



Chapter 1

Budgeting Concepts

Regression, Seasonality, Balance Sheet & Cash Flow

Using Regression to Create Budgets

Excel provides the ability to extrapolate data from your accounting system to produce budgets, projections or forecasts using the least squares method of linear regression analysis. The process is extremely easy as follows.

Simple Regression Example: In the first screen below we start with three columns of data for the months of January, February and March.

	A	B	C	D	E	F	G
1	Sales Forecast for the Second Quarter						
2							
3		Jan	Feb	Mar			
4	Dept 1	343	476	588			
5	Dept 2	455	459	755			
6	Dept 3	327	633	589			
7	Dept 4	432	455	512			
8		1,557	2,023	2,444			
9							Jun

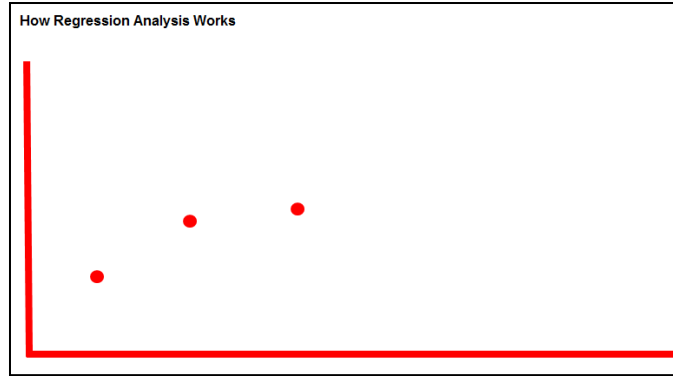
Start with Three Simple Columns of Data

These three columns are highlighted and the Fill Handle is dragged out three additional columns. The results are that Excel fills in columns for April, May and June – column including headings, totals and data. But where does this new data come from? The answer is that Excel uses Linear Regression Analysis to produce this data.

	A	B	C	D	E	F	G
1	Sales Forecast for the Second Quarter						
2							
3		Jan	Feb	Mar	Apr	May	Jun
4	Dept 1	343	476	588	714	837	959
5	Dept 2	455	459	755	856	1,006	1,156
6	Dept 3	327	633	589	778	909	1,040
7	Dept 4	432	455	512	546	586	626
8		1,557	2,023	2,444	2,895	3,339	3,782

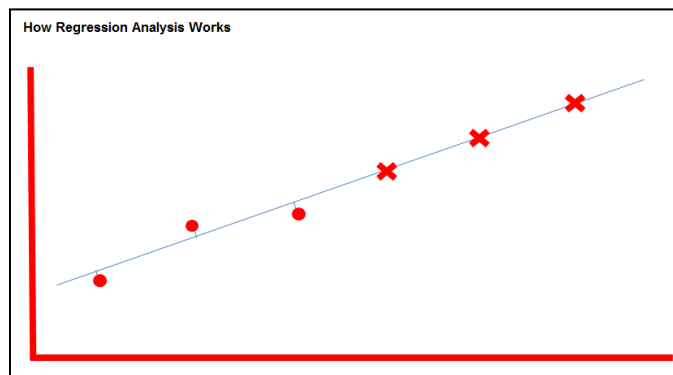
The Fill Handle Uses Regression to Project April, May and June

Excel evaluates the data for January, February, and March on a row by row basis, and uses this information to project the following variables. To help you better understand this concept, here is how regression works from a visual perspective:



Excel Plots the Beginning Data in a Chart As Shown Above

Excel then draws a straight line through these three data points. There is only one true line in which the distance between the data points and the line is the least amount. Excel then uses this line and the intervals between the original points to project the next values which are shown in X's below.



Excel Draws a Straight Line Thru the Data Points Which is Used to Project the New Data

Of course Excel does not really plot the data or draw a line on a chart, but this is in essence what happens. Excel calculates the results using algebra's linear equation formulas based on vectors. For more information, linear algebra is described here in the Wikipedia: http://en.wikipedia.org/wiki/Linear_algebra.

More Detailed Example: In the example shown below I have exported the income statements for the past six years from my accounting system. The next step is to highlight these six columns from 2002 through 2007 as shown below, and drag the Fill Handle to project 2008 values. (Please note that in this example I have selected the entire columns and the Fill Handle is shown in the upper right hand corner of the selected range.)

The screenshot shows an Excel spreadsheet titled "Regression Example 1 (Compatibility Mode) - Microsoft Excel". The spreadsheet contains financial data for the years 2002 through 2007. A callout box with the text "Drag here to generate 2008 values" points to the 2008 column header area.

	2002	2003	2004	2005	2006	2007
Income						
Consulting Income	\$ 317,108.13	\$ 380,529.76	\$ 456,635.71	\$ 547,962.85	\$ 657,555.42	\$ 726,456.67
Other Regular Income	494,950.00	593,940.00	712,728.00	855,273.60	1,026,328.32	1,133,871.06
Reimbursed Expenses	22,362.09	26,834.51	32,201.41	38,641.69	46,370.03	51,228.86
Other Income	67,466.00	80,959.20	97,151.04	116,581.25	139,897.50	154,556.51
Total Income	\$ 901,896.22	\$ 1,082,263.46	\$ 1,298,716.16	\$ 1,556,459.39	\$ 1,870,151.27	\$ 2,066,113.10
Expense						
Automobile Expense	\$ 2,139.55	\$ 2,567.46	\$ 3,080.95	\$ 3,697.14	\$ 4,436.57	\$ 4,901.45
Bank Service Charges	37.34	44.81	53.77	64.52	77.43	85.54
Conference Registration Fees	400.00	480.00	576.00	691.20	829.44	916.35
Contract Labor	26,654.80	31,985.76	38,382.91	46,059.49	55,271.39	61,062.95
Contributions	1,282.53	1,539.04	1,846.84	2,216.21	2,659.45	2,938.12
Dues and Subscriptions	6,051.13	7,261.36	8,713.63	10,456.35	12,547.62	13,862.41
Hardware Purchase	3,950.05	4,740.06	5,688.07	6,825.69	8,190.82	9,049.09
Insurance	11,697.00	14,036.40	16,843.68	20,212.42	24,254.90	26,796.42
Miscellaneous	21,010.25	25,212.30	30,254.76	36,305.71	43,566.85	48,131.96
Office Supplies	6,861.83	8,234.20	9,881.04	11,857.24	14,228.69	15,719.63
Online Computer Services	5,789.74	6,947.69	8,337.23	10,004.67	12,005.60	13,263.60

Using the Fill Handle to Create a Budget for 2008 based on Six Years of Actual Data

In this example, Excel projects the 2008 beginning budget values based on the actual data for the past six years. Do you have a better way to prepare a budget for the coming year? I doubt it. Do you have a faster way? I doubt it. Give it a try.

