8401-0011
Wireless Sensor Networks Technical Note
LORD Corporation, MicroStrain Sensing Systems

Calculating a Linear Slope with Microsoft Excel®

Overview
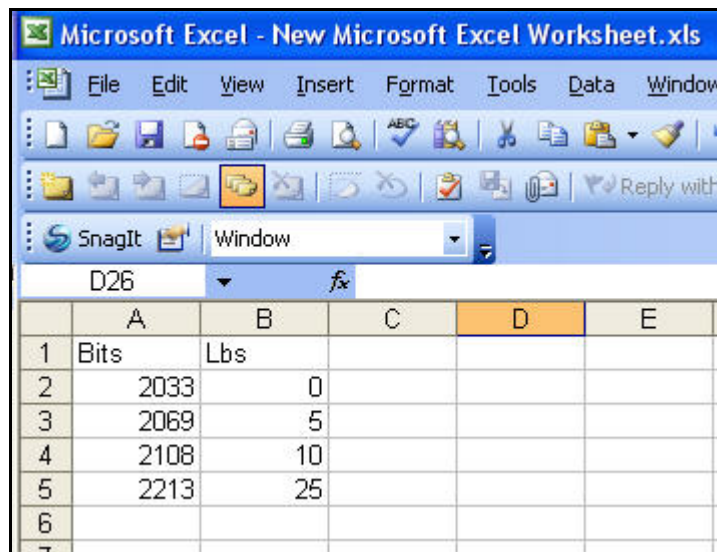When using the MicroStrain V-Link®-LXRS™ 8 Channel Wireless Analog Sensor Node and SG-Link®-LXRS™ 3 Channel Wireless Analog Sensor Node with sensors such as load cells, it may be necessary to calculate a linear slope by combining many observed readings over the output range of the load cell. The slope provides the formula for converting the nodes' raw bits output into engineering units. This technical note presents a step-by-step method for calculating a linear slope in the Microsoft Excel® spreadsheet.

Basis
This technical note targets the spreadsheet work itself. It is suggested that you first read our technical note entitled Using a Load Cell with V-Link®-LXRS™ to understand the basis for this technical note and how to apply its results.

Method
- Open a blank spreadsheet.
- Enter the observed raw bits and the loads as shown in Figure 1.

Figure 1: *Enter bits vs. load*

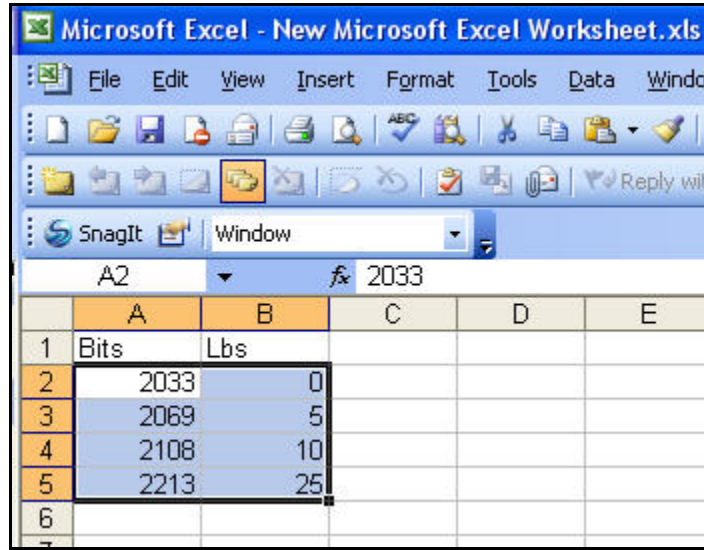- Highlight the data points as shown in Figure 2.

Figure 2: *Highlight data points*

- Click Insert and a drop-down menu will appear.
- Click Chart and the Chart Wizard will appear as shown in Figure 3.
- Click XY (Scatter).
- Click Scatter with data points connected by smoothed Lines without markers.
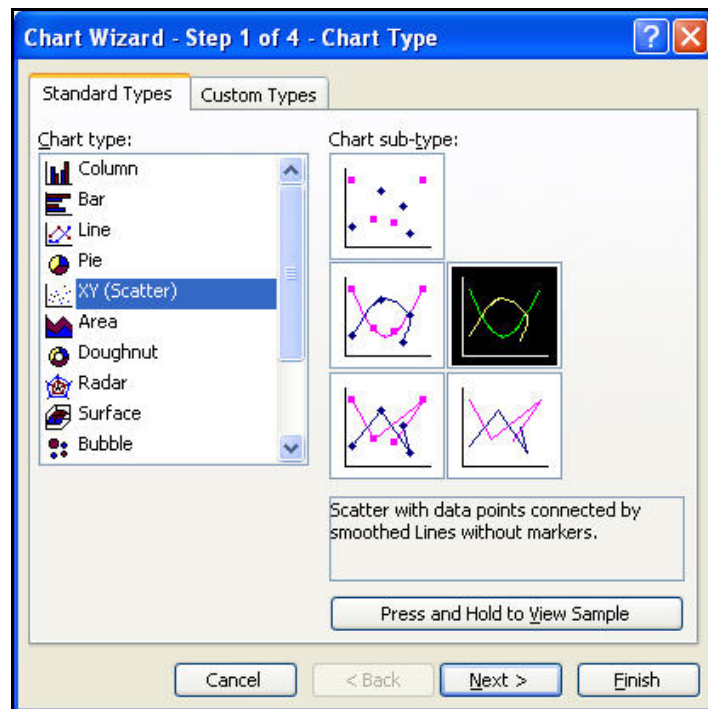

