

Power Charting in Excel 2010/2016



Basic charts in Excel are so easy that "a cave man can do them," but can you build advanced charts that allow users to filter the data displayed interactively? Or build charts that change dynamically as the volume of data changes? Or combination charts on two axes? Or Pivot Charts? Can you build charts commonly used in dashboards, such as gauge charts or thermometer charts? In this two-hour session, you will learn how to build amazing charts in Excel, Word, and PowerPoint that will communicate your message much more effectively.

Introduction

Most accounting professionals quit using charts to communicate financial and operational information years ago because charting was too time consuming and too cumbersome, but the new charting engine in Microsoft Office overcomes both of those issues. Now users can build advanced charts quickly and easily that allow users to filter data interactively, and create charts that change dynamically as the volume of data changes. Plus, users can easily produce combination charts on two axes, generate advanced Pivot Charts, and build charts commonly used in dashboards, such as gauge charts or thermometer charts. In this two-hour session, you will learn how to build amazing charts to communicate your information and analyses more effectively.

Learning Objectives

Upon completing this course, participants should be able to:

- List six major types of charts produced by Microsoft Office
- Use Excel, Word, or PowerPoint to create and modify standard Office charts
- Describe the process for creating dynamic headings in Office charts
- Explain the general process for creating custom charts such as gauge or thermometer charts
- Use chart templates to simplify and facilitate creation of similar charts in the future

Overview of Charting in Microsoft Office

Microsoft Office 2013 includes fifty-three predefined chart types in ten broad categories. The following table summarizes the types and number of charts available in Excel 2013.

- | | |
|---------------------|----------------------|
| • Column – 7 | • XY – 7 |
| • Line – 7 | • Stock – 4 |
| • Pie – 5 | • Surface – 4 |
| • Bar – 6 | • Radar – 3 |
| • Area – 6 | • Combo – 4 |

Office 2016 adds an additional six predefined chart types in five categories – Treemap, Sunburst, Histogram (2), Box & Whisker, and Waterfall – bringing the total number of predefined charts to fifty-nine.

Column charts, the most common of all chart types, display data points in vertical columns. Column charts are typically used to compare discrete values and do not necessarily imply the passage of time. A bar chart is very similar to a column chart, except that a bar chart has a horizontal orientation while a column chart has a vertical orientation. Bar charts are useful when the number of values to be compared is large or when category labels are long. Cylinder, cone, and pyramid charts are grouped with column and bar charts in earlier versions of Microsoft Office.

Line charts are commonly used to plot continuous data over time. Line charts are exceptionally useful at helping to identify trends in data. A line chart assumes that all of the data points plotted are spaced evenly in time. If they are not, a line chart should be avoided. As an alternative, an XY chart will always space the data points according to their relative time position. An area chart is essentially a line chart where the area below the line has been filled. Like line charts, area charts are useful for displaying values over time.

XY charts, or scatter plots, are used to show the relationships between variables plotted on the X (horizontal) and Y (vertical) axes. The values plotted on the X-axis are considered independent of the values plotted on the Y-axis. In other words, the values plotted on the X-axis drive or cause the values plotted on the Y-axis. Importantly, there is no category axis in an XY chart. Both axes display values. Bubble charts are like XY charts but with an additional data series, which is represented by the size of the bubbles. All data series are values – there are no category axes. Bubble charts are grouped with XY charts in Microsoft Office 2013.

Pie charts are commonly used to display the relative makeup of data. They are useful for identifying proportional values or contributions to a total. For pie charts to be effective, no more than five or six data points should be used. When you have a greater number of data points, consider using a bar chart, pie of pie chart, or bar of pie chart instead. A doughnut chart is similar to a pie chart except that it can display more than one series of data. However, because each successive series of data is placed in concentric rings, it can be relatively easy to misinterpret the meaning of the chart. Given this limitation, doughnut charts are usually best utilized with only one data series. If multiple series of data are required, consider using a stacked column chart instead.

Radar charts have separate axes for each category of data. These axes extend outward from the center of the chart. Radar charts are useful for identifying relationships among data series and making comparisons of data values. With a surface chart, colors are used to distinguish *values*, not series. Surface charts can display two or more data series on a surface. They are often used to find optimum combinations between two sets of data.

Stock charts are very useful for displaying information regarding security prices, such as high, low, or closing stock prices. In addition, opening values and volume may be displayed. Stock charts may also be used to display scientific data. For example, stock charts may be useful in charting rainfall or temperatures.

Combo charts, new in Microsoft Office 2013, provide a direct means of creating combination charts. For example, an accounting or business professional may want to plot sales dollars in columns and gross margin percentage as a line on the same chart. Combo charts also allow a user to plot one or more data series on a secondary axis. This is useful when the values being charted vary widely from data series to data series or when you have mixed data types.

Choosing a Chart Type

With all of the choices available, sometimes the most difficult part of creating a chart is choosing which type is best for a given situation. A few guidelines may be helpful.

- When comparing items to other items, *column charts*, *bar charts*, and *cylinder*, *cone*, and *pyramid* charts are the best choice.
- When comparing data over time, *line charts* and *area charts* are usually superior to other options.
- To make relative comparisons of one data point to another, *pie* and *doughnut charts* are useful. *Stacked bar charts*, *stacked column charts*, *100% stacked bar charts*, and *100% stacked column charts* are also good choices.
- Causal relationships in data are often best depicted with *XY charts*. If three data values need to be plotted, use a *bubble chart* instead of an XY chart.
- If the data values vary widely among data series or you have mixed data types, a *combo chart* on multiple axes may be the best choice.

