

One-Minute Spotlight

THE CRYSTAL BALL SCATTER CHART

Once you have run a simulation with Oracle's Crystal Ball, you can view several charts to help you visualize, understand, and communicate the simulation results. This Spotlight uses Crystal Ball and a simple spreadsheet (shown below) to demonstrate how you use a scatter chart.

The screenshot shows the Oracle Crystal Ball interface for a simulation titled "Simulation with Design of Experiments". The response variable is "Length", with a target value of 63.0 and specification limits of 59.0 (LSL) and 67.0 (USL). The simulation results show a mean of 63.77 and a standard deviation of 1.36. The transfer function is $Length = 0.05755 * MoldTemp + 0.09025 * CycleTime + 0.4565 * HoldPres + -0.0002825 * MoldTemp * CycleTime + -9.18$. The results from Minitab show estimated coefficients for Length using data in uncoded units.

Factor	Name	Actual Value	Nominal Value	Std Dev	Dist.
1	MoldTemp	155	155	10	Normal
2	CycleTime	100	100	5	Normal
3	HoldPres	130	130	3	Normal

Forecast Name	Part Length
Trials	1000.00
Mean	63.77
Standard Deviat	1.36
Cp	0.98
Cpk-lower	1.17
Cpk-upper	0.79
Cpk	0.79
Cpm	0.86
Z-LSL	3.51
Z-USL	2.38
Zst-total	2.37
Zlt	0.87
p(N/C)-below	0.00
p(N/C)-above	0.01
p(N/C)-total	0.01
PPM-below	223.83
PPM-above	8600.18
PPM-total	8824.02
LSL	59.00
USL	67.00

Response: Length = 63.732

Transfer Function:
 $Length = 0.05755 * MoldTemp + 0.09025 * CycleTime + 0.4565 * HoldPres + -0.0002825 * MoldTemp * CycleTime + -9.18$

Results from Minitab [Go to results sheet](#)
(Estimated Coefficients for Length using data in uncoded units)

Term	Coefficient
Constant	-9.18
MoldTemp	0.05755
CycleTime	0.09025
HoldPres	0.4565
MoldTemp*CycleTime	-2.83E-04

This example model demonstrates the application of combining simulation with a designed experiment. The model uses the results from a designed experiment to simulate the variability in the part length (the response, or transfer function from the designed experiment) based on variability in each of three factors.

The three factors are defined as assumptions with appropriate normal probability distributions, and simulation of the model results in a distribution of the response and the likelihood of defective parts (those with lengths that are out of spec).

