How to build trend charts

From time to time I have published trend charts examining a variety of factors such as logic wafer cost versus node, wafer cost versus wafer fab capacity, wafer cost versus country, etc. I thought it would be useful to describe the method I use to generate these charts so that users can generate their own charts with their own assumptions.

The key to a valid trend chart is to insure you are only varying one parameter at a time. Because I generate these types of charts on a regular basis I have set up the Strategic Cost and Price Model to make this easy to do.

The following is a detailed description of how I would set up the model for a 40,000 wafers per month fab in Taiwan running various TSMC nodes to look at wafer cost versus node:

1. Go to the first "User" row on the 'Fabs' tab (currently row 102).
2. Column B is optional, it is just a display value, it doesn't drive anything.
3. In column C enter a name for the fab, for example I might enter "Scott" (cell C102 for the current model).
4. In column D select a country (cell D102 for the current model).
5. Column E is optional, it is just a display value, it doesn't drive anything.
6. Column F is only used when a company is known to have a built a large cleanroom that they fill with equipment over time, it isn't relevant in this example and should be left blank.
7. In column G select a date the fa came on-line, I always select one quarter before the current quarter so the fab is always a new fab that is still depreciating. For the current model in cell G102 I would select 2019-Q1.
8. In column H select a TSMC process, in this case I will start the series with 130nm so I would select "TSMC - FND - 130nm – NA" (cell H102 in the current model).
9. In column I enter a capacity for the fab, in this case I will use 40,000 wafers a month because that is a typical logic fab size but you can use any size you want (cell I102 in the current model).
10. In column J select "300mm" for the wafer size (cell J102 in the current model).
11. You have now defined a Fab.
12. Go to the 'Main Selection' sheet and select the current quarter in cell C6 (2019-Q2 in my example).
13. In cell D8 select the fab you just defined, "User 1 - NA – Scott" in my example.
14. Go back to the 'Fabs' tab and in the current model the manufacturing cost for the wafer is displayed in cell D113. That is the value for 130nm, write it down.
15. No go back to cell H102 on the 'Fabs' sheet and select "TSMC - FND - 90nm – NA". Go back to cell D113 and write down the cost for 90nm.
16. Continue going to cell H102 and indexing the node and cell D113 for the cost. By repeating this you can step through all the different TSMC nodes.

You can use this same procedure for other companies and node.

If you want to look at cost versus fab size you define a custom fab with a small capacity and then keep increasing the capacity in cell I102 and looking at the new cost in cell D113.

If you want to look at cost versus country define a custom fab with a specific country selected in cell D102, look up the cost in cell D113 and then change the country in cell D102.