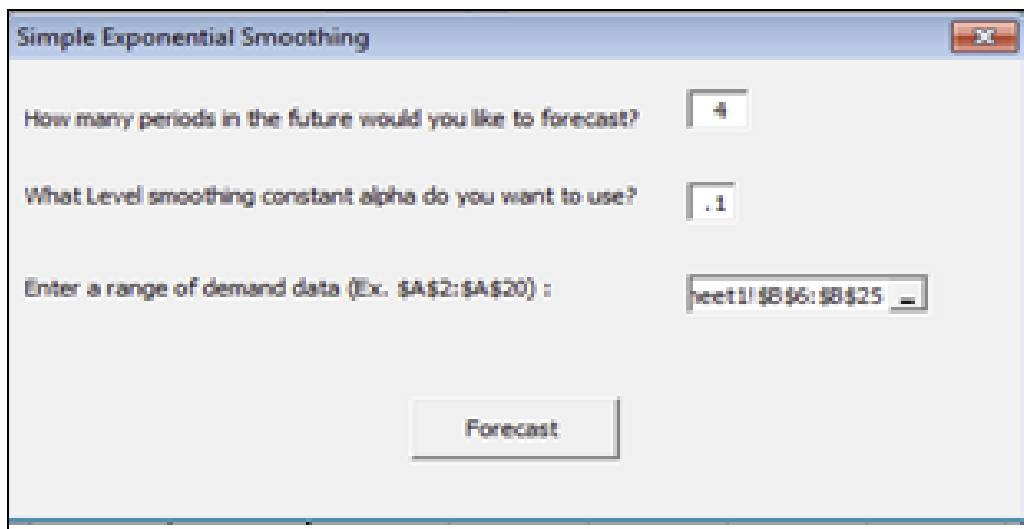|	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Periods	Demand	Level	Trend	Seasonal Factor	Forecast	Error	Absolute Error	MSE	MAD	% Error	MAPE	TS	
2	0		2,593	227										
3	1	2,250	2,788	224	0.90	2,535	285	285	81,326	285	13	12.67	1.00	
4	2	1,737	3,001	223	0.60	1,803	66	66	42,859	176	4	8.25	2.00	
5	3	2,412	3,247	225	0.70	2,248	-164	164	37,534	172	7	7.76	1.09	
6	4	7,269	3,529	231	1.80	6,249	-1,020	1,020	288,246	384	14	9.33	-2.17	
7	5	3,514	3,779	233	0.89	3,345	-169	169	236,282	341	5	8.42	-2.94	
8	6	2,143	3,969	228	0.60	2,394	251	251	207,362	326	12	8.97	-2.30	
9	7	3,459	4,271	236	0.70	2,946	-513	513	215,285	352	15	9.80	-3.58	
10	8	7,056	4,442	229	1.83	8,227	1,171	1,171	359,923	455	17	10.65	-0.20	
11	9	4,120	4,666	229	0.89	4,176	56	56	320,276	410	1	9.62	-0.09	
12	10	2,766	4,873	227	0.59	2,893	127	127	289,849	382	5	9.12	0.24	
13	11	2,556	4,948	211	0.71	3,634	1,078	1,078	369,186	445	42	12.12	2.62	
14	12	8,253	5,102	206	1.80	9,297	1,044	1,044	429,259	495	13	12.17	4.47	
15	13	5,491	5,392	214	0.89	4,738	-753	753	439,864	515	14	12.29	2.83	
16	14	4,382	5,789	232	0.59	3,300	-1,082	1,082	492,087	556	25	13.17	0.68	
17	15	4,315	6,042	234	0.69	4,174	-141	141	460,615	528	3	12.51	0.45	
18	16	12,035	6,324	239	1.78	11,195	-840	840	475,953	547	7	12.17	-1.10	
19	17	5,648	6,531	236	0.91	5,942	294	294	453,027	533	5	11.76	-0.58	
20	18	3,696	6,700	229	0.61	4,097	401	401	436,800	525	11	11.71	0.17	
21	19	4,843	6,933	230	0.70	4,817	-26	26	413,845	499	1	11.12	0.13	
22	20	13,097	7,176	231	1.80	12,861	-236	236	395,934	486	2	10.65	-0.35	
23	21				0.90	6,676								
24	22				0.60	4,584								
25	23				0.70	5,473								
26	24				1.80	14,568								
27														
28														
29														
30														

Figure 10: Simple Demand Forecasting Spreadsheet formatting

Simple, but clean, formatting for the Demand Forecasting output of the data.