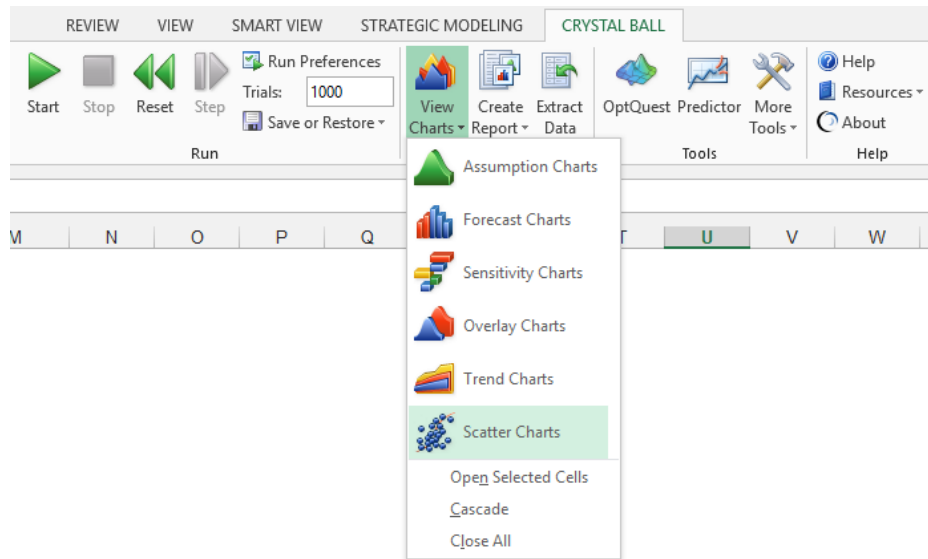
ORACLE

The Scatter Chart, continued

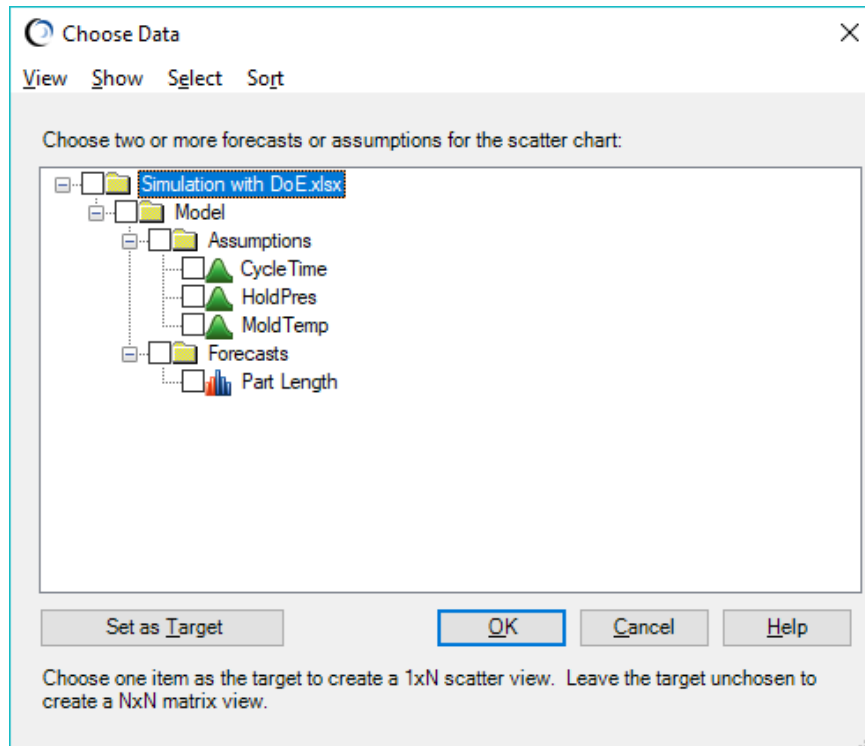
CREATING THE SCATTER CHART

Once you have run a simulation, you can use scatter charts to help you understand relationships among the three input factors. Scatter charts show correlations and other relationships between pairs of forecasts and assumptions plotted against each other.

To create a scatter chart, select the Scatter Charts option from the Analyze menu on the control panel, or select the Scatter Charts command on the Crystal Ball ribbon:



After the dialog appears, click New to create a new scatter chart.