Warning - Regression only works when the underlying data follows a consistent trend. If revenue has grown steadily for the past six years, then regression will likely project a reasonable value for year seven. However if revenue has jumped all over the board for the past six years, then regression will likely give you a worthless projection for year seven.

Consider that in 2008 gasoline prices jumped from \$1.60 per gallon to more than \$4.00 per gallon. If you use regression to predict gasoline prices for 2009 based on this 2008 increase, regression will likely predict gasoline prices in the \$10.00+ per gallon range for 2009, when in fact gasoline prices have dropped back down. Therefore after applying regression techniques, you should always visit each line item in the projection and consider whether the projected values make sense, or whether some other basis offers a better alternative.

For example, a new lease agreement or revised depreciation schedule would provide a better basis for a 2008 budget than would any regression projection – therefore you would use these more accurate numbers instead of regression’s projected numbers.

In this next example, we start by exporting 4 years’ worth of monthly trial balance data from Dynamics GP to Microsoft Excel. In Dynamics, we have printed the report to the screen and to Excel as a CVS (comma value separated) file.

Microsoft Dynamics GP

Financial > Accounts

Screen Output - Trial Balance Summary

File Edit Tools Find Help

sa The Phone Company 4/13/2008

Print Send To Modify 100% Completed 5 Pages Page 1

System: 4/13/2008 9:53:34 PM

Year Date: 4/13/2008

From: 1/1/2008 To: 12/31/2008

Account: Custom

Sorted By: Division Inactive, Zero B; Print Currency In: Functional (2-03)

Inactive	Account	Description	Beginning Balance	Debit	Credit
	000-1100.00	Check Inter Acct Description	\$0.00	\$0.00	\$0.00
	000-1100.00	Cash Suspense	\$0.00	\$0.00	\$0.00
	000-1200.00	Unbilled Accounts Receivable	\$0.00	\$0.00	\$0.00
	000-1300.00	Inventory	\$0.00	\$86,896.97	\$3,365,345.00
	000-1312.00	Inventory Offset	\$0.00	\$0.00	\$0.00
	000-1320.00	Inventory Returns	\$0.00	\$0.00	\$0.00
	000-1380.00	Work in Progress	\$0.00	\$0.00	\$0.00
	000-1390.00	Standard Cost Revaluation	\$0.00	\$0.00	\$0.00
	000-1430.04	Installation Charges - Canada	\$0.00	\$0.00	\$0.00
	000-1500.00	FA Clearing	\$0.00	\$0.00	\$0.00
	000-1800.00	Revaluation Offset for Fin. Revaluation	\$0.00	\$0.00	\$0.00
	000-201401	Control Accounts for Costs	\$0.00	\$0.00	\$0.00
	000-2111.00	Accrued Purchases	\$0.00	\$0.00	\$0.00
	000-2730.00	Purchases Clearing Account	\$0.00	\$0.00	\$0.00
	000-2735.00	Purchases Clearing Acct for Inventory	\$0.00	\$0.00	\$0.00
	000-2740.00	Advances from Customers	\$0.00	\$0.00	\$0.00
	000-2950.00	PPV - Realized	\$0.00	\$0.00	\$0.00
	000-2950.01	PPV - Unrealized	\$0.00	\$0.00	\$0.00
	000-4100.01	Sales - West	\$0.00	\$0.00	\$118,760.00
	000-4100.02	Sales - Central	\$0.00	\$0.00	\$6,252,946.00
	000-4100.03	Sales - East	\$0.00	\$0.00	\$6,815,600.00
	000-4100.04	Sales - Canada	\$0.00	\$0.00	\$2,564,700.00
	000-4120.01	Service Plans - West	\$0.00	\$0.00	\$0.00
	000-4120.02	Service Plans - Central	\$0.00	\$0.00	\$0.00
	000-4120.03	Service Plans - East	\$0.00	\$0.00	\$0.00
	000-4120.04	Service Plans - Canada	\$0.00	\$0.00	\$0.00
	000-4130.01	Installation Charges - West	\$0.00	\$0.00	\$0.00
	000-4130.02	Installation Charges - Central	\$0.00	\$0.00	\$0.00
	000-4130.03	Installation Charges - East	\$0.00	\$0.00	\$0.00
	000-4130.04	Installation Charges - Canada	\$0.00	\$0.00	\$0.00
	000-4140.01	Repair Charges - West	\$0.00	\$0.00	\$0.00
	000-4140.02	Repair Charges - Central	\$0.00	\$0.00	\$0.00

282 of 379 records selected.

This same data is then opened in Excel as shown in the following screen. I have deleted the balance sheet account line items and inserted a column called Category to help tidy the data.

GP Trial Balance - M

Home Insert Page Layout Formulas Data Review View Developer Acrobat

Get External Data Refresh All Edit Links Connections Sort Filter Advanced Text to Columns Remove Duplicates What-If Analysis Subtotal Outline Analysis

'Sales - Central'