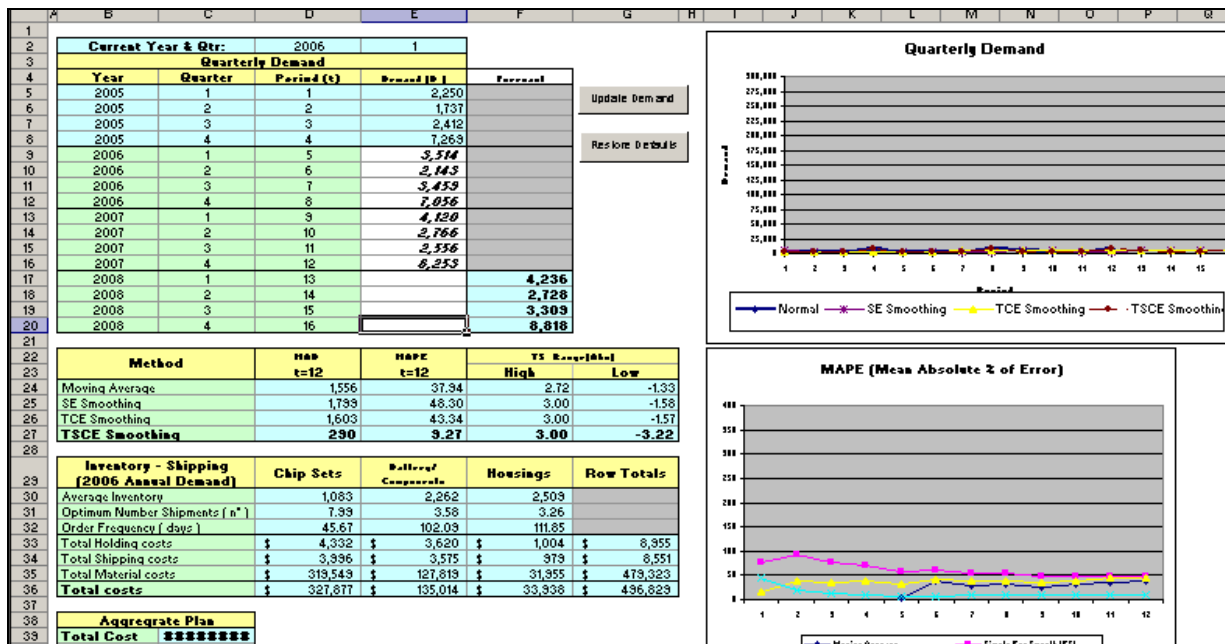## 4. Example: Alternative Output for Demand Forecasting

Figure 11: Alternative Output for Demand Forecasting

Cell formatting, colors, buttons, and auto-generated graphs.

However, can you spot what is right, and wrong, with the Quarterly Demand graph plots shown above?

5. Example: Advanced Main Level GUI

Figure 12: Advanced Main Level GUI Example

Example of a integerated main GUI control panel for Demand Forecasting, and the Inventory Management, Facilities Management, and the Transportation management.

BUTTON [1]: Upon Button click, the screen auto fits to the current maximize screen size.

BUTTON [2]: Upon Button Click, this button will print the entire Current Worksheet containing the results of the STEP 1, 2, 3 and 4.

BUTTON [3]: Upon Button click, a screen will open to allow the user to enter 24 months of Monthly Demand Data and the parameters of the Forecasting coefficients.

BUTTON [4]: Upon Button Click, the software will perform calculations based on the program code written. The results will be displayed in the Summary Results to the right with the Best Model determined by the Month 24 MAPE. The resulting demand will be displayed for the best model presented.

