

# A SPREADSHEET Primer

**M**any contractors who use spreadsheets are doing more work than they have to simply because they don't understand how to make the spreadsheet do the work for them. In this article, I'll show you a handful of simple techniques that will take the mys-

by Joe Stoddard

tery out of using multiple worksheets and building formulas. You can skip over anything that seems too basic, but I'm betting that even experienced users will discover something new.

The sample spreadsheet used here is designed to help you plan tool and equipment purchases, and to compare actual expenses to budgeted costs. But the setup procedures and formulas will work in spreadsheets that perform basic accounting, estimating, job costing, and many other common paperwork chores in a small construction company.

I use Microsoft Excel 97, but Lotus 1-2-3 or any other professional spreadsheet will work equally well, so long as it can provide multiple worksheets in the same file. A template is also available for download from [jlcnet.com/downloads](http://jlcnet.com/downloads), and should be compatible with most popular spreadsheet programs.

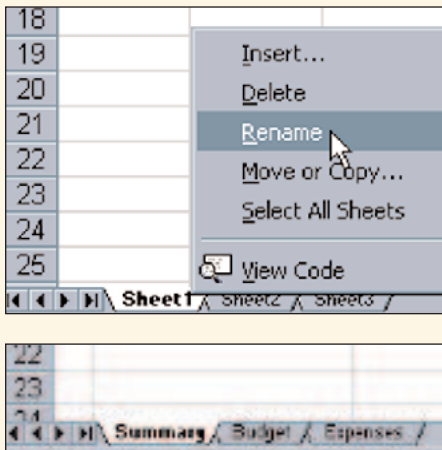
If you've never used a spreadsheet, you can find more information in either *Excel 97: Fast & Easy* (Visual Learning Guides) by Nancy Stevenson, or *The Essential Excel 2000 Book* by Faithe Wempen and Donna Payne. You can also arrange to have free daily tips on Excel (and dozens of other programs) delivered via e-mail by signing up at [www.tipworld.com](http://www.tipworld.com).

## Create the Workbook

From the *File* menu, select *New* to create a blank workbook, which automatically opens with three blank,

Learn how to build formulas, copy and link worksheets, and provide simple navigation in big spreadsheets

## Renaming Worksheets



**Figure 1.** To rename a worksheet, right-click on the tab, select **Rename** from the menu (top), and type the new name (above). Alternatively, double-click on the tab and type the new name.

tabbed worksheets. Rename the three blank sheets *Summary*, *Budget*, and *Expenses* (see Figure 1). The *Budget* sheet is where you will plan how much to spend for the year on new tools and equipment, and on maintenance of existing inventory. Throughout the year, you will record actual expenditures on the *Expenses* sheet. The *Summary* sheet will display subtotals from the other two sheets and compare budgeted costs with actual expenses.

### List Main Categories

The next step is to set up the categories you want to track. These will vary depending on how you run your business, but let's start with three types of purchases: general tools for daily use on site; equipment, such as generators and ladders, that will move from job to job; and tools and equipment for the company shop. You may also want to set up a fourth category to track maintenance costs for tools and equipment you already own.

Click on the *Summary* tab and type the list of categories into Column B as shown in Figure 2. The blank rows at the top of the sheet will be used for the title block, and the blank row between each category will make the worksheet easier to read.

Next, click on the *Budget* tab and enter your categories again, but this time leave plenty of blank rows between them, as shown in Figure 3. The blank rows make room for you to record individual tool or equipment purchases planned for the coming year. Formulas

	A	B
1		
2		
3		
4		
5		
6		Category
7		
8	A.	TOOLS
9		
10	B.	EQUIPMENT
11		
12	C.	SHOP TOOLS
13		
14	D.	MAINTENANCE
15		Totals
16		
17		