Elements of a Chart

A chart in Microsoft Office is not a single unitary object, but is a collection of elements. Each chart contains some or all of the elements listed in the following table. More importantly, ***each element can be formatted independently of every other element***. If an element needs modification or adjustment for proper display, simply click on the element to activate it and then act on the element through the Ribbon or context-sensitive menu.

Adjust the formatting, scaling, appearance, etc., as required and then move on to the next element that requires adjustment. While Office does a good job of automating the entire charting process, advanced

users can still fine-tune charts by modifying individual elements. The flexibility provided by Microsoft Office in the chart creation process allows users to create nearly any chart required.

- **Data Series** – broad categories of data plotted in a chart
- **Data Points** – individual data elements plotted in a chart
- **Category Axis** – horizontal axis
- **Category Axis Label** – labels along the category axis
- **Value Axis** – vertical axis
- **Legend** – identifies data series
- **Data Labels** – identifies data points
- **Gridlines** – used to visually extend labels from an axis
- **Chart Area** – background area of a chart
- **Plot Area** – section of a chart containing the actual plot, including the plotted data, the axes, and the axis labels
- **Walls** – used for formatting the vertical axis in 3-D charts
- **Floor** – used for formatting the horizontal axis in 3-D charts
- **Trendlines** – can be plotted against data in a chart; can also be used to display a linear regression formula
- **Error Bars** – display potential error amounts relative to each data marker in a data series
- **Chart Title** – identifies the chart

Creating a Chart

Creating a chart in Excel requires four basic steps:

1. Arranging the data in a way that makes it easy to chart.
2. Selecting an appropriate chart type.
3. Selecting a chart layout and style from the Chart Tools tab.
4. Fine-tuning the chart's look and feel on the Chart Tools Design or Format tabs, by using the context-sensitive menu, or by using the Chart Buttons or Formatting Task Pane in Office 2013.

Generally, arranging the data so that the X-axis categories are in columns, and the data series are on rows produces the best charts using the default process. If the data series are in columns, the axes can be switched with a single click. While most users instinctively highlight their data before creating a chart, that step is unnecessary unless you want to chart two or more noncontiguous data ranges. To select noncontiguous data ranges, use **CTRL + Click and Drag** to highlight the ranges.

To create the first example chart, position the cursor within the data. Press **ALT + F1** to create a chart as an object on the worksheet that contains the data and then re-position and resize the chart as desired. To resize a chart, first select the chart and then click on one or more of the eight resizing handles on its border, indicated by the rectangles in **Figure 1**, and then drag them to resize the chart.