Figure 3: *Chart Wizard*

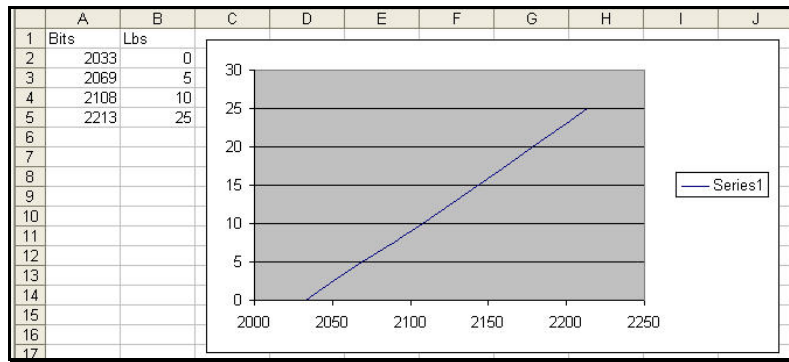- Click Finish and a plotted chart will appear as shown in Figure 4.

Figure 4: Plotted chart

- Right-click on the blue slope line and a drop-down menu will appear as shown in Figure 5.
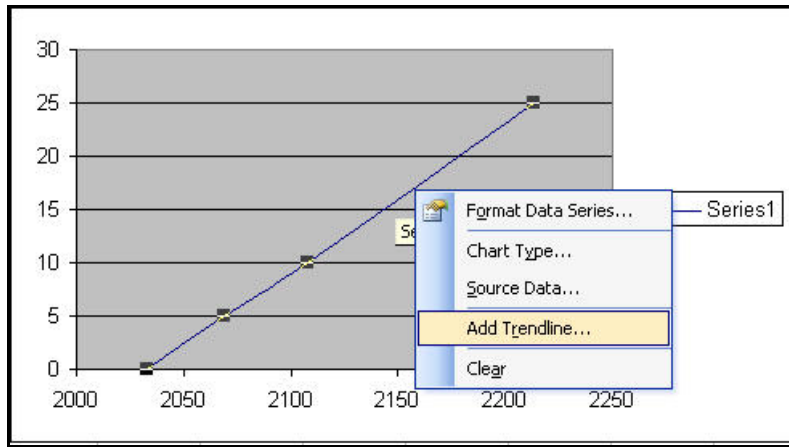

Figure 5: Slope

- Click Add Trendline and the Add Trendline window will appear as shown in Figure 6.
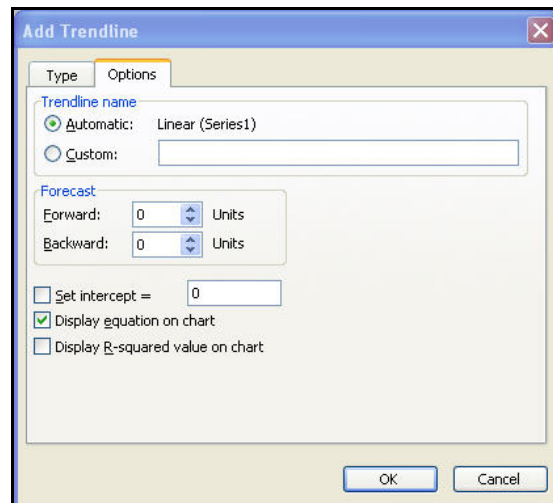

Figure 6: Add Trendline

- Click the Options Tab.
- Check the Display equation on chart checkbox.
- Click OK, the Add Trendline window will disappear, and the $y = mx + b$ equation will appear in the graphing area as shown in Figure 7.
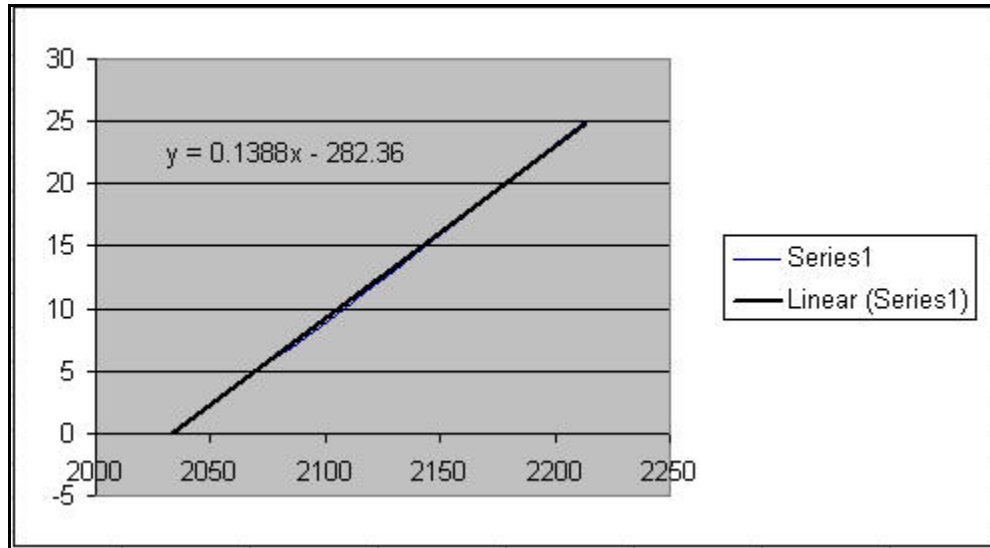

Figure 7: y = mx + b Equation

- In our example, we see y = 0.1388x – 282.36
  - Where y = Lbs
  - Where 0.1388 is the Gain
  - Where x = Bits
  - Where -282.36 is the Offset