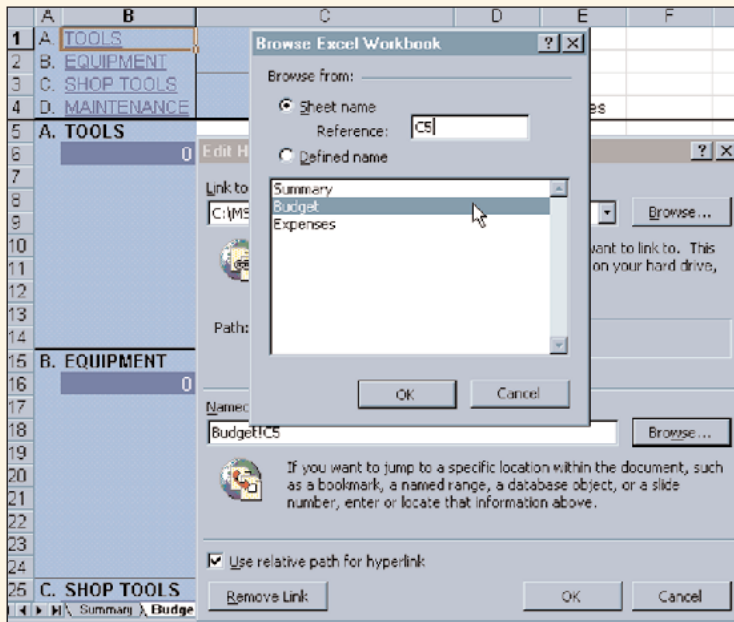
**Figure 2.** Type the list of categories into Column B, leaving a blank row between each one to make the list easier to read. Also leave blank rows at the top of the sheet to make room for a title block.

## Planning for Data

	A	B	C	D	E
1			Budget		
2					
3					
4			Description	Amount	Notes
5	A.	TOOLS			
6					
7					
8					
9					
10					
11					
12					
13					
14					
15	B.	EQUIPMENT			
16					
17					
18					
19					
20					
21					
22					
23					
24					
25	C.	SHOP TOOLS			
26					
27					

**Figure 3.** With the category headings entered in every tenth row (B5, B15, B25, and B35), there's plenty of room for itemized lists of planned purchases. Color is optional and can be added later, but it makes the worksheet easier to read.

# Making Hyperlinks



**Figure 4.** To create a hyperlink:

1. Highlight the cell you want to link.
2. From the menu, choose **Insert**, then **Hyperlink** (or press CTRL K on the keyboard) to open the hyperlink dialog.
3. Click the upper **Browse** button to find the worksheet you'd like the link to point to.
4. Click the lower **Browse** button and select the cell the link will jump to.
5. Click OK.

in selected cells on this sheet will feed data entered here to the subtotals in the *Summary* sheet.

## Add Navigation

All those extra blank rows push most of the spreadsheet off the bottom of the screen, making it cumbersome to move back and forth between categories. One solution is to create a navigation block at the top of the sheet using “hyperlinks” for each category, as shown in Figure 4. When you click on the hyperlink, you jump immediately to the corresponding category.

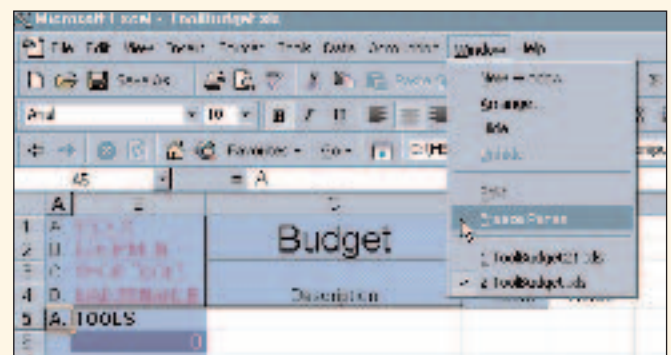
**Freeze panes.** Hyperlinks make it easy to jump to categories, such as *Maintenance*, that have scrolled off the bottom of the screen. But making the jump creates the opposite problem: When you arrive at the *Maintenance* category, all of the categories above it have now scrolled off the top of the screen.

One solution is to add hyperlinks at each category heading that will send you back to the top of the list. An easier solution, however, is to freeze the top four rows, as shown in Figure 5. Now when you jump to the bottom of the list, the navigation block — as well as the column headings — are always in plain view.