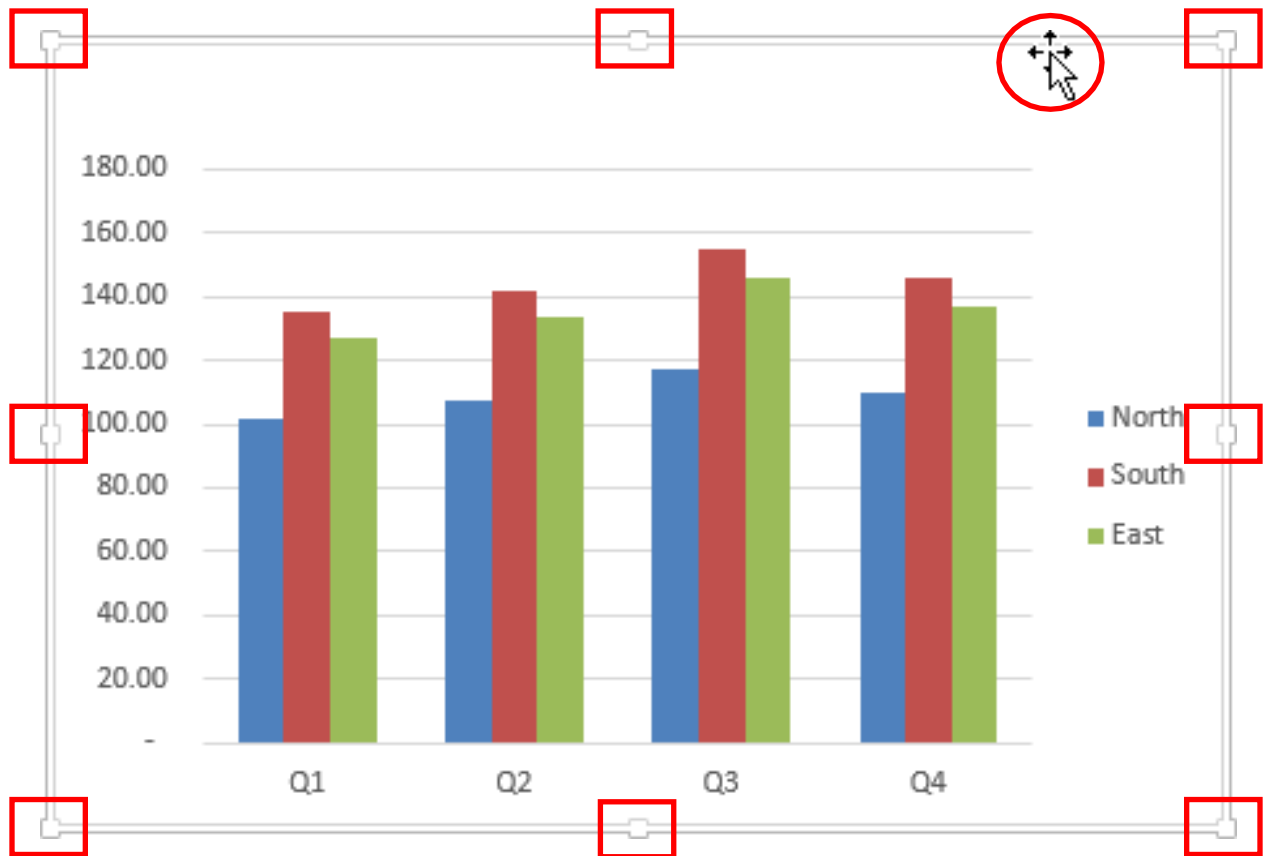


Figure 1 - Using the Chart Border to Resize and Reposition a Chart

To reposition a chart, first select the chart and then click on its border, making sure to avoid the resizing handles. The cursor will change to a compass rose, as shown in the circle in Figure 1, at which point the chart may be dragged to its desired position. After repositioning the chart, the worksheet should resemble the one in **Figure 2**.



To create a chart on a separate Chart Sheet, position the cursor within the data and press **F11**. Both one-click methods create a chart using the default chart type. To change the default chart type, click on a chart to display the **Chart Tools** tab. Select the **Chart Tools, Design** tab and then click **Change Chart Type**. In the **Change Chart Type** dialog box, select the desired default chart type, click **Set as Default Chart**, and click **OK**.

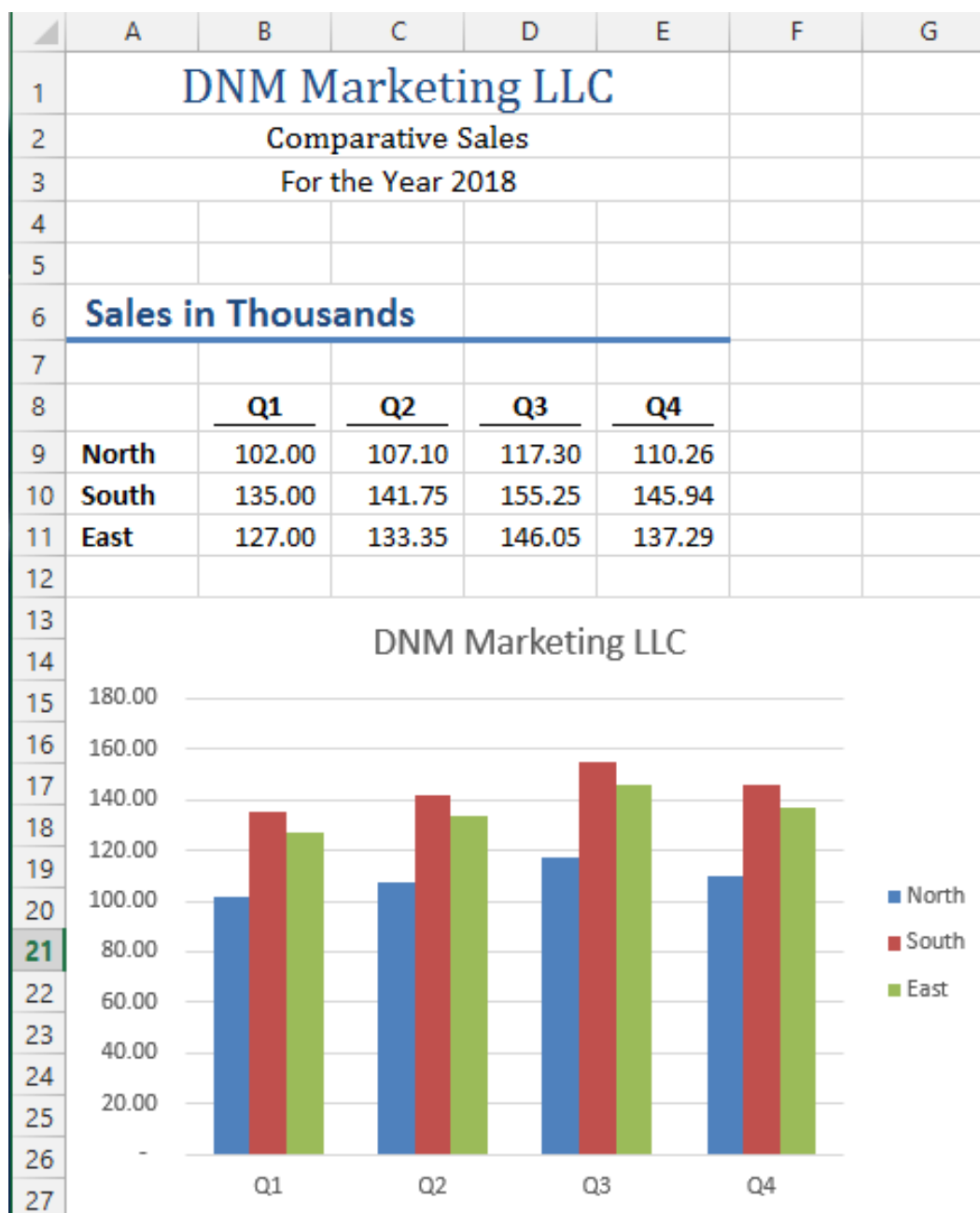


Figure 2 - Simple Column Chart Created with a Single Keystroke

Now that we have a chart, select **Change Chart Type** from the **Chart Tools, Design** contextual tab and review the various chart types available. In our example, a simple column chart is appropriate for our needs, but a chart's type can be changed at any stage of creation or use. Our chart needs a title and the Y-axis formatted, so that it displays dollar signs and zero decimal places. To choose a layout that includes a chart title, select the **Chart Tools, Design** tab. Expand the **Quick Layout** gallery and select a layout that contains a chart title and a legend on the right hand side as shown in **Figure 3**. Note that the chart layout gallery will change, depending on the type of chart selected.