Account	Category	Description	1/31/06	2/28/06	3/31/06	4/30/06	5/31/06	6/30/06
000-4100-01	Sales	Sales - West	(408,011.81)	(411,599.63)	(397,531.12)	(381,576.83)	(363,082.85)	(348,082.85)
000-4100-02	Sales	Sales - Central	(643,508.54)	(641,723.35)	(651,671.80)	(657,878.88)	(668,880.85)	(668,880.85)
000-4100-03	Sales	Sales - East	(736,956.86)	(742,564.19)	(741,847.84)	(750,265.86)	(743,749.56)	(743,749.56)
000-4100-04	Sales	Sales - Canada	(258,873.89)	(255,821.77)	(260,361.99)	(256,002.54)	(252,359.45)	(252,359.45)
000-4120-01	Service	Service Plans - West	(4,643.40)	(4,394.49)	(3,783.32)	(4,625.02)	(5,831.19)	(5,831.19)
000-4120-02	Service	Service Plans - Central	(78,546.43)	(78,333.99)	(77,621.15)	(76,515.01)	(75,701.31)	(75,701.31)
000-4120-03	Service	Service Plans - East	(64,113.09)	(65,321.31)	(65,777.32)	(66,864.31)	(65,358.77)	(65,358.77)
000-4120-04	Service	Service Plans - Canada	(22,335.31)	(21,854.10)	(21,819.44)	(20,338.13)	(22,040.64)	(22,040.64)
000-4130-01	Installation	Installation Charges - West	(13,541.67)	(13,997.99)	(14,198.33)	(13,785.61)	(14,328.08)	(14,328.08)
000-4130-02	Installation	Installation Charges - Central	(145,905.91)	(146,071.19)	(145,481.15)	(144,574.56)	(146,158.50)	(146,158.50)
000-4130-03	Installation	Installation Charges - East	(282,819.17)	(283,050.57)	(283,506.42)	(284,220.01)	(284,782.32)	(284,782.32)
000-4130-04	Installation	Installation Charges - Canada	(87,370.54)	(88,120.50)	(88,848.32)	(89,062.34)	(88,693.91)	(88,693.91)
000-4140-01	Repair	Repair Charges - East	(2,624.74)	(4,110.73)	(5,029.49)	(5,346.21)	(4,874.93)	(4,874.93)
000-4140-02	Repair	Repair Charges - Central	(26,900.17)	(28,282.06)	(28,136.26)	(28,192.07)	(27,949.55)	(27,949.55)
000-4140-03	Repair	Repair Charges - East	(49,601.91)	(49,994.48)	(49,999.19)	(49,164.78)	(48,781.73)	(48,781.73)
000-4140-04	Repair	Repair Charges - Canada	(12,665.88)	(12,642.85)	(12,157.14)	(12,453.48)	(11,873.82)	(11,873.82)
000-4180-01	Sales Discounts	Sales Discount - West	9,038.75	8,730.93	8,646.16	8,912.35	8,364.17	8,364.17
000-4180-02	Sales Discounts	Sales Discount - Central	150,799.77	151,586.15	151,986.49	150,353.01	149,532.25	149,532.25
000-4180-03	Sales Discounts	Sales Discount - East	130,638.24	129,029.42	127,718.79	127,782.03	126,523.60	126,523.60
000-4180-04	Sales Discounts	Sales Discount - Canada	38,480.86	38,518.74	38,666.30	39,442.48	40,027.62	40,027.62
000-4183-01	Trade Discounts	Trade Discount - West	3,379.74	3,783.37	3,517.33	3,906.94	3,826.04	3,826.04
000-4183-02	Trade Discounts	Trade Discount - Central	53,799.17	54,820.72	54,988.75	54,769.59	54,856.58	54,856.58
000-4183-03	Trade Discounts	Trade Discount - East	57,274.52	56,149.94	55,573.71	55,642.04	54,278.73	54,278.73
000-4183-04	Trade Discounts	Trade Discount - Canada	32,531.85	33,258.28	33,976.94	34,287.32	34,447.50	34,447.50
000-4190-01	Sales Returns	Sales Returns - West	5,571.10	4,832.50	4,065.68	3,702.52	5,033.99	5,033.99
000-4190-02	Sales Returns	Sales Returns - Central	102,179.32	101,646.73	101,580.46	101,148.18	100,279.51	100,279.51
000-4190-03	Sales Returns	Sales Returns - East	127,370.16	126,707.08	126,513.27	125,690.15	125,435.77	125,435.77
000-4190-04	Sales Returns	Sales Returns - Canada	44,180.16	44,320.86	43,570.03	43,265.64	43,153.83	43,153.83

To create a budget for 2009, we will start by using the Subtotals Tool located on the Data Ribbon. This action inserts subtotals in each column below each change in the category column.

The Subtotal dialog box is open, showing the following settings:

- At each change in: **Category**
- Use function: **Sum**
- Add subtotal to:
 - 7/31/09
 - 8/31/09
 - 9/30/09
 - 10/31/09
 - 11/30/09
 - 12/31/09
- Replace current subtotals
- Page break between groups
- Summary below data

The data table below shows the results of the subtotal operation:

Category	Description	1/31/06	2/28/06	3/31/06	4/30/06	5/31/06
Sales	Sales - West	(408,011.81)	(411,599.63)	(397,531.12)	(381,576.83)	(363,082.8)
Sales	Sales - Central	(643,508.54)	(641,723.35)	(651,671.80)	(657,878.88)	(668,880.6)
Sales	Sales - East	(736,956.86)	(742,564.19)	(741,847.84)	(750,265.86)	(743,749.5)
Sales	Sales - Canada	(258,873.89)	(255,821.77)	(260,361.99)	(256,002.54)	(252,359.4)
Sales Total		(2,047,351.10)	(2,051,708.94)	(2,051,412.75)	(2,045,724.11)	(2,028,072.7)
Service	Service Plans - West	(4,643.40)	(4,394.49)	(3,783.32)	(4,625.02)	(5,831.1)
Service	Service Plans - Central	(78,546.43)	(78,333.99)	(77,621.15)	(76,515.01)	(75,701.3)
Service	Service Plans - East	(64,113.09)	(65,321.31)	(65,777.32)	(66,864.31)	(65,358.7)
Service	Service Plans - Canada	(22,335.31)	(21,854.10)	(21,819.44)	(20,338.13)	(22,040.6)
Service Total		(169,638.23)	(169,903.89)	(169,001.23)	(168,342.47)	(168,931.5)
Installation	Installation Charges - West	(13,541.67)	(13,997.99)	(14,198.33)	(13,785.61)	(14,328.0)
Installation	Installation Charges - Central	(145,905.91)	(146,071.19)	(145,481.15)	(144,574.56)	(146,158.5)
Installation	Installation Charges - East	(282,819.17)	(283,050.57)	(283,506.42)	(284,220.01)	(284,782.3)
Installation	Installation Charges - Canada	(87,370.54)	(88,120.50)	(88,848.32)	(89,062.34)	(88,693.5)
Installation Total		(529,637.29)	(531,240.25)	(532,034.22)	(531,642.52)	(533,962.8)
Repair	Repair Charges - East	(2,624.74)	(4,110.73)	(5,029.49)	(5,346.21)	(4,874.5)
Repair	Repair Charges - Central	(26,900.17)	(28,282.06)	(28,136.26)	(28,192.07)	(27,949.5)
Repair	Repair Charges - East	(49,601.91)	(49,994.48)	(49,999.19)	(49,164.78)	(48,781.7)
Repair	Repair Charges - Canada	(12,665.88)	(12,642.85)	(12,157.14)	(12,453.48)	(11,873.6)
Repair Total		(91,792.70)	(95,030.12)	(95,332.08)	(95,156.54)	(93,480.0)
Sales Discounts	Sales Discount - West	9,038.75	8,730.93	8,646.16	8,912.35	8,364.1