## Add Data

It's easier to troubleshoot formulas if you have some data to work with, so the next step is to fill in some of the blanks on the *Budget* sheet. Begin by listing any tools and equipment you plan to purchase in the coming year,

# Freezing Rows



**Figure 5.** When you select **Freeze Panes** from the **Window** menu, all rows above the highlighted cell are fixed in place and will not scroll with the rest of the sheet.

## Copying a Formula

A	B	C	D	E	F
1	A. TOOLS	Budget			
2	B. EQUIPMENT				
3	C. SHOP TOOLS				
4	D. MAINTENANCE				
5	A. TOOLS	Description	Qty.	Amount	Total
6		Circular saw	2	200	=D5*E5

A	B	C	D	E	F
1	A. TOOLS	Budget			
2	B. EQUIPMENT				
3	C. SHOP TOOLS				
4	D. MAINTENANCE				
5	A. TOOLS	Description	Qty.	Amount	Total
6		Circular saw	2	200	400
7		Worm drive saw	1	250	250
8		Framing nailer	1	250	250
9		Finish nailer	1	250	250
10		Recip saw	2	250	500
11		Chop saw 12"	1	400	400
12		Compound miter saw 12"	1	500	500
13					0
14					0
15	B. EQUIPMENT	Ladder, 24-foot fiberglass		200	
16		Mason's staging	6	80	
17		Compressor		300	


**Figure 6.** To copy a formula into a block of cells:

1. Highlight the cell holding the formula you want to copy (in this case, F6).
2. Press CTRL C to create a copy of the cell (or choose **Copy** from the **Edit** menu).
3. Click and drag to highlight the destination cells (F7 to F10), then press ENTER

## Using Autosum

A	B	C	D	E	F
1	A. TOOLS	Budget			
2	B. EQUIPMENT				
3	C. SHOP TOOLS				
4	D. MAINTENANCE				
5	A. TOOLS	Description	Qty.	Amount	Total
6		Circular saw	2	200	400
7		Worm drive saw	1	250	250
8		Framing nailer	1	250	250
9		Finish nailer	1	250	250
10		Recip saw	2	250	500
11		Chop saw 12"	1	400	400
12		Compound miter saw 12"	1	500	500
13					0
14					0
15	B. EQUIPMENT	Ladder, 24-foot fiberglass		200	0

**Figure 7.** To display the sum of the *Amount* column for the category A. Tools:

1. Click on the cell where you want the sum to display (B6).
2. On the toolbar, click the **Autosum** icon , which inserts the first part of the formula — =SUM() — into the cell, and changes the mouse cursor from an arrow to a plus sign.
3. Click and drag the cursor between the first and last cells you want to add, then hit ENTER.

The final formula is =SUM(F6:F15), which displays the sum of all cells between F6 and F15. (To use **Autosum** for cells that are not aligned in a row or column, hold down the CTRL key while clicking on the cells or groups of cells you want to include.)

one item per row. Add the estimated purchase price in the *Amount* column. If you're unsure of the price, take a guess — one of the advantages of planning on a spreadsheet is that you can easily make changes later.

Do the same for each of the other categories. Filling in the *Maintenance* items will probably take the most time, since it requires inspecting the tools and equipment you already own, and estimating the cost to repair or maintain them in the coming year. You don't have to complete this inventory before you continue building the spreadsheet, but it will help to have some numbers in the *Amount* column to make sure the formulas are working correctly. The spreadsheet won't be useful, of course, till all of the information it holds is up-to-date.

## Add Formulas

Although the spreadsheet seems complicated, there are only a few formulas tying it all together. Here's a step-by-step description of how to build the formulas needed on each sheet.

**Simple arithmetic.** In Excel, most formulas begin with an equals sign (=), and the simplest formulas use arithmetic "operators" (+, -, \*, /) to add, subtract, multiply, or divide the contents of two or more cells.

On the *Budget* sheet, for example, we need a formula in every cell of the *Total* column that multiplies the quantity by the dollar amount for each line item. The easiest way to do this is to create the formula in the topmost cell, then copy it into all of the other cells (Figure 6).

**Autosum.** Another simple formula used over and over on the spreadsheet is one that adds a row or column of numbers and displays the total. On the *Budget* sheet, for example, the formula appears in the cell immediately below each category heading, and displays the total budget amount for each category.