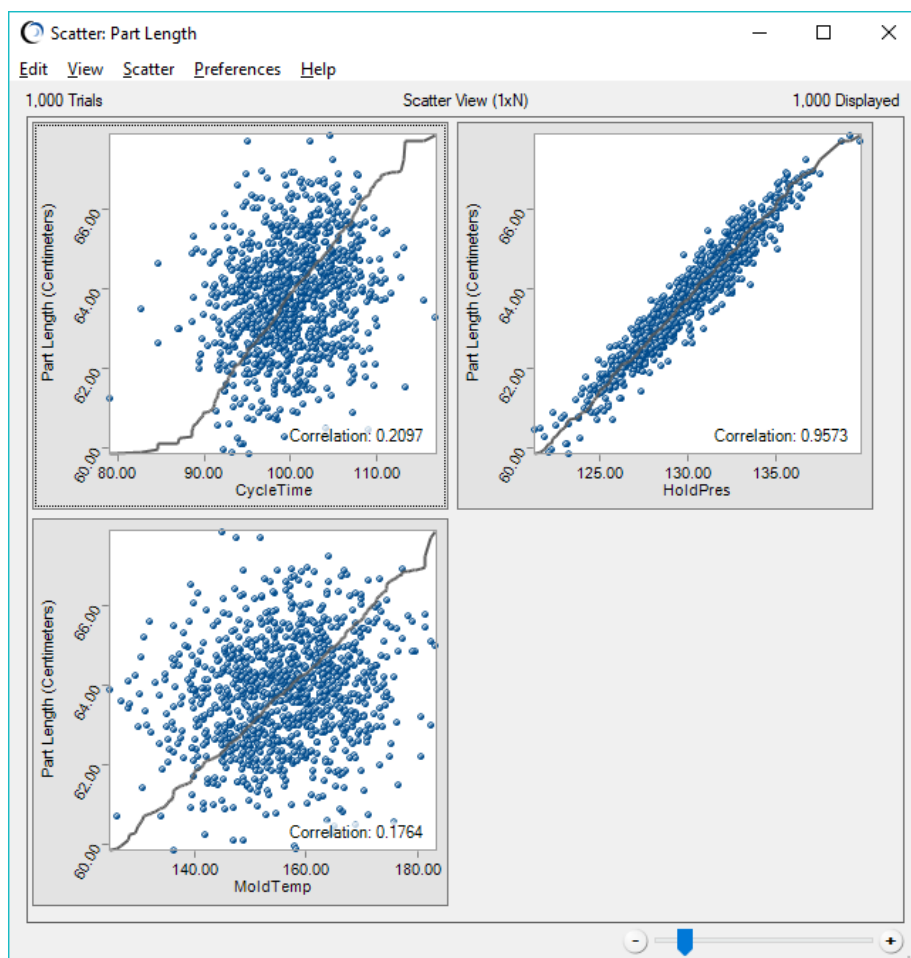


The Scatter Chart, continued

The picker dialog shows a tree view of all the assumptions and forecasts in your model. Select the Part Length forecast and click on Set as Target (you have the option to select an assumption as a target as well). Then select the other assumptions (or you could select any other forecasts if they existed) that you wish to see in the scatter chart for Part Length. Click on OK.

INTERPRETING THE SCATTER CHART

In its basic form, a scatter chart contains one or more plots of a target variable mapped against a set of secondary variables. Each plot appears as a cloud of points or symbols aligned in a grid within the scatter chart window. In this example, you can view each of the three inputs mapped against the Part Length forecast. The HoldPres assumption has a strong positive correlation (0.9573) with Part Length, a relationship verified by the sensitivity chart.



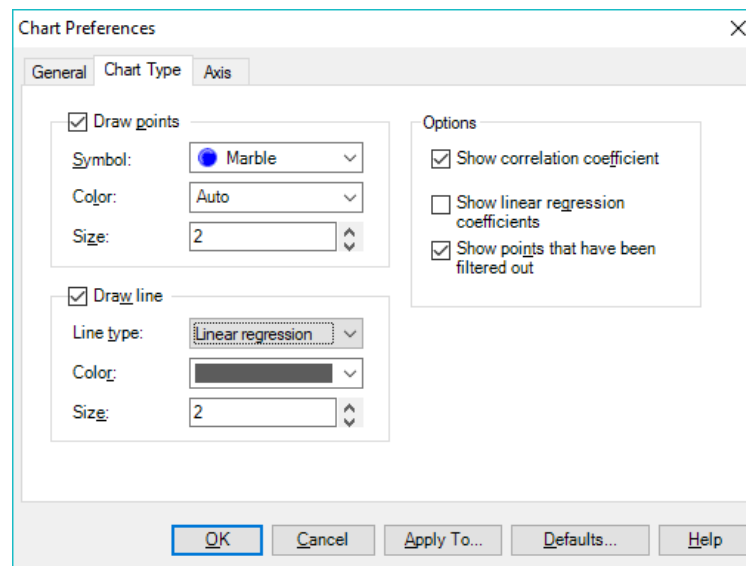
The line in each graph shows where the pairwise points would appear if they were sorted in ascending order. The closer the points conform to the line, the closer the relationship among the plotted variables. Lines sloped from the lower left to the upper right show positive relationships. If the relationship is negative, the line slopes from the upper left to the lower right.