Next we collapse the outline to display only row totals and use the “Select Visible Cells Tool” to select the visible data in Excel. With only the subtotal and grand total rows displayed, we apply a color and then expand the outline. The result is that formatting has been applied to the subtotal and grand total rows to make them easier to read.

The screenshot shows the same data table as above, but with the subtotal and grand total rows highlighted in blue. The rows are:

- Row 7: **Sales Total**
- Row 12: **Service Total**
- Row 17: **Installation Total**
- Row 18: **Repair Total**

To create the budget, select the 36 columns with numeric data, then click and drag the “Fill Handle” out twelve additional columns to create the 2009 budget as shown below.

The screenshot shows an Excel spreadsheet with a table of data. The table has columns for dates (9/30/08, 10/31/08, 11/30/08) and values. A callout box labeled "The Fill Handle" points to the small square at the bottom-right corner of the selected cell range. Another callout box labeled "Drag Out 12 Columns" points to the right edge of the spreadsheet grid, indicating the process of extending the column range to include column AX.

	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY
1	9/30/08	10/31/08	11/30/08											
2	(381,866.66)	(384,480.81)	(380,788.33)											
3	(740,463.93)	(735,137.92)	(724,978.79)											
4	(752,770.61)	(745,590.73)	(749,975.46)											
5	(230,008.13)	(227,113.29)	(218,310.86)											
6	(2,105,109.33)	(2,092,322.75)	(2,074,043.40)											
7	(7,541.37)	(6,706.20)	(6,361.50)											
8	(75,727.16)	(74,945.72)	(74,247.27)											
9	(67,599.76)	(66,693.19)	(64,869.86)											
10	(25,187.61)	(24,516.33)	(23,640.26)											
11	(176,055.90)	(172,861.44)	(169,118.89)											
12	(15,120.18)	(13,439.67)	(13,169.62)											
13	(145,370.24)	(144,267.34)	(145,231.35)											
14	(282,988.51)	(283,228.24)	(282,462.41)											
15	(95,228.82)	(95,039.32)	(95,174.60)											
16	(538,707.75)	(535,974.57)	(536,037.98)											
17	(877.50)	(1,533.89)	(931.53)											
18	(23,491.54)	(24,649.12)	(24,298.60)											
19	(43,480.86)	(42,894.84)	(42,278.37)											
20	(4,029.04)	(4,028.17)	(4,086.76)											
21	(71,878.94)	(73,106.02)	(71,595.26)											
22	7,302.93	7,224.52	6,806.35											
23	152,710.65	152,785.73	152,326.79											
24	126,784.64	126,071.22	126,620.06											
25	32,828.08	32,628.72	31,519.46											
26	319,626.30	318,710.19	317,272.66											
27	8,386.39	7,535.89	7,634.95											

The result is that Excel uses linear regression analysis to predict the future values. Once you have completed this process you should insert better numbers on those line items where you have better budget amounts. For example, you would look to the lease agreement to determine the best amount to use for rent expense. You would use your depreciation schedule to provide numbers for depreciation expense. However for those numbers where you have no better basis to use for budget preparation purposes, why not use Linear Regression Analysis to provide the answer.

After all numbers have been updated, use the =ROUND() function to duplicate the budget on a separate workbook with all amounts properly rounded. Format as desired, label the budget appropriately, and you are done. A complete monthly budget prepared in less than 5 minutes. The great news now is that same budget can be imported back into Dynamics GP without reentering the data.

Adjusting for Seasonality

Annual budgets are not very useful as a tool because they make it difficult to monitor actual versus budget results throughout the year. But simply dividing an annual budget by 12 is not a very good approach either, because many line items are subject to seasonality. For example, actual revenue may be twice as high in some months compared to other months, but comparing these seasonal sales amounts to a non-seasonal budget is virtually meaningless because you can't tell whether you are on target, off target, or by how much. Therefore, it is difficult to determine if corrective measures are needed on a month to month basis.

Seasonal budgets make a big difference. I believe one of the primary reasons companies don't analyze their budgets to actuals throughout the year is because their budgets weren't seasonal to begin with, and therefore the comparison was virtually meaningless. You could start by calculating the percentage of a given line item's expense that occurs on a month-to-month basis. If the answers each year consistently show percentages significantly below or above

8.33% for a given month, then congratulations, you've just detected a seasonal lump or dip in your budget, and the percentage to use in predicting that same lump or dip next year.

Add seasonality to your budget, simply spread the annual amount of each budget line item across the 12 months as a ratio of last's year's monthly amount compared to the annual amount. In most cases, one formula copied down and across allows you to accomplish this task. If additional years of actual data is available, you might first compute seasonal averages based on averages for all available actual data.

Budgeting Balance Sheets and Cash Flow

Too often budgets consist of a profit and loss statement, but this falls short. Companies are advised to create a budgeted cash flow statement as well, (which implies the creation of a budgeted balance sheet). Once the budget balance sheet items have been created, the budgeted cash flow budget is a simple matter of crunching the numbers. To produce a budgeted balance sheet, assumptions are needed related to the days in accounts receivable, accounts payable and inventory. These day calculations are best derived by examining the days in accounts receivable, accounts payable and inventory for recent years, and using those amounts as a guide. For example:

1. **AR** - The budgeted accounts receivable balance may be calculated as 46 days of the prior months sales.
2. **AP** - The budgeted accounts payable balance may be calculated as 28 days of the prior months variable expenses.
3. **Inventory** - The budgeted inventory balance may be calculated as 62 days of the prior month's COGS amount.
4. **Loan Payments** – Loan repayments should be budget based on the actual amortization schedules, based on the principle payment amounts.
5. And so on.