Figure 3 - Selecting a Chart Layout

In the chart, click and highlight the text of the placeholder label **Chart Title** and type in **DNM Marketing LLC**. Press **ENTER** to continue on another line. Change the font to **12pt** and then enter **Sales by Division**. Click anywhere on the chart to end the edit process.

Now, let's change the number format of the quarterly sales amounts. Click anywhere on the numbers in the Y-axis area to activate the axis. A gray box will surround the area. Select the **Charts Tools, Format** contextual tab. Click **Format Selection** to open the **Format Axis** task pane. Click on **Number** in the task pane. Then, select **Currency** in the **Category** box, enter **0** decimals, and select **\$** as the symbol.

In current version of Office, users can no longer double-click on a chart element to format an element. However, the formatting process can be shortened by using the context-sensitive menu. For example, to format the vertical axis of any chart, just right-click in the vertical axis area and select **Format Axis**. Any chart element can be formatted using this shortcut process.

Now, let's make the chart more appealing by adding some visual effects. Click on the chart and select the **Chart Tools, Design** contextual tab. Expand the **Chart Styles** gallery and select one of the styles, **Style 6**. Select the **Chart Tools, Format** contextual tab, expand the **Shape Styles** gallery, and click **Colored Outline – Olive Green, Accent 3**. Next, let's change the color palette. Select **Change Colors** from the **Chart Tools, Design** tab and then click on **Color 7** to complete the chart. The completed chart is shown in **Figure 4**. The process to create a simple chart with professional results couldn't be easier or faster.

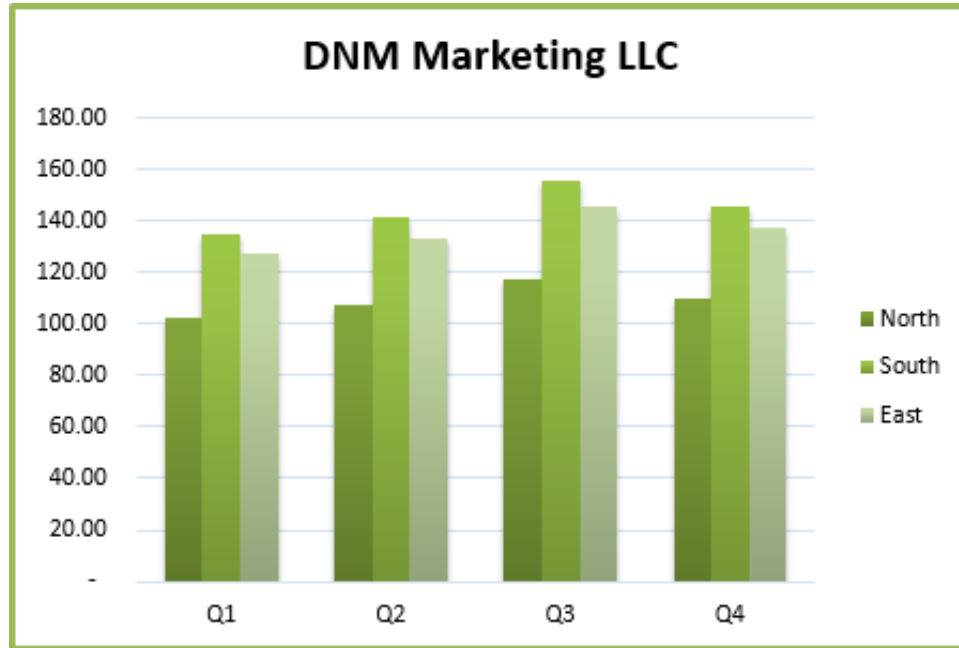


Figure 4 - Adding Advanced Visual Effects to a Simple Chart with a Few Clicks

Let's suppose that a quarter has passed, and the CFO of DNM Marketing would like to change the chart to include the latest quarter while removing the oldest quarter. First, type in the new heading (**Q1**) and data in the column immediately to the right and adjacent to the current data. Enter **112.2**, **148.4**, and **139.7** for the North, South, and East divisions, respectively. Now, click on the chart. In the source data, the legends are surrounded by a red box, the X-axis labels are surrounded by a magenta box, and the data series are surrounded by a blue box. Click and drag the blue box in the lower right-hand corner of the data series area one cell to the right so that the new quarter is now inside the box. Similarly, click and drag the blue box in the lower left-hand corner of the data series area one cell to the right so that the original first quarter data is not included in the data series box, as shown in **Figure 5**. Notice how the chart immediately changes to reflect the new data range.