The Scatter Chart, continued

FORMATTING THE SCATTER CHART

You can use the Plot Sizer at the lower right to increase or decrease the size of all plots and the amount of detail shown within them. You also have several options for chart and scatter preferences.

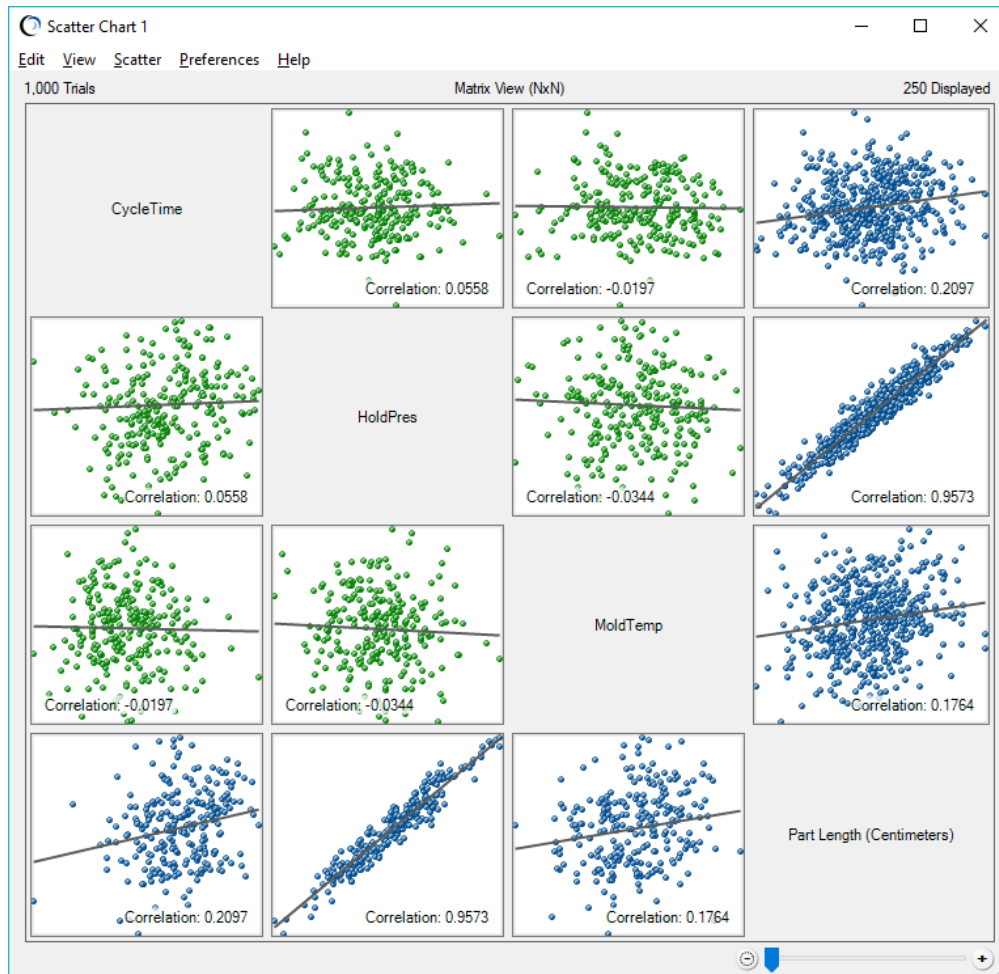
Under Preferences > Chart, you can change the appearance of the title, axes, points, line, and more. The default is the Ordered Fit line shown above, but you can change the line to change it to a Linear Regression line, which uses a least-squares technique to show the linear relationship of the points.



SELECTING THE MATRIX VIEW

Under Preferences > Scatter, you can also change from Scatter View to a Matrix View. In the Matrix view, each selected variable is plotted against every other selected variable to show the relationships among them, including the intercorrelations among the three inputs.

The Scatter Chart, continued



For more information or to contact us, browse to <http://www.oracle.com/technetwork/middleware/crystalball/overview/index.html>.