The easiest way to enter the formula is to use the *Autosum* feature (Figure 7). After building the formula in cell B6 for the Tools category, you could use *Autosum* again in cell B16 for Equipment, but again it's easier to copy it instead. Once again, the spreadsheet automatically adjusts the formula range from cells F5:F14 to F15: F24.



## Linking Worksheets

	A	B	C
1			
2			
3			
4			
5			
6			
7			
8	A. TOOLS	=	
9			
10	B. EQUIPMENT		
11			
12	C. SHOP TOOLS		
13			
14	D. MAINTENANCE		
15	Totals		
16			

	A	B
1	A. TOOLS	
2	B. EQUIPMENT	
3	C. SHOP TOOLS	
4	D. MAINTENANCE	
5	A. TOOLS	
6		
7		
8		
9		
10		
11		
12		
13		
14		

**Figure 8.** To link values from the **Budget** sheet to the **Summary** sheet:

1. Type an equal sign (=) in cell C8 of the **Summary** sheet to start the formula (left).
2. Click the tab for the **Budget** worksheet.
3. Click on cell B6, the cell that holds the budget total for the Tools category (right), and press ENTER.

**Worksheet to worksheet.** In several places in the spreadsheet, a cell in one worksheet displays a value from another worksheet. On the *Summary* worksheet, for example, values for the *Budget Amount* column are supplied by formulas linked to the *Budget* worksheet (Figure 8).

### Copy Between Worksheets

Likewise, the values in the *Actual* column come from formulas on the *Expenses* worksheet, which we've left blank till now. We could manually type the categories into this sheet, but it's easier to copy them from the *Budget* sheet, formulas and all, because that worksheet is already set up to handle itemized lists of tools and equipment.

All we really want to copy are the first two columns (Figure 9). To complete the sheet, add the labels Amount, Vendor, Invoice, Description, Manufacturer, and Model to columns C through H.

### Edit Hyperlinks and Formulas

If you now click on one of the hyperlinks on the *Expenses* sheet, you'll jump immediately

## Copying Columns

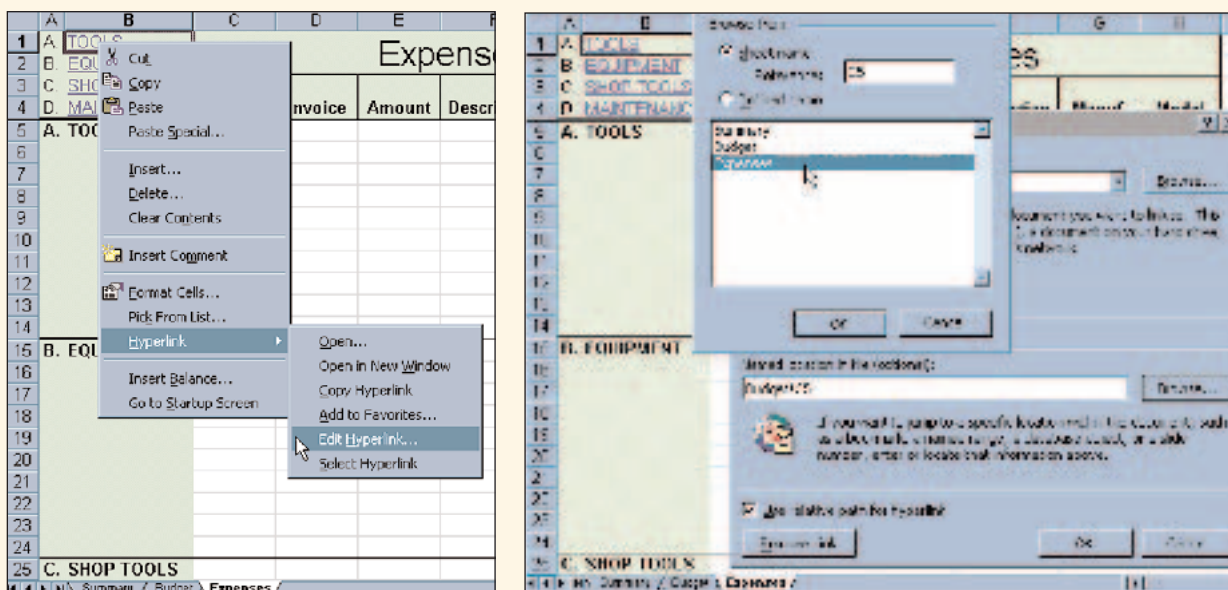
	A	B
1	A. TOOLS	
2	B. EQUIPMENT	
3	C. SHOP TOOLS	
4	D. MAINTENANCE	
5	A. TOOLS	
6		0
7		
8		
9		
10		
11		
12		
13		
14		
15	B. EQUIPMENT	
16		0
17		
18		
19		
20		
21		
22		
23		
24		
25	C. SHOP TOOLS	