BUTTON [5]: Upon Button Click, this group of buttons will open and display the actual Excel Worksheets for each of the: Static. Each open sheet will also have an option to the return back to the MAIN or PRINT the selected sheet.

BUTTON [6]: Upon Button Click, this group of buttons will open and display the actual Excel Worksheets for each of: Moving Average. Each open sheet will also have an option to the return back to the MAIN or PRINT.

BUTTON [7]: Upon Button Click, this group of buttons will open and display the actual Excel Worksheets for each of the: Exponential. Each open sheet will also have an option to the return back to the MAIN or PRINT..

BUTTON [8]: Upon Button Click, this group of buttons will open and display the actual Excel Worksheets for each of the: Holt. Each open sheet will also have an option to the return back to the MAIN or PRINT.

BUTTON [9]: Upon Button Click, this group of buttons will open and display the actual Excel Worksheets for each of: Winter's. Each open sheet will also have an option to the return back to the MAIN or PRINT.

BUTTON [10]: Upon Button Click, this button will open the MS Excel worksheet that displays a complete summary of all the Forecasting techniques in one a page summary. On this opened sheet are available the option to the return back to the MAIN or PRINT.

BUTTON [11]: Upon Button Click, this button will open the MS Excel worksheet that displays a complete summary of all the Forecasting techniques in one a page summary.

BUTTON [12]: Upon Button Click, this button will open the MS Excel worksheet that has been determined to be the Optimal (Best) based on the lowest MAPE comparison.

BUTTON [13]: Upon Button Click, this button will clear the current data in the Demand Summary Results

BUTTON [14]: This is a ListBox selector. Upon Click on each list item, the *Model Selected* will be updated in the Summary Results: Model Selected cell. Though the Best Model has been calculated (STEP 1), this feature gives the user the ability to choose different Forecasting methods and experiment with the Inventory Management results.

BUTTON [19]: This is a data entry cell for whole numbers. The data entry should be for the Standard Deviation of the Weekly Demand. It is used to calculate the Safety Stock Inventory. Hit enter after typing in the value.

BUTTON [15]: This is a data entry cell for whole numbers in percentage format. The data entry should be the Holding Cost in terms of a percentage value. Hit enter after typing in the value.

BUTTON [16]: This is a data entry cell for the Per Unit Cost in dollars. Enter a dollar value. Hit enter after typing in the value.

BUTTON [17]: This is a data entry cell for the Common Order Cost ($) for each order. Enter a dollar value. Hit enter after typing in the value.

BUTTON [18]: This is a data entry cell for the CSL (%). Enter a percentage to represented the service level needed. Hit enter after typing in the value.

BUTTON [19]: This is a data entry cell for the Lead Time (weeks) Enter a whole number value. Hit enter after typing in the value.

BUTTON [20]: Upon Button Click, this button will compute all the variables based on the selected Forecasting method for the Inventory Management and display the results in the Summary table. To change the results, change a variable or choose a different an alternative forecasting method and click on Compute Inventory again.

BUTTON [21]: Upon Button Click, this button will clear the entire of Inventory Summary results

BUTTON [22]: Upon Button Click, this button will navigate to another worksheet to enter all the data and parameters needed for the Facilities Design computations.

BUTTON [23]: Upon Button Click, this button will automate the computation of Facilities design utilizing Solver Program for the optimization and will update the screen draw of the network.

BUTTON [24]: Upon Button Click, will open the with automatically generate a Network Design figure.

BUTTON [25]: Upon Button Click, this button will open the worksheet with the data results for the entire optimization of the Facilities design..

BUTTON [26]: Upon Button Click, will launch Risk Solver Platform for Monte Carlo Simulation analysis

BUTTON [27]: Upon Button Click, this button will clear the entire of Facilities Summary results

BUTTON [28]: Upon Button Click, this button will compute optimal Transportation results.