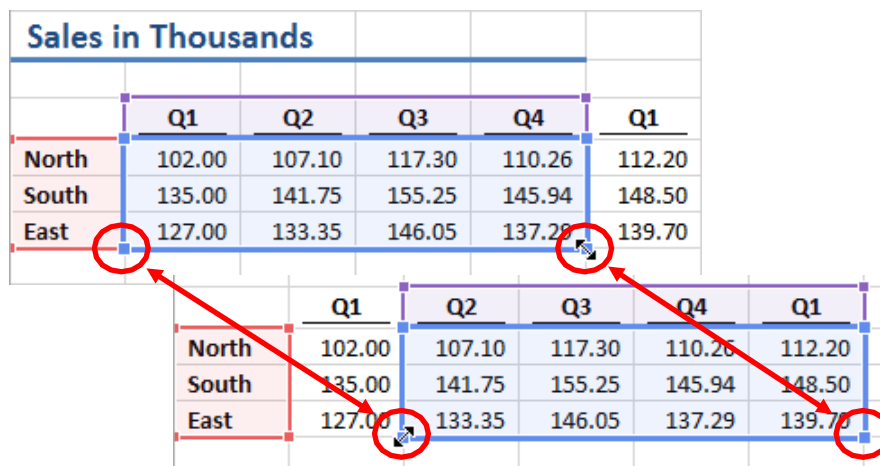


Figure 5 - Adding Data and Adjusting the Data Range of an Existing Chart

Manipulating Axes

The next example is designed to demonstrate the ease with which users can switch axes and delete unwanted data series in a chart. Position the cursor in the chart data and press **ALT + F1** to create the initial chart. Resize and reposition the chart as desired. Change the chart layout so that the chart includes a chart title and a legend on the right. Note that the chart displays quarters as the legend elements and the product groups as the X-axis elements. Switch the axes so that the product groups become the legend elements, and the quarters become the X-axis elements. Click on the chart and select the **Chart Tools, Design** contextual tab. Then, click on **Switch Row/Column** in the **Data** group. The chart now displays quarters as the X-axis elements. Debbie, the owner of DNM Marketing, wants a chart to help her understand whether the new lotion line is cannibalizing the old crème line. Click on the chart columns for Mask, Astringent, and Scrub, in turn, and press **DELETE** to delete these three data series from the chart.

Combination Chart on Two Axes

The next example uses a combination line and column chart on two axes to display quarterly sales dollars and gross margin percentage. Position the cursor in the data and press **ALT + F1** to create the initial chart. Select the **Chart Tools, Design** tab and choose **Change Chart Type**. Select a simple line chart – **Line** – and click **OK**.

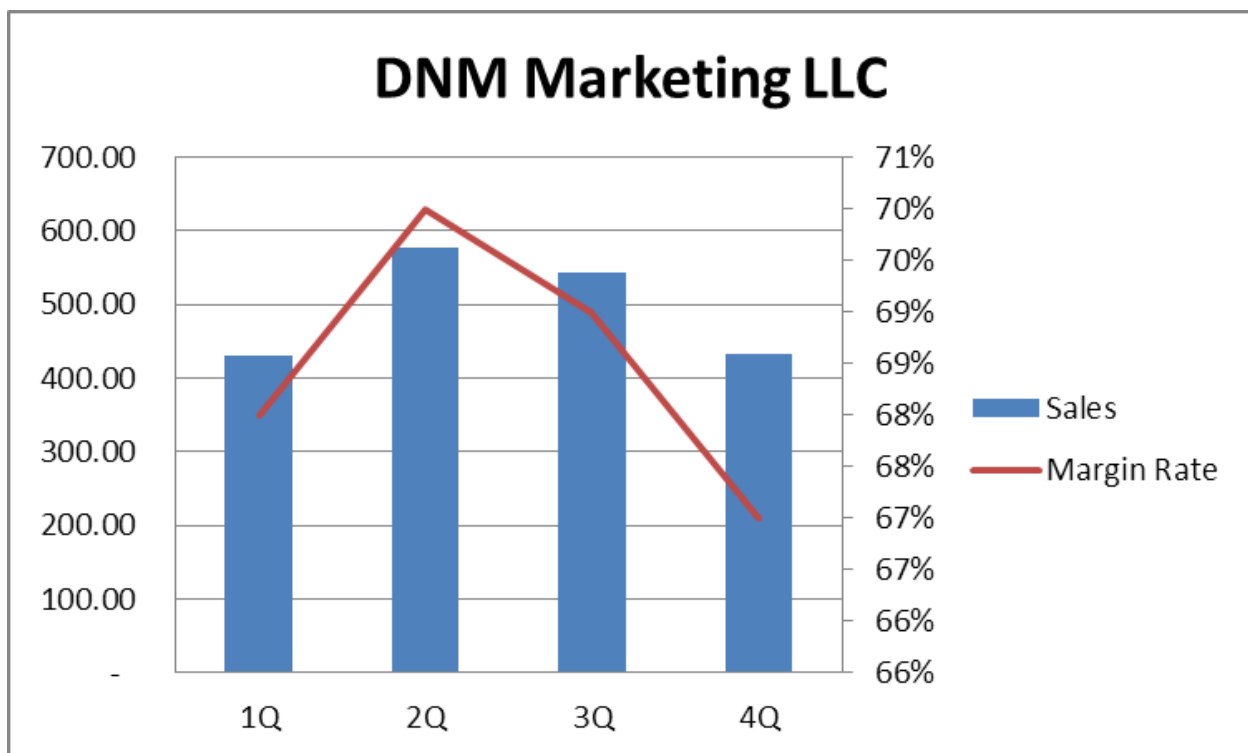


Figure 6 - Partially Completed Line and Area Chart on Two Axes

Immediately, you can see that the gross Margin Rate is hugging the X-axis because of the scale difference with sales dollars. The gross Margin Rate needs to be put on a Y-axis of its own. Click on the line to activate the data series and then right-click and choose **Format Data Series**. Select **Series Options** in the Navigation

Pane on the left and then click **Secondary Axis** in the Series Options pane on the right. Click **Close**. The new axis formatted as percentages appears on the right.