**Figure 9.**

To copy entire columns, including formulas, from the **Budget** to the **Expenses** worksheet:

1. Click and drag across the letters A and B at the top of the **Budget** work area — this will highlight every cell in both columns.
2. Press CTRL C (or select **Edit**, then **Copy** from the menu bar).
3. Click on the **Expenses** worksheet tab to switch to that sheet.
4. Place the cursor in cell A1 and hit ENTER.

## Editing Hyperlinks



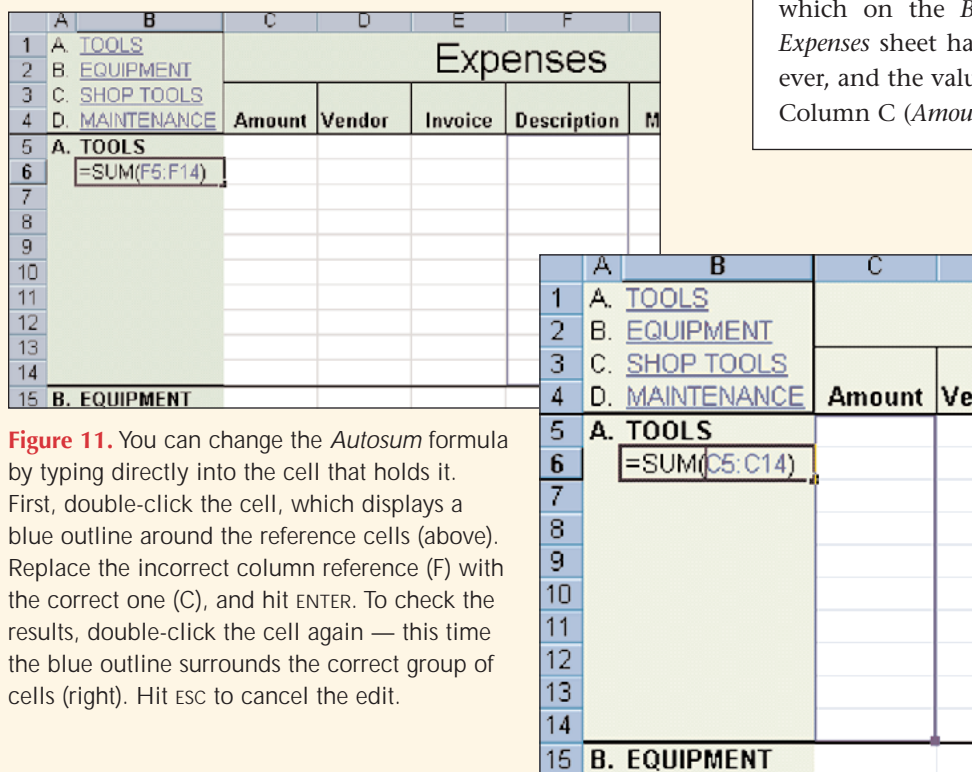
**Figure 10.** To change a hyperlink, right click on the cell containing the hyperlink formula, and select **Edit Hyperlink** from the menu (left). Click on the lower browse button, select a new “Sheet name” from the list, and type in the new cell “Reference” (right).

back to the *Budget* sheet. That’s because the copied hyperlinks still refer to cells on the sheet where they were first created.