Once the balance Sheet items have been budgeted, the resulting Cash Flow Budget is computed as follows:

	A	B	C	D	E	F	G	H	I
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
3	Beginning Cash		1,000	3,500	6,450	8,150	8,060	7,500	8,010
4									
5	Budgeted P&L:								
6	Revenue		10,000	11,000	12,100	8,000	6,200	15,000	16,500
7	COGS		4,000	4,400	4,840	3,200	2,480	6,000	6,600
8	Gross Margin		6,000	6,600	7,260	4,800	3,720	9,000	9,900
9									
10	Expense 1		500	-	-	-	500	-	-
11	Expense 2		600	1,450	1,750	1,200	800	600	600
12	Expense 3		200	200	200	700	700	1,000	1,000
13	Expense 4		400	400	400	-	-	600	600
14	Expense 5		700	200	450	500	600	600	300
15	Expense 6		1,200	1,200	2,800	3,300	2,100	4,300	3,000
16	Expense 7		100	200	100	200	50	50	100
17	Total Expenses		3,700	3,650	5,700	5,900	4,750	7,150	5,600
18									
19	Profit/Loss		2,300	2,950	1,560	(1,100)	(1,030)	1,850	4,300
20									
21	Budgeted Balance Sheet:								
22	A/R (46 days of sales)	1,150	1,260	1,390	1,520	1,010	780	1,890	2,080
23	A/P (28 days of expenses)	(270)	(270)	(270)	(410)	(430)	(350)	(520)	(410)
24	Inventory (62 days of COGS)	790	680	750	820	540	420	1,020	1,120
25	Loan Balance (From Amort. Schedule)	4,200	4,000	3,800	3,600	3,400	3,200	3,000	2,800
26									
27	Change in A/R		(110)	(130)	(130)	510	230	(1,110)	(190)
28	Change in A/P		-	-	140	20	(80)	170	(110)
29	Change in Inventory		110	(70)	(70)	280	120	(600)	(100)
30	Change in Loan		200	200	200	200	200	200	200
31									
32	Ending Cash		3,500	6,450	8,150	8,060	7,500	8,010	12,110

Rounding Budgets

The ROUND() function rounds a number to a specified number of digits. For example, if cell A1 contains 237825, and you want to round that value to the nearest thousands, you can use the following formula in cell C1:

	A	B	C	D	E	F
1	237825		238000			

Formula bar: C1 =ROUND(A1,-3)

Note: To round a number to a specific multiple (for example, to round to the nearest 0.5), use the MROUND function.

As an accounting software installer, I've learned from experience that most businesses can pick blindly from among the top accounting systems in the world and pretty much get the job done. From one business to the next, accounts payable needs, payroll needs, trial balance needs, reporting needs, and even inventory needs are similar and well covered by today's top accounting systems. However, there is one area which differs dramatically - and that area is in the sales order. It turns out that each company sells differing kinds of products and services with options so varied, that few accounting systems are prepared to handle those needs. In this situation, I make a bold claim that an Excel template can be easily used to fill in the missing gaps and supplement any accounting software system to provide excellent order taking capabilities.

In this case study, let us assume that we are working with a small copy shop – a small family owned company with about \$300,000 in revenue. In this case they have determined that QuickBooks meets all of these needs, except for order taking. Therefore our goal will be to build a Sales Order system using Excel in only a few minutes. Listed below are the key elements that you will learn in this case study:

1. Neat and Organized Worksheet Design
2. =NOW()
3. Data Validation Lists
4. =VLOOKUP
5. Creating Macro Buttons
6. Creating Macros
 - a. Simple Print macro
 - b. Simple erase and increment invoice number macro
 - c. More complicated posting macro
7. Relative versus Absolute Macros
8. Named Cells
9. Worksheet Protection
10. Adding Logic to the Product Configurator
11. Combining Macros
12. Locating the database on another sheet

Think about a copy shop for a minute, what is so difficult about taking an order in a copy shop? It is the options. How many copies would you like? Do you want that printed on front and back? Stapled or Bound? What kind of binding? What size paper? What color paper? What pound paper? Do you want regular or fast delivery? These are all standard questions asked by a copy shop, yet QuickBooks, nor any high end accounting system is able to take such an order. Even the million dollar solutions aren't equipped to take such an order. These companies must instead resort to purchasing a software application called a "product configurator", solutions which can cost \$75,000 to \$750,000 or more. To make matters more difficult, there are often rules associated with various options – for example, when ordering a car, if you order the sun roof option, you can not also order the T-Top option. Product configurators must account for and accommodate these types of situations.

- Let us begin by simply labeling our sales order form. As you can see in the screen to the right, we've added some labels and highlighted some data input fields with yellow background and gridline borders.

	A	B	C
1	Molly's Copy Shop		
2	Date Time		
3			
4	Name	<input type="text"/>	
5	Address	<input type="text"/>	
6			
7	Number of Pages	<input type="text"/>	
8	Number of Copies	<input type="text"/>	
9			
10	Standard Copy Rate	\$	0.03 Per Page
11	Standard Base Rate	<input type="text"/>	
12			
13	Which Color Paper?	<input type="text"/>	
14	Sur-Charge for Color	<input type="text"/>	
15			
16	What Size Paper?	<input type="text"/>	
17	Sur-Charge for Size	<input type="text"/>	
18			
19	Total Sur-Charges	<input type="text"/>	
20			
21	Total Invoice Price	<input type="text"/>	
22			

(For purposes of this case study, we will only build in options for color and size, but once you get the hang of it, adding in additional options for paper weight, binding, duplex printing, etc is a rather simple matter.)

- =NOW()** – Next we type in the Excel Function =NOW(). This will cause Excel to display the computer's date and time each time an order is produced. You can see the =NOW() function in the formula bar and the results displayed in cell B2 below.