For better impact, sales dollars should to be plotted as a column chart. Click on the Sales chart line. From the **Chart Tools, Design** tab, choose **Change Chart Type**. Select a simple two-dimensional **Clustered Column** chart and click **OK**. Immediately, the sales distribution will be displayed as columns. The partially completed chart is shown in **Figure 6**. In Excel 2013, users can create a Combo Chart on two axes directly from the ribbon.

Choose a combination of chart layouts, chart styles, and themes to add the visual effects necessary to communicate your message effectively.



All of our charting examples have started by creating charts on the face of the worksheet where the chart data resided. To create a chart on a new Chart Sheet, position the cursor in the data and press **F11**. To move an existing chart from a worksheet to a chart sheet or from a chart sheet to an existing worksheet, right-click on the chart and choose **Move Chart** from the context-sensitive menu.

Adding Analytic Elements

Excel offers four chart elements for analysis – trend lines, error bars, drop lines, and up/down bars. These elements are briefly defined as follows.

- **Trend lines** – Statistical trends fitted to data using least squares regression
- **Error bars** – Used to show the standard error of an estimate
- **Drop lines** – Vertical lines from data points to the x-axis so that users can ascertain the exact location of the data point on the x-axis
- **Up/down bars** – Boxes drawn between two data series at each x-axis interval on a line chart to highlight differences

In the next example, company managers are trying to evaluate whether a large special order will be completed on time given current production levels. The data consists of three columns – production week, planned production, and actual production. A trend line will be used to evaluate the viability of the production plan. Position the cursor in the data and press **ALT + F1** to create the initial chart. Select the **Chart Tools, Design** tab and choose **Change Chart Type**. Select a simple line chart without markers and click **OK**.

Our chart needs a title and a Y-axis label. Select the **Chart Tools, Design** tab. Expand the **Chart Layout** gallery and select a layout that contains a chart title, Y-axis label, and a legend on the right hand side, such as **Layout 1**. Select and type in the chart title, **Special Order 12-934A projected shortfall over current production schedule** and the Y-axis label, **Total Metric Tons Produced**. An easy way to enter titles and labels is to click on the appropriate placeholder and then click and type the text in the **Formula Bar**. Press

ENTER to see the results. Next, add an X-axis label. From the **Chart Tools, Layout** tab, select **Axis Titles, Primary Horizontal Axis Title, Title Below Axis** and then enter the X-axis label, **Production Week**. In Office 2013, click the **Add Chart Elements** button to add the axis title. T

Now, let's fine-tune the formatting of the X-axis, add markers to the actual production line, and add a trend line that projects current production levels over the twenty-six week production schedule. First, click in the X-axis area and then right-click and select **Format Axis**. In the Navigation Pane, choose **Axis Options**. In the pane on the right, select Interval between labels **Specify interval unit** and enter **2**. Then, select Position Axis **On tick marks** and click **Close** to complete the modification of the X-axis. Now, click on the **Actual** production line. Right-click and select **Format Data Series**. In the Navigation Pane, choose **Marker Options**. In the pane on the right, select Marker Type **Built-in**, Type **Square**, and Size **4** and click **Close** to complete the modification of the actual production line. Next, add a trend line to project actual production. Click on the actual production line and then right-click and select **Add Trendline**. In the Navigation Pane, choose **Trendline Options**. In the pane on the right, select **Custom** in the **Trendline Name** section and enter **Projected**. In the Navigation Pane, choose **Line Style**. In the pane on the right, select Width **2 pt** and then Dash type **Square Dots**. Click **Close** to complete the chart as shown in **Figure 7**.