To fix the hyperlinks, you need to change the sheet name they refer to (Figure 10). Do this four times on the *Expenses* sheet, once for each of the four category hyperlinks.

There’s also a small problem with the formulas we copied into Column B. These formulas, you’ll remember, display the value in the *Total* column, which on the *Budget* sheet is in column F. The *Expenses* sheet has different column headings, however, and the value we want to display is the total of Column C (*Amount*).

## Editing a Formula



**Figure 11.** You can change the *Autosum* formula by typing directly into the cell that holds it. First, double-click the cell, which displays a blue outline around the reference cells (above). Replace the incorrect column reference (F) with the correct one (C), and hit ENTER. To check the results, double-click the cell again — this time the blue outline surrounds the correct group of cells (right). Hit ESC to cancel the edit.

## Building a Variance Formula

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

**Figure 12.** To build a formula that calculates the difference between values in the **Budget** and **Actual** columns:

1. Click on cell G8 in the **Variance** column and type an equals sign (=) to start the formula.
2. Click on C8 in the **Budget** column.
3. Type a minus sign (-).
4. Click on E6 in the **Actual** column, and press ENTER.

Fortunately, it's easy to correct the formulas. You can either create a whole new formula using *Autosum*, or simply edit the existing formula (Figure 11).

These four cells on the *Expenses* sheet (in our example cells B6, B16, B26, and B36) are the cells you will link to fill in the values on the *Summary* sheet. To make these links, follow the process outlined earlier in Figure 8, but make sure you don't get the worksheets mixed up.

### Final Formulas

All that's left is to complete the formulas on the *Summary* sheet. First, at the bottom of the *Budget Amount* column, use *Autosum* to total cells C7 to C14. Then copy the formula to the bottom of the *Actual Amount* and *Variance* columns (E15 and G15).

**Variance column.** Finally, build a formula in the *Variance Amount* column that subtracts the *Actual Amount* from the *Budget Amount* (Figure 12). Then copy the formula into cells G10, G12, and G14.

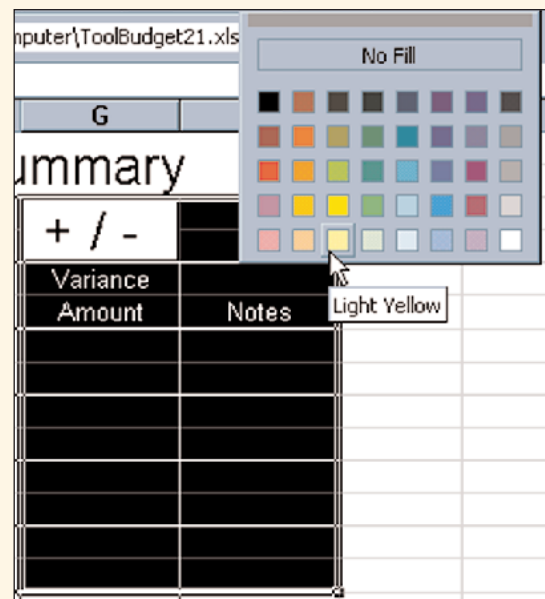
### Add Color and Formatting

With all of the formulas and hyperlinks in place, the spreadsheet is essentially complete. But adding color and changing the formatting of certain cells will make the worksheets easier to read and understand.

First, add three colors to the *Summary* worksheet to distinguish the *Budget*, *Actual*, and *Variance* columns from each other (Figure 13).