BUTTON [29]: Upon Button Click, open the Transportation management

BUTTON [30]: Upon Button Click, this button will clear the Transportation Management results.
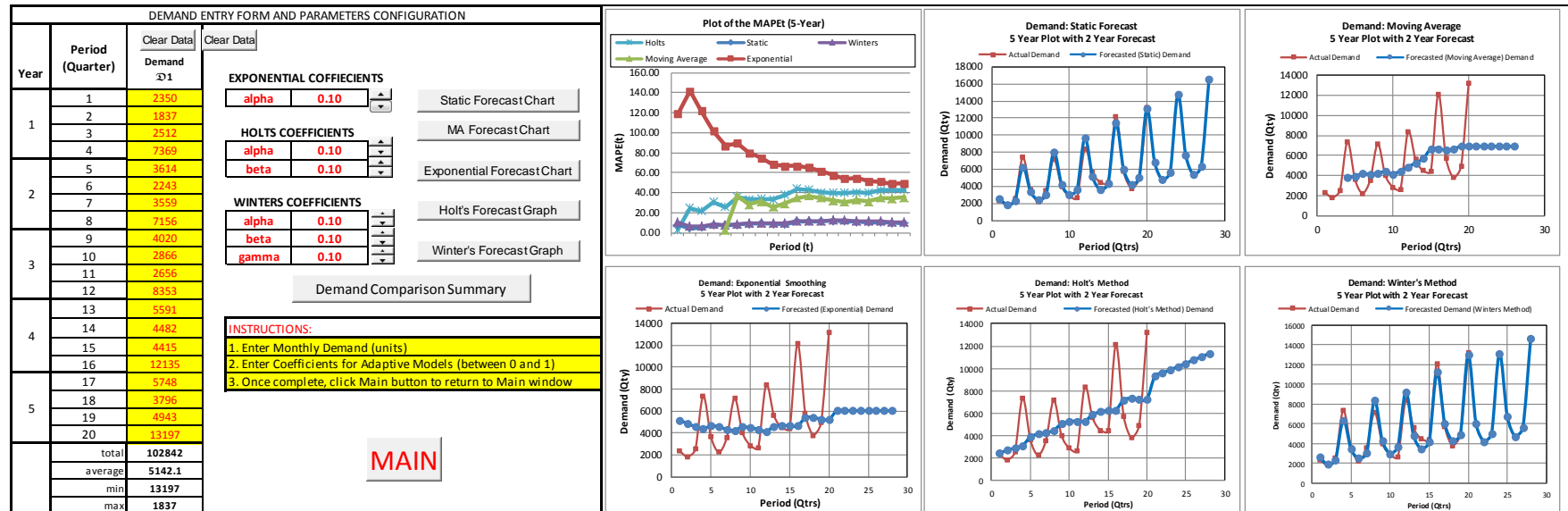
6. Example: Advanced Data Entry Input for User