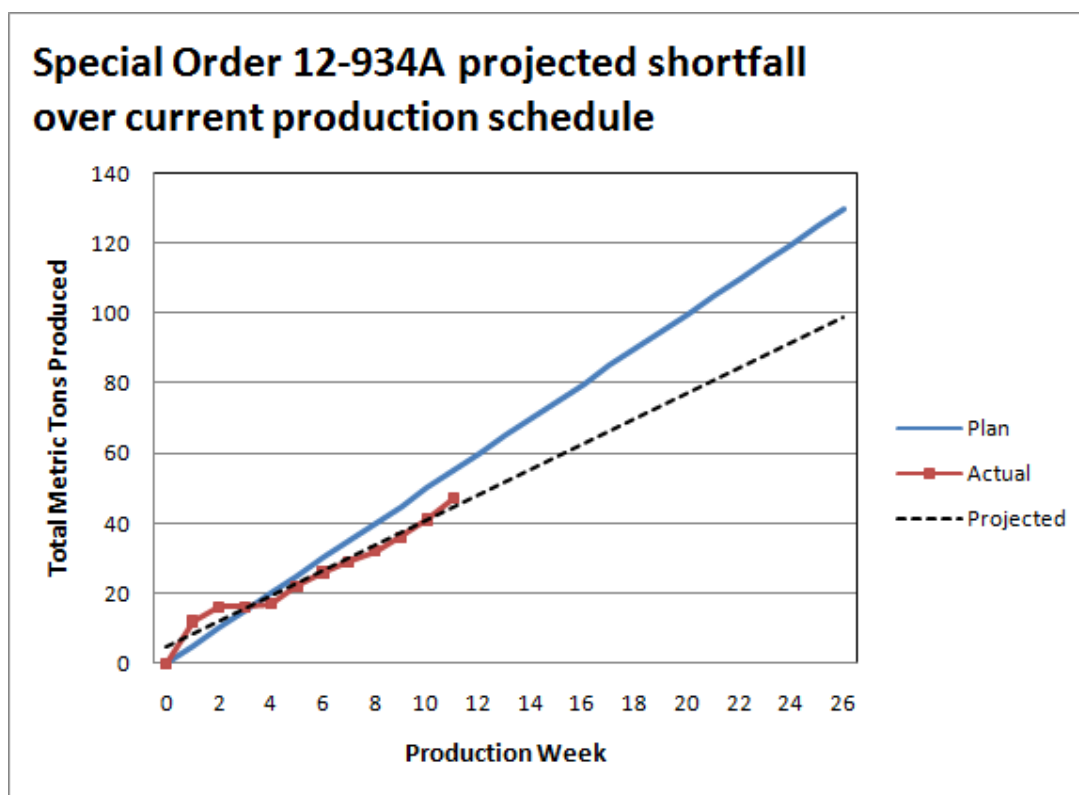


Figure 7 - Completed Line Chart with Projection Trend Line

With the projected production trend line in place, it is easy to see that production will fall short about 30 metric tons over the current production schedule. The chart not only provides the analysis required for understanding the production problem facing the company but also effectively communicates the need for action.

Communicating More Effectively with Charts

Communicating effectively with charts requires a strategy. Before creating a chart, take time to determine what is to be communicated by the chart and what type of chart will be most effective at communicating the message. If possible, include the message in the title of the chart. For example, compare the two charts in **Figure 8**. Note how the top chart is much more effective at communicating the message than the bottom chart because the message is in the title.