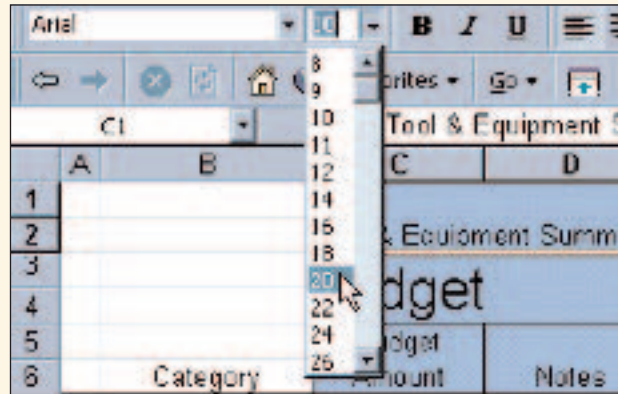
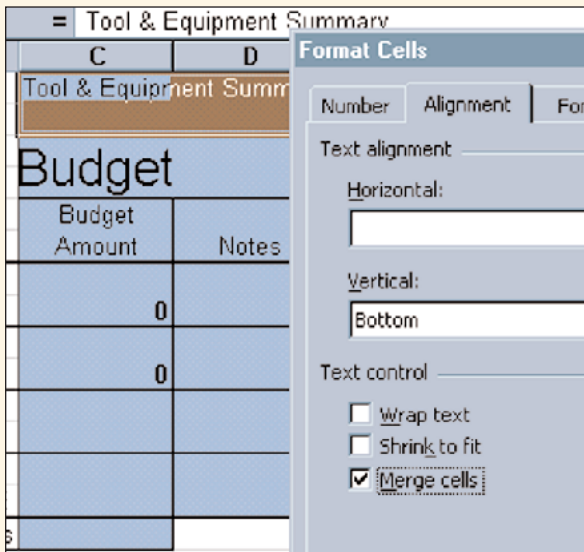
Next, to make it easier to tell the difference between the *Budget* and *Expenses* worksheets, color

## Adding Color



**Figure 13.** To change the background color, first highlight the cells you want to color, then click the color icon on the menu bar. (Alternatively, open the Format menu and click on **Cells**, then select the **Patterns** tab). When you click on the color you want from the drop-down color chart, the highlighted cells fill with that color. To remove color, select "no color" from the color chart.

## Merging Cells



**Figure 14.** You can merge several cells to create a single wider or taller cell. Highlight the cells you want to combine, then click **Format** on the menu bar. Choose **Cells** from the dropdown menu, then click the **Merge Cells** box on the **Alignment** tab (left). Now you can increase the point size of the text so the title fills the larger box (right).

one blue and the other green. To make the category subtotals stand out, use a slightly darker shade of the same color.

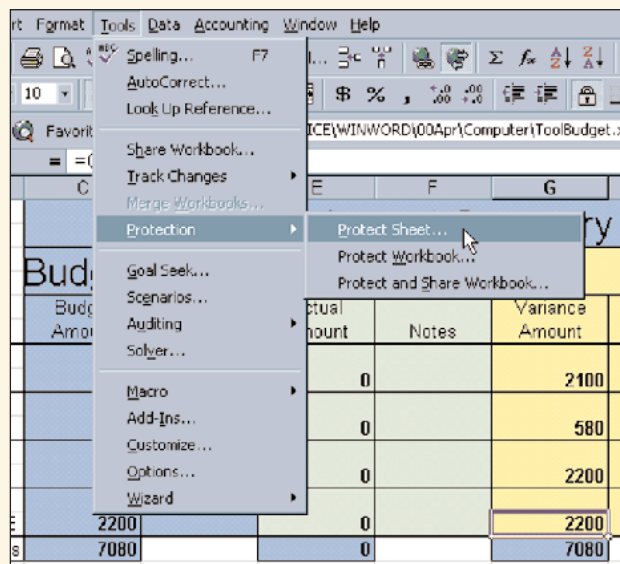
**Merge cells.** To display the worksheet titles in a larger size, first merge the group of cells that will hold the title, then change the point size of the type (Figure 14).

**Protect formulas.** The *Summary* worksheet never needs input from the keyboard, because it uses formulas to copy values from other worksheets. To prevent anyone from accidentally overwriting these formulas, you can lock or “protect” the entire worksheet (Figure 15). You can do the same to the other two worksheets, but you’ll have to “unprotect” them whenever you need to add or change the contents of a cell.



*Joe Stoddard is technology editor at the Journal of Light Construction.*

## Locking Cells



**Figure 15.** To prevent someone from accidentally overwriting important formulas, you can lock an entire worksheet. From the **Tools** menu click **Protection**, then select **Protect Sheet**. (If the sheet is already protected, the command changes to **Unprotect Sheet**, and clicking it will unlock the sheet.)