Figure 13: Advanced Data Entry Input Example

In the example, shown in Figure 13, you can see that the smoothing coefficients are adjustable using the scroll bar Form control. Additionally, the miniaturized charts for each forecasting method are presented in a Dashboard Cockpit on the right side for immediate visual inspection upon adjustment of the Data or the smoothing coefficient. By presenting the Dashboard cockpit of the linked Charts, it helps to ensure the smoothing coefficients are optimal. Buttons are also added that link the worksheet to other worksheets for more expedient maneuvering between the worksheets and full-page charts.
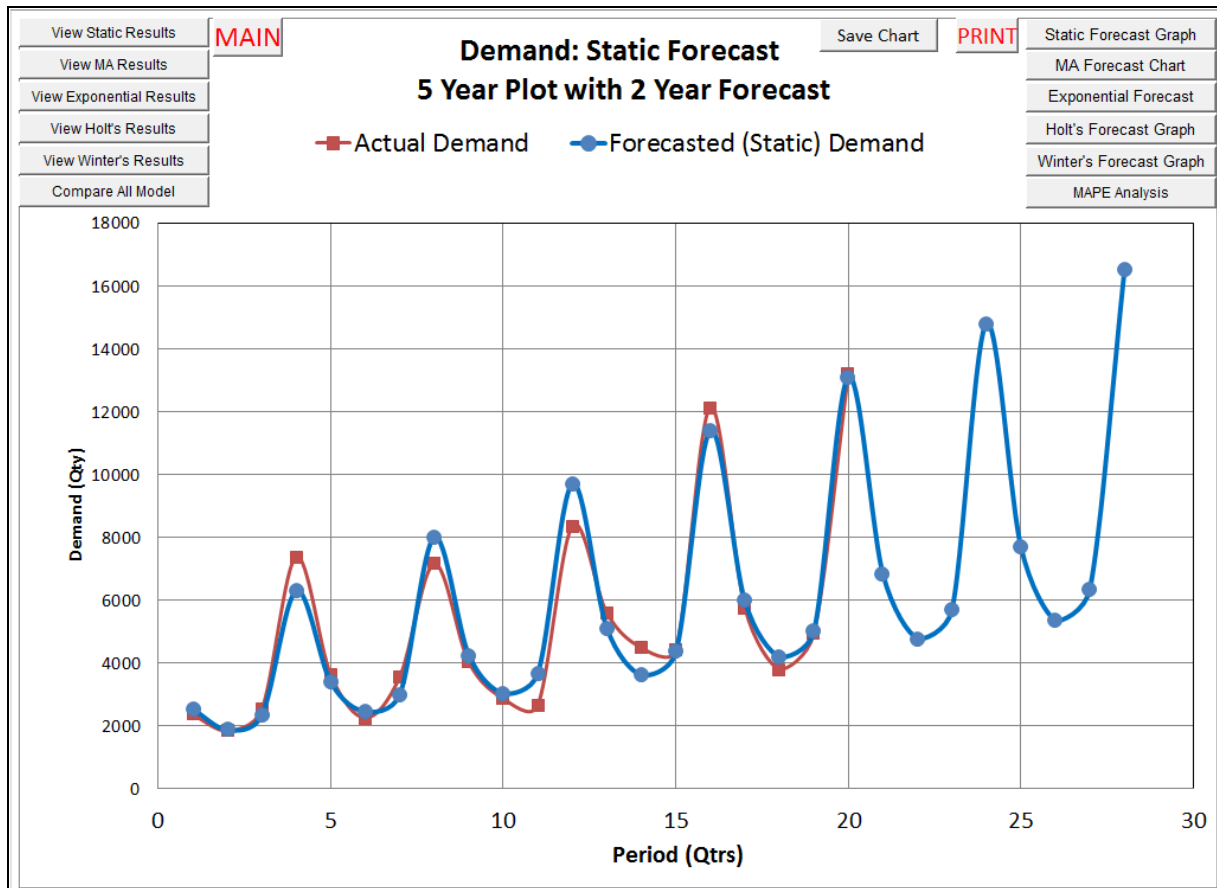
7. *Example: Advanced Chart Output*

Figure 14: Example of the Full-Page Static Forecasting Chart

In Figure 14 is shown an example of a Full-Page Chart for the Static Forecasting result. Notice that the horizontal and vertical axes are both labeled. The data series are plotted with different types of markers (squares vs dots), the legend is clearly labeled to which plot is Actual vs Forecasted, the Chart Title is descriptive and in the top left and right hands sides, are buttons that provide direct links to the rest of the workbook. Additionally, an on-screen PRINT button is provided, as well as a Save Chart (as picture) is provided.

To export this Chart into Microsoft Word, you can follow this procedure:

1. **Click on the Outer Edge of the Chart, so that the entire Chart is selected.**
2. **Select COPY**
3. **Open MS Word.**
4. **Then Paste Special. Select Bitmap or JPEG or PNG as the past option.**

There are more options for bringing the Chart into MS Word (and Powerpoint), but this provides a basic approach that prints well and easy to use. You can search online for more advanced graphic editing approaches between Excel and Word (and Powerpoint). If you just copy and paste from Excel to Word, you will not allows get clean formatting. Therefore, try to select a Picture type of format (e.g., Bitmap, JPEG, PNG).

Also, remember to Label the Figure (i.e., Figure #: Title) and then explain this Figure.

Additional Web References:

http://excelsemipro.com/2010/11/excel-2011-ribbon-screen-shots/

http://www.youtube.com/watch?v=8DjUCUY9xOg

http://www.sjsu.edu/depts/geography/resource/swdocs/xl-guide/edit/celref.htm

http://peltiertech.com/Excel/SolverVBA.html