	A	B	C
1	Molly's Copy Shop		
2	Date Time	7/27/2010 17:55	
3			
4	Name	<input type="text"/>	

- Calculations for Base Rate** – Next we add simple calculations to multiply the total number of pages to be copied by the total number of copies and the base rate per copy. To make it easier to visualize, I have added some customer data. (The formula contained in cell B11 is displayed in the formula bar.)

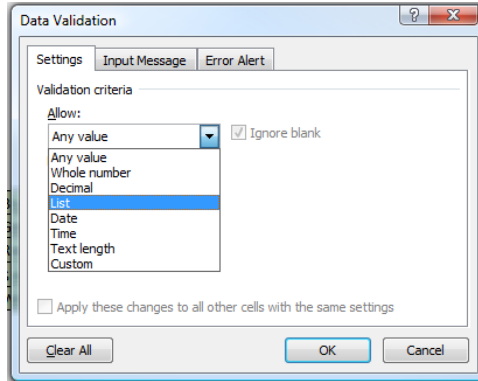
B11		fx =B7*B8*B10	
	A	B	C
1	Molly's Copy Shop		
2	Date Time	7/27/2010 17:59	
3			
4	Name	Carlton Collins	
5	Address	100 Peachtree Street	
6			
7	Number of Pages	75	
8	Number of Copies	125	
9			
10	Standard Copy Rate	\$	0.03 Per Page
11	Standard Base Rate	\$	281.25

4. **Color Options** – Next I created a table of the color options along with a sur-charge rate per page for each color. Notice that there is a “zero” sur-charge when selecting white paper. Make sure to sort your table in descending order because we plan to refer to that table via a Lookup function – and as we all know, lookup functions do not work properly unless the table array is sorted in descending order. To make the table of options more readable, I applied gridlines and a greenish background.

E9		fx 'Blue	
	A	B	C
1	Molly's Copy Shop		
2	Date Time	7/27/2010 18:02	
3			
4	Name	Carlton Collins	
5	Address	100 Peachtree Street	
6			
7	Number of Pages	75	
8	Number of Copies	125	
9			
10	Standard Copy Rate	\$	0.03 Per Page
11	Standard Base Rate	\$	281.25
12			
13	Which Color Paper?	Blue	
14	Sur-Charge for Color		

Blue	\$ 0.002
Green	\$ 0.002
Red	\$ 0.002
Silver	\$ 0.005
White	\$ -

5. **Data List Validation** – Now this is where the excitement begins. Next I create a data validation list in cell B13 using column one of my options table. To do this, select B13, and choose Data validation from the Data Ribbon. Next select List and use the Cell Chooser to highlight the options in column one of your color options table.



125	
\$ 0.03	Per Page
\$ 281.25	

Green	
Blue	
Green	
Red	
Silver	
White	

Blue	\$ 0.002
Green	\$ 0.002
Red	\$ 0.002
Silver	\$ 0.005
White	\$ -

6. **=VLOOKUP** – Next I inserted a =VLOOKUP function in cell B14 to return the Sur-Charge rate based on the Color Selected.

B14		fx =VLOOKUP(B13,E9:F13,2)	
	A	B	C
8	Number of Copies	125	
9			
10	Standard Copy Rate	\$ 0.03	Per Page
11	Standard Base Rate	\$ 281.25	
12			
13	Which Color Paper?	Green	
14	Sur-Charge for Color	\$ 0.002	

Blue	\$ 0.002
Green	\$ 0.002
Red	\$ 0.002
Silver	\$ 0.005
White	\$ -

Notice that when you select different colors in cell B13, the rate in Cell B14 changes according to the Color Option table.

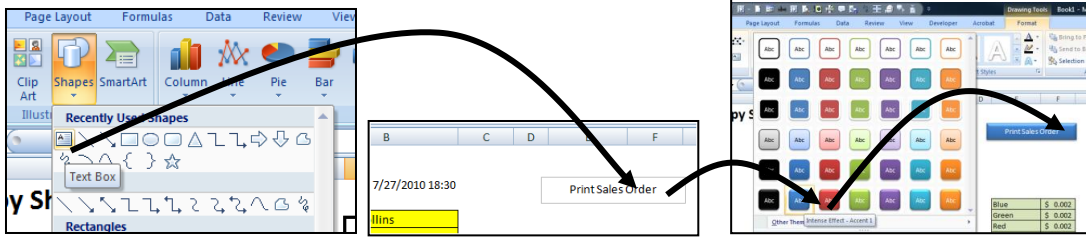
7. **Size Options** - Repeat steps 4,5 & 6 above to also create Size Options.

8	Number of Copies		125		
9					
10	Standard Copy Rate	\$	0.03	Per Page	Blue \$ 0.002
11	Standard Base Rate	\$	281.25		Green \$ 0.002
12					Red \$ 0.002
13	Which Color Paper?		Silver		Silver \$ 0.005
14	Sur-Charge for Color	\$	0.005		White \$ -
15					
16	What Size Paper?		4 by 6 inch		11 by 14 Inch \$ 0.002
17	Sur-Charge for Size	\$	(0.002)		11 By 17 inch \$ 0.008
18					4 by 6 inch \$ (0.002)
19	Total Sur-Charges				5 by 7 Inch \$ (0.001)
20					8.5 by 11 Inch 0