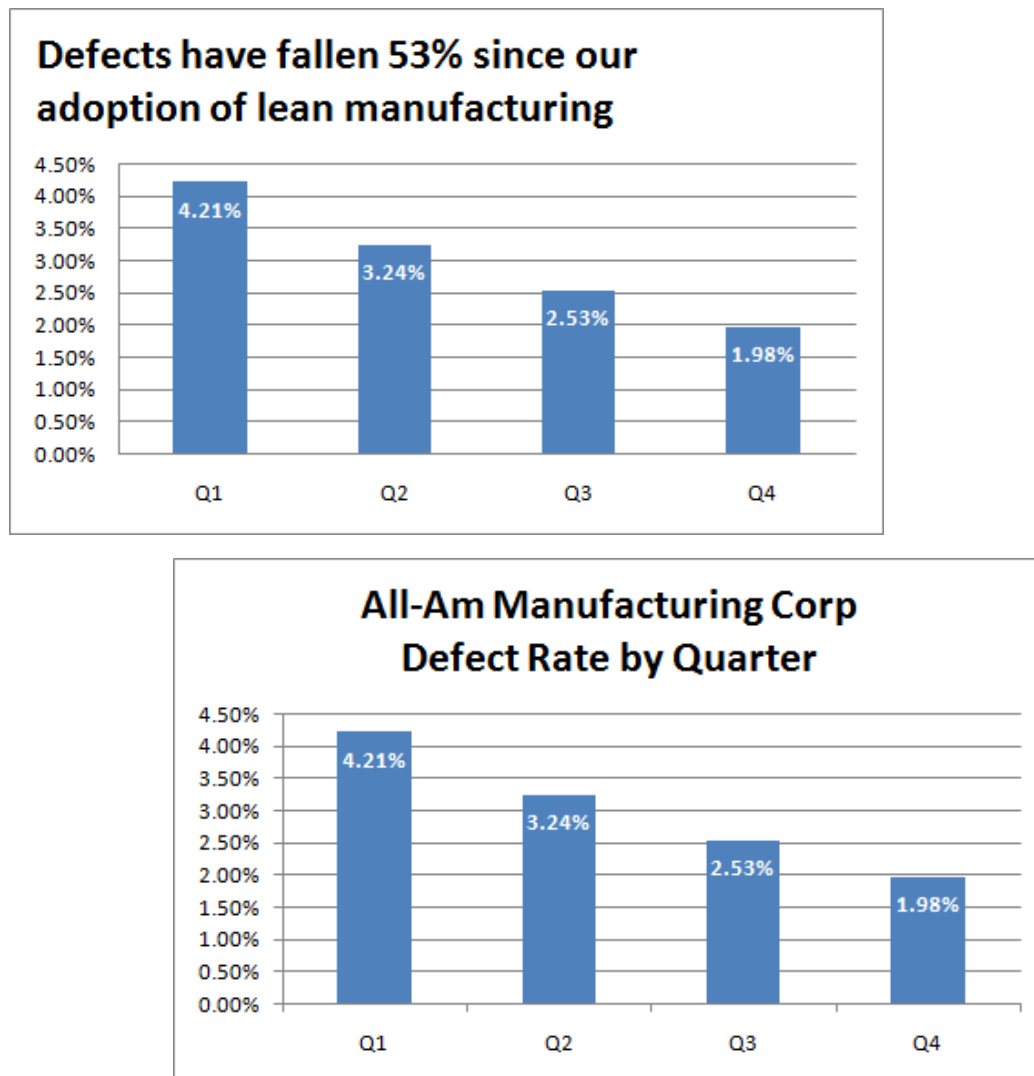


Figure 8 - Putting the Message in the Title of the Chart

Alternatively, annotate the chart with text boxes and arrows so that the message is clearly communicated as shown in **Figure 9**. When charts communicate intended messages clearly and effectively, productivity and decision quality improve. Productivity is improved because staff time is not wasted in preparing or delivering explanations of charts. Decision quality is improved because the intended message is communicated effectively, thereby reducing user misunderstanding and poor decisions that could result from that misunderstanding.

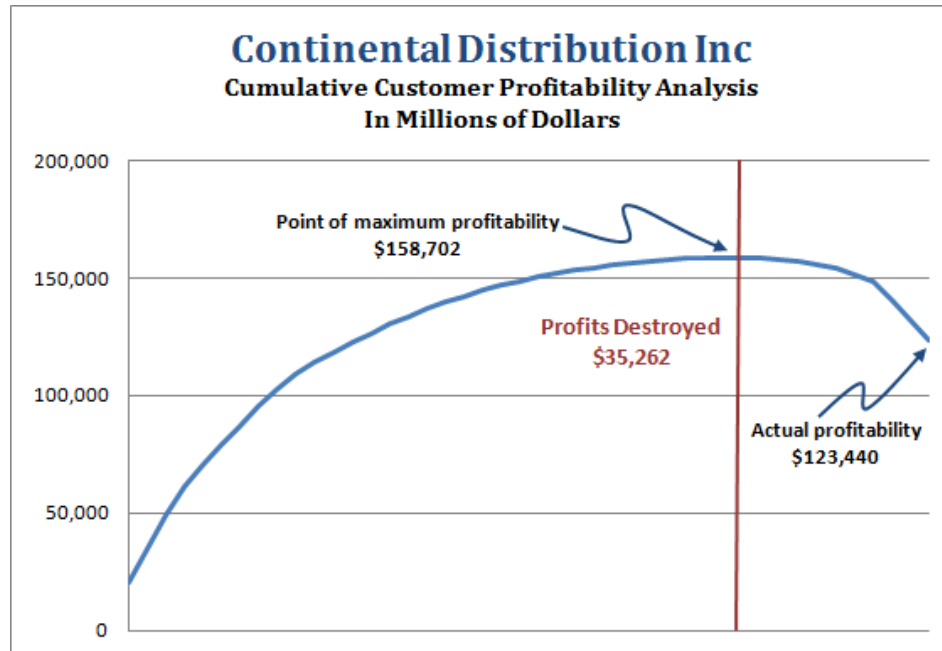


Figure 9 - Using Text Boxes and Arrows to Create Self-Explaining Charts

Another technique for communicating information effectively with charts is to highlight points of interest by using contrasting colors. For example, net income may have dipped precipitously in the third quarter when fuel costs had risen for several months. To draw attention to this anomaly, use a contrasting color for presentation of third quarter net income results as shown in **Figure 10**.

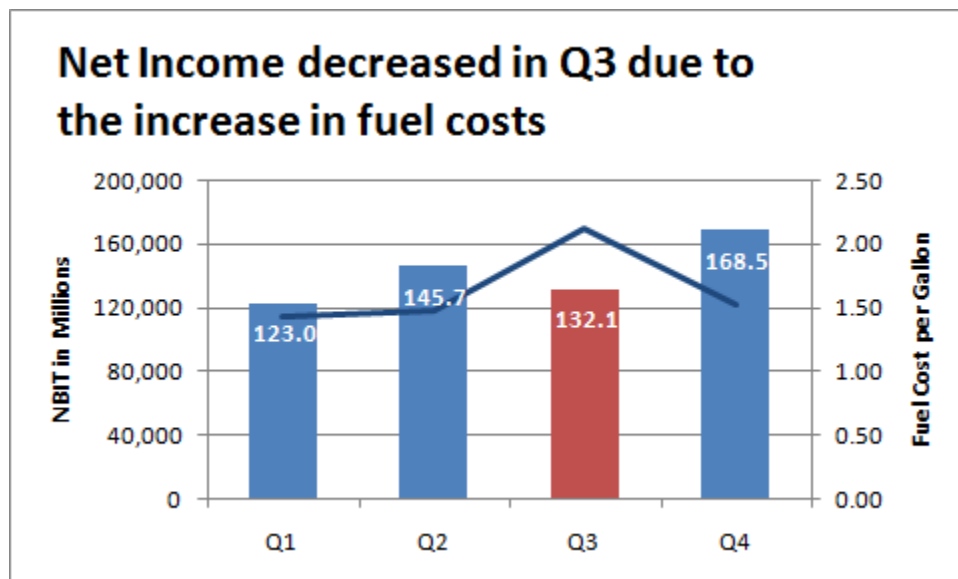


Figure 10 - Using Contrasting Colors to Highlight Data of Interest