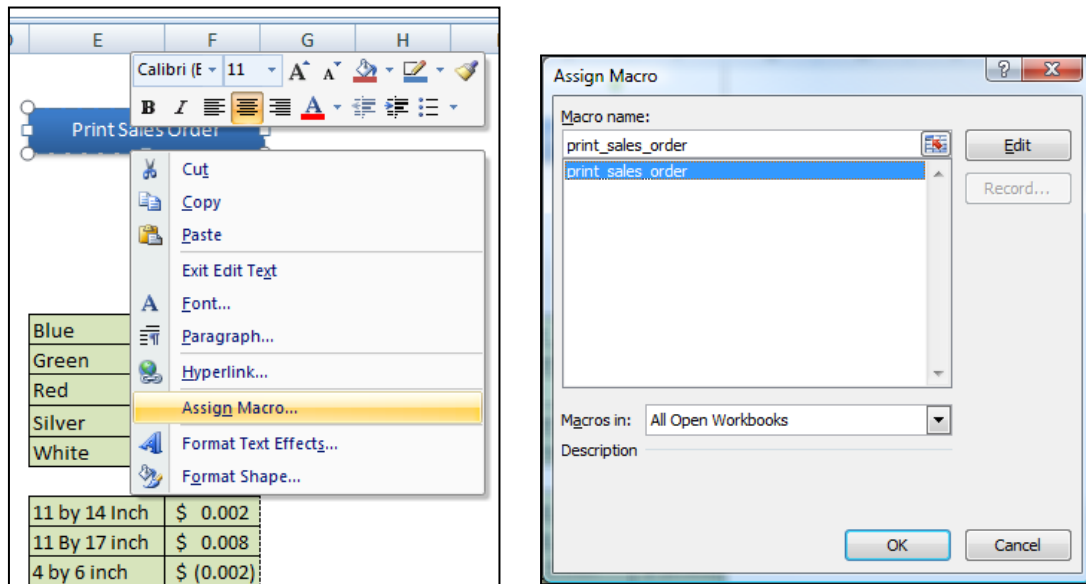
8. **Invoice Total** – From here it is an easy step to add calculations to total the invoice. Of course your complete invoice would also include sales tax calculations as well. Our example is kept as simple as possible to make sure that the key points come across as easy as possible. Here's what we have so far:

B19		fx		=(B14+B17)*B8*B7	
	A	B	C	D	E
1	Molly's Copy Shop				
2	Date Time	7/27/2010 18:30			
3					
4	Name	Carlton Collins			
5	Address	100 Peachtree Street			
6					
7	Number of Pages	75			
8	Number of Copies	125			
9					
10	Standard Copy Rate	\$	0.03	Per Page	Blue \$ 0.002
11	Standard Base Rate	\$	281.25		Green \$ 0.002
12					Red \$ 0.002
13	Which Color Paper?		Silver		Silver \$ 0.005
14	Sur-Charge for Color	\$	0.005		White \$ -
15					
16	What Size Paper?		8.5 by 11 Inch		11 by 14 Inch \$ 0.002
17	Sur-Charge for Size	\$	-		11 By 17 inch \$ 0.008
18					4 by 6 inch \$ (0.002)
19	Total Sur-Charges	\$	46.875		5 by 7 Inch \$ (0.001)
20					8.5 by 11 Inch 0
21	Total Invoice Price	\$	328.13		
22					

9. **Macro Buttons** – To make the Sales Order form easier to use, next we will add three macro buttons. We start this process by creating a single text box, and use the Drawing Tools to make it look fancy. Here are steps:

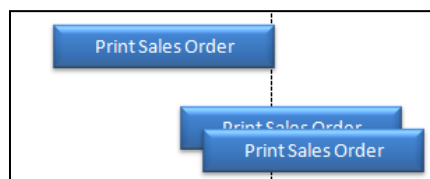


10. **Create the Print Macro** – Next create a print macro by selecting “Macro, Record Macro” from the “View Ribbon” (make sure that no spaces are used in your macro name and save the macro to “This Workbook”). Set the “Print Area” appropriately to display your Sales Order Form. Next simply highlight your Sales Order Form and print three copies, then stop recording your macro by selecting “Macro, Stop Recording” from the “View Ribbon”. Once completed assign the Macro to the Print Sales Order Button by right mouse clicking and selecting “Assign Macro”. The right click menu and the Assign Macro Dialog box are shown in the two screens below.

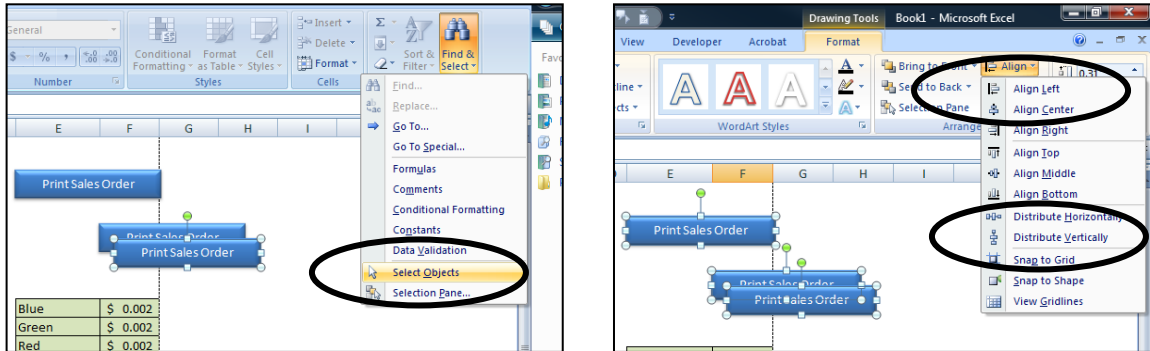


You want to print three copies of the Sales Order as follows: One for your customer’s records; One for your product people to follow when making the copies, and one for bookkeeper to use when entering the invoice amount into QuickBooks.

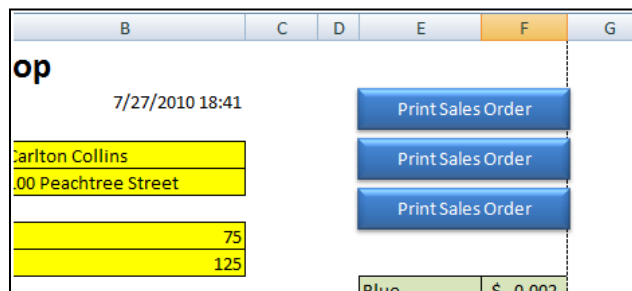
11. **Additional Macro Buttons** – Next right click on the edge of the existing macro button twice, and choose “Copy”; then click away from the button and Paste twice. This will create two exact copies of your macro button. (You must right click twice on the edge of the button to display the second menu of options.)



Next select the “Select Objects” menu option from the “Home” Ribbon’s “Find and Select” menu in the “Edit” Group. Then lasso the three buttons and from the “Drawing Tools”, use the Alignment tools to left justify and Distribute Vertically the three buttons.



The results will appear as follows:



Press escape to deselect the “Object Pointer” tool, and return your cursor to normal.

12. **Post Sales Order Macro Button** – Next I created a macro to post the sales order information to a database. This is complicated and I will demonstrate several teaching points in class to help you fully understand the process of writing a combination relative and absolute Here are the steps:

- a. Relabel the second Macro Button to Read “Post Sales Order”. This will require you to first right mouse click on the button and select the text, or if you prefer, remove the macro before continuing.
- b. Highlight cells B2 thru B21 and label that range “salesorderdata” using the Name Box.
- c. Go to Cell H1 and enter the phrase “Database” in cell H1.
- d. Label cell H1 “database” using the Name Box.
- e. Copy the labels in cells A2 thru A21 and Paste Transpose them to cell H2.
- f. Start recording a macro named “postsalesorder”.
- g. Click the “Use Relative References” option from the Macros Group on the View Ribbon.
- h. Press the F5 key to launch the GoTo Dialog Box.
- i. Select the range “salesorderdata” by double clicking on the word “salesorderdata”.
- j. With your cursor hovering above the selected range, right mouse click and choose “Copy”.
- k. Press the F5 key to launch the GoTo Dialog Box.

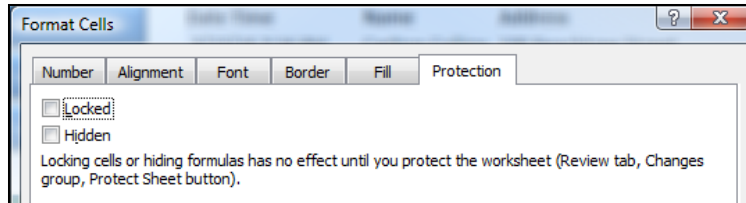
- l. Select the range “database” by double clicking on the word “database”.
- m. Press the End key, followed by the Down Arrow. (You will now be on the last row.)
- n. Press the Down Arrow. (You will now be on a blank row underneath the last row.)
- o. With your cursor hovering above the selected range, right mouse click and choose “Paste Special”.
- p. In the paste Special Dialog Box, check Values and Check Transpose, and click OK.
- q. Place your cursor on cell A1.
- r. Stop recording the macro by selecting “Macro, Stop Recording” from the “View Ribbon.
- s. Assign the newly recorded macro to the Post Sales order macro Button.
- t. Select Column H and format it to display Time and Date.
- u. Adjust the width of your database columns to your preference.

13. **New Sales Order Macro Button** – Finally, edit the Third macro Button to Read “New sales Order” and create a macro that selects the yellow background data cells and deletes the contents. (Make sure to toggle the “Use Relative References” option off because this macro needs to be an absolute macro.) (Also make sure to select Cell B4, then hold the CTRL key down while you also select the other yellow back ground cells). Before you Stop Recording this macro, click on cell B4 so your cursor will be in the correct place to start recording a new sales order.

	A	B	C	D	E	F	G	H	I	J	K	
1	Molly's Copy Shop							Database				
2	Date Time	7/27/2010 19:25			Print Sales Order		Date Time					
3					Post Sales Order		7/27/10 7:16 PM					
4	Name	Sandra Williams			New Sales Order		Name					
5	Address	65 Nestle Way					Address					
6							7/27/10 7:16 PM					
7	Number of Pages	45					Carlton Collins					
8	Number of Copies	100					100 Peachtree Street					
9												
10	Standard Copy Rate	\$	0.03	Per Page	Blue	\$	0.002					
11	Standard Base Rate	\$	135.00		Green	\$	0.002					
12					Red	\$	0.002					
13	Which Color Paper?	Green			Silver	\$	0.005					
14	Sur-Charge for Color	\$	0.002		White	\$	-					
15												
16	What Size Paper?	11 By 17 inch			11 by 14 Inch	\$	0.002					
17	Sur-Charge for Size	\$	0.008		11 By 17 inch	\$	0.008					
18					4 by 6 inch	\$	(0.002)					
19	Total Sur-Charges	\$	45.000		5 by 7 Inch	\$	(0.001)					
20					8.5 by 11 Inch		0					
21	Total Invoice Price	\$	180.00									
22												

14. **Testing** – Test your three macros by filling in new sales order information, then click the three macro buttons in sequence to print, post and delete your data.

15. **Unlock Data Input Cells** – Next, select the cells containing the yellow background and also select the database columns (Hold the CTRL key down to make multiple selections. Then format the those cells to unlock them by right mouse clicking atop your selection and selecting “Format Cells, and unchecking the Locked Box on the protection tab – as shown below:



16. **Protect Your Worksheet** - Finally turn on worksheet protection by selecting “Protect Sheet” from the Review ribbon. Enter a password and repeat the password. This will prevent you or others from making accidental changes to the formulas and data contained in your template.
17. **Keep in Mind** – This case study covered the basics, but you could enhance this template a number of ways. Here are a few example hints:
 - a. Combine the three macro buttons into one button that performs all tasks – printing, posting, and deleting.
 - b. You might also add a grid for matrix pricing – pricing for volume below 1,000, 5,000, and 10,000 total pages copied.
 - c. You might add an invoice number to the top of the page. Each time you post, your macro might also create a temporary formula in an empty cell that refers to the invoice number and adds one, then copies pastes that result atop the invoice number cell using the paste value command. Make sure the macro then deletes the formula in the temporary cell.
 - d. You could easily add more options to your order form.
 - e. Notice that we also included an option to decrease our price if a smaller paper size is selected.
 - f. The sales order form could be dressed up to look far more professional. Colors, grids, logos, etc. could all be added to make the sales order form match the accounting system, for example.
 - g. You could copy the worksheet and edit a second order for to be used in different situations. For example, Worksheet A might contain an order form that charges regular rates when a regular customer enters the store, and Worksheet B could charge higher rates when a lawyer enters the store – and so on.
 - h. The resulting database will continue to compile each sales order as posted, adding new orders to the bottom of the database area each time you post.
 - i. The bookkeeper need only record the date, customer name, address, and total amount due in QuickBooks. The printed Sales Order copies on file will serve as supporting documentation.
 - j. You can download a copy of this example template from www.CarltonCollins.com – click the Excel Link.